New Entries to IPNI Library as References

[1] J. Hawksworth, H. Audino, R. Clarry, Secondary J. Hawksworth, H. Audino, R. Clarry. 2017. The Long View: How will the global economic order change by 2050? Page 1 - 72.
Reference ID: 23486
Note: H 8.1.1.5 #23486e
Abstract: After a year of major political shocks with the Brexit vote and the election of President Trump, it might seem brave to opine on economic prospects for 2017, let alone 2050. However, I still think it is important to take a longer term view of global economic prospects that looks beyond the short-term ups and downs of the economic and political cycle, which are indeed very difficult to forecast. Instead our approach in this report, based on a rigorous modelling approach, focuses on the fundamental drivers of growth: demographics and productivity, which in turn is driven by technological progress and diffused through international trade and investment. Such forces saw America progress through the 19th and early 20th centuries to become the largest economy in the world despite a civil war, various other conflicts with foreign powers, three presidential assassinations, and numerous economic and financial crises. These forces also helped global economic growth to bounce back strongly from two world wars and a Great Depression to reach record levels in the post-war decades. Looking ahead, we think they will see emerging economies come to dominate the 21st century. By 2050 we project China will be the largest economy in the world by a significant margin, while India could have edged past the US into second place and Indonesia have risen to fourth place. The EU27's share of global GDP could have fallen to below 10%. We also think the world economy will more than double in size between now and 2050, far outstripping population growth. I think this kind of long-term view, looking beyond short-term economic and political cycles, is particularly useful for policymakers and businesses in areas like pensions, healthcare, energy and climate change, transport, housing and other types of infrastructure investment.

[2] A.-A.F. De Almeida, R.R. Valle. 2010. Cacao: Ecophysiology of growth and production. Page 37 - 70.
Reference ID: 23487
Note: H 8.1.4 #23487 > S 8.1 #23367
Abstract: Cacao (*Theobroma cacao* L.), one of the world's most important perennial crops, is almost exclusively explored for chocolate manufacturing. Most cacao varieties belong to three groups: Criollo, Forastero and Trinitario that vary according to morphology, genetic and geographical origins. Cacao is cropped under the shade of forest trees or as an unshaded monocrop. Seedlings initially show an orthotropic growth with leaf emission relatively independent of climate. The mature phase begins with the emission of plagiotropic branches that form the three crown. At this stage environmental factors exert a large influence on plant development. Growth and development of cacao are highly dependent on temperature, which mainly affetcs vegetative growth, flowering and fruit development. Soil flooding decreases leaf area, stomatal conductance and photosynthetic rates in addition to inducing formation of lenticels and adventitious roots. For most genotype drought resistance is associated with osmotic adjustment. Cacao produces caulescent flowers, which begin dehiscing

in late afternoon and are completely open at the begining of the following morning releasing pollen to a respective stigma. Non-pollinated flowers abscise 24-36 h after anthesis. The percentage of flowers setting pods ranges from 0.5 to 5%. The most imporatnt parameters determinantsof yield are related to (1) light interception, photosynthesis and capacity of photoassimilate distribution, (2)maintenance respiration, and (3)pod morphology and seed formation. These events can be modified by abiotic factors. Cacao is a shade tolerant species, in which appropriate shading leads to relatively high photosynthetic rates, growth and seed yield. However, heavy shade reduces seed yield and increases incidence of diseases. In fact, cacao yields and light interception are highly correlated when nutrient availability is not limiting. High production of unshaded cacao requires large inputs for protection and nutrition of the crop. Annual radiation and rainfall during the dry season explains 70% of the variation in annual seed yields.

[3] W.B. Group, Secondary W.B. Group. 2015. Commodity Markets Outlook October 2015. Page 1 - 74. W. World Bank.
Reference ID: 23488
Note: H 0 #23488e
Hanging notes only part of the report. E-copy (Full Version of the Report)
Abstract: Ample supplies and weak demand, especially for industrial commodities, contributed to the continued slide in most commodity prices in the third quarter of 2015 (Figure 1). Annual price forecasts are revised down for 2015 and 2016. Only a modest recovery is expected in 2016 (Figure 2). This issue briefly analyzes the implications of the ongoing El Niño episode and the recent Nuclear Agreement with Iran for agricultural and energy markets, respectively. Although El Niño could be the strongest on record, its impact is likely to be predominantly local rather than global because world commodity markets are currently well-supplied and spillovers from local markets to global prices are typically weak. Following Iran's Nuclear Agreement, the country's 40 million barrels in floating storage could be made available almost immediately upon sanctions being lifted; and, within a few months, Iran could increase its crude oil production toward pre-sanctions levels. The impact of Iranian exports on global oil and natural gas markets could be large over the longer term provided that Iran attracts the necessary foreign investment and technology to extract its substantial reserves.
Trends. Energy prices dropped 17 percent in the third quarter of 2015, as oil prices weakened due to continuing supply surpluses and anticipation of higher Iranian oil exports in 2016. Coal and natural gas prices declined marginally on continued weak demand and excess supply. Oil consumption growth has risen this year, in part due to lower prices. Oil supply continues to outpace demand, although global production is plateauing and yearon- year growth is diminishing. U.S. oil production peaked in April and is now on a declining trend. OPEC production reached a three-year high, with much of the increase coming from Iraq and Saudi Arabia. OECD crude oil inventories have soared, with much of the increase in North America. Non-energy commodity prices fell 5 percent in the third quarter of 2015, down more than a third from their early-2011 high. Abundant supply and large inventories were among the reasons. Metals prices fell 12 percent to barely half their early-2011 peak on weakening demand and supply increases from earlier large investments. Agriculture prices fell 2.4 percent (down for six consecutive quarters) on comfortable supply prospects, despite El Niño fears. Fertilizer prices fell marginally on abundant production capacity. Precious metals prices declined 7 percent on weakening investment demand reflecting expectations of a U.S. interest rate hike and dollar appreciation.
Outlook and risks. All main commodity price indices are expected to decline in 2015,

mainly owing to ample supply and, in the case of industrial commodities, slowing demand in China and emerging markets (Table 1). Energy prices are expected to fall 43 percent from 2014. Average oil prices for 2015 of $52/bbl have been revised down from $57/bbl (July Commodity Markets Outlook) owing to large stocks, resilient supply, and expectations of larger Iranian oil exports. Natural gas prices are expected to be sharply lower, following the path of oil prices while coal prices are expected to fall on slowing Chinese demand. Downside risks to the energy price forecast include higher-than-expected production from OPEC producers and continuing falling costs of the U.S. shale oil industry. Slowing demand and high stocks would further weigh on oil prices. Upside risks include accelerating declines in shale output, delayed implementation of the Iran agreement, and supply curtailment because of geopolitical events.

[4] C.P.C. NCEP, Secondary C.P.C. NCEP. 2017. ENSO: Recent Evolution, Current Status and Predictions. Page 1 - 6. N.O.a.A.A. (NOAA).
Reference ID: 23489
Note: H 0 #23489

[5] H. Moerdiono. 2017. Media Perkubunan April 2017, Vol 64. Page 1 - 78.
Reference ID: 23490
Note: S Serial #23490

[6] H. Moerdiono. 2017. Media Perkebunan May 2017, Vol 52. Page 1 - 79.
Reference ID: 23491
Note: S Serial #23491

[7] IPC. 2014. Focus on Pepper (*Piper nigrum* L.) Vol.6 No.1, Vol 6. Page 1 - 64.
Reference ID: 23492
Note: S Serial #23492

[8] IPC. 2015. Focus on Pepper (*Piper nigrum* L.) Vol.7 No.1, Vol 7. Page 1 - 72.
Reference ID: 23493
Note: S Serial #23493

[9] IPC. 2016. Focus on Pepper (*Piper nigrum* L.) Vol.8 No.1, Vol 8. Page 1 - 57.
Reference ID: 23494
Note: S Serial #23494e

[10] W.D.L. Gunaratne, H.M.P.A. Subasinghe, C.A. Yap, M. Anandaraj, D. Manohara. 2015. Production of Quality Pepper (*Piper nigrum* L.) Planting Materials. Page 1 - 26.
Reference ID: 23495
Note: S 8.10 #23495
Abstract: Pepper, could be propagated either through seeds or through vegetative cuttings. Micro propagation technology has been developed but so far it cannot be used for the commercial scale plant production. From the inception, commercial pepper cultivations have been established using the plants produced through vegetative cuttings. Conventionally, planting material production was considered as a tool for establishment of the next generation and with the time, commercial multiplication of better quality genetic material with desirable characters were added into the process. However, in the case of pepper, the process of the production of Quality Planting Material covers more objectives beyond that. In a commercial pepper

plantation, life span of the crop expand beyond 20 years and mostly in live support systems, the effective production period extend even beyond 30 years. Planting material may be a major source of disease carrier, if precautions were not taken, and which determine the vigour of the plant and economic potential of the established plant. Any mistake at this stage may result in many losses during the whole life span of the crop.

[11] Y.R. Sarma, D. Manohara, T. Premkumar, S.J. Eapen.2013. Diseases and Insect pests of Black Pepper (*Piper nigrum* L.). Page 1 - 100.
Reference ID: 23496
Note: S 8.10 #23496e
Abstract: Black pepper (*Piper nigrum* L.) known as the "King of Spices" is the most important spice traded internationally, accounting for almost one-third of the total volume and value of global spice trade. It originated in Western Ghats of India and spread to other countries through secondary introduction where it is extensively cultivated. The pepper vine thrives best in the tropics in a moist, hot climate, at elevations from 50 - 1500 feet mean sea level, with an evenly distributed rainfall. The robust and luxurious growth is seen on fertile, flat or gently sloping, land that is rich in humus with good drainage and light shade. Black Pepper is widely cultivated in Brazil, India, Indonesia, Malaysia, Sri Lanka, Thailand, Vietnam, Madagascar and China. Other countries like Benin, Brunei, Cambodia, Cameroon, Ecuador, Ethiopia, Fiji, Guatemala, Honduras, Kenya, Malawi, Mexico, F.S. Micronesia, Samoa, St. Lucia, Tanzania, Uganda, Zambia and Zimbabwe cultivate pepper in a small scale. In general, Black Pepper is a small farmers' crop and a source of livelihood. It is mostly a rainfed crop. However effective moisture management during prolonged dry periods would significantly enhance crop productivity. Pepper is a woody climber trained on live or dead supports. It is grown as monocrop as well as mixed crop especially in coffee, coconut and areca nut plantations. The production and productivity of black pepper is steadily declining in most of the countries. There are number of challenges faced by pepper farmers in different regions where pepper is grown commercially. One of the major challenges is diseases and pests affecting the crop. Diseases are more severe than insect pests, their symptoms and timely diagnosis would help in successful management of these problems. Implementation and adoption of Integrated Disease and Insect Pest Management (IDM/IPM) along with Good Agricultural Practices (GAP) is a rational and holistic approach to increase crop production. The main objective of this publication is to provide various management options available to address the major disease and insect pests. In addition, all disease and insect pests that cause considerable damage to pepper have been listed for the reader's information.

[12] C.J. Jose, K. John, P. Wahid, A.B. Enie, P.A. Det, S.C. Ng, A. Herath. 2005. Pepper (*Piper Nigrum* L.) - Production Guide for Asia and the Pacific. Page 1 - 219.
Reference ID: 23497
Note: S 8.10 #23497e
Abstract: The dried fruit of the plant, *Piper nigrum* L, generally known as pepper, is an important tropical spice. Black pepper is obtained when mature green or yellow berries of the pepper vine are harvested and dried. If the fruits are retted and skin (pericarp) along with the underlying pulp is removed before drying, white pepper is obtained. Both black and white pepper have a characteristic pungency and distinct aroma that makes these products essential ingredients in food from all parts of the world. Pepper finds a place on dining tables in all countries and all types of cuisine. Pepper has an

important place in global trade in spices. Historically, it was the first spice to be traded internationally and largely responsible for opening up trade routes between the West and the East. Today, it is the most important spice traded, in terms of quantity as well as value, and accounts for a significant portion of world trade in spices. There are many uses of pepper. It is a popular ingredient in different cuisine, in the West as well as in Oriental cooking. With well-documented curative and restorative powers, pepper is used in traditional medicines in many parts of the world, as in Ayurvedic treatments in India and Jamu preparations in Indonesia. Oil of pepper is a constituent in certain perfumes. In the past, Egyptians used it in the embalming mixture and also as an air purifier. More recently, pepper has been found to improve the bio-availability of specific medicines during treatment of serious illness. Its insect repellent properties are also being exploited in agriculture and household use. Pepper has a chequered history. It is as old as human civilisation itself. The Assyrians and Babylonians (3000BC-2000BC) traded in pepper obtained from the Malabar Coast of India. The Vedas, the Bible and the Quran contain references to pepper. Expeditions in search of pepper led to the discovery of new trade routes. Wars have been fought and countries colonised to gain control over the supply of pepper and other spices. Among the 109 spices listed by the Geneva based International Standards Organisation, pepper is the most significant. In some tropical countries, pepper plays an important role in the economy of small farmers. These farmers plant, nurture, harvest and sell pepper for their livelihood. The price of pepper, which sometimes fluctuates violently and can fall to very low levels, all too often destroys their hopes and aspirations

[13] K.K. Kee.1995. Regional Rainfall Pattern and Climatic Limitations for Plantation Crops in Peninsular Malaysia. The Planter. Vol 71(827). Page 67 - 78.
Reference ID: 23498
Note: #23498e
Abstract: The influence of rainfall on crop growth and yield is highlighted. This paper stresses the usefulness of good rainfall records and how these data can provide a basis for decision making at the estate level. In Peninsular Malaysia, three broad regional rainfall pattern had been distinguished. The characteristics of each rainfall region are indicated together with the main climatic limitations for the four main plantation crops i.e. oil palm, rubber, cocoa and coconut. The modifying effects of local soils and relief are briefly discussed

[14] A. FMB. 2017. Fertilizer Focus July/August 2017, Vol July/August 2017. Page 1 - 70.
Reference ID: 23499
Note: #23499e

[15] O. Warburg. 1911. F. Wohltmann, Der Tropenpflanzer. Page 1 - 1184.
Reference ID: 23500
Note: #23500e (Note: E-journal in german)

[16] R. Howeler. 2014. Sustainable Soil and Crop Management of Cassava in Asia: A Reference Manual. Page 280 - 280.
Reference ID: 23501
Note: #23501e

[17] K.P. Ong. 2016. The Basics of Oil Palm Nutrition. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 80.
Reference ID: 23502
Note: #23502e

[18] Y.A. Liew. 2016. Managing soil environment and its major impact on oil palm nutrition and productivity in Malaysia. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 70.
Reference ID: 23503
Note: #23503e (Note: Conference Paper is #23504)

[19] K.J. Goh, T.N. Mahamooth, P.H.C. Ng, C.B. Teo, Y.A. Liew. 2016. Managing soil environment and its major impact on oil palm nutrition and productivity in Malaysia. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 71.
Reference ID: 23504
Note: #23504e (Note: Slides presentation of this paper is #23503)
Abstract: In the early years of oil palm expansion in Malaysia, extensive use of soil information was common especially to select suitable lands for oil palm, understand the dynamic mechanism of soil water and nutrients, which are commonly the most limiting agronomic factors to oil palm growth and production in Malaysia, and formulate manuring (fertilizer) recommendations for oil palm. Furthermore, oil palm is mainly rain-fed and therefore, almost all its needs apart from carbon dioxide for photosynthesis are derived from the soils. While good soil management is essential and probably the key reason for the continuous and successful cultivation of oil palms on the same piece of land for nearly a century or into the fourth generation of cropping, poor soil management can have dire consequences. For example, without manure, the mean fresh fruit bunch yield of oil palms was 32 t ha^{-1} yr^{-1} on Selangor series soil compared to just 15 t ha^{-1} yr^{-1} on Rengam series soil but with manure similar oil palm yields were obtained from both soil types. With the expansion of oil palm, many new soil series/types are regularly added to oil palm cultivation, which may not have been covered by past experiences or may pose major challenges. In fact, it can readily be envisaged that this will present a more complex situation for soil management and probably dictate a better one to ensure competitiveness and economic viability of oil palm cultivation. Therefore, this paper re-visited our earlier works with updates on soil management with the objectives of providing a general discussion of the principles of soil management, soil requirements of oil palm, and soil management requirements with emphasis on soil organic matter and soil microbe management for oil palm before elucidating the specific soil management practices to improve problem or marginal soils for oil palm cultivation.

[20] A. Heng. 2016. Fertilizers as Sources of Plant Nutrients. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 74.
Reference ID: 23505
Note: #23505e (Note: Conference paper is 23506)

[21] A. Heng. 2016. Fertilizers as Souces of Plant Nutrients. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 5.
Reference ID: 23506
Note: #23506e (note Slides presentation is #23505)
Abstract: Generally, it is agreed that there are 17 essential plant nutrient elements.

Three major essential elements H, C, O, are obtained from atmosphere and water through photosynthesis. The other 14 essential mineral elements supplied by the soil, of which 12 are usually managed in agriculture through the use of fertilizers. These consists of the macro-nutrients (N, P, K, Mg, Ca, S), and the micro-nutrients (B, Cu, Zn, Fe, Mn, Mo). The other 2 are Cl & Ni. There are a few other elements, such as Na, Si, Se, V and Co, which are not essential, but may be beneficial to some plants either directly or indirectly. Fertilizers are any solid, liquid or gaseous substances containing one or more plant nutrients. They are either applied to the soil, directly on the plant (foliage) or added to aqueous solutions (fertigation), in order to maintain soil fertility, improve crop development, yield and, or crop quality. Organic fertilizers are fertilizers derived from organic matter - animal matter, human excreta or vegetable matter (e.g. compost, manure).
Inorganic fertilizers are those made from or containing material that does not come from plants or animals, and therefore exclude carbon-containing materials except ureas.

[22] A. Guha. 2016. Manuring the Oil Palm. MEOA Seminar 2016 LAB (Learning and Brainstorming) on Manuring Oil Palm. Page 1 - 65.
Reference ID: 23507
Note: #23507e

[23] OECD/FAO. 2016. OECD-FAO Agricultural Outlook 2016-2025. Page 138 - 138.
Reference ID: 23508
Note: #23508e
Abstract: The twelfth joint edition of the OECD-FAO Agricultural Outlook provides market projections to 2025 for major agricultural commodities, biofuels and fish. The 2016 report contains a special feature on the prospects for, and challenges facing, Sub-Saharan Africa.
Over the ten-year Outlook period, slowing demand growth will be matched by efficiency gains in production, implying relatively flat real agricultural prices. However, market and policy uncertainties imply a risk of resurgent volatility. The outlook for agriculture in Sub-Saharan Africa is for rising food availability, which will support a declining incidence of undernourishment. The sector's prospects could be much improved by more stable policies across the region, by strategic public and private investments, notably in infrastructure, and by suitably adapted research and extension.

[24] K. Sundram. 2017. Key Drivers/Challenges in the Oils & Fat Complex. MPOC. Page 1 - 13.
Reference ID: 23509
Note: #23509e

[25] M.R. Chandran. 2017. Roundtable on Palm Oil 2017: Challenges & Opportunities. MPOC. Page 1 - 20.
Reference ID: 23510
Note: #23510e

[26] C. Bek-Nielsen. 2017. The Big Picture. MPOC. Page 1 - 8.
Reference ID: 23511
Note: #23511e

[27] H.F. Heinisch, R.A.P. Alibasah. 1959. Comparative determination of moisture in palm oil. The Planter. Vol 35(4). Page 204 - 216.
Reference ID: 23512
Note: #23512e > S Serial #
Abstract: The contents of free fatty acids, moisture and impurities are the factors which determine the quality of palm oil, and these factors also have an influence on the alterations in quality during storage and transport. The water contents in palm oil causes and autocalytic hydrolysis through reaction with glycerides (1,2), whereby the presence of free fatty acids act as catalysts. The rate of this splitting-reaction is proportional to the contents of free fatty acids and this also to a great extent depends on temperature and the quantity of water present in the oil. During the past years, Sumatra exported on an average 150,000 tons of palm oil a year and the greater part of this quantity contained not more than 0.3% of free fatty acids (expressed as palmitic acid).The percentage of moisture in palm oil is usually not higher than 0.2% while the contents of impurities is commonly spoken of as "traces of impurities." In recent times, through the application of improved methods in the drying of oil, more oil is now exported with a moisture content of not more than 0.05%. Efforts have been made to produce oil with moisture content as low as possible as this is economical in terms of freight charges as otherwise the cost of freight will unnecessarily be high due to the presence of water in oil which also affects the quality of the oil.

[28] A.B. Pedersen. 1958. Some notes on oil palms. The Planter. Vol 34(7). Page 389 - 392.
Reference ID: 23513
Note: #23513e > S Serial #
Abstract: The recent years have brought along new ideas and ways of germinating the oil palm seeds and raising the seedlings into a suitable size for transplanting. The most common method of germination in Malaya is the open pit system, where sand or peat is used as germination medium, but the method in use in Belgian Congo and French West Africa, commonly named the "Congo Chest" system, has also found its way to Malaya. A successful germination in an open pit can be obtained either by use of sand or peat if the pit is well drained, the soil well watered twice a day and if not more than two - three germinations are carried out in the same soil. During the germination a chemical compound is by this process deposited in the soil around the seeds and when accumulated will slow down the future germination considerably. The seeds are normally spread out side by side on top of the germination medium and buried by a 3/4-1" layer of same. After a period of 6-7 months a germination results of 80-90% can be expected. This method is by far the cheapest and simplest way of germinating oil palm seeds, but it has the drawback that while some seeds will germinate after 6-8 weeks another 4-5 months will elapse before all seedlings of the progeny can be removed to the nurseries. The Congo Chest or fermenting box method is said to give a quick and even germination, but also requires strict daily attention. The Congo Chest can be made in nearly any size according to the number of seeds to be germinated. It should be well insulated to avoid loss of heat from the fermenting material. This can be done by heaping soil around the outside of the box. The most suitable fermenting medium is broadleaved creepers as Calopogonium and Passiflora mixed with grasses and this is put on the bottom of the chest to provide heat for the wooden boxes containing the seeds for germination.

[29] A.B. Pedersen. 1957. The Young Oil Palm. The Planter. Vol 33(2). Page 134 - 135.
Reference ID: 23514
Note: #23514e > S Serial #
Abstract: Malaya is slowly entering its oil palm era with thousands of acres coming into bearing every year. Many estates are pioneering in the field of oil palm planting with little or no prior experience; only a few are privileged in having been able to follow all stages of growth of the Oil Palm thus securing themselves from the danger of old mistakes being repeated in new planting. The most common mistakes occur during preparation of the field for planting. As the Oil Palm has got hundreds of small roots branching out from the base of the stem it is far more vulnerable than a tree with a tap-root if good rooting conditions do not prevail from the beginning. The area of a six to seven foot circle around the planting hole should be level with the rest of the field, not on a ridge and not in a depression. If a seedling is planted on a ridge, even as small as one foot above the field level, the seedling will seldom grow straight after its base has developed into full size. It tends to learn towards the lowest place in its surroundings and as times goes by, the more it grows, the more top-heavy it becomes and the more it leans.

[30] P. Bipinchandra. 2017. Roundtable on Global Economics & Fx Markets: Impact on Commodities. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 9.
Reference ID: 23515
Note: #23515e

[31] N. Meda. 2017. Transgraph (Roundtable on Global Economics & Fx Markets). Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 14.
Reference ID: 23516
Note: #23516e

[32] T. Andriesen. 2017. Palm Oil, Crude Oil, China & Africa. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 6.
Reference ID: 23517
Note: #23517e

[33] H. Sauthoff. 2017. The "Lauric-Family" - now reunited? The challenged partnership in the "post-commodity-hype-era". Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 17.
Reference ID: 23518
Note: #23518e

[34] U.R. Unnithan. 2017. Global Biodiesel Outlook in a Changed Global Landscape. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 60.
Reference ID: 23519
Note: 23519e

[35] N. Ellard. 2017. Surviving and Thriving in a Difficult World for Oleochemicals - Surviving Predictions. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 33.
Reference ID: 23520
Note: #23520e

[36] J. Fry. 2017. Lessons from the latest El Nino and La Nina, the implications for prices. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 34.
Reference ID: 23521
Note: #23521e

[37] A.P. Rachmat. 2017. Indonesian Government Policies & Climate Impact to CPO Supply and Demand. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 27.
Reference ID: 23522
Note: #23522e

[38] D.D. Lehman. 2017. World Supply and Demand for Grains and Oilseeds and Impacts on Palm Oil. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 42.
Reference ID: 23523
Note: #23523e

[39] D.E. Mistry. 2017. Palm Oil Tsunami? Price Outlook 2017. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 31.
Reference ID: 23524
Note: #23524e

[40] A.B. Pedersen. 1958. Some notes on oil palm selection. The Planter. Vol 34(3). Page 151 - 154.
Reference ID: 23525
Note: #23525e
Abstract: The last decade has with the successful introduction of Tenera planting material seen a revolution in oil palm selection. Only a few large oil palm companies in Malaya have, however, an established Research Organisation capable of producing legitimate seeds of selected, high yielding parent trees, while all the smaller oil palm estates are confronted with the problem of obtaining planting material of a high-yielding quality without the help of Research Workers. As very little has been published in Malaya on this subject after the war it is hoped that the following notes may be of some value to other planters. The Deli Dura oil palm of the far east is believed to have been introduced to the Botanic Garden in Buitenzorg, (now Bogor), Indonesia in 1848 probably from the island Bourbon or from Madagascar, where a variety, Elaeis madagascariensis is present. Some experiments in establishing plantations of Deli Dura in 1859 in Indonesia met with failure and it was not before 1913 that the founder of Societe Financiere des Caout-choucs, Mr. Adrian Hallet, successfully opened the first Oil Palm Estates in the far east at Atjeh, North Sumatra. The Deli Dura Oil Palm has since been introduced to Malaya, where it now have become a must promising plantation crop.

[41] ISP. 2017. The Planter. Vol.93 No.1092 March 2017. Page 161 - 222.
Reference ID: 23526
Note: S Serial #23526

[42] L.T. Gan, H. Cai. 2017. Calculating GHG emission in oil palm using PalmGHG. The Planter. Vol 93(1092). Page 167 - 176.
Reference ID: 23527
Note: #23527 > S Serial #23526
Abstract: Accounting for potential greenhouse has (GHG) emissions from palm oil production is essential to demonstrate how responsible palm oil production can be carried out. The potential sources of GHG emission that result directly from new plantings of oil palm and sources of emission from oil palm growing and production are enumerated. The cumulative impact, which affects the final carbon balance in oil palm agriculture, is quantified. The analysis helps to identify GHG emission hotspots so that mitigation palms can be developed and implemented. The aim is to minimise GHG emission that may result from oil palm development and production.

[43] M.S. Goh, K.J. Goh. 2017. Palm Oil and Human Breast Milk: Fat Distribution and Cholesterol Content. The Planter. Vol 93(1092). Page 181 - 190.
Reference ID: 23528
Note: #23528 > S serial #23526
Abstract: As palm oil is naturally high in palmitic acid, there is often the tendency to associate it with cardiovascular diseases (CVDs). On the other hand, human breast milk which shares similar fatty acid composition with palm oil is regarded as an impeccable food for babies. This irony becomes more glaring when we consider the high sn-2 palmitic acid in human breast milk which enhances its absorption into the blood stream (about 3.7 times than that in palm oil). Nevertheless, new scientific findings have now debunked the myth that CVDs are associated with palm oil or saturated fats such as palmitic acid. Moreover, there is a strong negative correlation between saturated fats in vegetable oils and plant cholesterols implying that their consumption will reduce plant cholesterol intake.

[44] S. Vogel. 2017. Global Soy Markets - Record Demand Meets An Interesting Supply Side. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 30.
Reference ID: 23529
Note: #23529e

[45] T. Mielke. 2017. Global Oil Supply, Demand and Price Outlook of Vegetable Oils and Impacts on Palm Oil Demand and Prices. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 25.
Reference ID: 23530
Note: #23530e

[46] Y. Liu. 2017. 2017 Main Vegetable Oils Outlook from China's Perspective. Palm and Lauric Oils Price Outlook Conference & Exhibition, 7-8 March 2017, Shangri-la Hotel, Kuala Lumpur, Malaysia. MPOC. Page 1 - 28.
Reference ID: 23531
Note: #23531e

[47] IPC. 2015. IPC Standard Specifications for Black/ White Pepper (Whole and Ground) and Whole Dehydrated Green Pepper. Page 1 - 11.
Reference ID: 23532
Note: S 8.10 #23532
Abstract: This standard applies to three commercial forms of Pepper (Black, White and Dehydrated Green - abbreviated as B, W, & DG) from harvest berries of *Piper nigrum* L. of the Piperaceae family. This standard applies to dried or dehydrated peppers intended for food processing and for direct human consumption, including for catering purposes or for retailing. It does not apply to the product when indicated as being intended for further processing.

[48] S.M. PLC. 2017. POLY4 Product Handbook. Page 1 - 50.
Reference ID: 23533
Note: S 25 #23533
Abstract: POLY4 is the trademark name of Sirius Minerals Plc's flagship polyhalite product. Polyhalite is a naturally occurring low chloride multi-nutrient fertilizer containing four of the six essesntial macro nutrients required for plant growth.
Using POLY4 as the source of potassium, sulphur, magnesium, and calcium is more efficient and effective for farmers, delivering flexible and more sustainable fertilizer practices. It allows farmers to maximise the economic potential of their land, in terms of crop yield, and quality and soil structure with one simple product.

[49] P. Nath, M. Bouzayen, A.K. Mattoo, J.C. Pech. 2014. Fruit Ripening: Physiology, Signalling and Genomics. Page 1 - 321.
Reference ID: 23534
Note: S 2.2 #23534
Abstract: Fruits are important to our dietary requirements as they provide vitamins, minerals, antioxidants and various other molecules important to human health. Fruit formation involves three distinct stages: fruit set, fruit development and fruit ripening. Of these, ripening has received the most attention particularly in fleshy fruit where nature and extent of ripening is associated with consumer preferences. It is during fruit ripening that changes in colour, texture and taste occur that contribute to the build-up of the sensory and nutritional quality of fruit. In fleshy fruits, ripening is also related to spoilage, which can have a major financial impact on agricultural industries. Understanding the mechanisms by which the various physiological and biochemical changes take place during fruit ripening is therefore of prime importance for both practical and scientific considerations.
Extensive molecular dissection of fruit ripening has shown that thousands of genes are recruited for developing these physiological and biochemical changes. In recent years, high throughput technologies have permitted breakthrough discoveries uncovering some of the key factors and signalling pathways by which ripening-related genes are set into motion. This up-to-date monograph seekt o draw together the most recent advances in this area. Providing a comprehensive account covering almost every area related to fruit ripening, it includes the molecular mechanisms regulating fruit ripening, nutrition, epigenetic control of ripening, fruit biodiversity and biotechnology. This book represents a complete resource for researchers of postharvest science and fruit physiology.

[50] K.S. Tan. 1976. Studies on Growth and Nutrition of Oil Palm. Thesis of Masters of Science. University of Singapore. Page 286 - 386.
Reference ID: 23535
Note: S 8.1.1 #23535
Abstract: This study concerns (a) the destructive analysis of young and old palms to determine growth indices and nutrient contents, and (b) certain aspects of shoot apex, leaf, flower and fruit development.
The shoot apex shows four histogens. The laminar tissue differentiates basipetally and no splitting is involved during formation of plications. Juvenile eaphylls are distinct from adult leaves. Leaf initiation, lamina development, rachis and petiole lengthening have been studied. From leaf initiation to full expansion it takes 31 months.
For a mature palm, the periods from spadix initiation first seen in the axil of P9, and from its inflorescence sex expression in P35, to anthesis are 32 ane 15 months respectively. Flower development is acropetal. Number of flowers in male and female inflorescence is determined. Mature pollen grains are two celled. The embryo sac is of the Polygonum type. Female flowers are receptive for three days. Fertilisation is porogamous. Endosperm is free nuclear and later become cellular. The mature embryo is straight. The drupe ripens between 155 and 188 days after pollination.
Fertiliser treatment increased all growth indices studied, induced early flowering and resulted in higher productivity of the young palms especially on the non-lateritic soils (Batu Anam/Durian series).
Palms on the lateritic soils (Malacca series) compared with those on the non-lateritic soils showed poorer root system; lower growth rates; higher variation of shoot/root and leaf area ratios, resulting in lower crop growth rate.
The productivity of the young palms on the non-lateritic inland soils was lower than those of similar age on the coastal clayey soils in West Malaysia. However, it was similar in mature palms growing under these two conditions. For the mature palms on the partial or lateritic soils, it was poorer than those on the non-lateritic soils but comparable with those on the clayey sands in Nigeria.
During the immature period (0-3 years) the average annual dry matter increment was 27.9 kg/palm; index, 2.03; and nett assimilation rate, 0.035 g/dm^2/wk for palms on the non-lateritic soils. The corresponding values during the mature period (6-9 years) were: 223.5 kg/palm (or 33.1 tonnes/ha); and 0.143 g/dm^2/wk.
Nitrogen and potassium were the largest quantities taken up during the early growth stages. The average total annual nutrient uptake by the manured palms on the no-lateritic soils during the mature period (3-9 years) were in kg/palm = 2.44 K, 1.77 N. 0.78 Ca, 0.46 Mg and 0.29 P; and in g/palm = 16.79 Mn and 1.22 B. These values are 2.4 to 4.0 times higher than those for palms on the lateritic soils.
A nutrient balance sheet is presented. The implicators of the results are discussed and further lines of research suggested.

[51] A.D. Capistrano, G.G. Marten. 1986. Agriculture in Southeast Asia. Page 6 - 19.
Reference ID: 23536
Note: #23536e > S 26.1 #11269 (Chapter 1)
Abstract: Southeast Asia has a land area of 4.5 million square kilometers *km2). About half the area is continental (Burma, Thailand, Vietnam, Laos, Cambodia, Singapore and Peninsular Malaysia) and the other half is archipelagic or insular (Indonesia, the Philippines, Brunei, Sabah and Sarawak). Most of Southeast Asia has a tropical humid climate with tropical rainforest as the major form of natural vegetation.

[52] IPNI. 2017. Preparing for the Certified Crop Adviser 4R Nutrient Management Specialist Exam. Page 1 - 98.
Reference ID: 23537
Note: S 21 #23537e
Abstract: The International Certified Crop Adviser (ICCA) Program developed the 4R NMS (4R Nutrient Management Specialist) Certification to meet the growing demand for qualified advisers with focused knowledge and skills in nutrient management. Not all CCSa do nutrient management work, but focus on other aspects of crop advising. The 4R NMS specialty allows those CCAs who advise on nutrient management to become more visibly recognized for their knowledge and skills. The CCA 4R NMS Specialty Area is an additional specialty certification that builds upon the nutrient, soil and water components of the international CCA Certification, to demonstrate the Crop Adviser's proficiency in working with the 4R concept and building it into nutrient management planning. Nutrient management is an integrated process that considers not only the agronomic aspects of soil and crop nutrition, but also the social, economic, and environmental relationships with the management system. The 4R concept of nutrient management has been developed and is being implemented worldwide by industry, researches, governmental agencies, and farmers and their advisers. With the goal of building a Nutrient Management Plan that puts the right nutrient sources, at the right rate, in the right place, and at the right time - the 4Rs of nutrient management. Agronomy and horticulture are dynamic fields where new discoveries and approaches continue to occur at a rapid pace. This guide was developed to support the first edition of the Performance Objectives for 4R Nutrient Management Specialist. Watch for updates in future years.

[53] S. Zingore. 2011. Maize Productivity and Response to Fertilizer Use as Affected by Soil Fertility Variability, Manure Application, and Cropping System. Better Crops With Plant Food. Vol 95(1). Page 4 - 5.
Reference ID: 23538
Note: #23538e > S Serial #20259e
Abstract: Studies in sub-Saharan Africa (SSA) show that fertilizer use is consistently more profitable and efficient on fertile fields. When soils are degraded, restoration of soil fertility through balanced fertilization and organic matter additions is necessary to achieve high crop productivity. Other options for managing soil fertility, such as manure, crop rotations, and improved fallows are most effective when strategically combined with fertilizer.

[54] E. Ngullie, V.B. Singh, A.K. Singh, H. Singh. 2011. Fertilizing for Sustainable Onion Production Systems (India). Better Crops With Plant Food. Vol 95(1). Page 7 - 9.
Reference ID: 23539
Note: #23539e > S Serial #20259e
Abstract: Studies evaluated straight versus combined applications of manures, fertilizers, and microbial biofertilizers with reference to onion bulb yield and soil nutrient balances. Given the good supply of quality manures, observations favored the combined application of inorganic fertilizers and manures over sole application of either nutrient source. Application of 50 to 75% of the fertilizer recommendation plus any microbial inoculant treatment failed to achieve a viable alternative.

[55] V. Nosov. 2011. Status of Grain Maize Production and Agronomic Efficiency of Mineral Fertilizer Use. Better Crops With Plant Food. Vol 95(1). Page 10 - 11.
Reference ID: 23540
Note: #23540e > S Serial #20259e
Abstract: The major region of grain maize cultivation in Russia is in the South. This article considers both mineral fertilizer use and maize productivity in the region. The agronomic efficiency of fertilizer applied to maize is summarized for two maize growing zones differing in annual rainfall. The profitability boundary of NPK use is estimated for a direct effect of fertilizers on maize yield, not taking into consideration the residual effect of fertilizer application.

[56] J.L. Jifon, G.E. Lester. 2011. Effect of Foliar Potassium Fertilization and Source on Cantaloupe Yield and Quality. Better Crops With Plant Food. Vol 95(1). Page 13 - 15.
Reference ID: 23541
Note: #23541e > S Serial #20259e
Abstract: Potassium has a strong influence on crop quality parameters. Previously reported work from the Rio Grande Valley of Texas (Better Crops, No.1, 2007) demonstrated the impact of foliar K on cantaloupe (muskmelon) quality. The objectives of this multi-year field study were to further evaluate the impact of foliar K on cantaloupe yield and quality in calcareous soils testing high in K, and whether differences exist among K sources for foliar feeding. Foliar K treatments resulted in higher plant tissue K concentrations, higher soluble solids concentrations, total sugars, and bioactive compounds (ascorbic acid and β-carotene). Among the different K salts, KNO3 consistently resulted in non-significant effects on fruit quality compared to control treatments. Yields were significantly affected by late-season foliar K treatments in only one year.

[57] J. Espinosa, A. Melville, K. Hylton. 2011. Poverty Alleviation through Balanced Fertilization for Corn and Integral Family Development. Better Crops With Plant Food. Vol 95(1). Page 18 - 20.
Reference ID: 23542
Note: #23542e > S Serial #20259e
Abstract: A high percentage of the rural population of Guatemala lives in poverty. This poverty can be observed in most households and steps to free rural families from this burden can lead to prosperity and stability. With such a high level of poverty, getting money in the pockets of rural poor is particularly important. Agriculture in the highlands of Guatemala centers primarily on corn (maize) production, and is a fundamental part of the region's history and culture. To address the issues of hunger, malnutrition, and future economic autonomy, a robust, sustainable agricultural program is needed. Fertilizer, used in accordance with site-specific nutrient management concepts, is an integral part of that program.

[58] B.S. Tubana, D. Harrell, T. Walker, S. Phillips. 2011. Midseason Nitrogen Fertilization Rate Decision Tool for Rice Using Remote Sensing Technology. Better Crops With Plant Food. Vol 95(1). Page 22 - 23.
Reference ID: 23543
Note: #23543e > S Serial #20259e
Abstract: In drill-seeded, delayed flood rice production in the mid-southern United States, N fertilizer is most commonly applied using a two-way split application. The second application occurs at midseason near the panicle initiation stage of rice

development where approximately one-third of the estimated N fertilizer requirement is applied. Midseason N rates are often adjusted either up or down by rice producers or crop consultants by visual assessment of the rice. In rice cropping systems such as these, instruments which could make in-season estimates of yield potential and available soil N would provide the initial framework to predict midseason N needs and greatly improve N fertilizer use efficiency in rice.

[59] W. Wu, Z. Wang, H. Liu. 2011. Effect of Resolution of Digital Elevation Models on Soil-Landscape Correlations in Hilly Areas. Better Crops With Plant Food. Vol 95(1). Page 25 - 27.
Reference ID: 23544
Note: #23544e > S Serial #20259e
Abstract: A study of six different digital elevation model (DEM) grid sizes and their impact on the relationships between soil properties and their physical terrain found that the most accurate model is not always produced at the highest resolution. The knowledge of which DEM resolution produces an appropriate model for a particular landscape can be used as a guideline for optimizing field sampling strategies.

[60] T. Jensen, K. Tiessen, E. Salvano, A. Kalischuk, D.N. Flaten. 2011. Spring Snowmelt Impact on Phosphorus Addition to Surface Runoff in the Northern Great Plains. Better Crops With Plant Food. Vol 95(1). Page 28 - 31.
Reference ID: 23545
Note: #23545e > S Serial #20259e
Abstract: Recent research in Alberta and Manitoba, Canada, confirms that snowmelt runoff is the dominant portion of annual total runoff from agricultural watersheds in the Northern Great Plains (NGP) of North America. The region is characterized by relatively level landscapes and a dry climate with cold winters and warm summers. Many of the methods used to estimate the risk of P movement into surface streams and lakes were designed for warmer, more humid environments and steeper topography where rainfall runoff is dominant and particulate P associated with soil erosion is the main nonpoint P source from agricultural land. In the NGP, however, soluble P originating from surface soil, plant residues, and surface-applied manure is a larger proportion of total P runoff than particulate P, especially during the spring snowmelt. Soil erosion control methods that help reduce P loading into surface waters in warmer, more humid climates may be less effective in reducing P losses in the NGP. Recent research in the region also suggests that soil-test P is highly correlated with total P losses in snowmelt runoff. In the NGP, these studies show that P losses in runoff can be most effectively reduced and controlled by avoiding the development of excessively high soil-test P levels.

[61] Y.A. University. 2015. Journal of Agricultural Research Vol.2 No.2. U Kyaw Kyaw wai (00047) Ywetsaine Sarpay. Yangon. Page 1 - 123.
Reference ID: 23546
Note: S 26.1.6 #23546

[62] Y.A. University. 2017. Journal of Agricultural Research Vol.4 No.1. Daw Tin Tin Aye (14961) Ywetsaine Sarpay. Yangon. Page 1 - 179.
Reference ID: 23547
Note: S 26.1.6 #23547

[63] S. Tun, K.K. Win, N.N. Htwe, T.T. Khanig. 2015. Effect of Nitrogen and Silicon fertilization on growth and yield of rice (*Oryza Sativa* L.). Journal of Agricultural Research. Vol 2(2). Page 1 - 9.
Reference ID: 23548
Note: #23548 > S 26.1.6 #23546
Abstract: The experiment was conducted to find out the appropriate rate of Nitrogen and Silicon for tested rice variety, and to study the interaction between Nitrogen and Silicon on rice yield. Four levels of nitrogen fertilizer rate (0, 90,120, ans 150 kg N ha^{-1}) and four levels of silicon fertilizer rate (0, 100, 150 and 200 kg Si ha^{-1}) were laid out in strip-plot design with three replications. Plant height, number of tillers per hill and leaf area index were increased with the combined application of nitrogen and silicon at the rate of 150 kg N ha^{-1} and 150 kg Si ha^{-1} (N^3Si^1) and 150 Kg N ha^{-1} and 200 kg Si ha^{-1} (N^3Si^3) in both seasons. The maximum number of panicles per hill and spikelets per panicle were obtained from 120 kg N ha^{-1} and 100 kg Si ha^{-1} (N^2Si^1) in both season. During the study periods, mean values of lodging shown at N3 (150 kg N ha^{-1}) was higher than N2 (120 kg N ha^{-1}) and N1 (90 kg N ha^{-1}) The combination of nitrogen and silicon fertilizers at the rate of 120 kg N ha^{-1} and 100 kg Si ha^{-1} (N^2Si^1) should be practiced to get the maximum grain yield without lodging.

[64] E.P. Win, M.M. Kyu, S.S. Thein, H.H. Oo, K.K. Win. 2015. Evaluation of Robust seedlings through modified mat nursery with different media and raising methods on rice yield. Journal of Agricultural Research. Vol 2(2). Page 10 - 17.
Reference ID: 23549
Note: #23549 > S 23.1.6 #23546
Abstract: Field experiments were conducted at the lowland field of department of Agronomy, Yezin Agricultural University during dry seasons, 2008 and 2010. Randomized complete block design with seven treatments and four replications was used in both experiments. Treatment were; (1) Modified Rice Mat Nursery (MRMN) (soil alone), (2) Modified Rice Mat Nursery (soil + cowdung- 1:1 v/v), (3) Modified Rice Mat Nursery (soil + rice hull ash- 9:1 v/v), (4) Modified Rice Mat Nursery (soil +cowdung + rice hull ash-2:1:1 v/v), (5) Dapog nursery, (6) Wet-bed nursery and (7) Conventional nursery (Farmers' Practice). The tested variety in both experiments was Sin Thwe Latt. In both experiments, the cowdung media was found to be not suitable for MRMN methods. The MRMN with soil and soil + rice hull ash media gave the healthy seedlings resulted in higher seedling height and seedling vigor index. The grain yield increased linearly with increasing number of panicles hill-1 and number of spikelets $panicle^{-1}$. Seedling vigor index had positive correlation with number of spikelets panicle-1 and grain yield. MRMN (soil alone) and MRMN (soil + rice hull ash) gave the maximum grain yield and the maximum benefit cost ratio in experiment I, and MPMN (soil + rice hull ash) gave the highest grain yield and the highest benefit cost ratio in experiment II. Thus soil + rice hull ash media was suitable for MRMN and gave the satisfactory good yield and profit in both experiments for dry season.

[65] C.C. Aung, K.K. Win, N.N. Htwe, K. Toe. 2015. Evaluation of Submergence Tolerant rice (*Oryza sativa* L.) Varieties in selected areas of Ayeyarwady and Bago (East) Region. Journal of Agricultural Research. Vol 2(2). Page 18 - 24.
Reference ID: 23550
Note: #23550 > S 26.1.6 #23546
Abstract: The experiments were conducted to evaluate the performance of submergence tolerant rice varieties in submergence areas of Maubin and Daiku Township, and to determine the growth and yield performance of submergence

tolerant rice varieties transplanted with two different seedling ages. Two seeding ages (35 -and 45-day) and seven varieties (Swarna-sub 1, BR 11-Sub 1, TDK 1-Sub 1, IRRI 119, Hnankar, IR 42 (Susceptible check) and FR 13 A (Tolerant check) were laid out in split-plot design with four replications at Maubin Township, Bago (East) Region during the wet season in 2014. Partial submergence and complete submergence conditions were observed in Maubin and Daiku Township respectively. The grain yield of two seedling ages was not significant different under partial submergence condition in Maubin Township whereas the grain yield of 45-day old seedling gave the higher yield than 35-day old seedling under complete submergence condition in Daiku Township. It was due to higher survival percent under complete submergence condition. BR 11-Sub 1, Swarna-Sub 1 and TDK 1-Sub 1 were found to be higher grain yield than susceptible check IR 42 under both partial and complete submergence conditions.

[66] E.H. Kyaw, K.K. Win, M.M. Kyu, H.H. Oo, Y.M. Soe. 2015. Performance of Mungbean (*Vigna radiata* L. Wilczek) as affected by foliar application of nitrogen and Boron. Journal of Agricultural Research. Vol 2(2). Page 25 - 31.
Reference ID: 23551
Note: #23551 > S 26.1.6 #23546
Abstract: Foliar nitrogen and boron fertilization was evaluated on Yezin 9 Mungbean cultivar in randomized complete block design with four replications to find out the appropriate rate and time of application on performance of mungbean. Treatments consisted of N_0B_0: N and B imission, N1: Foliar N-1 time application at 20 days after sowing (DAS), N_2: Foliar N-2 times application (20,30 DAS), N_3: Foliar N-3 times application (20,30,40 DAS), N_4: Foliar N-4 times application (20,30,40,50 DAS), and N1B1 - N_4B_4 : Foliar N+B (times of application were same as respective N treatments: N_1 - N_4).

[67] P.L.P. Won, T.D. Min, H.H. Oo, K. Toe, M.M. K, K.K. Win. 2015. Response of Nitrogen application and contribution of the uppermost three leaves at heading stage to grain yield of rice (*Oryza sativa* L.). Journal of Agricultural Research. Vol 2(2). Page 32 - 41.
Reference ID: 23552
Note: #23552 > S 26.1.6 #23546
Abstract: Field experiments were carried out to study the effect of nitrogen application and contribution of the uppermost three leaves on yield and yield components of rice. The trials were conducted at the Department of Agronomy, Yezin Agricultural University, during wet and dry seasons, 2010 and 2011. Split plot design with three replications was used in both experiments. The main plot factor was two items of nitrogen applications; nitrogen application and no nitrogen application at heading stage. Subplot factor consisted of eight different leaf removal treatments. The tested variety in both experiments was Manawthukha. The results from this study showed that yield, yield components, total dry matter, leaf area index and plant height were not affected by two items of nitrogen application at heading. For leaf removal, significant effects were observed in grain yield, 1000 grain weight, filled grain percent and total dry matter at harvest in both seasons. Yield reduction percent over no leaf removal (check) were 24.92% in flag leaf removal, 19.94% in second leaf removal, 13.40% in third leaf removal at wet season. For dry season, yield reduction percent were 21.69% in flag leaf removal, 21, 41% in second leaf removal and 16.71% in third leaf removal. Therefore, among the uppermost three leaves, the yield contribution of flag leaf was found to be most efficient in assimilate partitioning at grain filling stage of

rice.

[68] H.H. Htay, N.M. Htwe, N.H. Hom, S.S. Mar. 2015. Morphological characterization of selected rice (*Oryza sativa* L.) Germplasms. Journal of Agricultural Research. Vol 2(2). Page 42 - 49.
Reference ID: 23553
Note: #23553 > S 26.1.6 #23546
Abstract: The rice germplasm was selected to characterize and classify for different morphological and agronomic traits. The experiment was carried out at the Research Farm of Department of Plant Breeding, Physiology and Ecology, YAU from February to June, 2013. Twenty-seven rice germplasms were evaluated in Randomized Completely Block Design (RCBD) with three replications. The results showed that, all varieties had wide range of variability for quantitative characters. Shwe Se Yin has maximum effective yield plant-1 among 27 rice varieties while the Shwe Pyi Htay rice variety showed the lowest effective yield plant-1. The magnitudes of genotypic coefficient of variation (%) were greater than those of environmental coefficient of variation (%) in all observed characters. These morphological characters were less influenced by the environmental factors. Among the yield and yield component characters for days to 50% flowering, plant height , effective tiller hill-1, filled grain percent, number of spikelets panicle-1 and 1000 grains weight were showed moderate phenotypic coefficient of variation (%), genotypic coefficient of variation (%) and high heritability (%). In effective yield plant-1 was moderate genotypic coefficient of variation (%) and high phenotypic coefficient of variation (%) and high heritability (%). Therefore, progeny selection will be effective to improve those characters. According to cluster analysis, the 27 germplasm sources in rice breeding program.

[69] M.M.M. Aye, T. Min, K. Winn, S. Win. 2015. Changes in path coefficients of yield and yield components in rice (*Oryza sativa* L.) under different Water Regimes. Journal of Agricultural Research. Vol 2(2). Page 50 - 56.
Reference ID: 23554
Note: #23554 > S 26.1.6 #23546
Abstract: Insufficient irrigated water for dry season rice cultivation has occurred more occasionally, and appropriate rice varieties with levels of irrigation were therefore established together with minimum water application for dry season rice cultivation. Selection of a suitable plant type for different water regimes, path analysis would provide reliable information on nature, extent and direction of selection. Thus, the effects of water regimes on yield and yield components, and their direct and indirect effects on yield of rice were studied. All the observed characters except plant height and number of tillers per hill were significantly different. Among the three water regimes, intermittent irrigation showed higher yield and yield components than those of continuous flooding and saturated irrigation indicating that intermittent irrigation enhanced yield and yield component characters. The results of path coefficient analysis showed that different direct and indirect effect on yield. Number of panicles per hill possessed high positive direct effect and high correction value to yield per plant at continuous flooding and saturated irrigation indicating number of panicle per hill should be used as target selection trait to improve yield per plant. In intermittent irrigation, number of spikelets per panicle and filled grain percent should be used as target traits to improve yield per plant because these traits showed high positive direct effect and high correlation. Thus, one can conclude from the findings of present study that selection of traits with high positive significant association and high positive direct effect on grain yield can help improving yield.

[70] N.H.S. Kyi, K.K. Win, N.M. Htwe, N.H. Hom. 2015. Standard heterosis and combining ability for yield and its related traits in selected cotton (Gossypium hirsutum L.) Genotypes. Journal of Agricultural Research. Vol 2(2). Page 57 - 62.
Reference ID: 23555
Note: #23555 > S 26.1.6 #23546
Abstract: Ten inbred lines (Coker-124616, KBZ-2, NHH-44, V-14, SSB, FCC-99530, MC-4, Win Devi, Twain-191 and MC-3) were used to estimate the general combining ability and specific combining ability for yield and quality traits in cotton genotypes and to estimate the standard heterosis for yield among F1 crosses. Crossing among parents was done to produce F_1 progenies from September 2013 to February 2014 at Industrial Crop Section Farm Department of Agricultural Research (DAR), Yezin. Ten parents, 45 F_1 genotypes and two checks (Line-66 and Ngwe Chi-6) were tested in a Randomized Complete Block design (RCD) with two replications at Tatkone, from March 2014 to July 2014. Based on GCA estimates, it could be concluded that the best combiner was FCC-99530 (P6), Coker-124616 (P1) and MC-3 (P10) for yield plant-1. High specific combinations for yield plant-1 were found in the crosses of Coker-124616 x KBZ-2 (P1 x P2) followed by Coker-124616 x NHH-44 (P1 x P3) and FCC-99530 x Win Devi (P6 x P8). The combination of Coker-124616 x KBZ-2 (P1 x P2) had the highest positive standard heterosis value (42.49%) for yield plant-1 followed by FCC-99530 x MC-4 (P6 x P7). Therefore, these combinations could be selected to use in production of high yield to conduct further trails in hybrid cotton breeding programme.

[71] S.S. Min, K. Ngwe, S.S. Mar, K. Winn. 2015. Effects of straight and compound fertilizers on the growth and yield of rice. Journal of Agricultural Research. Vol 2(2). Page 63 - 69.
Reference ID: 23556
Note: #23556 > S 26.1.6 #23546
Abstract: Two seasons of rice experiment were tested to know the effects of recommended straight fertilizers application and compound fertilizers plus Urea fertilizer on growth and yield of rice in 2014. Shwe Thwe Yin rice variety was used and the experimental design was Randomized Complete Block design (RCB) with four replications. As straight fertilizers Urea, Triple super Phosphate (TSP) and Muriate of Potash (MOP) were applied with recommended rates of Department of Agricultural Research (DAR). The treatments were T1 (no fertilizers), T2 (three splits application of straight fertilizers), T3 (two splits application of straight fertilizers), T4 (15: 15: 15 compound fertilizer 125 kg ha-1 + 125 kg Urea ha-1) and T5 (straight fertilizers the same as the nutrient ratio of T4), T6 (15: 7: 8 compound fertilizer 125 kg ha^{-1} + 125 kg Urea ha^{-1}), and T7 (straight fertilizers the same as the nutrient ratio of T6). The plant growth data, yield components and yield data of both seasons were collected and analyzed. In both seasons, the straight fertilizers treatment T3 produced the highest grain yield. It is 49% more yield than the control treatment T1 and 17% more than T4 treatment in the dry season. In the wet season, T3 produced 69% more grain yield than that of control treatment and 25% more grain yield than that of T4 treatment. Treatment T3 also produced the highest parameters for almost the entire yield components.

[72] K.P. Nwe, K. Ngwe, S.S. Mar, M. Thuzar. 2015. Potassium fertilizer management on rice cultivation. Journal of Agricultural Research. Vol 2(2). Page 70 - 77.
Reference ID: 23557
Note: #23557 > S 26.1.6 #23546

Abstract: To evaluate the effect of potassium on growth and yield of rive and to find out the best suited scheme / Pot experiments were conducted to evaluate the effect of potassium on growth and yield of rive and to find out the best suited scheme / timing of potassium fertilizer application for rice crop during the dry and wet season of 2014. In this investigation, a recommended dose of potassium fertilizer (37 kg ha^{-1}) was used and eight treatments i.e. T1 (all potash applied as basal), T2 (all potash applied at 25 DAT), T3 (all potash applied at 45 DAT), T4 (1/2 potash applied as basal and remaining 1/2 at 25 DAT), T5 (1/2 potash applied as basal and remaining 1/2 at 45 DAT), T6 (1/2 potash applied at 25 DAT and remaining 1/2 at 45 DAT), T7 (1/3 potash applied as basal, 1/3 at 25 DAT and remaining 1/3 at 45 DAT) and T8 (Control - no K applied) were performed.
Yield and yield components with potassium use efficiency (KUE) were responded to different time of potassium fertilizer application. T6 and T2 produced more grain yield and obtained the greater KUE in both seasons. Lower grain yield was achieved at control and only basal application treatments. According to the results of this study, basal application of potash (traditional method) can be replaced by a late application at 25 DAT and two equal split applications at 25 DAT and 45 DAT can be promoted for getting maximum benefit. However, further investigations should be conducted to confirm the effect of potassium at field level.

[73] C.M. Aung, M.M. Khin, M. Thaung, T.T. Oo. 2015. Relative resistance of different cotton varieties to Jassid, *Amrasca devastans* (Distant) (Hemiptera: Cicadelidae). Journal of Agricultural Research. Vol 2(2). Page 78 - 84.
Reference ID: 23558
Note: #23558 > S 26.1.6 #23546
Abstract: Eight cotton varieties viz, Ngwechi 4, Ngwechi 6 (susceptible check), Lungyaw 3, Line 66, 96-74-10, Shwedaung 8, Raka 666 and Israel 3 were evaluated for their resistance to jassid, Amrasca devastans (Distant) with relation to leaf trichome density under natural conditions at Sipin Research Farm and Lungyaw Cotton Farm during pre-monsoon season in 2014. A negative linear relationship was observed between incidence of A. devastans and leaf trichome density suggesting that cotton varieties having more pubescent leaf trichomes received lower incidence of A. devastans. Three varieties, 96-74-10, Line 66 and Lungyaw 3 with the highest leaf trichome density showed resistance to A. devastans harbouring the lowest jassid populations at both locations in this study. Moreover, although the population fluctuation of A. devastans in other varieties exceeded economic threshold level (ETL), those of A, devastans in 96-74-10, Line 66 and Lungyaw 3 remained below ETL throughout the growing season at both locations. Therefore, the varieties 96-74-10, Line 66 and Lungyaw 3 were the most promising varieties and they might be helpful to tackle jassid problems at Sipin and Lungyaw area in pre-monsoon season. Consequently, the use of resistant varieties can lead to a major reduction in pesticide use as well as financial gain to farmers by cutting additional cost for the pesticides and no further pollution to the environment.

[74] K.K. Gyi, K.K. Than, T.T. Oo. 2015. Survey on Natural Incidence of Cotton Jassid *Empoasca devastans* (Distant) (Hemiptera: Cicadelidae) in Aunglan and Kyaukse Township. Journal of Agricultural Research. Vol 2(2). Page 85 - 90.
Reference ID: 23559
Note: #23559 > S 26.1.6 #23546
Abstract: The aims of the study were to observe the natural infestation level of cotton jassids *Empoasca devastans* (Distant) (Hemiptera: Cicadellidae) in two cotton growing

areas of Myanmar, and to access knowledge of the farmers and perception of cotton pests and their control practices. A survey was conducted among 60 cotton growers in six villages in Aunglan Township and Kyaukse Township as well as 7 cotton research and production farms under Department of Industrial Crops Development during postmonsoon season, 2012. Although incidence of all sucking pests was found throughout the growing period, the highest pest population was jassids followed by aphids and whitefly. Farmers in survey areas applied insecticides between 6-27 times during the crop season. Some farmers used insecticides in their cotton production regardless of pest attack and sprayed once a week. Most of the farmers in survey areas had lack of knowledge to distinguish between pests and some natural enemies as well as the correct use of insecticides. It is necessary to improve knowledge and management skills to control cotton pests through IPM programmes.

[75] K.K. Thin, O.M. Lynn, M. Thaung, T.T. Oo. 2015. Efficacy of Neem-seed oil, Groundnut oil, Coconut oil and Palm Oil against the Pulse Beetle, *Callosobruchus maculatus* (Fabricius) (Coleoptera: Bruchidae) on Stored Cowpea. Journal of Agricultural Research. Vol 2(2). Page 91 - 98.
Reference ID: 23560
Note: #23560 > S 26.1.6 #23546
Abstract: The experiments were carried out to investigate the efficacy of neem-seed oil, groundnut oil, coconut oil and palm oil for the protection of stored cowpea against Callosobruchus maculatus at the laboratory of Department of Entomology and Zoology, Yezin Agricultural University. Neem-seed oil was applied at the rate of 0.6 ml, 0.7 ml, 0.8 ml, 0.9 ml, 1.0 ml/ 100 g of cowpea seeds. Among them, neem-seed oil gave the strongest action against oviposition, adult emergence, damaged seed percentage, weight loss percentage and germination percentage of cowpea. Thus, neem-seed oil at 0.8 ml/100 g and groundnut oil, coconut oil, palm oil at 1.0 ml/ 100 g would be the best choice for management of pulse beetle. The oils had no adverse effect on seed viability after 4 months storage period.

[76] M.M. Mon, A.A. Myint, M. Thaung, T.T. Oo. 2015. Effect of some plant powders on lesser grain borer *Rhyzopertha dominica* (Fabricius.) (Coleptera: Bostrichidae) in rice. Journal of Agricultural Research. Vol 2(2). Page 99 - 109.
Reference ID: 23561
Note: #23561 > S 26.1.6 #23546
Abstract: Experiments were conducted to investigate the insecticidal activity of different plant powders viz., neem (*Azadirachda indica* A.Juss) leaf powder, eucalyptus (*Eucalyptus camaldulensis* Dehnh) leaf powder, tobacco (*Nicotiana tabacum* L.) leaf powder with four different dosage levels (0.5, 1.5, 2.5, 3.5g/20g of unhusk rice) against Lesser Grain Borer *Rhyzopertha dominica* (Fabricius.) in stored rice seeds (Palethwe-1). The collected parameters were number of dead insects, number of emerged adults, weight loss and germination of rice seeds treated with different plant powders throughout the study period. All tested plant powders were effective against the adult *R. dominica*. Among them, tobacco and black pepper treatments exhibited the highest adult mortality and the lowest adult emergence accompanied with no significant weight loss of rice seeds. Over 90 percent germination of rice seeds treated with different plant powders was observed during the four months of storage period.

[77] O.M. Lynn, J.-E. Kim. 2015. The Analysis of Azadirachtin in two commercial formulations and study on their degradation under different temperature and pH condition by using high performance liquid Chromatographic method. Journal of Agricultural Research. Vol 2(2). Page 110 - 116.
Reference ID: 23562
Note: #23562 > S 26.1.6 #23546
Abstract: Azadirachtin and neem-based insecticides are a very good substitute for synthetic pesticides. Two commercial neem formulations were determined azadirachtin contents by liquid chromatography and investigated their degradation under different temperature and pH conditions. Azadirachtin were found 0.1% in the liquid formulation and 0.01% in the pallet formulation. In addition, both temperature and pH was significantly effective on the degradation of azadirachtin.

[78] P.P. Win, O.M. Lynn, M. Thaung, T.T. Oo. 2015. Effect of different insecticides on yellow rice stem borer, *Scirpophaga incertulas* (Walker) (Lepidoptera: Pyralidae) on Shwe Bo Paw San. Journal of Agricultural Research. Vol 2(2). Page 117 - 123.
Reference ID: 23563
Note: #23563 > S 26.1.6 #23546
Abstract: The present study was conducted in 2014 monsoon season at Shwebo Township in Sagaing Region. Shwebo Paw San variety was used to evaluate the efficacy of different insecticides on yellow rice stem borer and its infestation under natural condition. Split-plot design was used with four replications. The insecticides, Carbofuran (Furadan 3G) - 14.82 kg $ha^{-1,}$ Acephate (75% SP) - 0.96 kg $ha^{-1;}$ Cartap hydrochloride (95% SP) - 0.48 kg ha^{-1} and Dimethoate (40% EC) -964 ml ha^{-1} were used. Carbofuran was added as basal application in seedbed and rice field. The other insecticides, Cartap hydrochloride, Acephate ad Dimethoate were applied as foliar spray at recommended doses. According to the economic threshold level, two times of insecticide application was done. Data were collected at weekly interval commencing from 7 days after transplanting. The results indicated that application of insecticides significantly ($P<0.05$) reduced the infestation of yellow rice stem borer compared with control in different locations. After second application, Cartap hydrochloride was found to be the most effective insecticide with the minimum whitehead percent (3.69%) followed by Acephate (5.82%), Dimethoate (6.53%) where as 8.66% in control. Therefore, it is concluded that Cartap hydrochloride can be used as an effective insecticide to control rice yellow stem borer on Shwebo Paw San.

[79] S. Phillips. 2017. Plant Nutrition Today - Fall 2017 Summer no.4: The Digitization Of Agriculture. Vol. 4(2). IPNI. Page 1-2.
Reference ID: 23564
Note: #23564e
Abstract: Agriculture is the least digitized major industry in the USA. This statement might seem surprising considering all the buzz around big data in agriculture over the past couple of years, but this was one of the points made by Vonnie Estes, VP of Business Development for Caribou Biosciences, at the recent New Ag International Conference. In her presentation, she discussed recent developments in the ag industry that will propel the shift to data-driven agriculture. What have been some of the barriers to a shift to digital agriculture? One reason suggested in the presentation was that focus has been more on the technology itself rather than the value to the user. Growers need to be delivered insights, not just data. Supporting this issue was another presentation at the Precision Ag Innovation Workshop earlier this year where it was noted that less than 25% of growers who have access to aggregated farm data

ever look at it. Other concerns impeding adoption are data quality, scalability, ownership, and protection.

[80] V. Nosov. 2017. Plant Nutrition Today - Fall 2017 Summer no.5: Sulfur's Importance In Southern and Eastern Russia. Vol. 5(2). IPNI. Page 1-2.
Reference ID: 23565
Note: #23565e
Abstract: The majority of sulfur (S) in soils is present as part of soil organic matter. Organic S is continually being transformed to plant-available sulfate (SO_4^{2-}) through organic matter mineralization by soil microorganisms. In areas of Russia, S mineralization from soil organic matter is often too slow to meet the nutritional demand of highyielding crops. Any deficit between the soil supply and crop demand must be overcome through S fertilization. The S requirement for crops grown in Russia is much like other temperate regions and is typically greatest for brassica crops like rapeseed (canola), followed by legumes, and then cereals. The harvested portion of these crops removes 10 to 30 kg S/ha. Sulfate taken up by plant roots is ultimately converted to various S-containing organic compounds, including S-containing amino acids. Crops like rapeseed also produce secondary S-containing metabolites called glucosinolates. Onion produces alliin compounds that may contain >80% of the total plant S.

[81] T. Bruulsema, 2017. Plant Nutrition Today - Fall 2017 Summer no.6: Global Phosphorus flows and forms. Vol. 6(2). IPNI. Page 1-2.
Reference ID: 23566
Note: #23566e
Abstract: The flows of phosphorus (P) on a global scale are critically important to sustaining the health of humanity and ecosystems. But perceptions of these flows, and of stocks, vary widely, leading to different opinions on how to manage the issues related to P use. This article will attempt to sort out what is known and what is unknown about P flows. In so doing, we may learn something about P forms and improving their management. At a recent workshop in Washington DC, a group of scientists discussed the theme of P sustainability. Interesting differences emerged among their perceptions of global P flows. They agreed that the amounts mined and put into the agri-food system as fertilizer total to more than four times the amount in foods consumed. They disagreed, however, on the fate of the phosphate that doesn’t get into the food. Some had the impression that global losses to water amounted to as much as 46% of the P mined. Others pointed out that measurements from monitoring runoff and drainage on-farm at field edge typically show much smaller losses to water, generally less than 5%, with a few occasional exceptions no more than 17%. Why so great a difference in scientists’ perceptions of the ultimate fate of P?

[82] K.M. Thant, K.K. Win, T.D. Min, K. Ngwe, R.M. Lampayan. 2017. Study on the current farmers' water management practice and their perception on water saving technology (AWD) in DaikU, Bago Region. Journal of Agricultural Research. Vol 4(1). Page 1 - 7.
Reference ID: 23567
Note: #23567 > S 26.1.6 #23547
Abstract: To assess the knowledge of current farmers' practice on irrigation water management in irrigated lowland rice and study their perception on water saving technology (AWD), the study was conducted in three village tracts in DaikU, Bago Region during dry season 2015. Purposive random sampling method was used to select 75 respondents from the study area and both qualitative and quantitative data

were collected using a structured questionnaire. The practice of conventional water management (continuous flooding) was common in the study area. Most of farmers kept continuous flooding at tillering, panicle initiation and flowering and 85.3% of farmers perceived that the more water was the better for increased yield and, as an effective weed control method (42.7%). Farmers kept maintaining a 5-7 cm an 5-9 cm depth of standing water (81.3%) depending on crop growth. As reported by 66.7% of farmers, duration of water shortage lasted often up to 10-15 days, mostly at flowering stage. Delay water supply schedule for raising seedling, irregularity in irrigation water interval, inadequate supply of irrigation water and poorly maintained irrigation facilities were the major constraints for summer rice farmers. Only 4% of farmers had known about AWD and farmers perceived that more weed infestation (30.7%) and lower yield (53.3%) would be affected by AWD. However, less pest and disease infestation would be resulted by AWD (12.0%).

[83] A. Win, N.M. Htwe, N.O. Myint, K. Toe, N.H. Hom. 2017. Effects of Paclobutrazol on growth of groundnut (*Arachis hypogea* L.). Journal of Agricultural Research. Vol 4(1). Page 15 - 22.
Reference ID: 23568
Note: #23568 > S 26.1.6 #23547
Abstract: Field experiments were conducted to find out the effect of paclobutrazol on growth and yield of groundnut, Sinpadetha-11 during 2010 and 2011 at the Farm of Yezin Agricultural University, Nay Pyi Taw. Split plot design was used replicating three times. Different concentrations of paclobutrazol were applied at different growth stages. Application of paclobutrazol at the pegging stage and beginning of the pod formation stage resulted stunted plants. Maximum total dry matter was given by application of paclobutrazol at the beginning of the pod formation stage and full pod stage in 2010 growing season and beginning of the pod formation stage and seed setting stage in 2011. Higher values of pod dry weight were resulted by application at the beginning of the pod formation stage and full pod stage in both growing seasons. Application of paclobutrazol at the beginning of the pod formation stage gave the highest value pod yield in both seasons. Application of paclobutrazol remarkable reduced plant height and increased total dry matter. Paclobutrazol with the rate of 40 ppm and 60 ppm gave the higher values of total dry matter in both growing seasons and in turn it regulated more pod formation and 11-18% pod dry weight increased was observed. Therefore, paclobutrazol with 40 ppm should be applied at the beginning of the pod formation stage to increase pod dry weight or yield of groundnut.

[84] T. Zin, N.H. Hom, N.M. Htwe, T.D. Min, M.M. Aung. 2017. Genotype x Environment Interaction and Stability analysis of selected rice (*Oryza sativa* L.). Journal of Agricultural Research. Vol 4(1). Page 23 - 29.
Reference ID: 23569
Note: #23569 > S 26.1.6 #23547
Abstract: This study was carried out to determine the magnitude of genotype x environment interaction effects on rice grain yield in diverse production environments; and to identify the stable rice genotypes for dry zone environments. The field experiment was executed in the dry season, 2014. Thirteen selected rice genotype were examined using randomized complete block design with three replications at seven dry zone areas, viz., Ye-U, Myaing, Wetlet, Seikphyu, Nyaung-U, Pyawbwe and Thazi. Additive main effects and multiplicative interactions (AMM) analysis was computed using PBTools (1.4) software, and stability analysis was done by using Eberhart and Russell model. It was found that the genotype x environment interaction

effect accounted for 34.60% of total variation. Yeanelo 1, IR07A234 and IR09A228 were identified as stable genotypes for dry zone area. Moreover, the best genotypes for specific location were IR87729-69-B-B-B and IR87705-44-4-B in Thazi; IR87707-446-B-B-B in Ye-U, Wetlet, Pyawbwe and Seikphyu; and Shwe Pyi Htay in Myaing and Nyaung-U. According to the permission of National Seed Committee (NSC), some inbred genotypes tested in this research were released as commercial varieties. In 2015, CSR36 was released as Shwe Asean; IR10T107 as Pyi Myanmar Sien; and IR87707-446-B-B-B as Yeanelo 4. Similarly, in 2016, IR87705-44-4-B was released as Yeanlo 5; and IR87707-182-B-B-B as Yeanelo 6. All these varieties are now grown commercially in the dry zone area.

[85] K.M. Htun, S.S. Mar, S.S. Thein, K. Toe, K. Ngwe. 2017. Effects of different rates of potassium fertilizer on rice productivity with or without rice husk ash in Minbya soil. Journal of Agricultural Research. Vol 4(1). Page 30 - 38.
Reference ID: 23570
Note: #23570 > S 26.1.6 #23547
Abstract: Two consecutive pot experiments were conducted at the screen house, Department of soil and water science, Yezin Agricultural University to study the effect of different levels of potassium fertilizer application with rice husk ask (RHA) on yield and yield components of Sinthwelatt rice variety in Minbya soil. The first experiment was carried out in the dry season and the second experiment was repeated in the wet season, 2015. The two factors factorial experiment comprised of two levels of RHA i.e. H_0 (without RHA) and H^1 (with 5 ton ha-1 RHA) and for levels of potassium fertilizer i.e. K_0 (K omission), K_1 (16 kg K ha^{-1}), K_2 (24 kg K ha^{-1}) and K_3 (32 kg K ha^{-1}). The experiment was laid out in randomized complete block design with four replications. The results revealed that highest grain yield was recorded in K3 due to production of higher number of tillers hill-1, filled grain %, number of panicles hill-1. In contrast, K omission produced lower yield due to lower number of tillers hill-1 and yield component parameters. For the RHA effect, the results indicated that application of 5 ton ha-1 RHA produced highest grain yield with highest number of tillers hill-1, number of spikelets panicle-1 and maximum number of grains panicle-1. Lowest plant growth parameters and yield components were obtained from the treatments without RHA. For combined effect of potassium fertilizer and RHA, results revealed that treatment H1K3 produced the highest grain yield. After experiment II, bulk density values decreased with an increased in total porosity, pH, CEC, carbon content of soil, available K and available P at all RHA treated soils compared to RHA untreated soils.

[86] L. Nge, S.S. Mar, A.A. Than, N.M. Htwe, K. Ngwe. 2017. Assessment of Nitrogen and Potassium fertilization on rice yield in Maubin Township. Journal of Agricultural Research. Vol 4(1). Page 39 - 46.
Reference ID: 23571
Note: #23571 > S 26.1.6 #23547
Abstract: To study the effect of different levels of nitrogen fertilization with and without potassium fertilizer combination on yield and yield components of rice crop, a field experiment was conducted in Maubin township during dry season 2015 and it was repeated in different place of the same village in the dry season of 2016. Four levels of nitrogen and potassium fertilizer treatments with four replication included in the experiment using RCBD experimental design. The usual application rate of phosphorus fertilizer (12 kg P ha^{-1}) was applied in all treatments except control. According to the experimental results, different rates of N and K fertilizer application had significant effects on plant height, number of tillers, number of panicles, number

of spikelets and grain yield. The higher values of these results were observed from balanced fertilization of N with K as compared to N without K fertilizer treatments showed an increase in ratio ranging from 6.7% to 38.25% for first season and from 20.83% to 28.57% for second season experiment. Yield increment by the application of N fertilizer with K indicated the need of K application in rice cultivation to increase yield. P treatment did not show any significant effect in this short-term experiment. The highest fertilizer rates (174 kg N ha^{-1} and 94 kg K ha^{-1}) treatment in the experiment (N_3PK_3) did not produce further increased grain yield.

[87] T.Z. Win, A.K. Myint, K. Ngwe, S.S. Thein, T.T. Khaing. 2017. Effects of nitrogen and potassium application on plant growth, yield and fibre quality of cotton (*Gpssypium hirsutum* L.). Journal of Agricultural Research. Vol 4(1). Page 47 - 55.
Reference ID: 23572
Note: #23572 > S 26.1.6 #23547
Abstract: In a study to investigate different rates of nitrogen (N) and potassium (K) application on growth yield and fiber quality of cotton (*Gossypium hirsutum* L.), var. Ngwechi-9 and to evaluate the nutrient interactions of N and K in cotton in Pyawbwe Township, Myanmar, two experiments were conducted the first one in pre-monsoon season and the second one in post-monsoon seasons (2015-2016). Four N fertilizer rates (0,60,120, and 180 kg N ha^{-1}) and three K fertilizer rates (0,62.25, and 124.50 kg K ha^{-1}) were set as factor A and B respectively, using randomized complete block design in two-factor factorial arrangement with three replications. In both seasons plant height, yield and yield components were the highest at 180 kg N ha-1. Potassium fertilizer application of 124.50 kg K ha-1 produced the highest seed cotton yield and improved fiber quality. The interaction of N x K application was observed in the number of bolls plant-1, boll weight plant-1 and yield. Maximum seed cotton yields were obtained from the treatments combining of 180 kg N ha-1 and 124.50 kg K ha-1 in both seasons. By the application of K fertilizer at 124.50 kg K ha-1, the fiber quality parameters, such as fiber length, fiber strength, fiber fineness and maturity ratio were the best in both seasons. This study suggested that application of K fertilizer at 124.50 kg K ha-1 in combination with 180 kg N ha-1 was the best in seed cotton production and its fiber quality for both seasons.

[88] T.T. Naing, Y.M. Soe, P.E.E. Kyaw, T.T. Khaing. 2017. Effect of raised bed method and fertilization on soil water storage groundnut yield. Journal of Agricultural Research. Vol 4(1). Page 56 - 64.
Reference ID: 23573
Note: #23573 > S 26.1.6 #23547
Abstract: A study was conducted with two field experiments, one in monsoon and another in post-monsoon season, 2015. To investigate the effect of raised bed method with four fertilization methods on soil waste storage and yield and yield components of groundnut, split-plot design with three replications of field experiments were conducted at the farm of Department of Soil and Water Science, Yezin Agricultural University during the monsoon and post-monsoon seasons of 2015. No raised bed method (R_0) and raised bed method (R_1) were arranged as main plots and four fertilization treatments, NPK recommended rate (30 kg Urea ha-1, 120 kg Triple-super-phosphate ha-1, 30 kg Potash ha^{-1}) (F_1), the integrated use of NPK (F_1)+ 5 ton FYM ha-1 (F_2), the integrated use of NPK (F_1) + 5 ton Compost ha-1 (F_3), and the integrated use of NPK (F_1) + 5 ton (FYM + compost) ha^{-1} (F_4), were assigned as subplots including no fertilizers and manures (F_0).
The results indicated that pant growths, groundnut yield and yield components (except

100 seed weight), soil water storage (SWS) and water use efficiency (WUE) were affected by R_1 at 5% level in monsoon season. In post-monsoon season, plant growth and number of pods per plant were affected by R_1 but yield and some yield components, SWS and WUE by using raised bed method did not show significant effects. Among the fertilizer applications, F4 produced the highest plant growth, yield and yield components, and the maximum SWS and WUE in both seasons. Bases on the results, raised bed method and the integrated use of NPK (F_1) + 5 ton (FYM + Compost) ha^{-1} produced the potential groundnut yield maximum SWS and WUE specially in monsoon season.

[89] N.S. Naing, Y.M. Soe, S.S. Thein, K. Moe. 2017. Response to Yield, Water and Nitrogen Use of Gybrid Rice under alternate wetting and drying irrigation and controlled release Nitrogen Fertilizers. Journal of Agricultural Research. Vol 4(1). Page 65 - 73.
Reference ID: 23574
Note: #23574 > S 26.1.6 #23547
Abstract: To evaluate the effects of alternate wetting and drying irrigation and controlled release nitrogen fertilizers on yield, water and nitrogen use efficiency on hybrid rice, pot experiments were conducted at the screen house of Department of Soil and Water Science, Yezin Agricultural University during the dry and wet seasons of 2015. In this study, the experiment was set up as split plot design with three replications involving N fertilizer types was used as main plot factors and irrigation regimes as sub plot factors. In this investigation, the rates of N fertilizer application were N_1-0 kg N ha^{-1} (control), N_2 - 150 kg N ha^{-1} (Urea), N_3-150 kg N ha^{-1} (Sulphur coated Urea)(SCU), N_4 - 150 kg N ha^{-1} (Gypsum coated Urea) (GCU) and irrigation management practices were I_1-Continuous flooding (CF) at 5 cm above the soil surface, I_2-(AWD_1), flooding 5 cm above the soil surface and reflooding again to original level when the water level decreases to the soil surface and I3 - (AWD2), flooding 5 cm above the soil surface and reflooding again to original level when the water level decreases to the depth 7.5 cm below the soil surface. Based on the finding of the present investigations, highest average yield , water use efficiency (WUE) and nitrogen use efficiency (NUE) were observed from SCU and N_0 (control) was lowest yield, WUE and NUE in both seasons. AWD_1 in wet season and AWD_2 in dry season produced higher yield, WUE and total water use than CF in this study. According to the results of this study, the use of controlled release nitrogen fertilizers (SCU) may be valuable option for the increase in nitrogen use efficiency and highest grain yield potential under rice cultivation on Yezin soil and alternate wetting and drying irrigation can give higher grain yield for rice production with effective use of irrigation water.

[90] K.L. Thu, A.N. Oo, K. Ngwe, P.E.E. Kyaw, S.P. Oo. 2017. Effect of Manure and chemical fertilizers on growth and yield of TheeHtet Yin Rice variety in Maubin Township. Journal of Agricultural Research. Vol 4(1). Page 74 - 80.
Reference ID: 23575
Note: #23575 > S 26.1.6 #23547
Abstract: An investigation comprising two field experiments was conducted at the farmer's field of LetKhoke Pin Village (Western Tar Pat Village Tract), Maubin Township, Ayeyarwaddy Region, during the dry seasons of 2015 and 2016, with the objective; to evaluate the effect of manure, chemical fertilizers and their combination effects on the growth and yield of TheeHtet Yin rice variety. These experiments were arranged in a Randomized Complete Block (RCB) Design with four replications. The treatments comprised of T_1 (control), T_2 (N: P: K at the rate of 86: 30: 40: kg ha^{-1}). T_3

(Cattle manure at the rate of 6.25 t ha^{-1}), T_4 (Poultry manure at the rate of 5 t ha^{-1}), T_5 (Cattle manure at the rate of 6.25 t ha^{-1} + N: P: K at the rate of 43: 15: 20 kg ha^{-1}), T_6 (Poultry manure at the rate of 5 t ha^{-1} + N: P: K at the rate of 43: 15: 20 kg ha^{-1}). The results showed that growth and yield components were responded to the application of manure and chemical fertilizers on TheeHtet Yin rice variety. The combination of poultry manure and NPK fertilizers produced the highest plant height, the maximum number of tillers per hill, panicles per hill, number of spikelets per panicle, 1000 grain weight, percentage of fill grain and grain yield in both seasons and followed by the combination of cattle manure and NPK fertilizers. The application of poultry manure only produced more yield than cattle manure applied only in both seasons. Least value of yield was resulted in the treatment of control in both seasons. According to the results of this study in Maubin Township, it could be suggested that poultry manure in combination with half amount of NPK fertilizers application could be used to get high yield of Theehtet Yin rice variety. Not only manures from animal sources but also other organic sources such as rice straw, compost and green manur should be examined future.

[91] M.T. Khaing, A.K. Myint, K. Ngwe, M. Thuzar, P.E.E. Kyaw. 2017. Phosphorus nutrition with or without Rhizobium Inoculation on Nitrogen accumulation and yield of Green Gram (*Vigna radiata* L.). Journal of Agricultural Research. Vol 4(1). Page 81 - 88.
Reference ID: 23576
Note: #23576 > S 26.1.6 #23547
Abstract: Phosphorus (P) is major limiting nutrient essential for higher yield and nitrogen fixation in green gram (*Vigna radiata* L.) which is good symbiont with rhuzibium bacteria. A set of pot experiments was carried out in 2015 using different levels of P application and rhizobium inoculation with the following objectives to examine the nitrogen (N) accumulation in green gram plant affected by phosphorus with or without rhizobium inoculation, and to evaluate the yield and yield components of green gram and the combining effect to P application and rhizobium inoculation. The treatments were 0, 30, 60, 90 kg $P_2 0_5$ ha^{-1} applications with or without rhizobium inoculation. Recommended fertilization at 32 kg N ha^{-1} and 63 kg K_2O ha^{-1} were applied as basal. The experiment was laid out in 2-factorial randomized complete block design with four replications. Throughout the growing season, 90 kg P_2O_5 ha^{-1} applications with rhizobium inoculation treatments showed the highest plant height and the maximum pod length. It also gave the maximum seed yield in both seasons. Rhizobium inoculation and different rates of phosphorus application of fertilizers together with rhizobium inoculation would improve crop yield, soil fertility, and environmental sustainability.

[92] P.T. Aung, N.O. Myint, K. Ngwe, M. Thuzar, A.A. Than. 2017. Effect of different organic nitrogen sources and urea fertilizer on growth and yield of maize (*Zea mays* L.). Journal of Agricultural Research. Vol 4(1). Page 89 - 95.
Reference ID: 23577
Note: #23577 > S 26.1.6 #23547
Abstract: A two consecutive seasons experiment was conducted to investigate the use of different organic N sources and urea fertilizer on growth and yield of maize, to determine the effect of the combination of different organic nitrogen sources and urea fertilizer on nitrogen use efficiency (NUE) and maize production and to study the changes of soil physico-chemical properties at Kya They Aie Village, Tattkon Township, Naypyitaw in April to August, 2015 for monsoon season and September,

2015 to January, 2016 for post-monsoon season. The treatments were Control (no nitrogen application), Urea (248kg Urea ha^{-1}), Leucaena (LU) (10 t ha^{-1}), Green gram (GG)(10 t ha^{-1}), Cow dung manure (CM)(10 t ha^{-1}), Poultry manure (PM) (5 t ha^{-1}), LU + Urea (5 t LU + 124 kg Urea ha^{-1}), GG + Urea (5 t GG + 124 kg Urea ha^{-1}), CM + Urea (5 t CM + 124 kg Urea ha^{-1}) and PM + Urea (2.5 t PM + 124 kg Urea ha^{-1}). Randomized complete block design (RCB) with four replications was used in this experiment. All of the tested N treatments produced greater maize yield than control. Application of only organic matter or urea fertilizer or combination of half dose of organic matter and urea would require to increase maize yield. Among tested organic N sources, Leucaena produced the greatest maize yield (5955 kg ha^{-1} in monsoon and 5793 kg ha^{-1} in post-monsoon season). The results were not significantly different from that of only urea fertilizer treatment in both seasons. Therefore, Leucaena could be fully substituted for urea fertilizer treatment in maize production. Combined application of half dose of LU or GG or CM or PM and urea fertilizer gave greater NUE and maize yield than application of only organic matter or urea alone in both seasons.

[93] K.K. Gyi, K.K. Than, T.T. Oo, M. Thaung. 2017. Efficacy of some insecticidal spray patterns on cotton Jassid, *Amrasca biguttula* (Ishida) (Hemiptera: Cicadellidae). Journal of Agricultural Research. Vol 4(1). Page 96 - 103.
Reference ID: 23578
Note: #23578 > S 26.1.6 #23547
Abstract: All tested spray patterns were found to be effective against cotton jassid and gave higher seed cotton yields compared to control. Cotton plants ratationally sprayed with 3 different insecticides at fortnight intervals proved to be highly effective by giving statistically highest seed cotton yields in Ngwechi-6 and Shwedaung-8 varieties with the lowest jassid infestation along the season. In economic point of view, plots treated with 3 insecticides at ETL within 30-90 DAE in pre-monsoon season and at ETL until 120 DAE in post-monsoon season gave higher incremental benefit-cost ratio (IBCR) so that it could be recommended as suitable spray patterns for two tested varieties. Although neem insecticide reduces jassid infestation, low IBCR was observed.

[94] K.N.W. Thant, M.H. Phyu, T.T. Oo, M. Thaung. 2017. Species diversity of natural enemy association on rice at two different locations. Journal of Agricultural Research. Vol 4(1). Page 104 - 112.
Reference ID: 23579
Note: #23579 > S 26.1.6 #23547
Abstract: The experiments were conducted to compare the species diversity and abundance of natural enemies on rive by using light trap, pitfall traps, yellow pan traps and yellow sticky traps at Nyaungbingyisu (Nay Pyi Taw Council Area) and Hmawbi from February to June 2014. Forty-four species from 7 orders of natural enemy were recorded from Nyaungbingyisu and 45 species from 7 orders of natural enemy were recorded from Hmawbi. Species abundance and species evenness were calculated by Shannon-Wiener formula. At Nyaungbingyisu, the species index of natural enemies in vegetative stage, reproductive stage and ripening stage were 2.05, 2.46 and 4.04, respectively. The equitability of natural enemies in vegetative stage, reproductive stage and ripening stage were 0.36, 0.43 and 0.71, respectively. At Nyaungbingyisu, natural enemy family of Miridae was the highest populations in vegetative stage. The highest mean population number was observed in family Hydrophilidae in reproductive stage and Family Formicidae in ripening stage. At Hmawbi, natural enemy family of Formicidae had greater population number in all stages.

[95] K.K. Soe, Y.Y. Min, M.Z. Aung, T.A.A. Naing. 2017. Evaluation of different control measures on bacterial wilt of tomato caused by *Ralstonia solancearum*. Journal of Agricultural Research. Vol 4(1). Page 113 - 116.
Reference ID: 23580
Note: #23580 > S 26.1.6 #23547
Abstract: The experiment was conducted in the greenhouse of the Department of Plant Pathology, Yezin Agricultural University in the months of April and May, 2016 to determine the effective control measures on bacterial wilt of tomato. Completely Randomized Design with three replications was used in this experiment. Different control measures - three kinds of organic amendments (5, 10, 20% dry weight basis each of cowdung compost, corncob compost and vermicompost), one agricultural waste (sugarcane begasse at 5, 105 20% dry weight basis), one antibiotic (streptomycin 10^5 ppm) and one fungicide (benomyl 1.25 kg ha-1) at their recommended rates were used to explore their suppressiveness on bacterial wilt disease. The lower wilted plant percentages (15 - 25%) were found in soil amended with 10% corncob compost (15%), 20% cowdung compost (20%), and 20% vermicompost (25%) than those of the use of stretomycin (55%) and benomyl (70%). The results suggested that the use of soil amendments was the best environmentally friendly tactics for control of bacterial wilt of tomato. However, corncob compost may increase disease intensity at higher rates.

[96] K.M. Htoo, Y.Y. Min, S.S. Aye, H.H. Oo, N.M. Htwe, T.A.A. Naing. 2017. Effect of potassium fertilizer application on bacterial blight of rice caused by *Xanthomonas oryzae* pv. Oryzae. Journal of Agricultural Research. Vol 4(1). Page 117 - 125.
Reference ID: 23581
Note: #23581 > S 26.1.6 #23547
Abstract: Twenty-seven isolates of *Xanthomonas oryzae* pv. oryzae (Xoo) were collected from Pyinmana, Lewe, Dakkhinathiri and Zeyathiri Townships in Union territory and Ye U, Taze, Khin U, Tabayin and Shwebo Townships in Sagaing Region. A pot experiment was conducted at the Department of Plant Pathology, Yezin Agricultural University (YAU) from April to August 2013. Lewe 3 isolate was found to be the highest pathogenicity (disease severity 76%) at maximum tillering stage on Manawthukha rice variety. Field experiments were conducted at Daik U and Maubin Township, during December, 2014 to April, 2015. Potassium fertilizer at different rates (15, 30 and 45 kg ha^{-1} as basal), 15 kg ha^{-1} in two splits (6 kg ha^{-1} at basal and 9 kg ha^{-1} at maximum tillering), 15 kg ha^{-1} in two splits (6 kg ha-1 at maximum tillering and 9kg ha-1 at early panicle initiation (EPI)), 30 kg ha-1 in two equal splits (1/2 at basal and 1/2 at maximum tillering), 45 kg ha-1 in three equal splits (1/3 at basal, 1/3 at maximum tillering and 1/3 at EPI), and no potassium fertilizer application were used as treatments. Potassium fertilizer application at the rate of 30 kg ha-1 in two equal splits (1/2 at basal and 1/2 at maximum tillering) was observed to render minimum disease severity and higher yield than other treatments.

[97] W.W. Htun, T. Myint, C.C. San. 2017. Sustainable microfinance performance: Improving socioeconomic status and social capital leading to rural development in Myanmar. Journal of Agricultural Research. Vol 4(1). Page 126 - 134.
Reference ID: 23582
Note: #23582 > S 26.1.6 #23547
Abstract: This study aims to explain how microfinance performances contribute the socioeconomic and social capital improvement in Myanmar rural society. Ayartaw township and Bogale township representing the dry zone and Ayeyarwady delta were

selected as the study areas. Each eighty sample respondents from Myanma Agricultural Development Bank (MADB) and Private Agency Collaborating Together (PACT) were selected by purposive sampling for three villages in Ayartaw township. The same sampling procedure was conducted for five villages in Bogale township. Socioeconomic and social capital improvement of the clients was examined by using descriptive analysis. It was found that disbursing of MADB and PACT loans was respectively for agriculture and income generating activities, loans were also allocated in subsistence living requirements, education expenses and debt payment in the study areas. MADB and PACT loans help the clients respectively their works to some extent as well as their subsistence living requirements as a relief program. Both MADB and PACT clients described their satisfaction on the performances of MADB and PACT such as disbursed loan amount, interest rate and disbursing process. Suggestions on MADB are the current loan amount should cover the actual rice crop production cost and disburse for all cultivating rice areas. PACT's schedule for collection of interest and loan should be convenient for the clients.

[98] W.W. Htun, T. Myint, C.C. San. 2017. Financial sustainability of microfinance institutions (MADB and PACT) in rural credit market for rural development in Myanmar. Journal of Agricultural Research. Vol 4(1). Page 135 - 143.
Reference ID: 23583
Note: #23583 > S 26.1.6 #23547
Abstract: This study aims to examine financial sustainability of microfinance institutions: Myanma Agricultural Development Bank (MADB) and Private Agency Collaborating Together (PACT) for rural development in Myanmar. In this study, secondary data of 2010-2015 on total incomes and total expenditures of MADB and PACT were gathered from the head offices of these two institutions. Detail information was collected by doing discussion with senior officers of MADB and PACT. The data were calculated by using operational self-sufficiency (OSS) ratio and break-even analysis formulas to determine financial sustainability of these two institutions in Myanmar rural credit market. Calculations on OSS ratio of these institutions showed over 100% describing financial sustainability and well microfinance performances of MADB and PACT in rural credit market from 2010 to 2015. According to the break-even analysis on MADB and PACT for that duration, the net income showed positive sign. It explains that MADB and PACT were running its microfinance performances without losses in rural credit market. Suggestion on MADB is that MADB would strengthen its loan facilities not only annual crop production loans but also farm machinery loans. PACT's practices would be continued and maintained its performances by considering various local situations.

[99] A. Phyo, C.C. San, N.M. Aung. 2017. Case study on profitability of Small Groundnut oil Mills in Myingyan Township, Mandalay Region. Journal of Agricultural Research. Vol 4(1). Page 144 - 152.
Reference ID: 23584
Note: #23584 > S 26.1.6 #23547
Abstract: This study was mainly focused on the current situation, profitability and influencing factors on profits of five small groundnut oil mills in Myingyan Township for year 2014. All mills have a capacity of approximately 1306 kg per day. For 2014, they processed only in average of 172 kg/day. Raw material (groundnut) price was more or less similar during January to June in 2014. After June, groundnut price was increased due to increase in export price of groundnut to China. The oil producing cost can be divided into three groups: fixed investment, raw material and processing costs.

Among them, raw material cost attributed to the highest proportion of total cost (more than 95%) in all mills. The amount of oil production depended on oil extraction method used and the quality of raw material. In study area, the extraction rate of groundnut was about 40% of oil and 55% of cake. Regarding profitability analysis, benefit cost ratio (BCR) above total cost was the same in all mills (around 1.03). BCR over variable cost was about 1.05. According to the profit function, oil processing profit was positively and significantly influenced at 1% level by raw material amount, oil price and cake price. It means that the larger in the raw material amount processed, price of oil and price of cake, the greater the profit can be obtained. It revealed that these mills were running in profitable condition. Tax payment also positively and significantly influenced on profit at 5% level. Tax payment was paid based on the amount of production. Groundnut price was negatively and significantly influenced on profit at 1% level. The adjusted R^2 showed that the model was significant and it can explain on the variation in groundnut oil processing profit by 86%.

[100] K.T. Khin, S.M. Than, T. Myint, C.C. San. 2017. Comparative advantages of rice productions in Maubin and Daik U Townships in Lower Myanmar. Journal of Agricultural Research. Vol 4(1). Page 153 - 159.
Reference ID: 23585
Note: #23585 > S 26.1.6 #23547
Abstract: This study was carried out to examine whether the farmers in the study areas are efficient producers in term of comparative advantage by using policy analysis matrix (PAM). This study was based on primary and secondary sources of data. The primary data for the study was obtained by using simple random sampling method from 120 sampled farmers in Maubin and Daik U Townships during September to October, 2015. Domestic Resource Cost (DRC) analysis and Policy Analysis Matrix (PAM) were used to measure the comparative advantage on rice in monsoon rice and summer rice growing seasons. The results showed that rice production in both township had comparative advantage because the values of DRC were less than unity. In both cultivation seasons, summer rice had more comparative advantage. The market distortions in rice cultivation were found in both outputs and inputs in the study areas. As the results of Nominal Protection Coefficient for Output, NPCO and Effective Protection Coefficient, EPC (>1) showed that positive protection occurred for farmers under existing government interventions. But the farmers were implicitly taxed on the price of tradable inputs by purchasing due to the distortion of foreign exchange policy. To obtain the higher comparative advantage, rice production should be enhanced and high quality rice should be more cultivated by supporting the quality seeds, better technologies and reliable inputs such as fertilizers and agro-chemicals.

[101] S.Y.W. Lei, T. Than, T. Myint, N.M.A. War. 2017. Traditional and Contract-type supply chain of cabbage and cauliflower in Kalaw. Journal of Agricultural Research. Vol 4(1). Page 160 - 165.
Reference ID: 23586
Note: #23586 > S 26.1.6 #23547
Abstract: This study was conducted to investigate the socio-economic characteristics, cost and return, marketing activities and supply chains of cabbage and cauliflower productions. The farm level survey and the market intermediary level survey were conducted to 50 each of cabbage and cauliflower growers and 30 marketing participants in October- November 2015. Supply chains of cabbage and cauliflower from farm to market (traditional supply chain) and to Myanmar Belle Dehydrated Factory (contract-type) were found in Kalaw. Descriptive, cost and return, and

marketing margin analysis were used. Among the market intermediaries of cabbage and cauliflower village collectors, brokers, township wholesalers and retailers got higher profit than others. In the traditional supply chain, benefit cost ratio of winter cabbage non-contract farmers (2.64) got more profit than contract farmers (2.38) in contract type supply chain of cabbage. In traditional chain, benefit cost ratio (3.01) of winter cauliflower production was less than rain-fed cauliflower (3.55). Seven marketing channels were performed and village collectors were active among the market intermediary.

[102] Z.N. Hlaing, N.M. Aung, C.C. San. 2017. Dominance of Informal seed sources and factors influencing the demand of quality seed in rice production. Journal of Agricultural Research. Vol 4(1). Page 166 - 172.
Reference ID: 23587
Note: #23587 > S 26.1.6 #23547
Abstract: The seed is the fundamental input for sustainable crop production and its quality forms the basis of high productivity. Therefore, farmers should replace periodically the seed with certified seed of formal agencies. However, lack of quality seed (certified seed) continues to be one of the greatest challenges in high production of crop. Hence, this paper aimed to identify the dominant seed sources of rice seed in production and to find out the factors affecting the demand of rice quality seeds. Data were obtained from farmer survey covering 120 farmers selected from Daik U and Maubin townships by purposive random sampling from Bago and Ayarwaddy regions of Myanmar. Descriptive method and regression were used in data analysis. It was observed that Maubin farmers widely used Hnan Kar, Sin Thu Kha and Thee Htat Yin rice varieties and the sources of these varieties were other farmers and own seeds for Hnankar (42 and 52%) and Thee Htat Yin (28 and 31 %) while township level Department of Agriculture (DoA), other farmers and own seed for Sin Thu Kha were 45%, 13% and 20% of seed sources, respectively. Hmawbi-2, Sin Thu Kha and Manaw Thu Kha varieties were commonly grown in Daik U township.

[103] IPNI. 2012. Scientific Principles Supporting RIght Source. Page 3-1 - 3-34.
Reference ID: 23588
Note: #23588e > S 2.8 #19284

[104] M.J. Pringle, S.E. Cook, A.B. McBratney. 2004. Field-Scale Experiments for Site-Specific Crop Management. Part 1: Design Considerations. Precision Agriculture. Vol 5. Page 617 - 624.
Reference ID: 23589
Note: #23589e
Abstract: This is a two-part paper concerned with the role of field-scale experiments in site-specific crop management (SSCM). Part I is a general introduction to experimental design for SSCM, while Part II focuses on applied analysis. All references are listed at the end of Part II. In Part I, we list the goals of SSCM-experimentation, in addition to the classes of valid experimental designs. Three general approaches are proposed for choosing experimental designs: approach A is for experiments concerning management classes, while approaches B and C are alternatives for continuous management. Approaches A and B are comparative and can be analysed with an appropriately modified ANOVA.

[105] M.J. Pringle, A.B. McBratney, S.E. Cook. 2004. Field-Scale Experiments for Site-Specific Crop Management. Part II: A Geostatistical Analysis. Precision Agriculture. Vol 5. Page 625 - 645.
Reference ID: 23590
Note: #23590e
Abstract: Part II analyses approach C experiments. Field-scale experiments were applied to four wheat fields in the Western Australian wheat belt. Different experimental designs were used: two two-dimensional sine-waves, a chequerboard, and a two-factor strip arrangement. In each experiment, the yield associated with a particular treatment was predicted by kriging to where the other treatments were located. Different forms of kriging were investigated. Co-located cokriging, using the previous-season yield map as a covariate, was the most promising. The kriged data were then modelled with polynomial yield response functions. The outcome was a map for each field that described the optimum application of experimental input. The requirements varied continuously across the field, and could justify future site-specific crop management. The two-factor strip experiment was the most successful of those presented; the field on which it was used showed relatively strong responses to the applied inputs. The other sites were affected by lack of rain and/or design flaws. The underlying philosophy is sound, but the method proposed is time consuming and inefficient. We hope that this paper can stimulate further research on the subject.

[106] Z.M. Win, T. Myint, T. Than, N.N. Htwe. 2017. Gender role and decision making in household economics activities between farm and landless households in Bogale Township. Journal of Agricultural Research. Vol 4(1). Page 173 - 179.
Reference ID: 23591
Note: #235091 > S 26.1.6 #23547
Abstract: The study was conducted in six villages, Bogale Township in collaboration with IRRI gender expert by ACIAR program. The primary data were collected from totally 163 sample women from farm and landless households by personal interview using structured questionnaire in June 2015. The study aimed to compare the household income between farm and landless households, to analyze the gender perspective in decision making, to study the role of gender in participation of extension and training activities and to explore the time allocation per day of women. As the findings, crop income was the main income in farm households while off-farm income and non-farm income were major sources in landless households. The current indebtedness level of sample farm and landless household were increasing compared with the previous year and three years ago. Farm households accessed more credit sources and higher credit amount than landless households. Women of farm household's decision making power were higher in livestock raising and crop production than other economic activities. Women decision making power was the highest in non-far, economic activities for landless households because it was one of the main income sources. Nutrition and healthy food training had the highest participation of women among the sex tension and other trainings in both households. For farm holders, rice production training was the second common training. Farmer and landless respondents used 40 and 88 minutes per day for off-farm work activity. In the other hand, farmer respondents used 86 minutes for farming and livestock work which was two times larger than landless respondents (47 minutes).

[107] T. Fairhurst, R. Hardter. 2017. Oil Palm Management for large and sustainable yields (Edited Version). Page 1 - 382.
Reference ID: 23592
Note: S 8.1.1 #23592 (Edited)
S 8.1.1 #11869 (Previous Version)
Reprint with amendments on pages: 192, 193, 243, 246, 249, 309, 341, 342, 346, 346
Abstract: One of the most attractive aspects of the oil palm industry is the strong sense of community amongst the redoubtable planters and agronomists who live and work on the front line, often in very remote places, and sometimes under difficult and trying circumstances. It had been our great pleasure to learn from their expertise, and experience their find hospitality, during hundreds of field trips and visit over the past twenty years.

[108] R. Sylvester-Bradley, D.R. Kindred, B. Marchant, S. Rudolph, S. Roques, A. Calatayud, S. Clarke, V. Gillingham. 2017. Agronomics: Transforming crop science through digital technologies. Advances in Animal Biosciences: Precision Agriculture (ECPA). Vol 8(2). Page 728 - 733.
Reference ID: 23593
Note: #23593e
Abstract: Good progress in crop husbandry and science requires that impacts of field-scale interventions can be measured, analysed andinterpreted easily and with confidence. The term 'agronomics' describes the arena for research created by field-scale digitaltechnologies where these technologies can enable effective commercially relevant experimentation. Ongoing trials with 'precisionfarmresearch networks', along with new statistical methods (and associated software), show that robust conclusions can be drawnfrom digital field-scale comparisons, but they also show significant scope for improvement in the validity, accuracy and precision ofdigital measurements, especially those determining crop yields.

[109] R. Sylvester-Bradley, R.E. Thorman, D.R. Kindred, K. Smith. 2014. Efficiencies of nitrogen fertilizers for winter cereal production, with implications for greenhouse gas. The Journal of Agricultural Science. Vol 152. Page 3 - 22.
Reference ID: 23594
Note: #23594e
Abstract: Fertilizer nitrogen (N) accounts for the majority of the greenhouse gas (GHG) emissions associated with intensive wheat production, and the form of fertilizer N affects these emissions. Differences in manufacturing emissions (as represented in the current carbon accounting methodologies) tend to favour urea, even when using the best available manufacturing technologies (BAT), whereas differences in fertilizer N efficiency and emissions of ammonia tend to favour ammonium nitrate (AN). To resolve these differences, data from 47 experiments in two large UK studies conducted from 1982 to 1987 and from 2003 to 2005 were reanalysed, showing that on average urea efficiency was 0·9 of AN (although mean ammonia emissions in 10 subsidiary experiments indicated an efficiency difference of 0·2); treating urea with a urease inhibitor (TU; AGROTAIN®, active ingredient N-(n-butyl) thiophosphoric triamide (n-BTPT)) brought its efficiency almost in line with AN; however, a significantly greater mean optimum N amount for TU (+ 0·1 of AN) was not fully explained. A standard response function relating wheat yield to applied AN was modified for degrees of relative inefficiency, thus enabling yields and GHG intensities (kg CO2e/tonne (t) grain) to be calculated using a PAS2050 compatible model for GHG emissions for any N amount of any N form.With AN manufactured by average European technology

(AET), the estimated GHG intensity of wheat producing 8 t/ha was 451 kg/t; whereas with urea or TU made by AET it was 0.87–0.99 or 0.84– 0.86 of this respectively. Using BAT for fertilizer manufacture, the grain's GHG intensity with AN and TU was 368 kg/t, but was 1·03–1·17 of this with untreated urea. The range of effects on GHG intensities arose mainly from remaining uncertainties in the inefficiencies of the N forms. Generally, economic margins and GHG intensities were not much affected by adjustments in N use for relative inefficiencies or different prices of urea-based fertilizers compared with AN. Overall, TU appeared to provide the best combination of economic performance and GHG intensity, unless the price for N as TU exceeded that for N as AN.

[110] D.R. Kindred, R. Sylvester-Bradley, A.E. Milne, B. Marchant, D. Hatley, S.L. Kendall, S. Clarke, K. Storer, P.M. Berry. 2017. Spatial variation in nitrogen requirements of cereals, and their interpretation. Advances in Animal Biosciences: Precision Agriculture (ECPA). Vol 8(2). Page 303 - 307.
Reference ID: 23595
Note: #23595e
Abstract: A range of precision farming technologies are used commercially for variable rate applications of nitrogen (N) for cereals, yet these usually adjust N rates from a pre-set value, rather than predicting economically optimal N requirements on an absolute basis. This paper reports chessboard experiments set up to examine variation in N requirements, and to develop and test systems for its prediction, and to assess its predictability. Results showed very substantial variability in fertiliser N requirements within fields, typically >150 kg ha−1, and large variation in optimal yields, typically >2 t ha−1. Despite this, calculated increases in yield and gross margin with N requirements perfectly matched across fields were surprisingly modest (compared to the uniform average rate). Implications are discussed, including the causes of the large remaining variation in grain yield, after N limitations were removed.

[111] D.R. Kindred, R. Sylvester-Bradley, S. Clarke, S. Roques, I. Smillie, B. Pete. 2016. Agronomics - an arena for synergy between the science and practice of crop production. Page 1 - 12.
Reference ID: 23596
Note: #23596e
Abstract: Progress towards sustainable intensification depends on effective exchange of knowledge and data between industry and academia. This requires engagement of both farmers and researchers, recognition that innovations can occur in the field as well as in the lab, and that researchers have as much to learn from farming and farmers as vice versa. A number of initiatives in the UK are recognising the value of farm networks for effective knowledge exchange and for asking questions of relevance on-farm; however the value for science is less well recognised. Uptake of digital record keeping and precision farming technologies is now becoming ubiquitous, giving new opportunities for farmers to share data amongst themselves and with researchers to provide new insights, but crucially also allowing farmers to make interventions in-field and to measure their impacts on-farm, for example by yield mapping. New statistical approaches are required to draw robust conclusions from this sort of data, but the authors believe its use could be transformative of agronomic science, so much so that we have created a new term to describe the approach; namely, 'agronōmics'. The major benefits of experimenting in fields with farmers are; i) working at a relevant scale with the ability to test treatments not possible at the plot scale; ii) the potential to assess treatment interactions with soil differences (experimenting with soils is

challenging with conventional plots); iii) the potential for greater precision to evaluate treatments with confidence intervals of less than 0.5 t/ha; iv) engagement of farmers, hence embedding knowledge exchange within research. However, it is crucial for effective knowledge exchange that farmers and researchers share the same concepts and metrics. ADAS has thus established the Yield Enhancement Network to allow both arable innovators and researchers to compare actual farm yields with theoretical 'potential' yields (estimated using conventional crop science concepts) and hence to develop the common conceptual framework necessary to underpin yield-targeted innovations.

[112] D.R. Kindred, A.E. Milne, R. Webster, B.P. Marchant, R. Sylvester-Bradley. 2015. Exploring the spatial variation in the fertilizer-nitrogen requirement of wheat within fields. Journal of Agricultural Science. Vol 153. Page 25 - 41.
Reference ID: 23597
Note: #23597e
Abstract: The fertilizer-nitrogen (N) requirement for wheat grown in the UK varies from field to field. Differences in the soil type, climate and cropping history result in differences in (i) the crops' demands for N, (ii) the supply of N from the soil (SNS) and (iii) the recovery of the fertilizer by the crops. These three components generally form the basis of systems for N recommendation. Three field experiments were set out to investigate the variation of the N requirement for wheat within fields and to explore the importance of variation in the crops' demands for N, SNS and fertilizer recovery in explaining the differences in the economic optima for N. The N optima were found to vary by >100 kg N/ha at two of the sites. At the other site, the yield response to N was small. Yields at the optimum rate of N varied spatially by c. 4 t/ha at each site. Soil N supply, which was estimated by the unfertilized crops' harvested N, varied spatially by 120, 75 and 60 kg/ha in the three experiments. Fertilizer recovery varied spatially from 30% to >100% at each of the sites. There were clear relationships between the SNS and the N optima at all the three sites. The expected relationship between the crop's demand for N and N optima was evident at only one of the three sites. There was no consistent relationship between the N recovery and the N optima. A consistent relationship emerged, however, between the optimal yield and SNS; areas with a greater yield potential tending to also supply more N from the soil. This moderated the expected effect of the SNS and the crop's demand for N on the N optima.

[113] C. Synder. 2017. Progress in Reducing Nutrient Loss in the Mississippi River Basin – But Effects on Gulf Hypoxia Still Lag. IPNI Issue Review July 2017, No. 1. Page 1 - 20.
Reference ID: 23598
Note: #23598e
Abstract: Nutrient losses from farm fields remain major economic and environmental concerns in the Mississippi River Basin (MRB). Current loss rates of nitrogen (N) can represent a substantial profit loss to many growers. Losses of both N and phosphorus (P) can negatively affect water quality in the streams and rivers within the Basin, and in the northern Gulf of Mexico. This report identifies trends in N and P use from 1987 to 2012, MRB and sub-Basin partial N and P balances, hypoxia in the Gulf of Mexico, and highlights progress toward reductions in nutrient losses. These results: 1) underscore the need for expanded implementation of beneficial 4R nutrient management, and complementary soil and water conservation practices; 2) help emphasize the importance of conducting long-term, systems-level 4R nutrient management research; and 3) point to the need for N and P performance monitoring

and tracking at field, farm, and watershed scales.

[114] IPNI. 1991. Research With Impact - Long-term Research Documents Importance of Balanced Plant Nutrition. IPNI. Page 1-2.
Reference ID: 23599
Note: #23599e
Abstract:
The Challenge:
Most crop nutrition research is conducted over relatively short periods of time, typically in the 2 to 5-year range. These studies are generally limited to a few years due to various constraints, including cost and space restrictions. While short-term experiments provide valuable information regarding 4R-based nutrient management, there are inherent limitations in evaluating the long-term impacts of fertilizer management on crop yield and quality, soil health, and environmental impacts. Many of these parameters change very slowly or have seasonal variation that require long-term assessment. Additionally, evidence of gradually declining soil fertility in under-fertilized plots provides the information necessary to halt soil degradation with proper nutrient management. There are few studies in the world that are truly long-term (e.g., >50-year duration), and those that do exist are routinely threatened with termination for various reasons, most often involving funding. Farmers increasingly need science-based information on the role of balanced plant nutrition to optimize profitability and minimize environmental impact.

[115] M.P.O.B. (MPOB). 2016. Malaysian Oil Palm Statistics 2016 -36th Edition. Page 1 - 209.
Reference ID: 23600
Note: S 8.1.1 #23600

[116] J. Sawyer, B. Lang, D. Barker. 2011. Sulfur emerge as a nutritional issue in Iowa Alfalfa production. Better Crops With Plant Food. Vol 95(2). Page 6 - 7.
Reference ID: 23601
Note: #23601e > S Serial #20260e
Abstract: Sulfur is often classified as a “secondary” essential element, mainly due to a smaller plant requirement, but also because it is less frequently applied as a fertilizer compared to N, P, and K. This has certainly been the case in Iowa, where research had not documented S deficiency or fertilization need for optimal crop production. However, if deficient, S can have a dramatic effect on plant growth and crop productivity – more than the classification “secondary” would imply.

[117] J. Sawyer, B. Lang, D. Barker. 2011. Sulfur Fertilization Response in Iowa Corn Production. Better Crops With Plant Food. Vol 95(2). Page 8 - 10.
Reference ID: 23602
Note: #23602e > S Serial #20260e
Abstract: With the positive results from S fertilization in alfalfa (see related article, page 6), trials were started in 2006 corn fields where early plant growth was exhibiting S deficiency symptoms or where there was expectation of S deficiency. Calcium sulfate (CaSO4•H2O, gypsum) was surface broadcast applied after early corn growth at 40 lb S/A, with a control treatment for comparison. The 40 lb S/A rate was chosen as a non-limiting S rate to maximize any potential yield increase.

[118] V.A. Romanenkov. 2011. Optimization principles of nitrogen management for winter wheat at the farm level (Central Russia). Better Crops With Plant Food. Vol 95(2). Page 12 - 15.
Reference ID: 23603
Note: #23603e > S Serial #20260e
Abstract: Despite the long history of studies and the diversity of calculation methods, the problem of optimization of the rates of mineral fertilizers and the ratios of nutrients in them is still the focus of attention. The rise in prices of material resources of agriculture and, hence, the rise in cost of agricultural produce make this problem even more acute.

[119] J.W. Van Groenigen, O. Oenema, K.J. van Groenigen, G. Velthof, C. van Kessel. 2011. Best Nitrogen Management Practices to Decrease Greenhouse Gas Emissions. Better Crops With Plant Food. Vol 95(2). Page 16 - 17.
Reference ID: 23604
Note: #23604e > S Serial #20260e
Abstract: Agricultural soils are the main source of human-caused emissions of the greenhouse gas (GHG) nitrous oxide (N2O) to the atmosphere. Those emissions are often expressed per area of land use or as a percentage of the fertilizer application rates. In a recent scientific journal article, we argued that N2O emissions should instead be related to agricultural production. In a meta-analysis of 19 independent studies that report both N2O emissions and crop yield, we show that N2O emissions per unit of harvested product are stable as long as the aboveground N surplus remains low. We conclude that the aims of optimal agricultural production and low GHG emissions are remarkably similar and might best be achieved through implementing best management practices (BMPs). Management should be focused on optimizing fertilizer N use efficiency (NUE) rather than on simply reducing fertilizer N application rates.

[120] J.C. Silvertooth, K.F. Bronson, E.R. Norton, R. Mikkelsen. 2011. Nitrogen Utilization by Western U.S. Cotton (North America). Better Crops With Plant Food. Vol 95(2). Page 21 - 23.
Reference ID: 23605
Note: #23605e > S Serial #20260e
Abstract: An adequate supply of N is essential for successful cotton production. Sufficient N initially supports rapid development of leaves and roots. Later in the season, most of the N is found in the seeds. Understanding cotton development aids in efficient nutrient management.

[121] Y. Duan, D. Tuo, P. Zhao, H. Li, S. Li. 2011. Crop yield and soil fertility as influenced by nutrient management in Rainfed Inner Mongolia (Northwest China). Better Crops With Plant Food. Vol 95(2). Page 24 - 25.
Reference ID: 23606
Note: #23606e > S Serial #20260e
Abstract: Traditional nutrient management within the rainfed regions of Inner Mongolia usually results in poor crop productivity. In this study, six successive crop seasons found N, P, and K fertilizer to be responsible for a range of crop yield increases between 5 and 50%. The combined use of recommended NPK rates with manures sustained crop yields and improved soil fertility, but caution must be exercised to avoid the overuse of P and, in turn, the over accumulation of P in soil.

[122] T. Bruulsema. 2011. Fertilizer Use and Human Health. Better Crops With Plant Food. Vol 95(2). Page 26 - 26.
Reference ID: 23607
Note: #23607e > S Serial #20260e
Abstract: Once again, food prices have been climbing. A growing human family seeks more and better food. Farmers, already under pressure to reduce impact on the environment, are pushed to produce more. Responsible stewardship of plant nutrition has never been more important.
The issue of food security comprises more than just quantity. Quality is just as crucial. Plant nutrition impacts both, ensuring that plant products nourish people. To meet the nutritional needs of expected population growth, global cereal production is forecast to increase by 70% by 2050. Important components of these nutritional needs include carbohydrates, proteins, oils, vitamins, and minerals. Plant nutrition affects them all.
Many of the healthful components of food are boosted by the application of nutrients. Since most farmers already fertilize for optimum yields, these benefits are easily overlooked. Applying N to cereals adds to the protein they produce, as well as their yields. Phosphorus, K, and S can all enhance the biological value of the protein in potatoes. Trace elements important to human nutrition, especially zinc, selenium, and iodine, can be optimized in the diet by applying them to food crops. Plant nutrition can impact the plant diseases that cause degradation of food products and mycotoxin risks.

[123] IFA. 2017. Plant Nutrients and Ocean Health. I.F.A. (IFA). Page 1 - 5.
Reference ID: 23608
Note: #23608e
Abstract: The fertilizer industry is fully committed and engaged to contribute to the implementation of Target 14.1 of the Sustainable Development Goals (SDGs): “By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.”

[124] The University Press Oxford, 1937. The Empire Journal of Experimental Agriculture Vol. 5. The University Press, Oxford. Page 1 - 380.
Reference ID: 23609
Note: #23609e

[125] P.E. Fixen, T.W. Bruulsema, T.L. Jensen, R. Mikkelsen, T.S. Murrell, S.B. Phillips, Q. Rund, W.M. Stewart. 2010. The Fertility of North American Soils, 2010. Better Crops With Plant Food. Vol 94(4). Page 6 - 8.
Reference ID: 23610
Note: #23610e > S Serial #20258e
Abstract: With the assistance of numerous private and public soil testing laboratories, the International Plant Nutrition Institute (IPNI) periodically summarizes soil test levels in North America (NA). Soil tests indicate the relative capacity of soil to provide nutrients to plants. Therefore, this summary can be viewed as an indicator of the nutrient supplying capacity or fertility of soils in NA. This is the tenth summary completed by IPNI or its predecessor, the Potash & Phosphate Institute (PPI), with the first summary dating back to the late 1960s (Nelson, 1980).

[126] G. Gamzikov, V. Nosov. 2010. Role of crop nutrition in narrowing the yield gap for spring wheat in Siberia (Russia). Better Crops With Plant Food. Vol 94(4). Page 9 - 11.
Reference ID: 23611
Note: #23611e > S Serial #20258e
Abstract: Mineral fertilizers and other agro-inputs are important for achieving high and stable yields of spring wheat, the principle field crop in Siberia. This article reviews the attainable yield of spring wheat by the major soil-climatic zones through the region. The authors characterize the present status of fertilizer consumption in Siberia and, based on minimum nutrient requirements of crops, give a short-term estimate of fertilizer consumption in the region.

[127] R. Zapata, J. Espinosa. 2010. Agronomic Education and Credit for Purchasing Fertilizer Bring Environmental and Social Benefits for Coffee Growers–An Update (Peru). Better Crops With Plant Food. Vol 94(4). Page 12 - 15.
Reference ID: 23612
Note: #23612e > S Serial #20258e
Abstract: An article in this publication in 2007 reported on a successful, privately funded program in Peru which enables farm families to improve their standard of living and better manage land in coffee production. IPNI staff have assisted this program by providing agronomic education. Following is a recap of the story and an update on continued progress of the “Family Program”.

[128] L. Leal, A. Salamanca, S. Sadeghian. 2010. Urea volatilization losses from coffee plantations (Colombia). Better Crops With Plant Food. Vol 94(4). Page 18 - 19.
Reference ID: 23613
Note: #23613e > S Serial #20258e
Abstract: Responses to N are common in the coffee growing areas of the world. In Colombia, N recommendations vary from 120 to 300 kg N/ha/year, according to soil organic matter content, shade level, and plant density. Yield reductions of 30 to 50% are expected when N is not applied to the crop. Urea is the most common source of N used in coffee production in Colombia due to its high N content and relatively low price per unit. High N losses via volatilization from broadcast-applied urea are expected under the climate and soil conditions prevalent in the coffee production areas in Colombia. However, field research in the country to quantify the magnitude of these losses has been lacking.

[129] T.S. Murrell, T.J. Vyn. 2010. Precision management of root zone potassium for corn: Considerations for the future (North America). Better Crops With Plant Food. Vol 94(4). Page 24 - 25.
Reference ID: 23614
Note: #23614e > S Serial #20258e
Abstract: Precision technologies allow fertilized soil volume to be managed over time to create zones of higher fertility, but just how this should be done for optimum short-term and long-term crop response is not well understood. Relevant considerations for K fertilizer placement include the persistence of increased fertility after banded applications as well as the redistribution of K within the soil that occurs simply under normal crop development. Research indicates that the location of prior crop rows may be even more important to soil K levels than the location of past fertilizer K bands.

[130] H. Singh, K.N. Sharma, G.S. Dhillon, Amanpreet., T. Singh, V. Singh, D. Kumar, B. Singh. 2010. On-farm evaluation of real-time nitrogen management in rice (Punjab, India). Better Crops With Plant Food. Vol 94(4). Page 26 - 27.
Reference ID: 23615
Note: #23615e > S Serial #23258e
Abstract: On-farm trials were carried out to evaluate real-time and fixed-date variable rate strategies of need-based N management in rice using a leaf color chart (LCC) in relation to blanket recommendations for the State and farmer practice. The strategy of fixed-datevariable rate N management produced yields similar to those obtained with the real-time N management or blanket recommendation strategies, although significant differencesin N use efficiency were obtained.

[131] S.J. Qiu, X.T. Ju. 2010. Effect of unrestricted nitrogen and irrigation application on Soil Carbon and Nitrogen Pools in Greenhouse Vegetable systems (China). Better Crops With Plant Food. Vol 94(4). Page 29 - 31.
Reference ID: 23616
Note: #23616e > S Serial #20258e
Abstract: In the north China plain, the amount of N fertilizer and irrigation application in greenhouse vegetable systems is about three to five times that in conventional cereal systems. Over a decade of shifting from the conventional cereal systems to greenhouse vegetables, the capacity for nutrient cycling within these greenhouse systems has fallen. Additionally, the content of inorganic C in the soil profile under greenhouse systems has shown a dramatic decline.

[132] V.I. Adamchuk. 2010. Precision Agriculture: Does It Make Sense?. Better Crops With Plant Food. Vol 94(3). Page 4 - 6.
Reference ID: 23617
Note: #23617e > S Serial #20257e
Abstract: In everyday language, the word “sense” normally refers to the five human senses, while “making sense” describes our efforts to interpret information that may seem confusing or conflicting. In precision agriculture, both meanings are important. While new equipment and software have been developed to practically implement site-specific crop management strategies, the question of which decision support mechanism to use remains. Thus, when viewing yield maps and/ or aerial imagery, it is relatively easy to identify a problematic area within a given agricultural field, but it is not always obvious what should or, at least, could be done about the problem. This article discusses the different soil and crop sensing technologies that have been developed around the world to address this particular issue.

[133] S. Huang, L. Huang, S. Liu, J. Jin, P. He. 2010. Spatial Variability and SSNM of spring wheat production under collective contract cropping (Northeast China). Better Crops With Plant Food. Vol 94(3). Page 7 - 9.
Reference ID: 23618
Note: #23618e > S Serial #20257e
Abstract: Spatial variability of soil fertility (soil OM and available P, K, S, and Zn) and water in different parts of the study area were main factors influencing spatial variability of grain yield. Site-specific nutrient management (SSNM) treatments applied significantly more N and less P for relatively high soil fertility plots, and more N and K for low soil fertility plots than with collective contract cropping practice. SSNM for NPK increased yields by 8 to 19% and improved income by 455 to 520 RMB Yuan/ha.

[134] W. Iftikar, G.N. Chattopadhayay, K. Majumdar, G.D. Sulewski. 2010. Use of village-level soil fertility maps as a fertilizer decision-support tool in the red and Lateritic soil zone of India (West Bengal, India). Better Crops With Plant Food. Vol 94(3). Page 10 - 12.
Reference ID: 23619
Note: #23619e > S Serial #20257e
Abstract: The combined influences of poor infrastructure, high implementation costs, and a diverse mosaic of small holders have limited the effectiveness of soil test-based fertilization programs in South and Southeast Asian countries. Geographic Information System (GIS)-based fertility maps represent an alternative decision support tool and this village-scale field study outlines a cost effective option of implementing improved nutrient management in large tracts of small-scale farming systems in Asia.

[135] J.F. Angus, C.N. Walker, J.F. Pedler, R.N. Norton. 2010. Optimizing nitrogen for wheat growing on hostile subsoils (Australia). Better Crops With Plant Food. Vol 94(3).Page 13 - 15.
Reference ID: 23620
Note: #23620e > S Serial #20257e
Abstract: Nitrogen application to areas of wheat paddocks with high subsoil salinity, alkalinity, and/or boron (B) often gives low nutrient use efficiency and poor returns. These areas can be identified within a variable landscape using electromagnetic induction surveys. Paddock zones can be identified and then N managed according to the degree of constraint imposed by the hostile subsoils.

[136] R. Mullen, G. LaBarge, K. Diedrick. 2010. Temporal Variability of Crop Response to Fertilizer (Ohio, North America). Better Crops With Plant Food. Vol 94(3). Page 16 - 17.
Reference ID: 23621
Note: #23621e > S Serial #20257e
Abstract: Owing to the weather, crops respond differently to fertilizers from one year to the next. Weather controls processes ofnutrient supply and loss from the soil, and crop nutrient demand. Improvement of nutrient use efficiency requires systems that take into account the influence of weather on these processes.

[137] J.P. Molin. 2010. Use of active optical sensors for crops in Brazil. Better Crops With Plant Food. Vol 94(3). Page 18 - 20.
Reference ID: 23622
Note: #23622e > S Serial #20257e
Abstract: Active optical sensors have been evaluated as a new approach for precision agriculture and have been successfully used on grain crops and cotton for real-time, site-specific N management. The Precision Agriculture Research Group of the University of São Paulo has been involved with several activities related to the major optical sensors currently on the market (GreenSeeker, CropCircle, and N-Sensor).

[138] R. Melchiori. 2010. Advances in the use of remote sensors in Argentinean Agriculture. Better Crops With Plant Food. Vol 94(3). Page 21 - 22.
Reference ID: 23623
Note: #23623e > S Serial #20257e
Abstract: Research on the use of remote sensors to improve N use efficiency (NUE) in Argentina has shown important advances in integrating efforts among different organizations and companies. Variable rate management based on remote sensing

would be an option to improve NUE under high yielding sustainable cropping systems.

[139] D. Franzen, G. Richards, T. Jensen. 2010. Precision management zones increase sugar production in North Dakota and Minnesota (Northern Great Plains). Better Crops With Plant Food. Vol 94(3). Page 24 - 25.
Reference ID: 23624
Note: #23624e > S Serial #20257e
Abstract: Use of variable rate N field management zones - based on sugarbeet leaf color differences derived from satellite imagery- has successfully increased crop yields and the amount of refineable sugar produced per acre of land where sugarbeets are grown in rotation in eastern North Dakota and western Minnesota. The development of a system to subdivide fields into three differentially managed zones is based on research and field experience looking at N management for sugarbeet production. The three management zones are simply characterized as low, medium, and high available N zones, and N and other nutrient rates are adjusted for each zone, based on soil test results.

[140] A. Tsirulev. 2010. Spatial Variability of soil fertility parameters and efficiency of variable rate fertilizer application in the Trans-Volga Samara Region (Russia). Better Crops With Plant Food. Vol 94(3). Page 26 - 27.
Reference ID: 23625
Note: #23625e > S Serial #20257e
Abstract: Precision agriculture approaches were compared to routine current management for conducting soil fertility assessment in a recent study. Measurement of soil spatial variabilityin precision agriculture was accomplished using GPS equipment with precise fixing of soil sampling points, automatic soil sampler, and special software to map various soil fertility parameters, including soil nutrient content. Both spring wheat yield and net profit were highest with variable rate fertilizer application in the on-farm research experiment.

[141] A. Winstead, J. Fulton. 2010. Getting Started with Precision Agriculture (North America). Better Crops With Plant Food. Vol 94(3). Page 29 - 30.
Reference ID: 23626
Note: #23626e > S Serial #20257e
Abstract: Precision agriculture (PA) technologies, once thought to be only for large-scale producers focused on intensive management, are readily available and affordable for awide variety of agricultural operations. Interest in adoption and implementation of PA technology has rapidly increased in the USA, including the demand for high-level GPS [real-time kinematic (RTK)] accuracy, precise applications of inputs, and solutions for information management.

[142] S. Phillips. 2010. The role of spatial variability in nitrient management. Better Crops With Plant Food. Vol 94(3). Page 32 - 32.
Reference ID: 23627
Note: #23627e > S Serial #20257e
Abstract: Athorough understanding of spatial variability in agricultural fields can influence many aspects of nutrient management. Whether it is what nutrient source to apply, what rate to use, when to make the fertilizer application, or what placement method to employ, understanding spatial variability can help growers, advisers, industry, and policymakers contribute to more efficient and effective fertilizer management.

[143] M.N.A. Rasid, T.C. Chek, A.F. Redzuan. 2014. Effectiveness of Urea-Coated Fertilizer on Young Immature Oil Palm Growth. Journal of Advanced Agricultural Technologies. Vol 1(1). Page 56 - 59.
Reference ID: 23628
Note: #23628e
Abstract: Urea-coated fertilizers were invented to reduce ammonia volatilization and act as slow-release fertilizers in the oil palm field. This study was designed to examine the effectiveness of three types of urea-coated fertilizers namely Urease Inhibitor-coated urea 25% N (UICU), resin-coated urea 43% N (RCU), Sulphur-coated urea 32% N (SCU), uncoated urea 46% N (UU) and uncoated AS, (SOA) 21%N on oil palm early growth. The trial commenced from planting of the new oil palms until 36 months after planting (MAP). The fertilizer rates were applied with equivalent nutrient content of conventional compound fertilizer, NPKMg (9/9/12/4+0.5%B-AS based) as Control (Co) treatment. From the analysis, RCU showed significantly bigger girth size over UU and UAS by 13%, respectively starting at 18 MAP and 24 MAP while SCU recorded significant performance over UU by 8% at 36 MAP. The result also showed that SCU produced significantly longer fronds over Co, UU and UAS by 9%, 13% and 10%, respectively at 30 MAP. The similar performance was shown by SCU which produced bigger petiole cross section (PCS) and higher leaf dry weight over UU and Co at 30 to 36 MAP respectively. Foliar analysis found that higher leaf-N was recorded at the SCU plot and exceeded the UU by 18% and over the critical level by 7% at 24 MAP. From the results, it indicated that SCU had consistent performance over UU on girth size, frond length, PCS, leaf dry matter and leaf-N content. Even though there was no significant difference between the other types of urea coated fertilizers, SCU was able to produce more vigorous vegetative growth. Therefore, SCU fertilizer can be used as an alternative source of urea to improve immature oil palm growth especially in dry regions where high volatilization rate occurs.

[144] L.T. Gan. 2009. RSPO and Sustainability. The Planter. Vol 85(996). Page 125 - 127.
Reference ID: 23629
Note: #23629e > S Serial #22376
Abstract: Palm oil is a key agricultural commodity, and, is the leading global source of vegetable oil. The increasing demand for oil and hence this commodity stems from increasing food consumption in developing countries, particularly China and India. Analysts predict that the demand for palm oil will double within the next few decades and this will continue to drive expansion of oil palm. It is expected that expansion in oil palm areas will come from Malaysia and Indonesia, particularly Indonesia, which has already expanded its area under oil palm areas very rapidly in the last three decades growing by 12 per cent per annum to 7.1 million hectare in 2008. Most expansion in oil palm cultivation has taken place in the islands of Sumatra and Borneo. Critics are concerned that between 1985 and 1997, extensive deforestation had occurred in Indonesia, resulting in the loss of 29 per cent of the total forest cover in Sumatra and 21 per cent in Kalimantan. Environment non-governmental organisations (ENGOs) have alleged that expansion of oil palm agriculture in Malaysia and Indonesia has destroyed huge tracts of tropical forest and threatened the survival of many native species, including the orangutan (*Pongo pygmaeus* and *P. abelii*), tigers (*Panthera tigris* Sumatra), Sumatran rhinoceros (*Dicerirhinus sumatrensis*) and Asian elephants (*Elephas maximus*). They have launched aggressive media campaigns that lobby for the boycott of palm oil products and for a moratorium on deforestation.

[145] E. Pushparajah. 2015. El Nino and Its direct and Indirect impact on Oil Palm. The Planter. Vol 91(1076). Page 721 - 722.
Reference ID: 23630
Note: #23630e > S Serial #22043
Abstract: When we were refer to El Nino, the major aspect that comes to mind is the period of lack of or absence of rainfall (and thus water) and its impact on growth and yield of oil palm. In fact some reasonably accurate estimates of expected crop losses can also be made. However, the impact of the lack of absence of rainfall on the escalation of the extent and intensity of forest and peat fires especially in Indonesia is becoming more prevalent. The resultant haze or even smog also affects Malaysia and neighbouring countries. However, we still seem hazy about the resulting haze (see also The Planter, Vol.77, May 2001, pg285-286). Not only do we seem complacent about all the other factors affecting the "intensity" of the haze, but we seem to be hazy about the measurement (particle size of suspended matter etc.) However, we do know about the potential impact on human health, but how much do we know about the potential adverse effect on agriculture and in particular oil palm?

[146] V. Ramesh. 2015. Oil Palm - Meeting global soil security challenge. The Planter. Vol 91(1070). Page 295 - 296.
Reference ID: 23631
Note: #23631e > S Serial#21166
Abstract: Soil is the mother of all human activities around the globe. Franklin D. Roosevelt famously said that, "the Nation that destroys its soil destroys itself". Soil security is closely related to the maintenance and improvement of the global soil resource to produce food, freshwater and fibre. Soil security also contributes to energy and climate sustainability, and to maintain the biodiversity and the overall protection of the ecosystem. Global soil resource is the "mother" of all environmental issues which requires special emphasis.

[147] V. Ramesh. 2015. Oil Palm Cultivation on Marginal Land. The Planter. Vol 91(1075). Page 643 - 644.
Reference ID: 23632
Note: #23632e > S Serial #21901
Abstract: The use of marginal land for oil palm cultivation has received wide attention and is often debated on. Marginal land refers to land which is typically characterised by low productivity and reduced economic return or by severe limitations for agricultural use. Marginal land in its original state is generally fragile and with high environmental risk. Incidentally, there seems to be some confusion between marginal land and marginal soils. The term land is broader than just soil as soil is just one component of land. The term land includes the atmosphere, soil geology, hydrology, plant and animal populations, and the results of past and present human activity. Food security, employment oppurtunities, rural development and multiplier effects to the surrounding communities' environment are the common reasons given for the development of marginal land. While there may be good justification for development of marginal land for agricultural purpose, multiple concerns have been raised over environmental impacts, ecosystem services, and sustainability of marginal lands such as erosion, land degradation, biodiversity, and climate change.

[148] J.A. Setiawan, M.D. Maghfoer, E. Nihayati. 2016. Application of manure, nitrogen fertilizer, and EM4 to improve growth and yield of red chili (*Capsicum annuum* L) on an Alfisol. Journal of degraded and Mining Lands Management. Vol 3(2). Page 535 - 542.
Reference ID: 23633
Note: #23633e
Abstract: Red chili is commodity of vegetable that has high economic value, but still has low productivity. The objective of this study was to elucidate the effect of goat manure and Urea application with EM4 and to obtain the best dose of combination in order to improve growth and yield of red chili. The study was conducted at Jatikerto-Malang from January to June 2015. The research applied Factorial Randomized Block Design that comprised of two factors by three replications. First factor: Goat manure and Urea, 25% N PKK + 75% N Urea (A1), 50% N PKK + 50% N Urea (A2) and 75% N PKK + 25% N Urea (A3). Second factor: Doses of EM4 0 L/ha (E0), 30 L/ha (E1), 40 L/ha (E2) and 50 L/ha (E3), and one control treatment (100% N Urea). Results of the study showed that combination of 50% N PKK + 50% N Urea and EM4 at levels 30 and 40 L/ha produced the best and optimal plant height, numbers of branches and number of flowers. Separately, application of 25% N PKK + 75% N Urea produced 292.67 fruits per plant, fruits weight per plant 389.08 g per plant and fruits weight per hectare 10.92 t/ha. EM4 at level 30 L/ha showed the best and optimal fruits weight per hectare, 12.27 t/ha. The control showed better growth but not significant compared with combination of 25% N PKK + 75% N Urea with EM4 at level 30 and 40 L/ha. Combination treatment produced number of fruits 26.01%, fruits weight per plant 21.53% and fruits weight per hectare 25.15% higher than control.

[149] P. Vimala, H. Salbiah, T. Zahrah, M. Ruwaida. 2001. Yield responses of vegetables to organic fertilizers (Penghasilan sayur-sayuran dengan baja organik). J. Trop. Agric and Fd. Sc. Vol 29(1). Page 17 - 27.
Reference ID: 23634
Note: #23634e
Abstract: The main objective of the paper is to obtain yield response data to organic sources and rates and subsequently to provide guidelines for organic vegetable cultivation in Malaysia. Three experiments were conducted to investigate the effect of organic fertilizers on vegetables. In the first experiment, poultry manure (PM) at 0, 13.3, 26.7, 39.9, 53.2 and 66.5 t/ha were applied to tomato (Lycopersicon esculentum), cabbage (Brassica oleracea var. capitata) and brinjal (Solanum melongena) grown on peat. Inorganic fertilizer (N: P2O5:K2O: MgO =12:12:17:2) at 2 t/ha was used as control. Tomato yield increased from 4 t/ha to 31 t/ha when PM was increased from 0 to 66.5 t/ha. A linear yield response to PM was obtained, represented by the equation, Y= 9.70 + 0.35 PM where Y=yield and PM=poultry manure in t/ha. Applying 2 t/ha inorganic fertilizer gave tomato yield of 24 t/ha. To get this yield under organic farming, 40 t/ha of PM need to be applied. For cabbage, yields increased from 6 t/ha to 25 t/ha when PM was increased from 0 to 53.2 t/ha. The yield response was quadratic represented by the equation, Y= 6.02 + 0.61 PM - 0.01 PM2. Applying inorganic fertilizer at 2 t/ha gave cabbage yield of 28 t/ha. Brinjal yields increased from 3 t/ha at 0 PM to 46 t/ha at 66.5 t/ha PM. A linearyield response represented by the equation, Y = 8.95 + 0.58 PM was obtained.Yields obtained with inorganic fertilizer at 2 t/ha, was 37 t/ha. To get yields equivalent to the inorganic application, the organic grower has to apply 48 t/ha PM. In the second experiment comparing processed (PPM) and unprocessed poultry manure (PM) at 6.7, 13.4 and 20.1 t/ha on Amaranthus (bayam) grown on peat, no significant yield difference was obtained

between PM and PPM. A linear yield response to rate of organic fertilizer applied was obtained. Yields obtained at 20.1 t/ha PM was 20 t/ha for the first crop and 14 t/ha for the residual crop. In the third experiment, on lettuce grown in Cameron Highlands on clay loam soil, PM was superior to three other compost evaluated, namely wormcompost, PM + sawdust compost, and PM + sawdust + rice husk compost. It is concluded that PM whether processed or unprocessed is the most suitable organic fertilizer presently available for organic vegetable cultivation. Recommendations would be about 40–50 t/ha for tomato, cabbage and brinjal on peat soil, 20 t/ha for Amaranthus on peat soil and 20 t/ha for lettuce in Cameron Highlands on clay loam soil.

[150] Mujiyati, Supriyadi. 2009. Effect of manure and NPK to increase soil bacterial population of *Azotobacter* and *Azospirillus* in chili (*Capsicum annum*) cultivation. Nusantara BioScience. Vol 1(2). Page 59 - 64.
Reference ID: 23635
Note: #23635e
Abstract: The objectives of this research were to find out the increase number of two bacterials populations, *Azotobacter* and *Azospirillum*, due to the use of manure fertilizer. The exsperiment was conducted using group randomly designed with two treatments. The plant populations were treated (i) whithout fertilizer as the control, (ii) with manure fertilizer, and (iii) with NPK fertilizer. Data was experimentally collected by planting chili in several plots treated by manure, with three replications. The field experiment was conducted in Gathak Village, Karangnongko Sub-district, Klaten District, Central Java. The data collected consist of the total population of Azotobacter and Azospirillum, nitrogen content in soil and the chili yield. The primary data of research were analyzed using ANOVA test and followed by LSD test, with the degree of significance by 95% .The results showed that the manure fertilizer can increase the population of bacteria as many as 0.02% (*Azotobacter*) and 0.46% (*Azospirillum*) when they were compared to the control one. So that it can increase the soil fertility when they were used in long time. Therefore increasing the nutrient availability in the soil was occurred. Application of manure fertilizer could increase the total nitrogen content in the soil and it is very useful for the fertilizing of plants.

[151] S.A. Hassan, R.Z. Abidin, M.F. Ramlan. 1995. Growth and Yield of Chilli (*Capsicum annuum* L.) in Response to Mulching and Potassium Fertilization. Pertanika J. Trop. Agric. Sci. Vol 18(2). Page 113 - 117.
Reference ID: 23636
Note: #23636e
Abstract: A field experiment was canducted to study the influence of levels of potassium fertilizer (0, 66 and 132 kg ha^{-1}) and types of mulching (black plaslic, reflective plastic and coconut fronds) on growth and yield of chilli. Plant height, yield, fruit number and dry weight of plant increased with increasing K levels and mulching. Yields were increased by 89% and 142% with K levels of 66 and 132 kg ha^{-1}, respectively. Highest yield was obtained from plant grown under reflective plastic mulch. Nitrogen, P, K and Ca content in leaf tissues, soil temperature and moisture under mulched conditions were higher than without mulch. There was a positive correlation between plant dry weight with soil temperature and moisture.

[152] N. Setyowati, Z. Muktamar, S. Oktiasa, D.W. Ganefianti. 2014. Growth and Yield of Chili Pepper under Different Time Application of Wedelia (*Wedelia trilobata*) and Siam Weed (*Chromolaena odorata*) Organic Fertilizers. International Journal on Advanced Science Engineering Information Technology. Vol 4(6). Page 13 - 16.
Reference ID: 23637
Note: #23637e
Abstract: Low content of soil organic matter and low availability of nutrients in Ultisol are major constraints of this soil to support growth and development of chili pepper. Application of organic fertilizer is required to increase content of soil organic matter as well as to improve other chemical, biological, physical properties of this soil. Wedelia (*Wedelia trilobata*) and Siam Weed (*Chromolaena odorata*) are potential sources of organic fertilizer. The aim of this study was to compare growth and yield of chili pepper under different time application of Wedelia and Siam Weed based organic fertilizers. Greenhouse house experiment was conducted employing Completely Randomized Design with 2 factors namely Wedelia and Siam Weed composts as first factor and 5 (five) different time of application as second factor. Each treatment was replicated 5 times. The study showed that most variables observed in this experiment were not affected by types of compost. Only were plant height, canopy width and dry weight of biomass significant difference between the two composts. Siam weed compost applied two weeks before planting resulted in plant canopy wider than Wedelia compost. However, Wedelia compost applied at planting resulted in longer chili pepper as compared to Siam weed compost. The experiment also revealed that Wedelia compost produced higher plant height and root dry weight as compared to Siam weed compost.

[153] N. Setyowati, Z. Muktamar, B. Suriyanti, M. Simarmata. 2014. Growth and Yield of Chili Pepper as Affected by Weed Based Organic Compost and Nitrogen Fertilizer. International Journal on Advanced Science Engineering Information Technology. Vol 4(2). Page 84 - 87.
Reference ID: 23638
Note: #23638e
Abstract: Fertility improvement of Ultisol is inevitable to increase growth and yield of chili pepper since the nutrient availability and organic matter of this soil is relatively low. Application of organic fertilizer will enhance microorganism activity in soil, thereafter will improve the availability of nutrients as well as other chemical, physical, biological properties of the soil. Most of manure releases nutrient quite slowly; therefore, addition of nitrogen to soil is expected to speed up the availability of nutrient to plant. Weed based organic fertilizers from Wedelia (*Wedelia trilobata*) and Siam weed (*Chromolaena odorata*) biomass have potential to substitute inorganic fertilizer. The objective of the experiment was to compare the effects of weed based organic compost and dry leaves compost with or without addition of nitrogen fertilizer on growth and yield of chili pepper. The experiment was carried out using Completely Randomized Design (CRD) with treatments of 200 kg urea ha-1; Wedelia compost (WDC) 20 ton ha-1; WDC 15, 10, and 5 ton ha-1 with addition of 200 kg urea ha-1 respectively; Siam weed compost (SWC) 20 ton ha-1, SWC 15, 10, and 5 ton ha-1 with addition of 200 kg urea ha-1 respectively; and dry leaves compost (DLC) 20 ton ha-1, DLC 15, 10, and 5 ton ha-1 with addition of 200 kg urea ha-1 respectively. The result revealed that composts with or without addition of nitrogen fertilizer had similar responses on the growth of chili pepper. Wedelia and Siam weeds compost at 20 ton ha-1 tended to give better yield of chili pepper as compared to application of urea alone. This result indicated that weed based organic fertilizers could substitute

nitrogen fertilizer.

[154] N. Hassan, S. Safiai, N.H. Mohammad Raduan, Z. Ayop. 2012. Goal Programming Formulation in Nutrient Management for Chilli Plantation in Sungai Buloh, Malaysia. Advances in Environmental Biology. Vol 6(12). Page 4008 - 4012.
Reference ID: 23639
Note: #23639e
Abstract: This paper presents a preemptive goal programming model for multi-objective nutrient management problem by determining the optimum fertilizer combination for chilli plantation in Sungai Buloh Malaysia. Application of nutrients to the soil is commonly done by using fertilizers. A fertilizer is said to be a complete or mixed fertilizer when it contains nitrogen, phosphorus and potassium (N-P-K). A set of data have been used to test the effectiveness and efficiency of the proposed model. Results of the model indicate that all objectives have been achieved. Moreover with the fertilizer combination, the current cost of fertilizer used for chilli plantation can be reduced. The flexibility of the model can be done by adjusting the goal priorities with respect to the importance of each objective.

[155] M.A. Rahman, M.F. Begum, M.F. Alam, H. Mahmud, K.M. Khalequzzaman. 2010. Effect of Tricho-compost, compost and NPK fertilizers on growth yield and yield components of chili. Int. J. Sustain. Agril. Tech. Vol 6(3). Page 64 - 72.
Reference ID: 23640
Note: #23640e
Abstract: To investigate the effect of Tricho-compost, compost and NPK on growth, yield and yield components of chili the experiment was conducted with randomized design at Botanical garden, Rajshahi University, Rajshahi, Bangladesh during August 2006 to February 2007. There were 15 treatments viz. T1 = Tricho-compost (3 kg/pot) + NPK, T2 = Tricho-compost (2 kg/pot) + NPK, T3 = Tricho-compost (1.5 kg/pot) + NPK, T4 = Tricho-compost (3 kg/pot), T5 = Tricho-compost (2 kg/pot), T6 = Tricho-compost (1.5 kg/pot), T7 = compost (3 kg/pot) + NPK, T8 = compost (2 kg/pot) + NPK, T9 = compost (1.5 kg/pot) + NPK, T10 = compost (3 kg/pot), T11 = compost (2 kg/pot), T12 = compost (1.5 kg/pot), T13= NPK, T14= spore suspension of Trichoderma harzianum, T15= control (Only soil). Tricho-compost, compost and NPK significantly (P=0.05) influenced the growth and yield of chili. The treatment Tricho-compost (3 kg/pot) + NPK (T1) produced the highest germination (%), vigour index, growth and yield of chili and the lowest yield and yield contributing parameters were recorded in control (T15). The correlation matrix showed that yield of chili had significant and positive correlation with plant height (r = 0.952**, 0.903** and 0.935**) and number of leaf per plant (r = 0.952**, 0.913** and 0.868**) at first harvest time after 30, 60 and 90 days, respectively; number of primary branch (r = 0.955** and 0.904 **) after 60 and 90 days, respectively; total number of flower (r = 9.00**) at maximum flower initiation at first harvest time; total number of fruit (r = 0.864**), fruit size (r =0.896**), fresh fruit weight (r = 0.868), dry fruit weight (r = 0.924**) and hundred seed weight (r= 0.891**) at first harvest time. The significant and negative correlation (r= -0.844**) was observed with the yield and number of days for first flower initiation at first harvest time, respectively. The results suggest that inorganic fertilizers (NPK) with Tricho-compost (3 kg/pot) is suitable for better production of chili that may increase soil fertility and this integrated approach could be contributed to improve crop production.

[156] B. Nur Rochman. 2015. Effect of solid organic fertilizer types on yield of red chilli, shallot and leek, Gontor AGROTECH. Science Journal. Vol 1(2). Page 53 - 70.
Reference ID: 23641
Note: #23641e
Abstract: The importance of organic fertilizers in a crop cultivation is to restore land productivity and reduce the use of synthetic fertilizers. Various ways has been developed to create quality organic fertilizer, for plants vegetables such as red chili, shallots and leek with low input. The aims of this study were to determine the effect of some kind of solid organic fertilizer on the growth and yield of red chili, shallots and leek, and to know the best organic fertilizer for each type plants. The experimental design used is Split Plot Design with the basic design of Randomized Complete Design Blockwith 3 replications as blocks. The main plots consisted of 3 species of plant vegetables. The subplot consisted of 5 kinds of solid organic fertilizer and without any treatments as control. There were 18 plots per block or the totals were 54 plots. The results showed that aplication of several types of solid organic fertilizer signifi cantly increased the growth and yield of red chilli, shallot and leek. Solid organic fertilizer from community A showed that the highest signifi cantly increased the growth and yield of red chilli. Combination of organic fertilizer and Rock Phosphate (RP) 2.4 ton / ha showed the highest growth and yield of leek. Combination of organic fertilizer and K-feldspar 0.6 ton / ha showed the highest growth and yield of shallot.

[157] P. Vimala, R. Melor, O.A. Shokri, P. Balasubramaniam. 2007. Effect of organic and inorganic fertilizers on growth, yield and nutrient content of bird chilli (*Capsicum frutescence*). J. Trop. Agric and Fd. Sc. Vol 35(1). Page 29 - 40.
Reference ID: 23642
Note: #23642e
Abstract: Four rates (0, 20, 40, 60 t/ha) of organic fertilizer (processed poultry manure) and three rates of inorganic fertilizer (0, 2 and 3 t/ha) were evaluated on bird chilli grown on an upland clay soil. Significant effects of processed poultry manure (PPM) and inorganic fertilizer (NPK) rates on yield were obtained. Interaction effects between PPM and NPK were not significant. Yield increased significantly from 6.46 t/ha at zero fertilizer to 15.49 t/ha at 20 t/ha PPM + 2 t/ha inorganic fertilizer (N: P2O5: K2O: MgO = 12:12:17:2). Regression analysis showed a significant quadratic response to the inorganic fertilizer, represented by the equation Y = 9.1455 + 5.0848x – 1.3292x2, where Y = yield in t/ha and x = fertilizer applied in t/ha. The optimum rate of inorganic fertilizer was 1.91 t/ha. Yield response to organic fertilizer as the sole nutrient source was quadratic, represented by the equation Y = 6.0813 + 0.1861x – 0.0018x2, where Y = yield in t/ha and x = organic fertilizer in t/ha. The optimum rate of organic fertilizer was 52 t/ha. Fertilizers had no significant effect on fruit weight, but had a significant effect on fruit length. Fruit weight ranged from 0.76–0.89 g and fruit length ranged from 3.8– 4.5 cm. Nutrient contents did not differ significantly, except for fruit Ca, Fe and Mn and leaf Mg and Mn. The mean fruit macronutrient contents were 2.38% N, 0.46% P, 5.22% K, 0.18% Ca and 0.24% Mg, and the mean fruit micronutrient contents were 27 mg/kg B, 13 mg/kg Cu, 76 mg/kg Fe, 8 mg/kg Mn and 27 mg/kg Zn. Mean leaf macronutrient content were 4.81% N, 0.36% P, 5.48% K, 1.62% Ca and 0.46% Mg, and mean leaf micronutrient contents were 44 mg/kg B, 17 mg/kg Cu, 284 mg/kg Fe, 17 mg/kg Mn and 47 mg/kg Zn. Most soil chemical properties improved with increasing rates of organic fertilizer.

[158] M. Ayub, M.A. Nadeem, M.S. Sharar, N. Mahmood. 2002. Response of Maize (*Zea mays* L.) Fodder to different levels of nitrogen and phosphorus. Asian Journal of Plant Sciences. Vol 1(4). Page 352 - 354.
Reference ID: 23643
Note: #23643e
Abstract: A field experiment was conducted to evaluate the effect of different combination of nitrogen and phosphorus on the fooder yield and quality of maize (*Zea mays* L.) The maize cultivar Pak. Afgoyee sown on 1st August, 2000 was given NP fertilizers at the rate of 0-0, 120-40, 120-60, 120-80, 160-40, 160-60, 160-80, 200-40, 200-60, and 200-80 kg ha^{-1}. Growth characteristics like plant height, number of leaves $plant^{-1}$, stem dismeter, leaf area $plant^{-1,}$ green fodder yield, dry matter yield and dry matter percentage were influenced significantly by the application of nitrogen and phosphorus. Maximum green fodder yield was obtained when nitrogen and phosphorus us were applied at the rate of 200-80 kg ha^{-1} but it was statisticallty similar to NP application of 200-60 kg ha^{-1}. The increase in yield was mainly due to increased plant height, number of leaves $plant^{-1}$ and stem diameter. Quality parameters such as crude protein, crude fibre and ask contents were also influenced significantly by the application of NP fertilizers. All NP combination producd higher crude protein, crude fibre and ask contents over control. Keeping in view both yield and quality NP levels of 200+60 kg ha^{-1} seems to be the best combination under Faisalabad conditions for maize cultivar Pal. Afgoyee.

[159] R.J. Buresh. 2010. Nutrient best management practices for rice, maize, and wheat in Asia. World Congress of Soil Science. Vol 16. Page 164 - 167.
Reference ID: 23644
Note: #23644e
Abstract: Site-specific nutrient management (SSNM), as developed through more than a decade of research with rice (*Oryza sativa* L.) in Asia, now provides scientific principles on nutrient best management practices for rice, maize (*Zea mays* L.), and wheat (*Triticum aestivum* L.) in Asia. These scientific principles of SSNM enable the pre-season determination of crop needs for fertilizer nitrogen (N), the within-season distribution of fertilizer N to meet crop needs, and the pre-season determination of fertilizer phosphorus (P) and potassium (K) rates to match crop needs and sustain soil fertility. Fertilizer best management for each cereal crop is tailored to field-specific conditions for crop yield, crop residue management, historical fertilizer use, use of organic materials, and nutrient inputs through irrigation water. The widespread uptake by farmers of improved nutrient management requires transforming science-based information into locally adapted tools that enable extension workers, crop advisors, and farmers to rapidly develop and implement best management practices for specific fields and growing conditions. These tools that use information technology and other means for technology dissemination include decision support software, videos, quick guides for fertilizing rice, and the leaf color chart (LCC) for managing fertilizer N.

[160] R.S. Thakur, J.S. Samra, K.L. Chadha. 1981. The nutrient levels in fruiting and non-fruiting terminals of three mango cultivars. Scientia Horticulturae. Vol 15. Page 355 - 361.
Reference ID: 23645
Note: #23645e
Abstract: The leaf nutrient status of 3 mango cultivars, determined in fruiting and non-fruiting terminals after fruit harvest (June 1976) from 20 orchards, were compared. N, P and Ca contents were significantly higher in 'Dashehari' than in 'Chausa' and

'Lucknow Safeda'. The reverse was true for K, S and Zn contents. Mg and Mn contents were more or less at par in all the 3 cultivars. Leaves collected from non-fruiting terminals contained significantly higher amounts of N and P in all the 3 cultivars, but K, Ca, S and Zn only in 2 cultivars, as compared to those from fruiting terminals. Mn and Fe contents in both kinds of terminals were more or less at par in all the 3 cultivars.

[161] R.R. Sharma, R. Singh. 2009. The fruit pitting disorder - A physiological anomaly in mango (*Mangifera indica* L.) due to deficiency of calcium and boron. Scientia Horticullturae. Vol 119. Page 388 - 391.
Reference ID: 23646
Note: #23646e
Abstract: A new disorder known as fruit pitting has been observed in some Indian mango orchards during the recent years. In this disorder, there is a development of some sunken pits on fruit peel, which distract consumers. Based on preliminary observations, it was observed that deficiency of nutrients could be the cause, and hence systematic studies were conducted in five indigenous cultivars such as ‘Alphonso’, ‘Amrapali’, ‘Dashehari’, ‘Mallika’ and ‘Neelum’, and five exotic mango cultivars such as ‘Edward’, ‘Irwin’, ‘Rosari’, ‘Sensation’ and ‘Tommy Atkins’ with the aim to observe the fruit pitting incidence and degree, and to investigate its probable causes. Our studies indicated that nearly 13% of the mango fruit was affected by fruit pitting with variable degree and magnitude. All indigenous cultivars had higher incidence of fruit pitting than exotic cultivars. ‘Dashehari’ had the maximum incidence of fruit pitting (30.3%), followed by ‘Amrapali’ (28.6%), and ‘Rosari’ the least (3.4%). Our studies indicated that the incidence of fruit pitting in mangoes was nearly 13% with a significant variability among the cultivars (Table 1). Although the concentrations of most of the major nutrients such as N, P, K, Mg, and minor nutrients such as Cu, Mn, Fe, Zn, did not differ significantly. However, the pitted fruit had lower Ca (1.53%) and B (22 mg kg-1) concentrations than normal fruit (2.47% and 38 mg kg_1, respectively), indicating that deficiency of Ca and B probably is the cause for fruit pitting in mangoes.

[162] K.L. Chadha, J.S. Samra, R.S. Thakur. 1980. Standardization of leaf-sampling technique for mineral composition of leaves of mango cultivar 'Chausa'. Scientia Horticullturae. Vol 13. Page 323 - 329.
Reference ID: 23647
Note: #23647e
Abstract: The effects of leaf age, leaf position on the shoot, sampling-direction and samplingheight of leaves of mango cultivar 'Chausa' on their mineral composition were studied. The P and K contents decreased, while Ca, Mg, S and Mn contents increased significantly with advancing age of leaves. In general, N, P, Mg, S, Zn, Mn and Fe contents were stable in 6- to 7-months-old leaves. P, K, Ca, Mn and Fe contents varied with sampling-direction, while K, Ca, S, Zn, Cu and Fe contents were significantly higher in the leaves from the lower portion than from the upper portion of the tree. A continuous increase in Ca and Mg contents and decrease in K and Mn contents of leaves were observed from basal to terminal leaves on a shoot. It was concluded that 6- to 7 months-old leaves from the middle of non-fruiting shoots, sampled from all directions and heights, were most suitable for assessing the nutritional status of a mango tree.

[163] F. Ramírez, T.L. Davenport. 2010. Mango (*Mangifera indica* L.) flowering physiology. Scientia Horticullturae. Vol 126. Page 65 - 72.
Reference ID: 23648
Note: #23648e
Abstract: Mango flowering is an important physiological event that sets the start of fruit production. Initiation is the first event that takes place for mangoes to flower. Coincident with shoot initiation, induction occurs based on the conditions present at the time of initiation. Numerous studies with mango trees support the existence of a florigenic promoter (FP) that is continuously synthesized in mango leaves and induces flowering. Translocation experiments suggest that the FP is carried from leaves to buds in phloem. Induction appears to be governed by the interaction of the FP and a vegetative promoter (VP). The FP is translocated as far as 100cm in subtropical conditions and 52cm in tropical conditions. In the tropics, floral induction occurs in stems that have attained sufficient time in rest since the previous flush. The age of the last flush is the primary factor governing flowering in the tropics as evidenced by experiments in Colombia. Tip pruning is ideal to synchronize vegetative flush events in the canopy. Potassium nitrate (KNO3) has been shown to stimulate flowering in sufficiently mature stems. Tip pruning and foliar applied KNO3 are effective methodologies that induce synchronous flowering especially in Colombia. Cool temperatures are important for mango floral induction under subtropical conditions. Mangoes grown in the low-latitude tropics rely less on low temperature. Soil and leaf analyses should be conducted to evaluate the nutrient status of trees.

[164] S.D. Sharma, P. Kumar, S.K. Yadav. 2014. Glomus-Azotobacter association affects phenology of mango seedlings under reduced soil nutrient supply. Scientia Horticullturae. Vol 173. Page 86 - 91.
Reference ID: 23649
Note: #23649e
Abstract: The aim of this research was designed to determine the effectiveness of indigenous arbuscular mycorrhizal (AM) fungal species *Glomus fasciculatum* (Thaxter sensu Gerdemann), *Glomus magnicaulis* (Hall) and *Azotobacter* strains on growth promotion of mango seedlings under limited nitrogen (N) and phosphorous (P) soil fertilization for sustainable nursery management in rainfed ecosystem. Three districts in the state of Himachal Pradesh namely, ‘Kangra’, ‘Hamirpur’ and ‘Bilaspur’ being located in the Shiwalik hill range of north-western Himalayas of India were selected purposely to measure the intensity of occurrence and distribution of indigenous AM fungal species and *A. chroococcum* strains in local ‘Dashe-hari’ mango orchards. AM fungi viz., *G. fasciculatum* (Thaxter sensu Gerdemann), *G. magnicaulis* (Hall), *G.mosseae* (Nicol. and Gerd.) and *Gigaspora heterogamma* (Nicol. and Gerd.), and two strains of *A. chroococcum* viz., AZ1 and AZ2 were predominant in the rhizosphere soil of the orchards. The data inferred that AM fungal spore load, root colonization and *A. chroococcum* bacterial count in different locations ranged from 2150–2975 spores kg^{-1} of the moist soil, 8.5–11.8% and 3.1×10^6–4.7×10^6 colony forming units (cfu), respectively. Soil type of the orchards varied between sandy loam and clay loam. To assess the comparative effectiveness of AM species and *Azotobacter* strains, the inocula were screened alone and in dual combination at different levels of N and P inorganic fertilizers. The inocula of potent isolates/strains i.e.,*Glomus fasciculatum*, *G. magnicaulis*, AZ1 and AZ2 were multiplied and inoculated under varied N and P fertilization in the ratio of 12:4 g kg^{-1} i.e. 2/3 N + P, 3/4 N + P and full N + P. Vegetative development affected by the mycorrhizal and bacterial inoculation was more pronounced when seedlings were inoculated with *G. fasciculatum* followed by *G.*

magnicaulis with AZ1 and/or AZ2 alone, and in dual combination at 2/3 dose of N + P. The inoculation of either of AM fungal species and/or bacterial strains led to a significant increasein plant height, stem diameter, leaf area and total root length in comparison to non-inoculated control, and was also demonstrated with *G. fasciculatum* and AZ1 stimulated maximum growth of the seedlingsin reduced N and P inorganic fertilizer sources. Considering the overall results, *G. fasciculatum* and AZ1 had a greater effect on vegetative growth promotion in reduced soil nutrient supply on mango seedlings.

[165] K.D. Larson, B. Schaffer, F.S. Davies, C.A. Sanchez. 1992. Flooding, mineral nutrition and gas exchange of mango trees. Scientia Horticullturae. Vol 52. Page 113 - 124.
Reference ID: 23650
Note: #23650e
Abstract: Two-year-old cultivar 'Peach' mango trees (Mangifera indica L.) were grown in containers with (+ Fe) or without (- Fe) chelated iron in limestone soil for 7 months and exposed to one of three flooding regimes: non-flooded (control) and 10 or 20 days of flooding. Prior to the imposition of flooding, and about 80 days later, total leaf chlorophyll content (Chl) and foliar concentrations of N, P, K, Ca, Mg, Fe, Mn, Cu and Zn were determined. Initially, Chl and foliar Fe and Mn concentrations were higher, but foliar K, Ca and Mg concentrations were lower, in the + Fe trees than in the -Fe trees. After the imposition of flooding treatments, significant interactions were observed between iron fertilization and flooding treatments with regard to Chl and certain foliar nutrient concentrations. Therefore, the effect of flooding on mineral nutrition was analysed separately for each iron fertilization regime. For + Fe trees, Chl was unaffected by flooding treamrent, but for - Fe trees Chl increased with increased flooding duration. For both iron fertilization regimes, foliar Mn increased with flooding and tended to be greatest with increased flooding duration. For both iron fertilization regimes, there was no effect of flooding on foliar N, Fe or Zn concentrations, and no clear effect of flooding on foliar Cu concentration. For + Fe trees, foliar P concentration was reduced in trees flooded for 20 days, but there was no effect of flooding on foliar P concentration in -Fe trees. Flooding resulted in reductions in foliar K concentration in -Fe trees, but not in + Fe trees. For both iron fertilization regimes, flooding resulted in a reduction in foliar Ca concentration. For +Fe trees, flooding for 20 days resulted in increased foliar Mg concentration, but there was no effect of flooding on foliar Mg in -Fe trees. Prior to flooding, net CO2 assimilation (A) was greater for +Fe trees than for -Fe trees.

[166] K. Schulze, W. Spreer, A. Keil, S. Ongprasert, J. Müller. 2013. Mango (*Mangifera indica* L. cv. Nam Dokmai) production in Northern Thailand- Costs and returns under extreme weather conditions and different irrigation treatments. Agricultural Water Management. Vol 126. Page 46 - 55.
Reference ID: 23651
Note: #23651e
Abstract: The manual irrigation of mangos by the use of water hoses is a common management practice in northern Thailand. However, this method is water-inefficient and labor intensive. Farmers in northern Thailand are increasingly confronted with weather anomalies, such as extended droughts and excessive rainfall in consecutive years. The objective of this paper is to investigate the water-saving potential and monetary benefit of farmers of different irrigation methods under conditions of more frequent weather abnormalities. This paper is concluded with a discussion of the

possible impact of water pricing on a farmer's water consumption. To date, no comparative field test has been conducted between traditional irrigation and micro sprinkler irrigation, which highlights the water-saving potential on one hand and shows a farmer's monetary benefit on the other hand. For the experiments, micro sprinkler systems were installed in two commercial mango orchards. Three irrigation scheduling methods were applied: full irrigation (FI) as calculated based on climatic water balance, deficit irrigation (DI), and farmer-controlled scheduling. In order to estimate the impact of using micro sprinklers, the fourth treatment consisted of farmer-controlled scheduling and the use of water hose manually placed under the trees, as an applied practice. Cost-benefit analyses show that an investment in a micro sprinkler system can be recommended. As the marketable yield of fruits can be increased substantially (31% increase in class I fruits larger 300 g) with improved irrigation, especially during a drought year, it is worthwhile to change traditional irrigation into modern, water-efficient, and flexible systems. DI increases the crop water productivity substantially and stabilizes yield during drought. The profit can be increased by 55% under FI with micro sprinklers. This study shows clearly that an introduction in the volumetric water price alone will not have an impact on a farmer's profit in the observed area. Therefore, it is questionable whether the introduction of a water price alone would stimulate the farmer to change his or her behavior in consumption.

[167] J.S. Samra, R.S. Thakur, K.L. Chadha. 1978. Evaluation of existing critical limits of leaf nutrient standards in mango. Scientia Horticullturae. Vol 8. Page 349 - 355.
Reference ID: 23652
Note: #23652e
Abstract: The leaf nutrient status of 30 bearing mango orchards was studied in relation to sandculture-based critical limits already reported for 1--2 year old mango seedlings from India and Florida. Several orchards which could be rated as deficient by these criteria were found to be high yielding and free from deficiency symptoms. Year-to-year variation was significant for yield, P, Ca and S. Similarly, orchards differed significantly in respect to their N, P, K and S status.

[168] C. Hernandez-Sanchez, G. Luis, I. Moreno, A. Camean, A.G. Gonzalez, D. Gonzalez-Weller, A. Castilla, A. Gutierrez, C. Rubio, A. Hardisson. 2012. Differentiation of mangoes (M*agnifera indica* L.) conventional and organically cultivated according to their mineral content by using support vector machines. Talanta. Vol 97. Page 325 - 330.
Reference ID: 23653
Note: #23653e
Abstract: Mangoes of uniform genetics (*Lippens* variety) cultivated in the Gomera Island (Canary Islands) by conventional and organic farming were used to analyze the mineral content in order to differentiate crops cultivated in the same geographic area by the cultivation practices. Farming differences as well as soil differences maybe reflected in the mineral content of the mangoes cultivated in these extensions. Concentration metal profiles consisting of the content of Ca, Co, Cu, Fe, K, Mg, Mn, Na, Ni and Znin mangoes wereo btained by using a tomic absorption spectrometry (AAS). Pattern recognition classification procedures were applied for discriminating purposes. Linear discriminant an analysis (LDA) allows to a classification performance of about 73% and support vector machines (SVM) found up to a 93% of predictionability. The classification success when applying support vector machines techniques is due to their ability for modeling non-linear class boundaries.

[169] T. Jensen, 2017. Plant Nutrition Today - Fall 2017 Summer no.7: There are poor growth areas in a field! Whta is the problem? Issue: 2. IPNI. Page 1 - 2.
Reference ID: 23654
Note: #23654e
Abstract: A farmer invests a lot of time, money, and hard work into each crop. The ultimate goal is to grow a high yielding and good quality crop in all portions of a field. However, most cropped fields tend to have better and poorer areas of crop growth. It seems that the poor growth areas are especially noticeable in years of adverse crop growth conditions, such as a shortage of adequate moisture. Under such conditions farmers are often interested in finding out what the limitation to crop growth is, and determine if there is some way to correct the problem. It is common for a farmer to ask for help in assessing the poor growth areas. This is when a crop adviser, or consulting agronomist can be called upon to make a visit to a field in question.

[170] P. He, 2017. Plant Nutrition Today - Fall 2017 Summer no.8: Nutrient Expert-Creating fertilizer recommendations when soil testing is not available. Issue: 2. IPNI. Page 1-2
Reference ID: 23655
Note: #23655e
Abstract: In much of the world, farmers do not have access to soil testing for making fertilizer recommendations. This traditional approach requires soil sampling, chemical analysis in the lab, statistical correlation with field research, and data interpretation. These resources are not available on many smallholder farms due to constraints such as limited access to laboratories, the relatively high cost of analysis, and inadequate timeliness in multiple cropping systems. Small and resource-poor farmers of the world have a great need for accurate agronomic information, just like largerscale farmers. Indeed, their needs may even more urgent, given the tight economic conditions and poverty that many small farmers operate in.

[171] C. Bengtsson, Y. Zimmer, Secondary C. Bengtsson, Y. Zimmer. 2017. Argentinian wheat exports - A revival ahead! A. Benchmark. Page 1 - 12.
Reference ID: 23656
Note: #23656e
Abstract: Once an important wheat exporter, beginning in 2001, Argentina slid off the charts in the face of increased export levies and additional restrictions that priced its wheat out of global markets and caused a marked reduction in wheat acreage. Since the 2015 election, duties on corn and wheat have been abolished while those on soybeans are being reduced gradually. This paper explores the perspectives of Argentinian wheat production under the new economic framework conditions.
In order to project future wheat prices at the farm gate, it is necessary to assess the “risk premium” caused by export restrictions over and above what would be caused by export fees themselves. On average, 2008 to 2015 domestic wheat prices were more than 100 USD/t lower than one would expect when just looking at export taxes.

[172] Y. Gan, C. Liang, G. Huang, S.S. Malhi, S.A. Brandt, F. Kate-Mupondwa. 2012. Carbon footprint of canola and mustard is a function of the rate of N fertilizer. Int J Life Cycle Assess. Vol 17. Page 58 - 68.
Reference ID: 23657
Note: #23657e
Abstract:
Purpose Best agricultural practices can be adopted to increase crop productivity and

lower carbon footprint of grain products. The aims of this study were to provide a quantitative estimate of the carbon footprint of selected oilseed crops grown on the semiarid northern Great Plains and to determine the effects of N fertilization and environments on the carbon footprint.
Materials and methods Five oilseed crops, Brassica napus canola, Brassica rapa canola, Brassica juncea canola, B. juncea mustard, and Sinapis alba mustard, were grown under the N rates of 0, 25, 50, 100, 150, 200, and 250 kg N ha−1 at eight environsites (location×year combinations) in Saskatchewan, Canada. Straw and root decomposition and various production inputs were used to calculate greenhouse gas emissions and carbon footprints.
Results and discussion Emissions from the production, transportation, storage, and delivery of N fertilizer to farm gates accounted for 42% of the total greenhouse gas emissions, and the direct and indirect emission from the application of N fertilizer in oilseed production added another 31%to the total emission. Emissions from N fertilization were nine times the emission from the use of pesticides and 11 times that of farming operations. Straw and root decomposition emitted 120 kg CO2eq ha−1, contributing 10% to the total emission. Carbon footprint increased slightly as N rates increased from 0 to 50 kg N ha−1, but as N rates increased from 50 to 250 kg N ha−1, carbon footprint increased substantially for all five oilseed crops evaluated. Oilseeds grown at the humid Melfort site emitted 1,355 kg CO2eq ha−1, 30% greater than emissions at the drier sites of Scott and Swift Current. Oilseeds grown at Melfort had their carbon footprint of 0.52 kg CO2eq kg−1 of oilseed, 45% greater than that at Scott (0.45 kg CO2eq kg−1 of oilseed), and 25% greater than that at Swift Current (0.45 kg CO2eq kg−1 of oilseed).
Conclusions Carbon footprint of oilseeds was a function of the rate of N fertilizer, and the intensity of the functionality varied between environments. Key to lower carbon footprint in oilseeds is to improve N management practices.

[173] T.C.P. Oxford. 1955. The Empire Journal of Experimental Agriculture London. Vol. XXIII. The Clarendon Press, London. Page 1-273.
Reference ID: 23658
Note: #23658e

[174] T. Mondal, J.K. Datta, N.K. Mondal. 2017. Chemical fertilizer in conjuction with biofertilizer and vermicompost induced changes in morpho-physiological and bio-chemical traits of mustard crop. Journal of the Saudi Society of Agricultural Sciences. Vol 16. Page 135 - 144.
Reference ID: 23659
Note: #23659e
Abstract: To study the impact of reduced dose of chemical fertilizer and its combination with biofertilizer and vermicompost on morpho-physiological and biochemical traits of mustard (*Brassica campestris* cv. B9), field experiments were conducted during winter seasons of November to February 2011–2012 and 2012–2013 respectively in an old alluvial soil zone of Crop Research and Seed Multiplication Farm, Burdwan University, Burdwan, West Bengal, India. Mustard was cultivated using a full recommended dose of chemical fertilizer (N:P:K– 100:50:50) and along with six different reduced doses of chemical fertilizer combined with biofertilizers and vermicompost. The performance of the crop was adjudged in terms of various parameters viz. leaf area index (LAI), leaf area duration (LAD), leaf area ratio (LAR), crop growth rate (CGR), net assimilation rate (NAR), photosynthetic rate (PR), harvest index (HI) and biochemical attributes such as total chlorophyll, sugar and proline content of physiologically active leaves of

mustard. Differential significant (p< 0.05) treatment response was reflected for the studied traits during crop maturity. The data revealed that vermicompost application significantly stimulated most of the studied attributes. It was concluded that 25% reduced dose of chemical fertilizer and its combination with vermicompost (T4) was optimum for most of the parameters studied as compared to the control at both crop stages.

[175] J.G. Waterer, J.K. Vessey, E.H. Stobbe, R.J. Soper. 1994. Yield and symbiotic nitrogen fixation in a pea-mustard intercrop as influenced by N fertilizer addition. Soil Biol. Biochem. Vol 26(4). Page 447 - 453.
Reference ID: 23660
Note: #23660e
Abstract: Intercropping pea and mustard has demonstrated the capacity to increase economic returns by achieving land equivalent ratios (LER) > 1. Mineral N is essential to produce adequate mustard stands, however, significant N additions are inhibitory to N, fixation. Yield and N, fixation studies characterized the response of pea and mustard in sole and intercrop conditions at four fertilizer N concentrations (10, 30, 60 and 90 kg N ha-‘). The yield of peas and LERs of the intercrop did not increase with increasing N rates. The mustard yields increased with N rate in sole-crop but not in intercrop plots. Seasonal patterns of nitrogenase activity and total N, fixation estimates in pea were made using acetylene reduction assays and the t5N isotope dilution technique, respectively. Nitrogenase activity early in the growing season was negatively correlated with N rate in both years. In 1990, nitrogenase activity increased later in the season in the treatments receiving 30 or 60 kg N ha-1 in 1991, the inhibition of nitrogenase activity with increasing N rate was sustained throughout the season. The N studies aimed at quantifying total N, fixation indicated no significant response to N rate in 1990 and a negative correlation to N rate in 1991. N transfer between the pea and the mustard was not identified.

[176] S. Balieiro. 2016. Exploring International competitiveness in grain and oilseed. Page 112 - 145.
Reference ID: 23661
Note: #23661e

[177] K. Majumdar, A.M. Johnston, S. Dutt, T. Satyanarayana, T.L. Roberts. 2013. Fertiliser Best Management Practices - Concept, Global Perspectives and Application. Indian Journal of Fertilisers. Vol 9(4). Page 14 - 31.
Reference ID: 23662
Note: #23662e
Abstract: The greatest challenge facing mankind in the coming decades is to produce the basic necessities of food, feed, fuel and raw materials from limited land area. Increasing food demand from limited land resources in the coming decades would require increased use of fertilisers. This will require application of proven scientific principles of nutrient management that ensures improved productivity of crops per unit area without adding to environmental concerns. The Fertiliser Best Management Practices (FBMPs), defined as practices which have been proven in research and tested through farmer implementation to give optimum production potential, input efficiency and environmental protection, provides a set of guidelines of overall crop nutrient management that addresses the sustainability issues. The recently developed “4R Nutrient Stewardship” concept has been proposed as definite scientific principles based on FBMPs that can help towards an inclusive social, economic and

environmental sustainability of production systems.

[178] M.S. Aulakh, N.S. Pasricha. 1998. The effect of green manuring and fertilizer N application on enhancing crop productivity in mustard-rice rotation in semi-arid subtropical regions. European Journal of Agronomy. Vol 8. Page 51 - 58.
Reference ID: 23663
Note: #23663e
Abstract: Mustard (*Brassica napus*) is an important oilseed crop grown in semi-arid subtropical soils of South Asia. Information on its fertilizer N and S requirements, nitrogen supplying value of green manure, and complimentary and synergistic effects of green manure and fertilizer N is needed for the development of a sustainable mustard-rice cropping system. A field experiment was conducted for 4 years (1990-1991 to 1993-1994) to evaluate the effects of different rates of fertilizer N and S with or without cowpea green manuring on yield, nutrient uptake, protein and oil content of mustard. The residual effects of green manuring were assessed on the succeeding rice crop. The seed yield of mustard increased significantly up to 100 kg N ha-1, but decreased thereafter with further increase in fertilizer N rate (150 kgNha-1). Cowpea grown as green manure crop in situ for 45-50 days during September-October, prior to seeding of mustard, accumlated 62-86 kg N ha -1. Green manuring, in the absence of fertilizer N, significantly increased the mustard yield. All through the 4 years, the combined application of green manure with 100 kg N ha-a (otherwise optimum rate) further improved the yield potential of mustard, illustrating the benefit that any amount of fertilizer N cannot achieve. Green manuring to mustard substantially improved the yield (920 kg ha -1) of the succeeding crop of rice. Protein concentration in mustard seed increased greatly from 14.0% in the control to 21.6% under fertilizer N and S treatments. Application of 100 kg N ha- ~ + 20 kg S ha- 1 + green manure increased the oil yield to 992 kg compared with 518 kg in the control. These results illustrated the complementary effects of green manuring in conjunction with the optimum rates of 100 kgN and 20 kg S ha -1 in maximizing the yields, uptake of N and S, protein, percentage of oil and oil production in mustard and its residual effect on succeeding rice crop.

[179] I. Piri, A. Tavassoli, F. Rastegaripour, M. Babaeian, E. Amiri. 2014. Effects of Sulfur and Water Supply on Quantitative and Qualitative Traits of Indian Mustard. Communication Soil Science and Plant Analysis. Vol 45. Page 236 - 249.
Reference ID: 23664
Note: #23664e
Abstract: Oilseed production can be affected in arid and semi-arid regions that are exposed to water shortages. Nevertheless, cultivation of drought-resistant crops such as Indian mustard is a suitable way to gain acceptable yields. Effects of different levels of irrigation and sulfur (S) fertilizer on the quantity and quality parameters of mustard (Brassica juncea) were assessed in a trial at the Indian Agricultural Research Institute, New Delhi, during 2007–2008 and 2008–2009 growing seasons. The experiment was carried out in a split plot as randomized complete block design with three replications. The experiment treatments consisted of three irrigation levels [no irrigation, one irrigation at 45 days after sowing (DAS), and two irrigations at 45 DAS and 90 DAS] in main plots and four sulfur levels (S; 0, 15, 30, and 45 kg S ha−1) in subplots. The results showed that in the two successive years of the experiment, the number of siliquae/plant, length of siliqua, number of seeds/siliqua, and 1000-seed weight increased significantly with increasing the level of irrigation, which resulted in greater seed yield than no irrigation. Also, mustard plants irrigated two times showed the

greatest values of nitrogen (N), protein, and oil content of the seeds over no irrigation in both years of this study. The oil yield and S content in the seed of mustard increased significantly with increasing the level of irrigation in both years. Number of siliquae/plant, siliqua length, number of seed/siliqua, and 1000-seed weight increased significantly with increasing the rates of S up to 45 kg S ha−1 in both years of experimentation; however, in 2008–2009 the difference between application of 30 and 45 kg ha−1 S was not statically significant. Also, the seed yield, N, protein, oil, and S contents in seeds of mustard increased significantly with increase in the level of applied S in both years.

[180] A. Riar, G. Gill, G. McDonald. 2016. Effect of post-sowing nitrogen management on co-limitation of nitrogen and water in canola and mustard. Field Crop Research. Vol 198. Page 23 - 31.
Reference ID: 23665
Note: #23665e
Abstract: In rainfed Mediterranean environments crop yields are limited by nitrogen (N) and water. The concept ofwater and N co-limitation has been used to describe how these competing resources are allocated duringgrowth, it has been proposed that growth is optimum when water and N are equally limiting. All thepublished work so far on water and N co-limitation has been done in cereals using single applications offixed amounts of N. However, delayed and split applications of N at key phenological growth stages canimprove N use efficiency and alter the severity of N and water stress during the growth of the crop. Theaim of the work reported here was to assess water and N co-limitation in the indeterminate crops canola (*Brassica napus*) and mustard (*B. juncea*) under different post-sowing N treatments. Four field experimentswere conducted over three years with different cultivars of canola and mustard, under different waterregimes, and grown with three N rates (0, 100 and 200 kg N ha.1 as granular urea) applied at differentphenological growth stages. The results suggested that yield gaps (Yg; the difference between actual andattainable yield) increased as total stress from water and N (TWN) and the maximum of the two stresses (MWN) increased and declined as the degree of water-N co-limitation increased, whether based on totalstress (CTWN) or maximum stress (CMWN). However, seasonal and genotypic variation in the Yg reductionand improvement in water use efficiency (WUE) with the degree of co-limitation were observed forCTWN. Application of N improved the CTWN without having the effect of split N application timing. Norelationship was found between N use efficiency for seed yield (NUESY) of canola and mustard and colimitationindices, which may be due to low N uptake efficiency during the pre-flowering period andlow physiological efficiency during the post - flowering period. This study provides the first empiricalevidence that yield of canola and mustard is co-limited by water and N under post-sowing N applicationwith seasonal and genotypic variation in response to CTWN. Future studies need to focus on the interactionof pre and post-flowering water and N stresses and their effect on CTWN in devising crop managementtools for this environment.

[181] S.K. Rautaray, B.C. Ghosh, B.N. Mittra. 2003. Effect of fly ash, organic wastes and chemical fertilizers on yield, nutrient uptake, heavy metal content and residual fertility in a rice–mustard cropping sequence under acid lateritic soils. Biosource Technology. Vol 90. Page 275 - 283.
Reference ID: 23666
Note: #23666e
Abstract: A field experiment was conducted for two years in sandy loam acid lateritic

soil to study the direct effect of fly ash, organic wastes and chemical fertilizers on rice (*Oryza sativa*) and their residual effect on mustard (*Brassica napus* var *glauca*) grown in sequence. Rice yields were higher when fly ash, organic wastes and chemical fertilizers were used in an integrated manner as compared to sole application of chemical fertilizers. Yields of mustard were also higher under the residual effect of the former rather than the latter. However, this beneficial residual effect under integrated nutrient sources was inadequate for the mustard crop in the low fertility test soil. Hence, direct application of fertilizers was needed, in addition to residual fertility. The effect of fly ash on mean rice equivalent yield of the rice-mustard cropping sequence was highest (up to 14%) when it was used in combination with organic wastes and chemical fertilizers. While the yield increase was 10% when it was used in combination with only chemical fertilizers. The minimum yield advantage, 3%, occurred when fly ash was applied alone. The equivalent yield of the rice-mustard cropping sequence was equally influenced by either of the organic wastes. Cadmium and Ni content in rice grain and straw were less under the direct effect of fly ash. The residual effect on mustard was similar for Ni content in seed and stover; however, Cd content was increased. Beneficial residual soil chemical properties in terms of pH, organic carbon and available N, P and K were noted for integrated nutrient treatments involved fly ash, organic wastes and chemical fertilizers as compared to continuous use of only chemical fertilizers. Application of fly ash alone was effective in raising soil available P. Thus, integrated use of fly ash, organic wastes and chemical fertilizers was beneficial in improving crop yield, soil pH, organic carbon and available N, P and K in sandy loam acid lateritic soil.

[182] I. Piri, M.M. Nik, A. Tavassoli, F. Rastegaripour, M. Babaeian. 2011. Effect of irrigation frequency and application levels of sulphur fertilizer on water use efficiency and yield of Indian mustard (*Brassica juncea*). African Journal of Biotechnology. Vol 10(55). Page 11459 - 11467.
Reference ID: 23667
Note: #23667e
Abstract: A field experiment was conducted at Indian Agricultural Research Institute, New Delhi during the crop season of 2007 to 2008 and 2008 to 2009 to study the effect of irrigation and sulphur on yield and water use efficiency of Indian mustard (*Brassica juncea* var. PusaJagannath). The experiment was carried out in split plot design with three replications. The treatments consisted of three levels of irrigation in the main plots [no irrigation, one irrigation at 45 days after sowing (DAS), and two irrigations at 45 DAS and 90 DAS] and four levels of sulphur in sub-plots (0, 15, 30, and 45 kg S/ha). The results showed that in both years of experimentation, application of two irrigations significantly increased the India mustard yield as indicated by dry matter accumulation, seed production, biological/biomass yield, and harvest index, in comparison to no irrigation. Also, the application of two irrigations, been on par with one irrigation, significantly enhanced seed and biological yield to 20.6 and 78.0 q/ha respectively in the first year, and 22.9 and 86.7 q/ha respectively in the second year, and the highest harvest index was obtained from the application of two irrigations in both years of the study. Water use efficiency as indicated by seasonal consumptive water use increased progressively with the increasing number of irrigations. Also, the amount of soil moisture extraction by the crop from upper layers increased and those from lower depth decreased with increase in the level of irrigation (from no irrigation to two irrigations) in both years of the study. Application of two irrigations to mustard gave higher net (yield) return and benefit-cost (B:C ratio) over one irrigation, which in turn, gave higher net benefit-cost returnand B:C ratio than no irrigation. The increasing

levels of sulphur application increased Indian mustarddry matter accumulation, seed and biological yield and harvest index. Seasonal consumptive water useby the crop and water use efficiency increased progressively with the increase level of sulphur application up to 45 kg S/ha . Quantity of soil moisture extraction from deeper layer increased with increase in the levels of sulphur application.

[183] K.G. Mandal, K.M. Hati, A.K. Misra, K.K. Bandyopadhyay. 2010. Root biomass, crop response and water-yield relationship of mustard (*Brassica juncea* L.) grown under combinations of irrigation and nutrient application. Irrig Sci. Vol 28. Page 271 - 280.
Reference ID: 23668
Note: #23668e
Abstract: A 3-year study was carried out to assess the root biomass production, crop growth rate, yield attributes, canopy temperature and water-yield relationships in Indian mustard grown under combinations of irrigation and nutrient application for revealing the dynamic relationship of crop yield (Y) and seasonal evapotranspiration (ET). Three post-sowing irrigation treatments viz. no irrigation (I1), one irrigation at flowering (I2) and two irrigations oneeach at rosette and flowering stage (I3), three nutrient treatments viz. no fertilizer or manure (F1), 100% recommended NPK i.e., 60 kg N, 13.1 kg P and 16.6 kg K ha-1(F2) and 100% recommended NPK plus farmyard manure@ 10 Mg ha-1 (F3) were tested in a split-plot design. Root biomass was significantly greater in I3 than I2 and I1, and in F3 than F2 and F1. The I3 x F3, I2 x F3 and I3 x F2 combinations maintained significantly greater crop growthrate, plant height, yield components, ET and crop yield andbetter plant water status in terms of canopy temperature, canopy-air temperature difference (CATD) and relative leaf water content (RLWC). Number of siliqua plant-1 and seeds siliqua-1 were the major contributors to the seed yield. Marginal analysis of water production function was used to establish Y-ET relationship. The elasticity of water production (Ewp) provides a means to assess relative changes in Y and ET, and gives an indication of improvement of Y due to nutrient application. The ET-Y relationships were linear with marginal water use efficiency (WUEm) of 3.09, 4.23 and 3.95 kg ha-1 mm-1 in F1, F2 and F3, respectively, and the corresponding Ewp were 0.63, 0.71 and 0.61. This implies that the scope for improving yield and WUE with 100% NPK was little compared with 100% NPK + farmyard manure. The crop yield was highest in I3 x F3 combination, and the similar yield was obtained in I2 x F3 and I3 x F2 combinations. Application of organic manure along with 100% NPK fertilizers maintained greater crop growth rate, better water relation in plants, yield attributes and saved one post sowing irrigation.

[184] O.P. Premi, B.K. Kandpal, S.S. Rathore, K. Shekhawat, J.S. Chauhan. 2013. Green manuring, mustard residue recycling and fertilizer application affects productivity and sustainability of Indian mustard (*Brassica juncea* L.) in Indian semi-arid tropics. Industrial Crops and Products. Vol 41. Page 423 - 429.
Reference ID: 23669
Note: #23669e
Abstract: An experiment was conducted for five-years (2005-06 to 2009-10) to evaluate the impact of *Sesbania* green-manuring (GM), mustard-residue recycling and fertilizers on soil health and productivity of Indian mustard under fallow-mustard sequence. *Sesbania* (GM) significantly increased SOC, carbon-sequestration-potential rate, infiltration rate, available NPK status but decreased bulk density. Supplementing mustard-residue recycling 2.5 t ha-1 further improved the soil quality attributes significantly. The increase in fertilizer from $N_{40}P_{8.7}K_0$ to $N_{80}P_{17.4}K_{33.3}$ also

improved the soil attributes gradually. This improvement in soil properties due to *Sesbania* (GM) and mustard-residue recycling significantlyinfluenced plant height, branches/plant, siliquae/plant, seeds/siliqua and ultimately seed and oil yield compared to existing fallow-mustard practice. The mustard seed yield was increased by 42.3% due to *Sesbania* (GM) and by 63.9% due to supplementary mustard residue recycling in five years. Increase infertilizers levels from N_{40} to N_{80} and $P_{8.7}$ to $P_{17.4}$ significantly improved mustard yield attributes, seed and oil yield while results of K application was inconsistent. The combined application of $N_{80}P_{17.4}K_{33.3}$ synergistically increased the seed yield by 82.1% over $N_{40}P_{8.7}K_0$. Sustainability yield index, partial factor productivity, production efficiency and incremental benefit cost ratio also showed significant improvement due to *Sesbania* (GM), mustard-residue recycling and judicious fertilizer use.

[185] H.V. Nguen, F. Lukman, J.P. Caliman, A. Flori. 1993. Spot Image as a visual tool to assess sanitary, nutrient and general status of estate oil palm plantation. PORIM Intl. Palm Oil Congress. Page 548 - 554.
Reference ID: 23676
Note: #23676e
Abstract: Remote sensing unit for perennial crops of CIRAD cooperates with IOPRL (Indonesian Oil Palm Research Institute, Marhate Tree Crop Research Centre), and PTP II of Sumatra, Indonesia to establish a methodology using satellite image as a complementary tool to control the nutrient, sanitary and general status of large estate oil palm plantations. The proposed method must be simple to operate and sufficiently reliable to ensure economic return. Two spot images of Seberang Oil Palm Plantation with less than 10% cloud coverage have been chosen for this study: January 30, 1991 and July 10, 1991. Digital image processing was carried out in Cirad remote sensing laboratory, Montpellier France. Therefore, 69 test plots have been located and studied in the field, in Seberang Oil Palm Plantation, in Sumatra. Gps, (Global positioning system), has been used to verify the exact location of the test plots on Indonesian topographical map scale 1/50 000, as well as on spot image. Field measurements of the reflectance of the young palms using a Cimel radiometer were also made for future correlation studies between satellite reflectance and the ground one.

[186] M.R. Amin, M.K. Hasan, Q. Naher, M.A. Hossain, Z.U. Noor. 2007. Response of onion to NPKS fertilizers in low Ganges River flood plain soil. Int. J. Sustain. Crop Prod. Vol 2(1). Page 11 - 14.
Reference ID: 23677
Note: #23677e
Abstract: An investigation was conducted at farmers' field of Baliakandi, Rajbari, during three consecutive rabi seasons of 2001 to 2003 to find out the optimum fertilizer dose of onion for greater Faridpur region under AEZ 12. Four different levels of NPKS viz. control, medium yield goal (MYG), high yield goal (HYG) and HYG X 1.3 were tested with Taherpuri variety of onion. Average of three years study reveals that a considerable response of onion to NPKS was observed. However, the response to N and P was more distinct in comparison to K and S. From the average yield data, a response curve was drawn and the relationship was quadratic in nature. The nutrient dose that maximized yield (107-72-90-33 kg NPKS/ha) as well as profit (95-50-70-32 kg NPKS/ha) of onion cultivation was found out from the response curve.

[187] A. Zaharah, P. Vimala, R.S. Zainab, H. Salbiah. 1994. Response of onion shallot to organic fertilizer on Bris (Rudua Series) soil in Malaysia. Acta Horticulturae. Vol 358. Page 429 - 432.
Reference ID: 23678
Note: #23678e
Abstract: Field studies were conducted to evaluate the effects of palm oil mill effluent (POME) as an organic fertilizer on yield of onion and shallor cultivated on bris soil. Four levels of POME (0, 32, 64, and 96 t/ha) were tested. The compound fertilizer (N:P:K:Mg =12: 12:17:2) at 1.5 t/ha was given in three split applications (basal and 4 and 6 weeks after transplanting). Results showed that the yield of onion increased significantly from 0.78 to 7.14 t/ha as the level of POME increased from 0 to 32 t/ha. The increase in yield was attributed to the increase in number of bulbs formed per unit area and also to the size of the bulb. Similar results were observed with shallot. A yield of 8.66 t/ha was obtained at 96 t/ha POME compared with 7.64, 6.39, and 3.52 t/ha at 64, 32, and 0 t/ha of POME, respectively. The increase in yield was mainly due to the increase in the number of bulbs per unit area and the size of bulb.

[188] L. Norgrove, S. Hauser. 2013. Carbon stocks in shaded *Theobroma cacao* farms and adjacent secondary forests of similar age in Cameroon. Tropical Ecology. Vol 54(1). Page 15 - 22.
Reference ID: 23679
Note: H 8.1.4 #23679
Abstract: Cacao is an important smallholder crop in West Africa, often grown under a forest canopy. Yields from cacao farms are low so farmers consider removing shade trees, however, the impacts on pest and disease dynamics, soil fertility and thus yield in the longer term are not understood. We estimated carbon stocks in shaded cacao systems in Cameroon using equations that took account of wood densities of individual species. The average C stock in cacao trees was 14.4 Mg AC ha^{-1}, compared with 121.1 Mg C ha^{-1} in the upper shade tree canopy, 5.8 Mg C ha^{-1} in necromass and 90 Mg ha^{-1} in soil. While total stocks was comparable to that in secondary forest only a small proportion was in the cacao per-se. Cutting shade trees would significantly reduce carbon stocks. Impacts of reduced C stock on sustainability are discussed.

[189] N. Tiralla, O. Panferov, A. Knohl. 2013. Allometric relationships of frequently used shade tree species in cacao agroforestry systems in Sulawesi, Indonesia. Agroforest. Sys. Vol 87. Page 857 - 870.
Reference ID: 23680
Note: H 26.1.3 #23680
Abstract: Shade trees play an important role within agroforestry systems by influencing radiation and wind regimes as well as nutrient and hydrological cycling. However, there is a lack of quantitative assessments of their functions. One of the reasons is the rare information on structural characteristics of shade tree species. Therefore, the aim of this study is to provide basic information on the structure of frequently used shade tree species for the implementation of models simulating the ecosystem processes in agroforestry systems. The investigation of the shade tree was conducted at two cacao agroforestry sites on Sulawesi, Indonesia. The measurements of the main structural parameters: diameter at breast height, tree height, trunk height, crown length and crown radius were carried out for the shade tree species *Aleurites moluccana*, *Cocos nucifera* and *Gliricidia sepium*. For data collection, the National Forest Inventory Field Manual Template by FAO (2004) was applied. Based on this information allometric functions were derived for the correspondent shade tree species. The best significant

relationship were obtained for the height crown length relationship of the dicotyledonous tree species' *A. moluccana* and *G. sepium* with a coefficient of determination r^2 = 0.925 and r^2 = 0.738, respectively, and the height-crown length relationship of the monocotyledonous palm *C. nucifera* with r^2 = 0.663. The transferability tests 'analysis of covariance' and 'homogeneity of slopes' have shown that the obtained allometric functions are also applicable to other cacao agroforestry systems of the region.

[190] G.B. Yadav, U.M. Khodke, S.B. Jadhav. 2010. Response of onion (*Allium cepa* L.) to irrigation schedules and nitrogen levels under micro-irrigation system. International Journal of Agricultural Engineering. Vol 3(1). Page 59 - 31.
Reference ID: 23681
Note: #23681e
Abstract: An experiment was conducted at College of Agricultural Engineering and Technology, MAU, Parbhani to assess the response of onion under different irrigation schedule and nitrogen levels under micro irrigation system. In the present investigation onion variety N-53 was tested for exploiting its maximum yield potential under four irrigation schedules namely I1(0.75 Etc), I2(1.00 Etc), I3(1.25 Etc) and I4 (conventional check basin) and three nitrogen levels namely N1 (75 % RDF of N), N2 (100 % RDF of N) and N3 (125 % RDF of N). The performance of drip irrigation system was judged by uniformity of distribution and emission uniformity. The water use efficiency and fertilizer use efficiency was also studied. The average emission uniformity coefficient of drip irrigation system was 95.07 per cent. The highest yield of onion bulb was obtained in the plots with drip irrigation method scheduled at 1.25 Etc mm depth and 100 per cent recommended dose of nitrogen.

[191] Y. Abou Rajab, C. Leuschner, H. Barus, A. Tjoa, D. Hertel. 2016. Cacao Cultivation under diverse shade tree cover allows high carbon storage and sequestration without yield losses. Plos One. Vol 11(2). Page 1 - 14.
Reference ID: 23682
Note: H 8.1.4 #23682
Abstract: One of the main drivers of tropical forest loss is their conversion to oil palm, soy or cacao plantations with low biodiversity and greatly reduced carbon storage. Southeast Asian cacao plantations are often established under shade tree cover, but are later converted to non-shaded monocultures to avoid resource competition. We compared three co-occurring cacao cultivation systems (3 replicate stands each) with different shade intensity (non-shaded monoculture, cacao with the legume *Gliricidia sepium* shade trees, and cacao with several shade tree species) in Sulawesi (Indonesia) with respect to above- and belowground biomass and productivity, and cacao bean yield. Total biomass C stocks (above- and belowground) increased fivefold from the monoculture to the multi-shade tree system (from 11 to 57 Mg ha-1), total net primary production rose twofold (from 9 to 18 Mg C ha-1 yr-1). This increase was associated with a 6fold increase in aboveground biomass, but only a 3.5fold increase in root biomass, indicating a clear shift in C allocation to aboveground tree organs with increasing shade for both cacao and shade trees. Despite a canopy cover increase from 50 to 93%, cacao bean yield remained invariant across the systems (variation: 1.1–1.2 Mg C ha-1 yr-1). The monocultures had a twice as rapid leaf turnover suggesting that shading reduces the exposure of cacao to atmospheric drought, probably resulting in greater leaf longevity. Thus, contrary to general belief, cacao bean yield does not necessarily decrease under shading which seems to reduce physical stress. If planned properly, cacao plantations under a shade tree cover allow

combining high yield with benefits for carbon sequestration and storage, production system stability under stress, and higher levels of animal and plant diversity.

[192] A.A. Khan, M. Zubair, A. Bari, F. Maula. 2007. Response of onion (*Allium cepa*) growth and yield to different levels of nitrogen and zinc in Swat Valley. Sarhad J. Agric. Vol 23(4). Page 933 - 936.
Reference ID: 23683
Note: #23683e
Abstract: The response of onion (*Allium cepa*) growth and yield to different levels of nitrogen and zinc in Swat valley was studied at Agricultural Research Station (North) Mingora Swat, during 2003-04. Nitrogen levels under trail were 0, 100 and 200 kg per hectare, while zinc levels were 0, 5, 10 and 15 kg per hectare. The statistical analysis revealed that both nitrogen and zinc significantly affected all the growth parameters studied. Maximum leaf length (41.81 cm), was recorded in plots fertilized with 100 kg nitrogen and 10 kg zinc per hectare, whereas maximum plant height (56.33 cm), bulb weight (136.5 g), yield (22280 kg) per hectare were recorded in plots fertilized with 100 kg nitrogen per hectare and zinc 10 kg per hectare.

[193] A.G. Assefa, S.H. Mesgina, Y.W. Abrha. 2013. Response of Onion (*Allium Cepa* L.) growth and yield to different combinations of N, P, S, Zn fertilizers and compost in Northern Ethiopia. International Journal of Science and Research (IJSR). Vol 4(2). Page 985 - 989.
Reference ID: 23684
Note: #23684e
Abstract: Low soil fertility status is a limiting factor in northern Ethiopia in general and the study area in particular. To improve this problem and increase onion yield, balanced fertilization is a key important factor identified. However, use of correct type and rate of fertilizer applications are major problems in the study area. The objective of this research was, thus, to investigate the effect of three different combinations of N, P, S, Zn fertilizers and compost on yield and growth parameters of “Adama red” onion variety (*Allium cepa* L.). A field experiment was conducted at a farmer’s field in Gumsalassa irrigation scheme in northern Ethiopia for the last two consecutive irrigation seasons (2012/2013 and 2013/2014). The experiment was laid out in randomized complete block design with three replications and five experimental plots (treated with N-P-S-Zn, N-P-S, N-P, compost and control) with unit plot size of 3m × 3.5 m = 10.5 m2 and subjected to analysis of variance. Applied fertilizer rates were N=130, P=20, S=21, Zn=15 and Compost 12000 Kg he-1. As a result, all combinations of fertilizers including compost gave significantly higher yield as compared to the control (P=0.05). On an average, the study revealed that a considerable response of onion to N-P-S-Zn fertilizers was observed with a maximum average yield of 25377.5 kg he-1. Conversely, the minimum average yield (9810.5 kg he-1) was observed in the control plot. Accordingly combinations of 130 kg N, 20kg P, 21kg S and 15kg Zn ha-1 could be recommended for better yield over others.

[194] B. Agumas, A. Abewa, D. Abebe. 2014. Response of Irrigated Onion (*Allium cepa* L.) to Nitrogen and Phosphorus Fertilizers at Ribb and Koga Irrigation Schemes in Amhara Region, North Western Ethiopia. International Research Journal of Agricultural Science and Soil Science. Vol 4(5). Page 95 - 100.
Reference ID: 23685
Note: #23685e
Abstract: Nitrogen (N) and phosphorus (P) fertilizer recommendations for irrigated

onion production is lacking for the different irrigation schemes in the Amhara region, North western Ethiopia. Two different experiments were conducted at Ribb and Kog irrigation schemes to determine the N and P fertilizer levels for irrigated onion. Experiments were conducted in the years 2010 and 2011. Treatments were comprised of factorial combinations of five N levels (50, 100, 150, 200 and 250 kg N ha-1) and three P levels (20, 40 and 60 kg P ha-1) with one satellite control treatment (0/0 N/P) replicated three times in RCBD. Onion variety used was Bombay Red. Results showed that application of 150 kg N ha-1 and 20 kg P ha- at Ribb and application of 100 kg N ha-1 and 60 kg P ha-1 at Koga are best recommended for onion production under irrigation.

[195] A. Lerna, G. Mauromicale. 2012. Tuber yield and irrigation water productivity in early potatoes as affected by irrigation regime. Agricultural Water Management. Vol 115. Page 276 - 284.
Reference ID: 23686
Note: #23686e
Abstract: Excessive amounts of irrigation water are often utilized for early potato cultivated in the Mediterranean basin. Given that water is an expensive and limited resource in semi-arid areas, it is crucial to provide a better irrigation management and/or irrigation technologies that facilitate its efficient and effective use, in turn leading to savings in water. With the aim of achieving appropriate irrigation water regimes in cultivation management of a potato crop in a Mediterranean environment, a two-year experiment was conducted in Sicily (South Italy). The effects of four irrigation regimes (irrigation only at plant emergence, irrigation during the whole cycle, irrigation from tuber initiation up to 50% of tuber growth, irrigation from 50% of tuber growth to the end of tuber growth), on the tuber yield and yield components, on irrigation water productivity (IWP) and on tuber quality, were studied. Our results showed a marked and significant effect of the irrigation regime on tuber yield, IWP, source/sink relationships and dry matter content of tubers. We also demonstrate that high yield levels of potatoes, high IWP and good tuber quality can be reached by irrigating with 100% maximum evapotranspiration (ETm) supply from tuber initiation up to 50% of tuber growth. Compared to irrigation with 100% ETm supply throughout the whole cycle, this allows making savings of irrigation water of roughly 77 mm year−1, which is a significant reduction for the semi-arid areas.

[196] A.M. Mohammed, J.S. Robinson, D.J. Midmore, A. Verhoef. 2005. Biomass stocks in Ghanaian cocoa ecosystems: the effects of region, management and stand age of cocoa trees. European Journal of Agriculture and Forestry Research. Vol 3(2). Page 22 - 43.
Reference ID: 23687
Note: H 8.1.4 #23687
Abstract: Determination of biomass produced in cocoa ecosystems is an important step towards quantifying the carbon sequestration potential of cocoa production systems. This study provides data on the biomass of cocoa systems being influenced by management, cocoa stand ages and region. Eight cocoa farms were sampled on the basis of three variables: region (Eastern, Western region), shade management (shaded, unshaded) and stand age (<15,>15 years). Allometric equations (R^2> 0.94) were developed to estimate the biomass of live cocoa trees, while the biomass stocks of non-cocoa trees was estimated using an existing equation by FAO. Generally, biomass stocks were higher in the Eastern than Western region, shaded than unshaded, and in stands >15 years than those <15 years.

[197] T. Oberthur, S. Cook, C. Donough, J. Cock, S.P. Kam, Y.L. Lim. 2015. Inteligencia de Plantaciones de palma de aceite: analisis de datos de produccion para la toma de decisiones agronomicas efectivas y el manejo de fertilizantes. Revista Palmas. Page 235 - 242.
Reference ID: 23688
Note: H 8.1.1 #23688 (English Version #21632e)
Abstract: The oil palm industry is at an inflection point. The last two decades of spectular growth through unrestricted land acquisition can not go on forever. Plantation owners now face not only a lack of suitable land but also declining value, yield ambiguity, labor storage, and a lack luster public image. The industry needs to find a new footing. Devise better processes. Do more with less. It needs to develop a new future for oil palm as a credible contributor to local and global food, energy, and environmental security. The promise of Plantation Intelligence (PI) is about implementing and accelerating this change, through Big Data generation and analysis. Oil palm production is a data-rich but information-poor activity. The industry collects vast amounts of data but relatively little is analyzed to improve management. The data itself holds the key to better agronomic practices, better resource allocation, and better management decisions. Plantation Intelligence is an adaptive learning process based on the analysis of a large data base of crop performance data to achieve better yield. Some of these factors cannot be controlled, such as climate and soil, while others can be manipulated, such as fertilization and harvesting protocols. IPNI's experience suggests that it is fairly straight forward for commercial plantations to adopt PI. Among the benefits: an accurate assessment of performance, return-on-investment, and obstacles to efficient production.

[198] Anonymous. 2017. InfoSawit Vol XI No 7 JULI 2017, Vol 5. Page 1 - 54.
Reference ID: 23689
Note: #23689e

[199] N. Neshev, I. Manolov. 2015. Content and Uptake of Nutrients with Plant Biomass of Potatoes Depending on Potassium Fertilization. Agriculture and Agricultural Science Procedia. Vol 6. Page 63 - 66.
Reference ID: 23690
Note: #23690e

[200] S.P. Cheong. 1981. Fertiliser practices for oil palm with special reference to a wet monsoonal climate. Development of The Oil Palm Industry in the East Coast. Page 188 - 202.
Reference ID: 23691
Note: #23691e
Abstract: Oil palms in Malaysia, particularly the higher yielding tenera (D x P) form, are known to require large quantities of nutrients for vegetative as well as reproductive dry matter production (Ng & Thamboo, 1967; Ng et al., 1968) The concept of 'nutrient balance' was introduced to assess the necessary manurial inputs for oil palms by evaluating the key factors of nutrient supply and demand (Hew & Ng, 1968; Ng, 1977). In recent years, field fertiliser experiments have been extensively established which have generally verified the oil palm fertiliser requirements computed for various soil and environmental conditions (Hew, Ng & Lim, 1973; Foster & Goh, 1976; Cheong & Ng, 1977). In order to achieve a satisfactorily high level of fruit production, not only is it essential to provide a sound and balanced fertiliser regime but also it is equally important to implement proper practices to ensure efficient nutrient uptake by the

palms especially in view of the considerably high maintenance cost generally incurred in manuring. The factors governing efficient fertiliser usage are primarily fertiliser placement, time of application; frequency of application and types of fertiliser used. These major considerations which are greatly influenced by the annual rainfall pattern, terrain features as well as soil physical and drainage properties are discussed with special reference to the wet monsoonal climate and edaphic environment of the East Coast of Peninsular Malaysia.

[201] E. Jahanzad, A.V. Barker, M. Hashemi, A. Sadeghpour, T. Eaton, Y. Park. 2017. Improving yield and mineral nutrient concentration of potato tubers through cover cropping. Field Crop Research. Vol 212. Page 45 - 51.
Reference ID: 23692
Note: #23692e
Abstract: Over-fertilization of food crops has resulted in increased environmental concerns over the past decades. On the other hand, literature indicates a decline in concentration of mineral nutrients in vegetables in the past 50 years. Thus, a need occurs to employ cropping systems that are less dependent on fertilization while maintaining yield and nutritive value of food crops. This study evaluated tuber yield and nutrient concentration of potatoes (*Solanum tuberosum* L.) following rye (*Secale cereale* L.), forage radish (*Raphanus sativus* L.), winter pea (*Pisum sativum* L.) and no cover crops (NCC). Four nitrogen (N) fertilizer rates (0, 75, 150, and 225 kg N ha−1) were applied to a red-skinned potato cultivar (Dark Red Norland) and a buff-skinned one (Superior).
Overall, potatoes grown after cover crops produced 13–25% more tubers compared to NCC. Potatoes following NCC needed to be fertilized at 225 kg N ha−1 to produce the highest yield of 26.5 Mg ha−1, whereas potatoes after winter pea or forage radish produced the same or higher yields (10–25%) at 75 or 150 kg N ha−1, respectively. Rye provided less N to a succeeding potato crop than forage radish or winter pea; however, potatoes following rye produced a greater yield than those planted after NCC. Potatoe tubers in cover crop plots accumulated more mineral nutrients compared to NCC; however, the differences among cover crops were not always significant. Overall, forage radish and winter pea were better alternatives to rye as indicated by less N fertilizer application, sustained tuber yield, and tuber mineral nutrient concentration.

[202] M.A.H.S. Jahan, A. Hossain, M.A.R. Sarkar, J.A.T. da Silva, M.N.S. Ferdousi. 2016. Productivity impacts and nutrient balances of an intensive potato-mungbean-rice crop rotation in multiple environments of Bangladesh. Agriculture, Ecosystems & Environment. Vol 231. Page 79 - 97.
Reference ID: 23693
Note: #23693e
Abstract: Bangladesh needs to produce more food on less land to assure future food security for an increasing population. The two techniques that need to be adopted more frequently are an increase in cropping intensity by producing two or more crops on the same piece of land, and an increase in the productivity of individual crops, particularly their ability to utilize basic or limiting resources such as water and nutrients. In this context, the present study was carried out to assess the most suitable crop rotation based on the dose of organic and inorganic fertilizers as a source of plant nutrients. The potato– mungbean–T. (transplanted) Aman rice (P-M-R) crop rotation was applied to three agro-ecological zones (AEZs) of Bangladesh (Bogra, AEZ-25; Joydebpur, AEZ-28; Jessore, AEZ-11). The results from a two-year experiment

indicate that the yield of P-M-R was influenced by the nutrient management applied. Except for potato, higher yield was obtained in the second year. The yield of potato and T. Aman rice was highest when crop residues were incorporated. In all locations, N (nitrogen) and K (potassium) were depleted in both years, but P (phosphorus), S (sulphur), Zn (zinc) and B (boron) showed a positive balance. Even after completing two cropping cycles and incorporating crop residues with different levels of nutrients, there was little change in soil pH, organic matter (%), total N (%), P, K, S, Zn and B. However, in all three locations, organic matter (%), total N (%), P, K, S, Zn and B increased in plots into which crop residues had been incorporated. The soil test-based nutrient management choice that incorporated crop residues gave a higher net return (3506 US$ ha-1) than other nutrient management combinations (3351–3483 US$ ha!1). These results indicate that soil test-based nutrient management and an integrated plant nutrient system that incorporates crop residues are suitable for the potato–mungbean–T. Aman rice crop rotation in multiple environments of Bangladesh.

[203] L. Zotarelli, L.R. Ren, D.J. Cantliffe, P.J. Stoffella, D. Gergela, D. Burhans. 2015. Rate and timing of nitrogen fertilizer application on potato 'FL1867'. Part I: Plant nitrogen uptake and soil nitrogen availability. Field Crop Research. Vol 183. Page 246 - 256.
Reference ID: 23694
Note: #23694e
Abstract: Knowledge of seasonal nutrient demand is necessary to maximize potato (*Solanum tuberosum*) yield and profitability while also minimizing the risk of excess fertilizer leaching into waterways. The objective of this study was to determine the effect of the N fertilizer rate and timing of application on the N use efficiency (NUE) and yield of chipping potato 'FL1867'. This study was conducted with grower collaboration on three commercial farms for two years (2011 and 2012) using subirrigation on course textured soils in Florida. All treatments received 56 kg ha−1 of N as ammonium nitrate applied as a band approximately 40 days before planting (Npre-pl). Liquid urea ammonium nitrate was then band applied at 0, 56, 112, or 168 kg ha−1 at plant emergence (Nemerg) followed by 56 or 112 kg ha−1 applied as a side-dress at tuber initiation stage (Ntuber init). The treatments were arranged in a factorial design with four replicates. The total amount of N fertilizer applied ranged from 112 to 336 kg ha−1. Maximum daily N uptake by the potato crop occurred between 55 and 65 days after planting, coinciding with the onset of the tuber bulking stage. Heavy rainfall prior to planting the 2011 crop reduced soil N availability from pre-plant applied N fertilizer indicating the high susceptibility of that application timing to leaching. Average tuber yield ranged from 25.6 to 47.2 Mg ha −1, with the lowest yields occurring when heavy rainfall close to harvest increased yield loss to decay. While higher Nemerg rates increased soil inorganic N, tuber yield was either not affected by N application or responded quadratically peaking at Nemerg levels between 95 and 125 kg ha−1. N application rates above this range decreased yield and NUE while increasing soil residual N at the end of the season. Plant N uptake and tuber yield did not increase with Ntuber init rate above 56 kg ha−1 and it was associated with lower NUE and also higher residual soil N.

[204] H. Shaaban, E. Kisetu. 2014. Response of Irish potato to NPK fertilizer application and its economic return when grown on an Ultisol of Morogoro, Tanzania. Journal of Agricultural and Crop Research. Vol 2(9). Page 188 - 196.
Reference ID: 23695
Note: #23695e

Abstract: A field experiment was conducted to determine the effects of different rates of NPK fertilizer on performance of Irish potato (*Solanum tuberosum* L.). This experiment employed use of 150 and 300 kg ha-1 of NPK (23:10:5) fertilizer and a local cultivar Alika of Irish potato as a response crop. Results indicated that the significantly ($p < 0.05$) highest average marketable number of tubers per plant (3.5) and tuber yield (18.74 t ha-1) was recorded at an application of 300 kg NPK ha-1. The lowest average number of tubers per plant (2.2) was recorded in the absolute control while the lowest tuber yield (14.99 t ha-1) was recorded at 150 kg NPK ha-1 compared with the absolute control (15.97 t ha-1). The coefficients of determination (R2) from the linear regression model showed that the variation in tuber yield was 50.7% with NPK fertilizer, 21.4% with number of tubers per plant and 23.6% with tubers per plot. Partial budget analysis indicated that the net benefit was in the decreasing order of 300 kg NPK ha-1 (5,335,500 Tshs/ha) > absolute control (4,135,000 Tshs/ha) >150 kg NPK ha-1 (3,552,000 Tshs/ha). The benefit cost ratios obtained for the absolute control, 150 and 300 kg NPK ha-1 were 2.1, 1.9 and 2.3, respectively, while the marginal rate of return for the two rates of fertilizer were -0.45 and 1.27, respectively. Based on the total variable costs and net benefit, NPK applied at 150 kg ha-1 was dominated (D) by the absolute control.

[205] L. Wang, Z. Pan, H. Xu, C. Wang, L. Gao, P. Zhao, Z. Dong, J. Zhang, G. Cui, S. Wang, G. Han, H. Zhao. 2015. The influence of nitrogen fertiliser rate and crop rotation on soilmethane flux in rain-fed potato fields in Wuchuan County, China. Science of the Total Environment. Vol 537. Page 93 - 99.
Reference ID: 23696
Note: #23696e
Abstract: As one of the important greenhouse gases, the characteristics and principles of methane exchange characteristics in cultivated lands have become hot topics in current climate change research. This study examines the influences of nitrogen fertilisation, temperature and soil water content on methane exchange characteristic and methane exchange functional gene-pmoA gene abundance based on experimental observations of methane exchange fluxes using the static chamber–gas chromatographic method and measurements of methanotroph gene copy numbers in three growing periods by real-time PCR in rain-fed potato fields. The results indicate that the rain-fed potato fields were a CH4 sink with an average annual methane absorption (negative emission) of 940.8 ± 103.2 g CH4- C/ha/year. The cumulative methane absorption first exhibited flat and subsequently increasing trend with the increase of nitrogen fertilisation from 0 ~ 135 kg N·ha−1. Methane cumulative absorption significantly increased with the increase of temperature when temperatures were below 19.6 °C. Methane oxidation capacity (methanotroph pmoA gene copy numbers) showed an increasing and subsequently decreasing trend with the increase of soil moisture. Crop rotation was observed to increase the methane absorption in rain-fed potato fields and nearly one time higher than that under continuous cropping. A mechanism concept model of the methane exchange in rain-fed potato fields was advanced in this paper.

[206] I. Manolov, N. Neshev, V. Chalova. 2016. Tuber quality parameters of potato varieties depend on potassium fertilizer rate and source. Agriculture and Agricultural Science Procedia. Vol 10. Page 63 - 66.
Reference ID: 23697
Note: #23697e
Abstract: The influence of potassium fertilizer source (K_2SO_4 and KCl) and fertilizer

rates on potato tuber quality parameters under pot and field experimental conditions were studied. The pot experiment included high rate of potassium fertilizers providing 600 mg $K_2O kg^{-1}$ soil from both sources, studded at four varieties. The field experiment included two fertilizer rates - 100 and 200 kg K_2O ha^{-1}. The dry matter content in tubers from the plants of the pot experiment was the highest for the controls of the three studied varieties - 19.78% for "Louisiana"; 17.16 for "Riviera" and 17.26% for "Hussar". The highest dry matter content (20.98%) in field conditions was observed for variant K_{200} (K_2SO_4). For all variants from the pot trail fertilized with KCl the starch content was decreased approximately with 2.2 to 2.4% in comparison to controls. Thhe highest tuber starch content was observed also for the control (15.24%) from the field study.

[207] S. Bandyopadhyay, I. Bhattacharya, K. Ghosh, C. Varadachari. 2008. New Slow-Releasing Molybdenum Fertilizer. Journal of Agricultural and Food Chemistry. Vol 56. Page 1343 - 1349.
Reference ID: 23698
Note: #23698e
Abstract: This paper describes a new water-insoluble molybdenum compound that has been developed as a slow-release fertilizer. The compound is an inorganic polymer formed by inclusion of molybdenum within a long-chain polyphosphate structure. It was designed by a process of “reverse engineering” of the molecule. Synthesis involved reaction of phosphoric acid with magnesium oxide, molybdenum trioxide, and sodium carbonate at 275 °C. Kinetics of reaction revealed complex multistage processes. X-ray diffraction patterns showed a crystalline nature with short-range as well as long-range ordering. The magnesium sodium polymolybdophosphate had ideal slow-release characteristics; it had low water solubility and high citrate solubility and was powdery, free flowing, and nonhygroscopic. Field testing showed an 80% increase in yield of green gram at a low dose of 0.04 kg/ha Mo. Nodulation increased by over 161%, and N content of gram increased by 20%. The slow-release fertilizer would provide an effective, low-cost, and environmentaly friendly alternative to Mo fertilization.

[208] R.L. Bansal, V.K. Nayyar. 1989. Critical level of Mn in Ustochrepts for predicting response of green gram (*Phaseolus aureus* L.) to manganese application. Fertilizer Research. Vol 21. Page 7 - 11.
Reference ID: 23699
Note: #23699e
Abstract: Greenhouse studies of 14 soils, having a range in DTPA extractable Mn, were made to determine the critical deficiency level of Mn in ustochrepts for predicting response of green gram to Mn application. Soil Mn was significantly related with Bray's per cent dry matter yield (r = 0.68**). Soil application of 20 mg Mn kgsoil significantly increased the yield. Both graphical and statistical models of Cate and Nelson indicated the critical level to be 2.9 mg kg- 1 soil of DTPA extractable Mn. The critical deficiency level in youngest matured terminal leaf (YML) of 40 day green gram plants was 19.0/~g g - l . The predictability of soil and plant critical Mn level was 93 per cent.

[209] E. Lunik. 2017. Transport and logistics - key drivers in global competitiveness. Page 1 - 2.
Reference ID: 23700
Note: #23700e
Abstract: In the global trade perspective, transportation, storage and handling costs can become game-changers. Building on agri benchmark’s database, we analyze the

entire supply chain, from farm gate to the importing country. To illustrate, we compare three of our typical farms for the 2013-2015 period in Brazil (Matto Grosso), the United States (Iowa), and Ukraine (Poltava), the major corn-exporting countries. Brazilian corn tends to be exported to Asia (South Korea, Japan, Taiwan), Ukrainian corn to Egypt and Spain, and the United States' corn to various locations (Japan, Mexico, Colombia). In this analysis, we compare farm gate prices, domestic and ocean freight rates of corn from these 3 global producers to two common export destinations: Egypt and Japan.

[210] E. Shunka, A. Chindi, G. W/giorgis, E. Seid, L. Tessema. 2016. Response of Potato (*Solanum tuberosum* L.) Varieties to Nitrogen and Potassium Fertilizer Rates in Central Highlands of Ethiopia. Advances in Crop Science and Technology. Vol 4(6). Page 1 - 6.
Reference ID: 23701
Note: #23701e
Abstract: Field experiment was conducted at Holetta and Jeldu Agricultural Research Station in the central highlands of Ethiopia to determine the rates of Nitrogen (N) and Potassium (K) fertilizers on growth, yield and yield components of potato. 4 × 32 factorial treatment was arranged in completely randomized block design with three replications on plot size of 3 m × 3 m during 2014-2015 cropping season. Nitrogen (87 kg, 110 kg and 133 kg/ha), Potassium (0, 34.5 kg, 69 kg and 103.5 kg/ha) and potato varieties (Betete, Gudenie and Jalenie) were used. Data were analyzed by using SAS software Version 9.2. The interaction effect of potassium and nitrogen fertilizers did affect marketable tuber number and plant height significantly. Gudenie produced the highest marketable yield (30.53 ton/ha) in 2015 with application of 69 kg/ha potassium and 110 kg/ha nitrogen rates while lowest marketable yield (16.67 ton/ha) was obtained from Belete variety at 0 kg/ha potassium rate and 87 kg/ha nitrogen rate. From these results, it can be concluded that interaction of nitrogen and potassium rates affected significantly plant height and marketable tuber numbers. Therefore, it is better to apply 69 kg/ha potassium and 110 kg/ha nitrogen for potato production to obtain reasonable economic yield at sites similar to experimental locations.

[211] M. Silvia, H. Susanti, Samharinto., G.M. Sugian Noor. 2016. Production of Chilli (*Capsicum frutescens* L.) in Ultisol Soil using Organic Household Waste Bokashi and NPK. EnviroScienteae. Vol 12(1). Page 22 - 27.
Reference ID: 23702
Note: #23702e
Abstract: Research on the production of chilli in utisol soil using organic household waste bokashi and NPK was conducted in Banjarbaru from February to June 2015. The research used Completely Randomized Design (CRD) with six treatments. The treatments were (P1) 100% NPK, (P2) 100% NPK + bokashi, (P3) 75% NPK + bokashi, (P4) 50% NPK + bokashi, (P5) 25% NPK + bokashi, (P6) 100% bokashi. 100% NPK and 100% bokashi were 250 kg ha-1 NPK and 10 t ha-1 bokashi respectively. The result showed that the aplication of treatments gave affected to height increase, number of nodes, first day of appearing flower, biomass, fruit number and weight of fresh fruit. The combination of 75% NPK and organic household waste bokashi can be recomended as the best doses for production of chilli. Organic household waste bokashi can contribute to reduce 25% of NPK aplication on the production of chili.

[212] U.o. Turin. 2000. Capsicum & Eggplant Newsletter, Vol 19. Page 1 - 162.
Reference ID: 23703
Note: #23703e

[213] L. Carrasco, E.L. Webb, W.S. Symes, L.P. Koh, N.S. Sodhi. 2017. Global economic trade-offs between wild nature and tropical agriculture. PLOS Biology. Vol 15(7). Page 1 - 22.
Reference ID: 23704
Note: #23704e
Abstract: Global demands for agricultural and forestry products provide economic incentives for deforestation across the tropics. Much of this deforestation occurs with a lack of information on the spatial distribution of benefits and costs of deforestation. To inform global sustainable land-use policies, we combine geographic information systems (GIS) with a meta-analysis of ecosystem services (ES) studies to perform a spatially explicit analysis of the trade-offs between agricultural benefits, carbon emissions, and losses of multiple ecosystem services because of tropical deforestation from 2000 to 2012. Even though the value of ecosystem services presents large inherent uncertainties, we find a pattern supporting the argument that the externalities of destroying tropical forests are greater than the current direct economic benefits derived from agriculture in all cases bar one: when yield and rent potentials of high-value crops could be realized in the future. Our analysis identifies the Atlantic Forest, areas around the Gulf of Guinea, and Thailand as areas where agricultural conversion appears economically efficient, indicating a major impediment to the long-term financial sustainability of Reducing Emissions from Deforestation and forest Degradation (REDD+) schemes in those countries. By contrast, Latin America, insular Southeast Asia, and Madagascar present areas with low agricultural rents (ARs) and high values in carbon stocks and ES, suggesting that they are economically viable conservation targets. Our study helps identify optimal areas for conservation and agriculture together with their associated uncertainties, which could enhance the efficiency and sustainability of pantropical land-use policies and help direct future research efforts.

[214] A. Jha, D. Sharma, J. Saxena. 2012. Effect of single and dual phosphate-solubilizing bacterial strain inoculations on overall growth of mung bean plants. Archives of Agronomy and Soil Science. Vol 58(9). Page 967 - 981.
Reference ID: 23705
Note: #23705e
Abstract: Available phosphorus is limiting in most cultivable soils in several parts of India, including Rajasthan. Four phosphate-solubilizing bacterial strains viz. *Pseudomonas fluorescens* BAM-4, *Burkholderia cepacia* BAM-6, *B. cepacia* BAM-12 and *Aeromonas vaga* BAM-77 were isolated from the rhizosphere of pearl millet (*Pennisetum glaucum*, cv. Raj 171), mung bean (*Phaseolus aureus*, cv. RMG 492) and sesame (*Sesamum indicum*, cv. RT 46). To the best of our knowledge, this is the first report on phosphate solubilization by *Aeromonas vaga*. Seed inoculation of mung bean with or without tricalcium phosphate (TCP) was performed to study the effect of single and dual bacterial inoculations in pot trials having sterilized sandy loam soil, and was found to enhance the growth and yield of plants. The results were on a par with chemical fertilizer, single superphosphate (SSP) and commercial biofertilizers, PSB (*Bacillus polymyxa*) and MC (*Pseudomonas striata*), used as standard reference. Addition of TCP to soil gave better results and dual inoculation was more effective than single inoculation of bacteria. Among the four strains studied, *A. vaga* and *P.*

fluorescens were found to be more valuable as single inoculants in terms of plant growth, whereas in combination treatments, *P. fluorescens* along with *B. cepacia* and *A. vaga* performed very well both in the presence and absence of TCP.

[215] S.K. Kaushik, R.C. Gautam. 1987. Effect of nitrogen and phosphorus on the production potential of pearl millet-cow pea or green gram intercropping systems under rainfed conditions. J. Agric. Sci., Camb. Vol 108. Page 361 - 364.
Reference ID: 23706
Note: #23706e
Abstract: Results are described of an experiment involving various pearl millet-cow pea or green gram planting and interplanting systems under four levels of nitrogen and two levels of phosphorus. Planting of pearl millet in paired rows of 30 and 70 cm gave as much yield as normal planting in uniform rows of 50 cm. The productivity per unit area was increased consuderably when pearl millet was interplanted with one row of cow pea or greem gram. Cow pea gave higher yield than green gram. Nitrogen fertilizer increased pearl millet as well as intercrops yield significantly. Pearl millet responded up to 60 kg N/ha and intercrops up to 30 kg N/ha. Phosphorus fertilizer did not produce marked improvement in either growth or yield of pearl millet. Application of 40 kg P_2O_5/ha increased grain yield of intercrops significantly.

[216] R. Chandra, S. Yadav, D. Mohan. 2008. Effect of distillery sludge on seed germination and growth parameters of green gram. Journal of Hazardous Materials. Vol 152. Page 431 - 439.
Reference ID: 23707
Note: #23707e
Abstract: Experiments were carried out to study the effect of distillery sludge amendments with garden soil (10, 20, 40, 60, 80 and 100%) on seed germination and growth parameters of *Phaseolus mungo* L. Germination percentage and index values decreased with rise in sludge concentration. Soil amended with 10% (w/w) sludge showed favorable growth while >10% was inhibitory for plant growth. Soil amended with 10% (w/w) distillery sludge induced the growth in root length, shoot length, number of leaves, biomass, photosynthetic pigment, protein and starch while 20% (w/w) sludge amended soil had variable effects on the root, shoot, leaves and nodules of *P. mungo* L. At concentrations (>40%) reduced all the growth parameters, viz., root length, shoot length, number of leaves, biomass, photosynthetic pigment, protein and starch of *P. mungo*. Malondialdehyde (MDA) product of lipid peroxidation was also enhanced in both root and leaves of sludge amended soil grown *P. mungo* at all the sludge amendments and exposure periods. A coordinated increase in cysteine, non-protein thiol and ascorbic acid antioxidants was up to 40 days of growth. After this period a decrease was observed. The N, P, K and Mg accumulation followed the order shoot > leaf > root. Calcium accumulation was highest in the upper part of the plants (including shoot and leaves). Furthermore, heavy metals content were also increased in different parts of *P. mungo* grown on increasing concentration of sludge amended garden soil with time. Zinc and copper accumulation was maximum versus other heavy metals. Based on these studies, sludge having concentrations ≤10% (w/w) can be applied as a fertilizer.

[217] M.A. Shankar, G.R.M. Sankar, K.L. Sharma, M.V. Muniswamappa, C.S. Rao, D.S. Chandrika. 2013. Effect of Micronutrient-Based Integrated Use of Nutrients on Crop Productivity, Nutrient Uptake, and Soil Fertility in Greengram and Fingermillet Sequence Under Semi-arid Tropical Conditions. Communications in Soil Science and Plant Analysis. Vol 44. Page 2771 - 2787.
Reference ID: 23708
Note: #23708e
Abstract: To identify the best combinations of micronutrient-based fertilization treatments in terms of crop yield and nutrient uptake, three field experiments with greengram−fingermillet as the test sequence with 12 treatments on micronutrient-based fertilization [with recommended nitrogen (N)−phosphorus (P)−potassium (K) fertilizer] were conducted during 2005 to 2007 in a semi-arid Alfisol at Bangalore. The effects of treatments on available soil and plant uptake of nutrients [N, P, K, sulfur (S), iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), boron (B), and molybdenum (Mo)] and yield of crops were assessed based on standard analysis of variance procedure. Using the relationships of yield with soil and plant nutrient variables, regression models of yield through soil and plant variables were calibrated and effects of variables on crop yields were assessed. The models gave high and significant yield predictability in the range of 0.87 to 0.98 through different variables. The model of plant uptake through soil nutrients indicated that soil S, Fe, and Zn had significant positive effects, whereas soil N, K, B, andMo had negative effects on plant nutrient status in greengram. Similarly, soil P, Mn, and Zn had significant positive effects, whereas soil N, K, and Fe had negative effects on plant uptake of nutrients in fingermillet. Based on a relative efficiency index (REI) criteria, T2 for plant uptake and T12 for maintaining soil nutrients were found to be superior in greengram, whereas T2 for plant uptake and T8 for maintaining soil nutrients were found to be superior in fingermillet over years based on REI. The combined REI over soil and plant nutrients for both crops indicated that application of T8 for greengram and T2 for fingermillet could be prescribed for attaining maximum plant uptake of nutrients and productivity of crops in sequence, apart from maintaining maximum soil fertility of nutrients under semi-arid Alfisols.

[218] A. Akhter. 2002. Response of rice to soil test based fertilizer recommendation. Thesis for the Master of Science in Soil Science. Bangladesh Agricultural University Mymensingh. Page 1 - 82.
Reference ID: 23709
Note: #23709e

[219] S.M. Haefele, K. Naklang, D. Harnpichitvitaya, S. Jearakongman, E. Skulkhu, P. Romyen, S. Phasopa, S. Tabtim, D. Suriya-arunoj, S. Khunthasuvon, D. Kraisorakul, P. Youngsuk, S.T. Amarante, L.J. Wade. 2006. Factors affecting rice yield and fertilizer response in rainfed lowlands of northeast Thailand. Field Crop Research. Vol 98. Page 39 - 51.
Reference ID: 23710
Note: #23710e
Abstract: Rice-based (*Oryza sativa* L.) rainfed lowlands are the major cropping system in northeast Thailand. Earlier research on nutrient management of rainfed lowland rice produced conflicting results with respect to inherent soil fertility, fertilizer response, and the importance of organic fertilizers, most probably because of highly variable soil quality and water resources. The objectives of this paper were to advance the understanding of soil fertility and fertilizer response in northeast Thailand and thereby

provide a basic framework for improved nutrient management of rainfed lowland rice. For this purpose, we analyzed an existing database on fertilizer trials conducted between 1995 and 1997 at eight different sites in northeast Thailand, which were previously described by Wade et al. [Wade, L.J., Amarante, S.T., Olea, A., Harnpichitvitaya, D., Naklang, K., Wihardjaka, A., Sengar, S.S., Mazid, M.A., Singh, G., McLaren, C.G., 1999a. Nutrient requirements in rainfed lowland rice. Field Crops Res., 64, 91–107]. Average annual rainfall across sites and seasons was 1300 mm, but half of all rainfed trials (12 of 23) experienced substantial water stress during the growing season. Average grain yield in N-omission plots was low (1.6 t ha-1), even when compared with that of rainfed lowlands in neighboring Lao PDR. Nitrogen was clearly the most limiting element, whereas PK treatments increased yields significantly in only 6 out of 78 observations. Average agronomic efficiency of applied N was good (16 kg grain kg-1 N), but highly variable among sites. Two groups of soils (i.e., sites) were separated because of their distinct differences in reaction to inorganic and organic fertilizer. Better nutrient availability improved crop performance at all field water stress levels occurring at the trial sites. However, yield reductions caused by water stress seemed to interact with the level of nutrient supply, that is, absolute yield differences between different fertilizer treatments decreased with increasing water stress.We concluded that efficient fertilizer use in rainfed rice of northeast Thailand can be achieved, but that existing uniform recommendations do not provide farmers with much useful advice. Therefore, we proposed a set of basic guidelines for improved nutrient management, which, after further efforts of all stakeholders involved, could contribute to increased system productivity.

[220] C.C. David. 1976. Fertilizer Demand in the Asian Rice Economy. Food Research Institute Studies. Vol 15(1). Page 109 - 120.
Reference ID: 23711
Note: #23711e
Abstract: In the successful agricultural development of Japan and Taiwan an intensive use of fertilizer, accompanied by improvements in water control and development of fertilizer-responsive rice varieties, compensated for a shortage of land (5). With the introduction of new rice varieties in the 1960s, a similar pattern of development is now taking place in many other Asian countries. As land is becoming scarce in South and Southeast Asia, a growing dependence is being placed upon yield per hectare and therefore upon those factors which raise yields - fertilizer, irrigation, and modern varieties. Until a decade ago, in most Asian countries fertilizer was used primarily on plantation crops such as sugarcane. In 1970 the rates of fertilizer application and consequently the rice yields of the South and Southeast Asian countries, shown in Table 1, were still much below those in East Asia (Japan, Taiwan, and South Korea). The pattern of fertilizer-rice price ratios suggests one explanation for the variation in the rate of fertilizer consumption between these two groups of countries. Farmers in East Asia operate in a much more favorable price environment. However, other factors such as soil fertility, climate, water control, farm size, and education undoubtedly help to explain intercountry differences in fertilizer consumption.

[221] E. Daniya, S.A. Dadari, W.B. Ndahi, N.C. Kuchinda, B.A. Babaji. 2015. Effect of seed rate and nitrogen fertilizer on weed species composition, density and diversity in two sesame varieties. Archives of Agronomy and Soil Science. Vol 61(4). Page 553 - 567.
Reference ID: 23712
Note: #23712e

Abstract: To evaluate the effect of seed and nitrogen rates on weed species composition, density, biomass and diversity in two sesame (Sesamum indicum L.) varieties, a field experiment was conducted in 2009, 2010 and 2011 rainy seasons at Samaru, Nigeria. Four seed rates, 2, 4, 6 and 8 kg ha−1, four nitrogen rates, 0, 30, 60 and 90 kg N ha−1 and two sesame varieties NCRIBEN 01M and E8 were arranged as factorial in a split plot design. Weeds with the highest important values in sesame field were Dactyloctenium aegyptium, Ludwigia decurrens, Ageratum conyzoides and Cyperus esculentus. Year had a significant effect on weed density, biomass, diversity, evenness and richness.Weed density, biomass, diversity and richness were lowest in the 2011 trial and weed species evenness in 2009. Variety E8 reduced weed biomass better than NCRIBEN 01M. Averaged over years, weed diversity and evenness were lowest at 4 kg seeds ha−1. Seed × nitrogen rates effect of 4 kg seed ha−1 and 30 kg Nha−1 produced the lowest weed species diversity and evenness. The result suggests that variety E8 at 4 kg seed ha−1 and 30 kgN ha−1 with hoe weeding at 3 and 6 WAS may provide better weed control, and it is recommended in sesame production.

[222] S.K. Atta, O. Van Cleemput. 1988. Field study of the fate of labelled fertilizer ammonium-N applied to sesame and sunflower in a sandy soil. Plant and Soil. Vol 107. Page 123 - 126.
Reference ID: 23713
Note: #23713e
Abstract: The recovery in crop and soil of labelled fertilizer ammonium-N applied to sesame and sunflower growing on sandy soil was measured. The sesame and sunflower received respectively 238 and 143kgNha -1 as (NH4)2 SO4 enriched with 4.63 At. % 15N excess. In the plants, the Ndff was 31.19% and 31.96% in sesame and sunflower, respectively. The fertilizer recovery by sunflower was 22.3%, by sesame only 12.3%. The amount of fertilizer N remaining in the soil at harvest was 13.04% for the sesame and 5.95% for the sunflower plot. The loss of fertilizer N under sesame was 74.66% and 71.75% under sunflower. The average of seed yield of the plants inside the 15N plot was compared with the seed yield of the same amount of plants from outside the 15N plot. They did not differ significantly, indicating that the results obtained from the 15N plot can be extrapolated to the rest of the field.

[223] E. Shakeri, S.A. Mohammad Modarres-Sanavy, M.A. Dehaghi, S.A. Tabatabaei, M. Moradi-Ghahderijani. 2016. Improvement of yield, yield components and oil quality in sesame (*Sesamum indicum* L.) by N-fixing bacteria fertilizers and urea. Archives of Agronomy and Soil Science. Vol 62(4). Page 547 - 560.
Reference ID: 23714
Note: #23714e
Abstract: Experiments were conducted in 2009–2010 at the Agricultural and Natural Resources Research Center of Yazd, Iran, to study the effect of nitrogen levels and plant growth promoting rhizobacteria (PGPR) containing *Azotobacter* sp. and Azospirillum sp. on seed yield, its components and quality traits of sesame cultivars. Treatments were arranged in a factorial experiment based on randomized complete block design with nitrogen rates (0 (control), 25 and 50 kg N ha−1), cultivars (Darab-14, GL-13 and local) and N-fixing bacteria levels (non-inoculation and inoculation) were applied with three replications. Nitrogen fertilizer significantly increased yield and yield components, but reduced oil content in 2010. Inoculating seeds with PGPR increased yield and yield components of sesame cultivars compared to the control treatment. Seed yield in PGPR inoculation with half a rate of N fertilizer treatment was more than seed yield in the full rate of N fertilizer without a PGPR inoculation

treatment. N fertilizer and PGPR application significantly decreased saturated fatty acids (palmitic and stearic acid) while it significantly increased unsaturated fatty acids (oleic and linoleic acid). Oleic acid had a significant negative correlation with linoleic acid (r = −0.79). The result showed that an application of PGPR could be usefully applied to reduce use of chemical fertilizer.

[224] C.C. Sim, A.R. Zaharah, M.S. Tan, K.J. Goh. 2015. Rapid Determination of Leaf Chlorophyll Concentration, Photosynthetic Activity and NK Concentration of *Elaies guineensis* Via Correlated SPAD-502 Chlorophyll Index. Asian Journal of Agricultural Research. Vol 9(3). Page 132 - 138.
Reference ID: 23715
Note: #23715e
Abstract: Determination of chlorophyll contents often requires destructives analysis and involves lengthyprocedures while measurement on photosynthetic rate requires specialized equipment that often limits extensive in-field application. SPAD chlorophyll meter gives indirect measurement of leaf chlorophyll contents in a rapid, non-destructive and convenient manner. The use of SPAD meter for each individual plant species require calibration curve for each individual plant species, as the accuracy of the estimation are highly affected by the leaf anatomical characteristics. This study reports the result of correlating SPAD-502 chlorophyll index readings to the actual extracted chlorophyll content and photosynthetic rate of oil palm leaf as well as the leaf nitrogen and potassium concentration. Concentration of oil palm leaf nitrogen and chlorophyll pigment as well as photosynthetic rate were highly correlated to SPAD-502 chlorophyll index with R2 of above 0.80. With good calibration equation, the SPAD-502 chlorophyll meter are extremely versatile for rapid determination of oil palm leaf nitrogen and chlorophyll concentration as well as photosynthetic rate.

[225] B.J. Alloway. 2011. Zinc in Soils and Crop Nutrition. Page 1 - 135.
Reference ID: 23716
Note: #23716e
Abstract: Zinc is essential for the normal healthy growth and reproduction of plants, animals and humans and when the supply of plant-available zinc is inadequate, crop yields are reduced and the quality of crop products is frequently impaired. In plants, zinc plays a key role as a structural constituent or regulatory co-factor of a wide range of different enzymes and proteins in many important biochemical pathways and these are mainly concerned with:
- carbohydrate metabolism, both in photosynthesis and in the conversion of sugars to starch
- protein metabolism
- auxin (growth regulator) metabolism
- pollen formation
- the maintenance of the integrity of biological membranes
- the resistance to infection by certain pathogens

When the supply of zinc to the plant is inadequate, one or more of the many important physiological functions of zinc is unable to operate normally and plant growth is adversely affected. The changes in plant physiological mechanisms brought about by a deficiency of zinc can result in the plant developing visible symptoms of stress which might include one or more of the following: stunting (reduced height), interveinal chlorosis (yellowing of the leaves between the veins), bronzing of chlorotic leaves, small and abnormally shaped leaves and/or stunting and rosetting of leaves (where the leaves from a whorl on shortened stems). These different types of symptoms vary

with plant species and are usually only clearly displayed in severely deficient plants.

[226] J.A. van Vliet, K.E. Giller. 2016. Chapter 5 - Mineral Nutrition of Cocoa Book. Page 186 - 263.
Reference ID: 23717
Note: H 8.1.4.1 #23717
Abstract: Cocoa is an important global commodity. It is mostly grown on small farms by millions of cocoa farmers who depend on the crop for their livelihood. Although potential yields exceed 6000 kg/ha, average from yields are often around 400 kg/ha. Among the production constraints met by farmers is nutrient limitation. In this review, we compile current knowledge on nutrient cycling in cocoa production systems, nutrient requirements of cocoa, and yield response to fertilizer application in relation to factors such as management, climatic, and soil conditions. Large amounts of nutrients are cycled within cocoa systems, mostly through 5-10t/ha/yr litter fall. Still, harvesting and small nutrient losses such as leaching lead to nutrient exports causing gradual soil nutrient depletion. Exact nutrient requirements of cocoa are unknown. Leaf and soil test interpretation to identify additional nutrient needs remain ambiguous. Recommended nutrient application rates vary more than 10-fold. In several trials fertilizer application more than doubled cocoa productivity; in other cases response is minimal. Differences in response between regions, fields and even trees have yet to be explained. Interactions with agroecology and management (especially shade) are poorly understood. Without this fundamental knowledge, farm level recommendations have a weak scientific base. Different types of research are recommended to complement current knowledge. Existing data and trials can be exploited through additional analysis and more detailed measurements. Cocoa farms are highly diverse and on-farm trials offer opportunities for understanding variability in production and fertilizer response. Finally, multifactorial shade-fertilizer response trials will be essential to address some of the fundamental knowledge gaps.

[227] D.W. Archer, A.D. Halvorson. 2010. Managing Nitrogen Fertilizer for Economic Returns and Greenhouse Gas Reductions in Irrigated Cropping Systems. Better Crops with Plant Food. Vol 94. Page 4 - 5.
Reference ID: 23718
Note: #23718e > S Serial #20256e
Abstract: Research shows that increasing N fertilizer rates generally increase net greenhouse gas (GHG) emissions from irrigated cropping systems in Colorado. Applying N fertilizer at rates above the economic optimum increases net GHG emissions and reduces profitability. Results of this study show avoiding over-application of N fertilizer and combining careful N fertilizer management with appropriate changes in tillage and crop rotation practices can reduce net GHG emissions while maintaining profitability.

[228] G.S. Yadav, D. Kumar, Y.S. Shivay, H. Singh. 2010. Zinc-Enriched Urea Improves Grain Yield and Quality of Aromatic Rice. Better Crops with Plant Food. Vol 94(2). Page 6 - 7.
Reference ID: 23719
Note: #23719e > S Serial #20256e
Abstract: Zinc-deficiency is widespread in the rice-growing tracts of northern India. The use of Zn-enriched prilled urea formulations assures better quality control than with Zn sulfate ($ZnSO_4$), which is being sold to farmers in India, but has quality issues. In this study, we found $ZnSO_4$ to be a better source to enrich prilled urea than Zn

oxide (ZnO). For aromatic rice production, 1.0% Zn-enriched urea (ZnSO4) was most effective in realizing higher grain yield and economic return.

[229] S.H. Chien, R.L. Kallenbach, M.M. Gearhart. 2010. Liming Requirement for Nitrogen Fertilizer-Induced Soil Acidity: A New Examination of AOAC Guidelines. Better Crops with Plant Food. Vol 94(2). Page 8 - 9.
Reference ID: 23720
Note: #23720e > S Serial #20256e
Abstract: Liming is a routine crop management practice on many agricultural soils and is partly a consequence of soil acidification by nitrification of N fertilizers. The Association of Official Analytical Chemists (AOAC) in 1934 adopted soil acidification values that suggest ammonium sulfate (AS) requires three times more lime to neutralize resultant soil acidity compared to ammonium nitrate (AN) or urea. This article reports on a critical examination of the value and discusses results of laboratory and 3-year greenhouse experiments with wheat-corn-wheat-corn-wheat grown to maturity in which the liming requirement for AS compared to urea and AN was approximately 25 to 47% less than the AOAC value. This report also discusses results from field trials where soils treated with AS, urea, or AN for tall fescue growth did not significantly decrease soil pH compared to the control over a 2- to 3-year period.

[230] T. Bruulsema. 2010. How Potassium Nutrition Can Suppress Soybean Aphids. Better Crops with Plant Food. Vol 94(2). Page 11 - 13.
Reference ID: 23721
Note: #23721e > S Serial #20256e
Abstract: The soybean aphid has become the most important insect pest of soybeans in the Northeast and Midwest regions of North America. It often damages soybean plants that are K-deficient more than those that are not. Recent research in Wisconsin and Michigan has found that K-deficient soybeans can in some, but not all, instances suffer more from aphids than soybeans without K limitation, and that the causes may be related to amino acid composition of the phloem sap.

[231] C.A.C. Crusciol, R.P. Soratto, E. Borghi, G.P. Mateus. 2010. Benefits of Integrating Crops and Tropical Pastures as Systems of Production. Better Crops with Plant Food. Vol 94(2). Page 14 - 16.
Reference ID: 23722
Note: #23722e > S Serial #20256e
Abstract: Dry winter seasons prevent farmers from successful adoption of sustainable no-till systems. The consortium (intercropping) of cereals with tropical forages has been successfully adopted in several regions of Brazil as a means to protect the soil and obtain higher yields and higher economic return. This article discusses the main conditions of this consortium and its advantages, including improvement of nutrient use efficiency.

[232] J. Zhang, A.M. Blackmer, T.M. Blackmer, P.M. Kyveryga. 2010. Fertilizer Bands and Dual Effects of Nitrogen on Young Corn Plants. Better Crops with Plant Food. Vol 94(2). Page 17 - 19.
Reference ID: 23723
Note: #23723e > S Serial #20256e
Abstract: Applications of N fertilizer that relieve temporary deficiencies of N in young corn plants can advance plant growth stage as well as accelerate rate of growth within growth stages. This article summarizes main points of the manuscript recently

published in Communications in Soil Science and Plant Analysis and describes how fertilizer bands applied prior to planting can advance growth stage of corn plants. Further discussion is focused on the practical importance of this effect.

[233] R. Norton, R. Perris, R. Armstrong. 2010. Learning from Long-term Experiments - What do they teach us?. Better Crops with Plant Food. Vol 94(2). Page 20 - 22.
Reference ID: 23724
Note: #23724e > S Serial #20256e
Abstract: Established in 1916, the Longerenong long-term rotation provides a platform for evaluating long-term trends in farming systems and soil health over a period of many years. Longerenong rotation 1 (LR1) gives us essentially the same message as other long-term agronomic experiments. The message is that rotations can be sustained and productive provided the challenges of diseases, weeds, soil structure, and nutrient replacement are met.

[234] I. Cakmak, A.M. Yazici. 2010. Magnesium: A Forgotten Element in Crop Production. Better Crops with Plant Food. Vol 94(2). Page 23 - 25.
Reference ID: 23725
Note: #23725e > S Serial #20256e
Abstract: Magnesium nutrition of plants is frequently overlooked and shortages will adversely impact plant growth. Many essential plant functions require adequate Mg supplies, the most visible being its role in root formation, chlorophyll, and photosynthesis. Many less visible reactions are also dependent on an adequate supply of Mg. This review briefly summarizes some of the essential roles of Mg for plants.

[235] R. Mikkelsen. 2010. Soil and Fertilizer Magnesium. Better Crops with Plant Food. Vol 94(2). Page 26 - 27.
Reference ID: 23726
Note: #23726e > S Serial #20256e
Abstract: Magnesium (Mg) is an essential plant nutrient that is too frequently overlooked. Although weathering of primary and secondary minerals may provide adequate Mg in some soils, there are some soils that benefit from Mg additions. There are various soluble and slowly soluble Mg sources available to meet crop demands.

[236] Y. Tong, W. Ma, Y. Gao, S. Zhang. 2010. Characteristics of Nutrient Uptake by Grape. Better Crops with Plant Food. Vol 94(2). Page 29 - 30.
Reference ID: 23727
Note: #23727e > S Serial #20256e
Abstract: Nutrient uptake was examined in an intensive year-round study of a 7-year old grape orchard in Fufeng County in order to guide nutrient management for grape production in Shaanxi Province. Macronutrient accumulation was identified according to plant development stage, which provides insight into the periods of peak nutrient demand and appropriate timings of fertilizer application.

[237] D.F. Roberts, N.R. Kitchen, K.A. Sudduth, S.T. Drummond, P.C. Scharf. 2010. Economic and environmental implications of sensor-based nitrogen management. Better Crops with Plant Food. Vol 94(1). Page 4 - 6.
Reference ID: 23728
Note: #23728e > S Serial #20255e
Abstract: Active-light reflectance sensors are currently being studied as a tool to guide

in-season “reactive” N application. A recent study evaluated the potential economic benefit and environmental implications for sensor-based N application in corn. Economic benefits and N savings were found for most fields. Results from this study support the continued development of sensor-based technology for in-season N management.

[238] F. Mite, J. Espinosa, L. Medina. 2010. Liming Effect on Pineapple Yield and Soil Properties in Volcanic Soils. Better Crops with Plant Food. Vol 94(1). Page 7 - 9.
Reference ID: 23729
Note: #23729e > S Serial #20255e
Abstract: The coastal plain, volcanic soil region of Ecuador is well suited to pineapple cultivation. Crop area expansion continues within the central and northern coastal plain. This growth is based on the availability of new pineapple genetic material, particularly the high yielding MD2 hybrid, which has excellent flavor and good acceptance in the international market.

[239] S. Tu, X. Sun, M. Liao, Y. Qin, W. Feng. 2010. Determining an Optimal Fertilization Strategy for No-till Rice-Wheat Cropping. Better Crops with Plant Food. Vol 94(1). Page 10 - 11.
Reference ID: 23730
Note: #23730e > S Serial #20255e
Abstract: Continuous no-till cultivation is a novel practice that is gaining popularity over conventional methods in the Chengdu Plain and elsewhere in China. The effect of fertilizer rate, balance, and timing on agronomic and environmental parameters is outlined in this multi-year study.

[240] T.S. Murrell. 2010. Visual Indicators of Potassium Deficiency in Corn. Better Crops with Plant Food. Vol 94(1). Page 14 - 15.
Reference ID: 23731
Note: #23731e > S Serial #20255e
Abstract: While marginal chlorosis and necrosis are the most widely recognized symptoms of K deficiency, they are not the only ones. Other plant manifestations can exist and may or may not be accompanied by marginal chlorosis or necrosis. As the number of visible symptoms increases, there is greater likelihood that the plant is experiencing a K deficiency.

[241] G.E. Lester, J. Jifon, D. Makus. 2010. Impact of Potassium Nutrition on Food Quality of Fruits and Vegetables: A Condensed and Concise Review of the Literature. Better Crops with Plant Food. Vol 94(1). Page 18 - 21.
Reference ID: 23732
Note: #23732e > S Serial #20255e
Abstract: Among the many plant mineral nutrients, K stands out as a cation having the strongest influence on quality attributes that determine fruit marketability, consumer preference, and the concentration of critically important human health-associated phytonutrients. However, many plant, soil, and environmental factors often limit uptake of K from the soil in sufficient amounts to satisfy fruit K requirements during development to optimize the aforementioned quality attributes. This was demonstrated in a study reported in this publication in 2007 (Lester et al., 2007) where foliar K markedly improved several cantaloupe fruit quality parameters, despite sufficient soil test K levels. This article expands on the previously reported work from the Rio Grande Valley of Texas by providing a review of published study abstracts on the effects of

soil and/or foliar K fertilization on several fruit and vegetable quality characteristics, including phytonutrient concentrations.

[242] A. Banerjee, G.N. Chattopadhayay, C.E. Boyd. 2010. Soil System-Based Approach: A tool for fish pond fertilization. Better Crops with Plant Food. Vol 94(1). Page 22 - 24.
Reference ID: 23733
Note: #23733e > S Serial #20255e
Abstract: To obtain maximum production of fish from any aquatic environment, it is necessary to maintain the nutrient status of the pond above critical levels in the soil-water system. This study describes an approach that achieves this goal through proper use of fertilizers and manures in fish ponds in India.

[243] L. Li, F. Chen, D. Yao, J. Wang, N. Ding, X. Liu. 2010. Balanced Fertilization for Ginger Production - Why Potassium Is Important. Better Crops with Plant Food. Vol 94(1). Page 25 - 27.
Reference ID: 23734
Note: #23734e > S Serial #20255e
Abstract: Potassium is one of the most important limiting factors for ginger production. The main practices to obtain high rhizome yield with optimal nutrient use efficiency include fertilizer application based on soil testing, topdressing K fertilizer at growth stages with peak demand, and applying enough K to balance the appropriate N and P application rates.

[244] H. Ghio, V. Gudelj, G. Espoturno, M. Boll, J. Bencardini, F. Garcia. 2010. Long-term On-farm Demonstrations in the Central Pampas of Argentina: A Case Study. Better Crops with Plant Food. Vol 94(1). Page 28 - 30.
Reference ID: 23735
Note: #23735e > S Serial #20255e
Abstract: The Pampas region includes most of the annual cropping area of Argentina, with almost 30 million ha of cropped land. Cropping is relatively recent, with a history of 100 to 120 years for the oldest fields. Low fertilizer use and continuous nutrient removal, with increasing crop yields in recent years, has resulted in deficiencies of N, P, and S in most of the region. Under these circumstances, research has shown that nutrient application rates close to crop removal could be an alternative to sustain the trend in increasing yields while reducing depletion of soil nutrients.

[245] J.H. Grove, E.M. Pena-Yewtukhiw, M. Diaz-Zorita, R.L. Blevins. 2009. Does Fertilizer N "Burn Up" Soil Organic Matter?. Better Crops with Plant Food. Vol 93(4). Page 6 - 7.
Reference ID: 23736
Note: #23736e > S Serial #20254e
Abstract: This long-term Kentucky study evaluated the impact of tillage and N rates on crop yield and soil organic matter (SOM). After 29 years of continuous corn with a winter cereal cover crop, the combination of no-till cropping and fertilizer N use resulted in SOM levels similar to those in adjacent grass sod. There was no evidence that fertilizer N caused SOM loss.

[246] R. Mikkelsen. 2009. Ammonia Emissions from Agricultural Operations: Fertilizer. Better Crops with Plant Food. Vol 93(4). Page 9 - 11.
Reference ID: 23737
Note: #23737e > S Serial #20254e
Abstract: Nitrogen fertilizer is an essential component on most farms. Although urea-based fertilizers are the most common global N source, they are susceptible to loss as ammonia (NH3) gas when left on the soil surface. Ammonia losses from fertilizer can represent a significant economic loss for farmers and can have a negative effect on air quality, ecosystem productivity, and human health. The major factors controlling NH3 losses from fertilizers are reviewed in this article.

[247] P. Fixen. 2009. Concepts for Facilitating the Improvement of Crop Productivity and Nutrient Use Efficiency. Better Crops with Plant Food. Vol 93(4). Page 12 - 14.
Reference ID: 23738
Note: #23738e > S Serial #20254e
Abstract: The global character of the demand for agricultural products and many of the most critical environmental issues creates a tight linkage between improving productivity and minimizing environmental impact. Merging these two objectives into one goal is likely the only strategic approach that will allow either objective to be accomplished. Sustainably meeting this challenging goal will require close cooperation and understanding among disciplines, across geographies, and between public and private sectors. Three concepts are offered that may facilitate this interaction.
• The 4R Nutrient Stewardship Framework: Application of the right nutrient source, at the right rate, right time, and right place is a concept that when seen within a framework connecting practices to on-farm objectives and sustainability goals, along with critical performance indicators, can help keep individuals working on “parts” cognizant of the “whole”.
• Mainstreaming of Simulation Models: Models recently developed can help identify unrealized yield potential and better manage the growing uncertainty of weather and climate.
• Global Data Networks: More extensive exploitation of electronic technology that facilitates global data collection, sharing, analysis, and use could expedite the acquisition and application of agronomic and plant nutrition knowledge.

[248] C. Witt, J.M. Pasuquin, G. Sulewski. 2009. Predicting Agronomic Boundaries of Future Fertilizer Needs in AgriStats. Better Crops with Plant Food. Vol 93(4). Page 16 - 17.
Reference ID: 23739
Note: #23739e > S Serial #20254e
Abstract: Predicting fertilizer consumption for a given crop and country is challenging. In this article, we explore an agronomic model based on yield gap analysis, fertilization for attainable yield, and area growth featuring case studies from Indonesia.

[249] D. Mengel, R. Lamond, V. Martin, S. Duncan, D. Whitney, B. Gordon. 2009. Chloride Fertilization and Soil Testing – Update for Major Crops in Kansas. Better Crops with Plant Food. Vol 93(4). Page 20 - 21.
Reference ID: 23740
Note: #23740e > S Serial #20254e
Abstract: Chloride (Cl-) is the ion form of chlorine (Cl). It is an essential, but sometimes overlooked, nutrient in crop production. Years of work have shown that wheat and other crops canshow substantial response to Cl- application. This article discusses Cl-

nutrition andsummarizes Kansas research results for major crops from the 1990s through 2006.

[250] P.J.S. Gramer. 1950. A Comparison between Oil palms and Coconuts. The Planter. Vol 26. Page 341 - 348.
Reference ID: 23741
Note: #23741e

[251] M.R. De Arruda, K.E. Giller, M. Slingerland. 2017. Where is sugarcane cropping expanding in the brazillian cerrado, and why? A case study, Anais Da Academia Brasileira De Ciencias. Page 1 - 9.
Reference ID: 23742
Note: #23742e
Abstract: Sugarcane growing area in Brazil sharply expanded between 2000 and 2010 due to the increasing world demand for sugar and ethanol. Since this expansion of sugarcane is said to occur in areas covered by degraded pastures, it is likely not threatening the environment or food production. In order to verify this assumption, we investigate at farm and field levels which types of land use sugarcane cropping replaced between 2005 and 2010 and the reasons for farmers shifting or not shifting to sugarcane, as a case study in two counties in the state of Goiás. Within the studied period, sugarcane cropping expansion was related to large farms, lower risk perceived by farmers, and higher profitability compared with soybean and beef cattle-raising. For smallholders, particularly dairy farmers, the need to comply with the set-aside rules under Brazilian Forest Code (Código Florestal Brasileiro) made a shift to sugarcane less attractive, as it would have forced them to reduce farm cultivable area, with loss of incomes. From 30,408 ha under sugarcane surveyed, 45.7% had used to be pastures, 31% had previously been pastures rotated with soybean and maize, and 23.3% had been cropped exclusively with soybean or maize.

[252] G.H. Merten, J.P.G. Minella. 2013. The expansion of Brazilian agriculture: Soil erosion scenarios. International Soil and Water Conservation Research. Vol 1(3). Page 37 - 48.
Reference ID: 23743
Note: #23743e
Abstract: During the next 10 years Brazil's agricultural area will expand to meet increased domestic and worldwide demand for food, fuel, and fiber. Present choices regarding land use will determine to what degree this expansion will have adverse effects that include soil erosion, reservoir siltation, water quality problems, loss of biodiversity and social conflict, especially around indigenous reservations. This paper presents an up-to-date inventory of soil erosion in Brazil caused by crop and livestock activities and provides estimates based on three different hypothetical land-use scenarios to accommodate the expansion of Brazilian agricultural activity by 2020:
Scenario 1 - expansion of cropping into areas of natural vegetation, without adoption of conservation practices;
Scenario 2 - expansion of cropping into areas of degraded pasture, without adoption of conservation practices;
Scenario 3 - expansion of cropping into areas of degraded pasture, together with conservation practices in 100% of the expanded area. The worst-case scenario involves expansion of agriculture into areas of native vegetation in the Brazilian Savannah (Cerrado) and Brazilian rainforest (Amazon) biomes,and could increase total soil erosion in Brazil (currently about 800 million metric tons a year) by as much

as 20% . In the best-case scenario, crop expansion under a conservation agriculture model would utilize currently degraded pasture, especially in the Savannah (circa 40 million hectares), reducing soil erosion in Brazil by around 20%. For this to occur, however, a national soil and water conservation policy needs to be implemented in Brazil to support a sustainable model of agriculture in which the environment can be preserved as much as possible.

[253] V. Nosov, S. Ivanova. 2009. Progress in Wheat, Sunflower, and Sugar Beet Cultivation in Russia. Better Crops with Plant Food. Vol 93(3). Page 4 - 5.
Reference ID: 23744
Note: #23744e > S Serial #20253e
Abstract: Progress with wheat, sunflower, and sugar beet production in Russia has been observed since the 1990s. Sugar beet cultivation has benefited the most due to the adoption of modern crop production technologies, including nutrient management. There are also real expectations for moderate yield improvement in wheat. Sunflower crop management is trailing and requires serious improvement before any large-scale gains in productivity can be expected.

[254] P.E. Fixen. 2009. World Fertilizer Nutrient Reserves - A View to the Future. Better Crops with Plant Food. Vol 93(3). Page 8 - 11.
Reference ID: 23745
Note: #23745e > S Serial #20253e
Abstract: The stewardship responsibilities of agriculture include the wise use of the raw materials from which commercial fertilizers are produced. Development and implementation of fertilizer best management practices (BMPs) with focus on the 4Rs—right source, right rate, right time, right place—are timely not only for short-term economic and environmental reasons, but also for the wise stewardship of the non-renewable nutrient resources upon which food, feed, fiber, and fuel production depend.

[255] R. Karamanos, J. Heard, T. Jensen. 2009. A Public-Private Cooperative Model for Updating Nitrogen Fertilizer Recommendations - The Manitoba Experience. Better Crops with Plant Food. Vol 93(3). Page 12 - 13.
Reference ID: 23746
Note: #23746e > S Serial #20253e
Abstract: 1989 through 2004 were used to update N fertilizer recommendations for wheat, barley, and canola in Manitoba. This was accomplished through a joint effort of a private industry soil fertility research unit (now part of Viterra, Inc.) and Manitoba Agriculture, Food and Rural Initiatives (MAFRI). They cooperated in reviewing, evaluating, and extracting pertinent research results to use in the updating. This is an example of cooperation between private industry research and government extension to improve fertilizer recommendations for use by farmers.

[256] A.E. Johnston, J.K. Syers. 2009. A New Approach to Assessing Phosphorus Use Efficiency in Agriculture. Better Crops with Plant Food. Vol 93(3). Page 14 - 16.
Reference ID: 23747
Note: #23747e > S Serial #20253e
Abstract: It is frequently stated that P is used inefficiently in agriculture, with percent recovery of P applied in fertilizers usually between 10 and 20%. We argue that such low efficiencies are primarily an artifact of the method used to calculate efficiency. When efficiency is measured by the “Balance Method” – P removed in crop expressed

as a percentage of P applied – and when soil P levels are being maintained near the critical level, the efficiency of fertilizer P use frequently exceeds 90%.

[257] D. Tarkalson, B. Brown, H. Kok, D.L. Bjorneberg. 2009. Impact of Removing Straw from Wheat and Barley Fields: A Literature Review. Better Crops with Plant Food. Vol 93(3). Page 17 - 19.
Reference ID: 23748
Note: #23748e > S Serial #20253e
Abstract: The sustainability of straw removal from wheat and barley fields from the standpoint of its effects on soil properties and nutrient cycling is a concern. A recent literature review reveals that there is no negative effect of small grain straw removal on soil organic carbon (SOC) content with irrigated conditions. With rainfed conditions, the results could be more variable and depend on site productivity. Large amounts of nutrients are removed when straw is removed, accelerating the rate of nutrient depletion and cost of replacing these nutrients.

[258] S. Huang, J. Jin, P. He. 2009. Effects of different patterns of land use on status of heavy metals in agricultural soils. Better Crops with Plant Food. Vol 96(3). Page 20 - 22.
Reference ID: 23749
Note: #23749e > S Serial #20253e
Abstract: Long-term use of high rates of chemical fertilizers and organic manures in open vegetable fields and field-scale greenhouse vegetable production contributed to the accumulation of Cu and Zn, while changes for other heavy metals were not detected. The contents of total Cu, Zn, and other heavy metals in soils increased with vegetable production history.

[259] T. Bruulsema, G. Belanger. 2009. Forage Fertilizer Decisions in an Uncertain Market. Better Crops with Plant Food. Vol 93(2). Page 3 - 4.
Reference ID: 23750
Note: #23750e > S Serial #20252e
Abstract: An important principle of plant nutrition is that plants don't care about market conditions.Top yields of quality forage are crucial to the success of most ruminant livestock productionsystems. Both yield and quality depend on the application of the right source of nutrientsat the right rate, at the right time, and in the right place.

[260] V.K. Singh, R. Tiwari, S.K. Sharma, B.S. Dwivedi, K.N. Tiwari, M.S. Gill. 2009. Economic Viability of Rice-Rice Cropping as Influenced by Site-Specific Nutrient Management. Better Crops with Plant Food. Vol 93(2). Page 6 - 9.
Reference ID: 23751
Note: #23751e > S Serial #20252e
Abstract: Averaged over study locations, the best system (two crop) grain yield under site-specific nutrient management (SSNM) was 12,850 kg/ha in comparison to 10,270 kg/ha under farmer practice (FP) – a 25% increase in productivity. SSNM resulted in an additional produce value of US$607 (gross) and US$464 net after deducting costs for extra inputs. These results clearly establish the importance of responsible nutrient management for breaking the prevailing situation of yield stagnation.

[261] I. Jelsma, M. Singerland, K.E. Giller, J. Bijman. 2017. Collective action in a smallholder oil palm production system in Indonesia: The key to sustainable and inclusive smallholder palm oil?. Journal of Rural Studies. Vol 54. Page 198 - 210.
Reference ID: 23752
Note: #23752e
Abstract: Indonesian smallholder oil palm generally yield much less than corporate plantations. We analysed a smallholder oil palm production system in West Sumatra which outperformed its nucleus estate plantation, consistently producing yields far above the national average for over 25 years. Its institutional setup allowed farmers to combine the advantages of smallholder and plantation agriculture by capitalizing on collective action. Collective action design principles (Ostrom, 1990; Cox, 2010) are used to assess the institutional setup of a smallholder production system. This case study demonstrates that with a strong institutional arrangement, smallholder oil palm farmers can participate in supply chains on advantageous conditions and substantially increase productivity, thereby contributing to both rural development and land sparing.

[262] M.A. Sabri. 2009. Evolution of fertilizer use by crops in Malaysia: Recnt trends and prospects, IFA Crossroads Asia-Pacific 8-10 December 2009. Page 1 - 39.
Reference ID: 23753
Note: #23753e
Abstract: Agriculture has always played a significant role in the development of Malaysia and continues to make a major contribution to the national economy. In value terms, its gross domestic product (GDP) grew steadily from RM 14.82 billion in 1990 to RM 40.07 billion in 2008. However, the contribution of the agricultural sector reduced from 18.7% to 3.8% during the same period (Table 1). This is attributed to the diversification and increase in other economic activities in the country. The total land use under the agriculture trended upward over the 15 years with bigger increase during the 2000-2005 period. With the fast expansion of oil palm cultivation, the land use under rubber, coconut and cocoa was reduced from 1995-2005 (Table 2). The total land use under the Ninth Malaysia Plan (9MP 2005-2010), is expected to increase to 6.9 million hectares. It must be mentioned that the area under oil palm have grown 6-folds over the last 30 years and presently accounted for 39.3% of the major crop area in 1990 and expected to increase to 66.1% by 2010. The total area under oil palm will be about 4.56 million Hectares by the end of 9MP. With the global recession, there is increase pressure to maximize food production to reduce import of agricultural products and the area under fruits and vegetables is targeted to reach 375,000 and 86,000 hectares, respectively by 2010. The Malaysian government has committed to promote and maintain agriculture as the third engine of growth in the country‟s economy and this sector has maintained its GDP contribution at about 8.1% of an enlarged national GDP of RM738.67 billion in 2008. The projected increases in agricultural production to the year 2010 for some crops are shown in Table 3 (Economic Planning Unit 2007). Agricultural growth will be achieved through expansion and/or further intensification of land use. Between 1995- 2010, agricultural land use increased from about 5.5 to about 6.9 million hectares. The growth will be supported mainly by the sustained growth in oil palm and higher production of food crops. The increase in area under mature oil palm and yield improvement can only be achieve through extensive application of Good Agricultural Practices (GAP) and increase in oil extraction rate (OER) in 2009 and beyond. The importance of fertilizers for achieving increase crop production must be emphasized. The cultivation of high yielding crop varieties requires high and proper supply of macro- and micro-nutrients for sustained and better crop performance and yields. Since fertilizers is usually the

highest variable costs item in the crop production budget, it is pertinent that the Government must continue to provide incentives or actions to improve efficiency in the fertilizer industry and to minimize fertilizer prices.

[263] Y. Basiron, F.K. Yew. 2009. Potential of Palm Oil for developing countries and rile in the food and fuel debate, Palm Oil – The Sustainable 21st Century Oil. Page 1 - 8.
Reference ID: 23754
Note: #23754e
Abstract: Agricultural production has become more complex in recent times. Firstly, an increasing quantity of food – including oils and fats – has to be produced to feed the spiralling world population. Expanding crop production requires arable land to be opened up for cultivation, leading to pressure from competing demands for use of the land (http://www.globalchange.umich.edu). Secondly, sustainable land management (Dumanski and Smyth, 1993) is required to ensure that scarce resources can be used on continuous basis. Much arable land is lost through unsustainable use, resulting in soil degradation from erosion and desertification. Furthermore, concerns over climate change now demand sustainable practices in crop cultivation, in a manner that minimises life cycle greenhouse gas (GHG) emissions. Another response is the use of vegetable oils as feedstock in bio-fuel production. The feedstock is from palm oil (Yusof, 2005; Choo et al, 2005), rapeseed (www.biofuelsb2b.com) and maize (Bourne, 2007). However, their use has raised anxiety about possible shortages for food applications and increased prices. The tropics with abundant sunshine and rainfall are well suited to agriculture. And, as many tropical countries are developing countries, agriculture is often used to spearhead their development. This paper will therefore discuss the role played by oil palm with regard to food, fuel and development.

[264] S.J. Scherr, K. Mankad, S. Jaffee, C. Negra. 2015. Steps Toward Green - Policy responses to the environmental footprint of commodity agriculture East and Southeast Asia. Page 1 - 198.
Reference ID: 23755
Note: #23755e
Abstract: East and Southeast Asian countries have become some of the world's foremost producers of commodity crops, but growth came at a high environmental cost. In this new book, EcoAgriculture Partners, The World Bank and Clarmondial recommend an Agricultural Green Growth framework for national and local governments to promote environmental stewardship in the production of key commodity goods.

[265] T.P.G. Editorial. 2016. Moving Forward with land use planning in oil palm expansion. The Planter. Vol 92(1082). Page 281 - 282.
Reference ID: 23756
Note: #23756e > S Serial #22800
Abstract: The oil palm is one of the most rapidly expanding tropical crops in the world over the past few decades. Expansion of oil palm production is expected to continue to meet the demand for edible vegetable oil to feed the increasing world population. Expansion of the area of oil palm plantations to meet these demands is expected to continue to occur in Southeast Asia. Latin America and Africa will play a bigger role as the new frontier for oil palm development especially taking into consideration the moratorium on oil palm expansion recently announced by the President of the Republic of Indonesia.

[266] T.P.G. Editorial. 2016. Carbon Footprint and Product Life Cycle assessment in palm oil production. The Planter. Vol 92(1083). Page 357 - 358.
Reference ID: 23757
Note: #23757e > S Serial #22922
Abstract: In COP 21 (21st Conference of the parties held in December 2015 in Paris), countries from around the world have pledged to limit the increase in world temperature to 2ºC by 2100. Both developed and developing countries have voluntarily pledged emission reduction at various level of commitments. To meet their pledges, countries will need all parties to participate in the emission reduction effort. In the developing countries, the agricultural and forestry sector which made up almost a third of all anthropogenic emission has become the focus of attention. Concerns were most prominent in the heavily forested tropical developing countries such as Indonesia, Malaysia and Sub-Saharan African countries where emissions from land use change has been and are expected to continue to be major part of the emission.

[267] D. Rajagopal 2016. Introduction of Oil Palm Pesticides App. The Planter. Vol 92(1083). Page 415 - 416.
Page 1 - 2.
Reference ID: 23758
Note: #23758e
Abstract: Young and Gen Y (millennial) planters nowadays have problems in catching up with demanding work load as planters. Millennial or Gen Y are people born during the 1980s and early 1990s and most of them must be working currently. Planters are required to work outdoors in a challenging environment and master multi tasks jobs quickly. The new millennial planters are likely to experience some subjected to such an environment. Thus this not only vause acute labour shortage of general workers but also executive level.

[268] M.R. Chandran. 2014. A Perspective on the multiple benchmarks for sustainable palm oil. The Planter. Vol 90(1061). Page 607 - 610.
Reference ID: 23759
Note: #23759e > S Serial #22026
Abstract: To emergence and presence of numerous sustainability references and standards for palm oil intensity the significance for the sector to transform itself so that sustainable practices become institutionalised over time. Having more references for sustainable palm oil raises awareness on sustainable development. If you look at palm oil producers, especially in Indonesia, people in the industry already knew about the RSPO (Roundtable on Sustainable Palm Oil). But now with ISPO (Indonesian Sustainable Palm Oil), in addition to RSPO's standard even more people now know sustainable palm oil has now increased its permeation and influence in Indonesia probably more than ever before.

[269] M.R. Chandran. 2014. Getting Our Act Together: Sustainability in the Malaysian Palm Oil Industry. The Planter. Vol 90(1061). Page 555 - 558.
Reference ID: 23760
Note: #23760e > S Serial #22026
Abstract: "Sustainability" is finding the compromise between the need for economic expansion while minding both the social and environmental impacts that may arise from the related activities. It is a market driven agenda stemming from the rise of ethical consumerism. Consumers are increasingly aware of the environmental and social impacts arising from business operations. They now hold these companies

more and more responsible, pressuring them to take immediate action to dampen any adverse effects that occur as a direct or indirect outcome from their commercial activities. In step the Environmental and Social Non-Governmental Oragnisations (ENGOs), promoting themselves as a trustworthy and influential faction as they police or champion the various relevant causes. This somewhat differs however in countries such as the US, France and UK, among others, where industries such as agriculture are highly regulated and closely monitored.

[270] G.F. Chung. 2014. Additional New Potential Threat to Oil Palm. The Planter. Vol 90(1059). Page 393 - 394.
Reference ID: 23761
Note: #23761e > S Serial #22027
Abstract: The national average yield of Malaysian crude palm oil (CPO) yield per hectare has been stagnant for the past 20 years, at 3.5-3.8 tonnes of CPO per hectare. It is common knowledge to all that, the factors affecting oil palm yield are soil fertility, moisture supply, sunshine hours, planting materials, planting density, age of palms, incidence of pests and disease and other agromanagement inputs. Poor management of pests and disease could be one of many factors causing stagnant yield and if unchecked could be major factor affecting yield.

[271] G.F. Chung. 2014. The Rat Story in Oil Palm Continues into Twenty-first Century, The Planter. Vol 90(1062). Page 633 - 635.
Reference ID: 23762
Note: #23762e > S Serial #21975
Abstract: Oil Palm (*Elaeis guineensis* Jacq.) has many pests including insects, mites, nematodes, rodents, birds and other animals, which can prevent the normal healthy growth and cause significant reduction of crop yield. A good description on these pests is given in Brian J. Wood's book "Pests of Oil Palms in Malaysia and Their Control" published in 1968. The Malayan Wood Rat (*Rattus tiomanicus*), is mentioned as the only rat species found in all areas planted with oil palm and causes serious damage to immature and mature palms. Other than *R. tiomanicus*, the other species of rats reported to attack oil palm in Peninsular Malaysia include the Rice Field Rat (*Rattus argentiventer*) in the 1970s and Malaysian House Rat (*Rattus rattus diardii*) in the 1980s. Polynesian Rat/ Little House Rat (*R. exulans*) is occasionally found in oil palm. Common species of rats in oil palm in Sabah are Swamp Giant Rat (*Rattus muelleri*), *R. exulans*, *R.r.diardii* and *R. argentiventer*. *R.r. diardii* is the dominant rat species in oil palm in eastern Sabah. With the expansion of oil palm to Sarawak, four species of rats (*R.muelleri*, *R. tiomanicus*, *R.r. diardii* and *R. argentiventer*) were found to be serious pests.

[272] T.P.G. Editorial. 2014. How Will Genomics Impact the Oil Palm Industry?. The Planter. Vol 90(1057). Page 233 - 236.
Reference ID: 23763
Note: #23763e > S Serial #22235
Abstract: Global demand for vegetable oil exceeds current production. This is driven by growth in global population, an increase in affluence, as well as an expansion in uses for vegetable oil, as renewable fuels and chemicals. Palm oil is the most consumed oil in the world (approximately 57.16 M tonnes were utilised in 2013), followed closely by soybean oil (42.83 M tonnes) and then rapeseed (canola) oil (24.52 M tonnes). However, the ability to meet growing demands for palm oil through an increase in planting area is limited given the limited land resources available, an

increasing loss of existing agricultural land for non-agricultural uses agricultural land degradation and limited accessibility of fresh water for agriculture.

[273] E. Pushparajah. 2014. Continuing unfair challenges for the oil palm Industry. The Planter. Vol 90(1056). Page 155 - 156.
Reference ID: 23764
Note: #23764e > S Serial #22239
Abstract: The unfair "attacks" on the oil palm industry became evident from the early 1980s and when these "underhand" claims were challenged, other insidious aspects were used to default oil palm. Finally when the industry assumed that the development of RSPO (Roundtable on Sustainable Palm Oil) [involving ENGOs (environmental non-governmental organisations), consumers and producers] and its implementation (at an extra cost to the industry) would allow it to concentrate on production efficiency, new demands have parachuted in! As all aware very recently a European based "food giant" Unilever and Wilmar, the world's biggest palm oil trader signed a pledge of "No Deforestation, No Peat, No Exploitation" in their oil palm trades. One wonders if this demand is a consequence of yielding to pressure groups? The question raised does not negate one's acceptance of the importance of conservation and the need for safeguarding the environment and the planet for future generations. However, one wonders why the developing countries (in this instance the producers of palm oil) have suddenly been projected to spearhead the move to be saviours of the planet! Are the food giants and large traders of other major agricultural products (many from developed countries) going to follow the demands enforced on the oil palm industry? If not will it not confirm the apprehension that the oil palm industry is being targetted for their competitiveness?

[274] E. Pushparajah. 2014. Sustaining the Competitive Edge of the Oil Palm Industry. The Planter. Vol 90(1060). Page 483 - 484.
Reference ID: 23765
Note: #23765e > S Serial #21791
Abstract: The oil palm industry continues to face many challenges (a number of which are unfair ones); and has been able to meet the challenges. At the same time it is realised that one cannot or should not be complacent with the existing situation. Thus there was a need to evaluate the current position and take appropriate steps to not only sustain, but improve on the competitive edge. With this in view The Incorporated Society of Planters (ISP) set "Planting Industry: Sustaining the Competitive Edge" as the theme of its 11th ISP National Seminar 2014 (NATSEM 2014), held in Kuantan, Pahang from 23 to 25 June 2014.

[275] V. Ramesh. 2014. Oil Palm - Surviving the Test of Economic Sustainability. The Planter. Vol 90(1055). Page 85 - 87.
Reference ID: 23766
Note: #23766e > S Serial #22240
Abstract: The end of 2013 reflected the true performance of plantation companies amidst the volatility and low crude palm oil (CPO) prices and many reporting higher cost of production. The volatility CPO prices and lower prices recorded during the year has an impact on depressed margins of plantation companies. Planters generally cannot accept the fact that prices were high up above RM4000 per tonne in 2008 and towards the end of 2013 prices ranged between RM2500 - RM2600 levels. A drop in CPO prices by RM100 per tonne will result in a margin depression by RM30 - 35 million for a mid-sized plantation company.

[276] T. Walker, R. Norman, B. Ottis, J. Bond. 2008. Starter Fertilizer for Delayed-Flood Rice - Agronomic Effects. Better Crops with Plant Food. Vol 92(2). Page 4 - 5.
Reference ID: 23767
Note: #23767e > S Serial #20248e
Abstract: Results from this study indicate that starter N applications when applied to semi-dwarfcultivars planted on clay soils in the Mississippi River Alluvial Flood Plain can increaseseedling plant height and moderately increase rice grain yield.

[277] B. Gordon. 2008. Maximizing Irrigated Soybean Yields in the Great Plains. Better Crops with Plant Food. Vol 92(2). Page 6 - 7.
Reference ID: 23768
Note: #23768e > S Serial #20248e
Abstract: Several years of irrigated field research in north central Kansas clearly demonstrated the importance of complete and balanced nutrition in the production of high yield corn (Gordon, 2005). However, fertilization of soybeans in a common corn/soybean rotation has traditionally been secondary to corn fertilization, as the crop is usually left to scavenge nutrients remaining after corn. This study was started in 2004 as an expansion of the original corn research to determine the benefit of direct fertilizer application to sprinklerirrigated soybeans. It has shown that the addition of P and K can have a significant impact on soybean yield, with 4-year average increases due to P and K as high as 34 bu/A. This experiment also demonstrated that Mn can impact soybean production in high yielding environments.

[278] N.F. Sayre, W. deBuys, B.T. Bestelmeyer, K.M. Havstad. 2012. "The Range Problem" After a century of Rangeland Science: New Research Themes for Altered Landscapes. Rangeland Ecology & Management. Vol 65. Page 545 - 552.
Reference ID: 23769
Note: #23769e
Abstract: The rangeland science profession in the United States has its roots in the widespread overgrazing and concurrent severe droughts of the late 19th century. These drivers contributed to rangeland resource degradation especially in the American Southwest— what E. O. Wooton (1908) called the "Range Problem." Although logical for the time, the scientific activities and resulting policies that arose out of this catastrophe were based on reductionist experimentation and productionist emphases on food and fiber. After a century of science and policy, there are two additional perspectives that shape our vision for the emphases of the future. First, rangeland landscapes are extremely heterogeneous; general principles derived from scientific experimentation cannot be easily or generally applied without adjusting to the distinct societal and ecological characteristics of a location. Second, rangeland management occurs at spatial scales considerably larger than those that have typically been addressed in range science. Scaling up science results is not a simple, additive process. The leading features of the emerging science are 1) research at landscape scales and 2) over longer time spans that 3) approaches conservation and management practices as treatments requiring scientific evaluation, 4) incorporates local knowledge, 5) is explicitly applied in nature, and 6) is transparent in its practice. We strongly argue for a science that supports resource management by testing hypotheses relevant to actual conservation practices and iteratively applying its findings in partnership with managers in an ongoing, adaptive fashion.

[279] T.S. Murrell. 2013. Is Potassium Fertilizer Really Necessary? Issue Review Ref#13100, IPNI. Page 1 - 8.
Reference ID: 23770
Note: #23770e
Abstract: Recently, the question has been raised of whether or not agriculture should be using potassium (K) fertilizers. Let's examine how soil fertility and plant nutrition scientists have determined if or when K should be applied. It starts with the plant. Plants require 17 nutrients to develop properly. Potassium is one of these and is taken up in large quantities. It is therefore termed a "macronutrient." Plants get their K from the soil via their roots. Consequently, one of the most basic questions that soil fertility and plant nutrition scientists have addressed over the past several decades is, "How much of a plant's nutrient needs can be met by what's already in the soil?"

[280] S. Li, X. Liu, W. Ding. 2016. Estimation of Organic Nutrient Sources and Availability for Land Application in China. Issue Review Ref#16024, IPNI. Page 1 - 12.
Reference ID: 23771
Note: #23771e
Abstract: Knowledge of the status and characteristics of organic nutrient resources in China is essential for their efficient management in agricultural production. Provincial and regional level estimates are provided for the amount of organic wastes, their nutrient supply capacity, as well as their availability to cropland.
Great increases in Chinese crop production and livestock farming have in turn produced large amounts of nutrient-laden animal wastes and crop residues. Organic wastes from human activities, and of green legume manures are also viewed as valuable organic resources. The recent government policy of "zero growth by 2020" for fertilizer sources is increasing the focus on how all available nutrient sources can be used best. Part of this focus is placed on an increased interest in using organic nutrient sources, like livestock manure, to offset inorganic fertilizer use. Estimation of the nutrient supply capacity and availability from these organic resources is important for understanding nutrient input/output balances in the Chinese agricultural system, and will have a great effect on nutrient management and fertilizer application in China.

[281] C.S. Snyder. 2016. Suites of 4R Nitrogen Management Practices for Sustainable Crop Production and Environmental Protection. Issue Review September 2016, No.1, IPNI. Page 1 - 16.
Reference ID: 23772
Note: #23772e
Abstract: Impacts of crop production nitrogen (N) inputs and losses to the environment are a growing public concern. A U.S. national N management and nitrous oxide emission science workshop, aided by science input from Canada scientists, resulted in seven crop- and region-sensitive N management frameworks. Each framework has three tiers or suites of 4R N management practices to improve economic, social, and environmental outcomes. Intelligent implementation of improved 4R suites of N management practices can result in greater crop recovery of applied N, sustained and improved soil fertility and health, and cleaner water and air; while reducing emissions of nitrous oxide.

[282] R.M. Norton. 2017. Nutrient Use Efficiency and Effectiveness in Australia: Assessing Agronomic and Environmental Benefit. Issue Review August 2017, No.1, IPNI. Page 1 - 9.
Reference ID: 23773
Note: #23773e
Abstract: MINERAL FERTILIZERS have made it possible to sustain the world's growing population, sparing millions of hectares of natural and ecologically-sensitive systems that otherwise would have been converted to agriculture1. Now, economic and environmental challenges are driving increased interest in nutrient use efficiency. Fluctuating prices for both agricultural produce and fertilizers have heightened interest in efficiency-improving technologies and practices that also improve productivity. In addition, nutrient losses that harm air and water quality can be reduced by improving the use efficiencies of nutrients, particularly for nitrogen (N) and phosphorus (P). The world's population, growing in both numbers and purchasing power, is projected to consume more food, feed, fiber, and fuel—increasing global demand for fertilizer nutrients2. Since fertilizers are made from non-renewable resources, there is continued importance in ensuring they are used efficiently. At the same time, research is showing how 4R Nutrient Stewardship is increasing fertilizer use effectiveness for improved productivity and profitability of farming systems.

[283] I.E. Henson. 2004. Modelling carbon sequestration and Emissions related to oil palm cultivation and associated land use change in Malaysia. M.P.O.B. (MPOB). Page 1 - 55.
Reference ID: 23774
Note: #23774e
Abstract: This report attempts perhaps the first comprehensive accounting of carbon sequestration and emission associated with the establishment and cultivation of oil palm in Malaysia and with the initial processing of its products. The study examines carbon exchanges over the final two decades of the last century, i.e. 1981 to 2000. Effects on carbon balance of land conversion associated with the expansion of oil palm planted area are included in the analysis. For determining the changes, use has been made of official statistics on areas and production, while modelling techniques have been employed to derive estimates of those variables for which direct information is lacking. Alternative scenarios are compared. Uncertainties in available data and assumptions used in the modelling are highlighted and areas requiring improved data access or collection are identified.

[284] I.E. Henson. 2009. Modelling Carbon sequestration and Greenhouse gas emissions associated with oil palm cultivation and land-use change in Malaysia. MPOB. Page 1 - 123.
Reference ID: 23775
Note: #23775e
Abstract: This report is an updated and expanded study of one undertaken previously (Henson, 2004). It assesses carbon sequestration, greenhouse gas (GHG) emission and the resultant carbon balance, associated with oil palm cultivation and related land-use change (LUC) in Malaysia. The updates include the application of new modelling routines, inclusion of additional factors, and expansion of the time frame. A generic computer model OPCABSIM (Oil Palm Carbon Budget Simulator) has been developed for processing all data and providing options for making the assessments. The boundaries of the study are defined as strating at land clearance and field planting of oil palm and extending to the processing and disposal of mill products and by-

products. Refining of palm oil and production of oleochemicals are not dealt with, although a brief treatment of biodiesel is included. The previous aspects of the study have been expanded to include emission of GHGs additional to CO_2. The period covered is 1981 to 2005, although for same aspects, results for earlier years can be generated where input data are available. Data are, in most cases, processed and presented on a regional basis with individual outputs for Peninsular Malaysia, Sabah and Sarawak. As well as giving balances and balance components covering total outputs, results are also presented per tonne of palm oil produced and perhectare.

[285] IPNI. 2017. Better Crops With Plant Food Vol.101, No.3. Page 1 - 28.
Reference ID: 23776
Note: #23776e

[286] W.B. Gordon. 2009. Starter Fertilizer Application Method and Composition in Reduced-Tillage Corn Production. Better Crops with Plant Food. Vol 93(2). Page 10 - 11.
Reference ID: 23777
Note: #23777e > S Serial #20252e
Abstract: Field studies were conducted at the North Central Kansas Experiment Field to evaluate four methods of starter fertilizer application (in-furrow, 2x2, 2x0, and placed in an 8-in. wide band centered on the row). Starter fertilizer consisted of 5, 15, 30, 45, or 60 lb N/A with 15 lb P2O5 and 5 lb K2O/A. A no starter check was also included. Starter placed in the seed furrow reduced plant populations and yield. Dribble (2x0) application of starter in a narrow surface band was approximately equal to 2x2 applied starter. Increasing the amount of N in the starter up to 30 lb/A consistently increased P uptake and yield. The use of a dicarboxylic copolymer product in starters was also evaluated and found to be beneficial in increasing P fertilizer performance and corn yield.

[287] T.L. Roberts. 2009. The Role of Fertilizer in growing the world's food. Better Crops with Plant Food. Vol 93(2). Page 12 - 15.
Reference ID: 23778
Note: #23778e > S Serial #20252e
Abstract: According to the United Nations (UN), the global population of 6.7 billion is expected to reach 9.2 billion by 2050. The Millennium Project and its State of the Future (2008) report indicated that food production will have to increase by 50% by 2013 and double in 30 years to help solve the current food crisis. This increased food production will have to occur on less available arable land and this can only be accomplished by intensifying production. However, intensifying production must be done in an environmentally safe manner through ecological intensification. The goal of ecological intensification is to increase yield per unit of land, approaching the “attainable yield” of farming systems, with minimal or no negative environmental impact. The world will not be able to meet its food production goals without biotechnology and improved genetics, and without fertilizer. Commercial fertilizer is responsible for 40 to 60% of the world’s food production. Our responsibility is to develop and employ management practices that use fertilizer effectively and efficiently. This article explores the role of fertilizer in producing the world’s food and associated best management practices (BMPs) that help ensure production and environmental goals are met.

[288] P. Wiatrak, A. Khalilian, J. Muller, W. Henderson. 2009. Applications of Soil Electrical Conductivity in Production Agriculture. Better Crops with Plant Food. Vol 93(2). Page 16 - 17.
Reference ID: 23779
Note: #23779e > S Serial #20252e
Abstract: Greater understanding of soil electrical conductivity (EC) could offer useful information for crop management decisions. Several years of study at Clemson University have identified some important insights, outlined in this article.

[289] W. Gao, J. Jin, P. He, S. Li, J. Zhu, M. Li. 2009. Optimum Fertilization Effect on Maize Yield, Nutrient Uptake, and Utilization in Northern China. Better Crops with Plant Food. Vol 93(2). Page 18 - 20.
Reference ID: 23780
Note: #23780e > S Serial #20252e
Abstract: Field experiments were conducted in northeast, northcentral, and northwest China in order to explore and compare regional yield responses, nutrient uptake, and nutrient utilization in maize. The results showed that spring maize yields in northeast and northwest China were higher than summer maize yield in northcentral China. Total macronutrient accumulation was higher in the northwest compared to other regions.

[290] Y. Xing, R. Wang, W. Sun, J. An, C. Wang, H. Bao, L. Gong, X.Z. Wang. 2009. Effect of Balanced Fertilization on Rice Nutrient Uptake, Yield, and Profit. Better Crops with Plant Food. Vol 93(1). Page 4 - 5.
Reference ID: 23781
Note: #23781e > S Serial #20251e
Abstract: Balanced fertilization is important in optimizing both rice yield and profit. In this study, balanced fertilization also accelerated rice nutrient uptake and maintained soil nutrient balance at the site.

[291] L. Bast, R. Mullen, I. O'Halloran, D. Warncke, T. Bruulsema. 2009. Phosphorus Balance Trends on Agricultural Soils of the Lake Erie Drainage Basin. Better Crops with Plant Food. Vol 93(1). Page 6 - 8.
Reference ID: 23782
Note: #23782e > S Serial #20251e
Abstract: Only a few decades ago, optimum plant nutrition involved applying more P than crops removed. In recent years, applications have come much closer to balancing removals. This trend has positive implications for both crop productivity and water quality.

[292] L. Yao, G. Li, B.M. Yang, S. Tu. 2009. Optimal Fertilization of Banana for High yield, quality, and nutrient use efficiency. Better Crops with Plant Food. Vol 93(1). Page 10 - 11.
Reference ID: 23783
Note: #23783e > S Serial #20251e
Abstract: Prescribed fertilizer application in first season banana crops (mother plants) uncovered a situation of oversupply due to seasonal differences in yield potential. This finding is of great importance in helping farmers adjust fertilizer inputs and improve fertilizer use efficiency, while maintaining high banana yield and quality.

[293] A.D. Halvorson, S.J. Del Grosso, F. Alluvione. 2009. Nitrogen Rate and Source Effects on Nitrous Oxide Emissions from Irrigated Cropping Systems in Colorado. Better Crops with Plant Food. Vol 93(1). Page 16 - 18.
Reference ID: 23784
Note: #23784e > S Serial #20251e
Abstract: Research shows that application of N fertilizer increases nitrous oxide (N2O) emissions linearly from irrigated cropping systems in Colorado. Conventional-till continuous corn had a higher level of N2O emissions than no-till continuous corn. Inclusion of soybean or dry bean in the no-till corn rotation increased the level of N2O emissions during the corn year of the rotation. Use of controlled release and stabilized N sources reduced N2O emissions under no-till when compared to urea and UAN fertilizer sources. Results of this work indicate that there are crop and fertilizer N management alternatives to reduce N2O emissions from irrigated systems.

[294] Y. Tong, J. Wang, W. Ma. 2009. Potassium Uptake by Kiwi Orchards in Shaanxi. Better Crops with Plant Food. Vol 93(1). Page 20 - 21.
Reference ID: 23785
Note: #23785e > S Serial #20251e
Abstract: Potassium concentration and accumulation in kiwi fruit trees showed that fall accumulated K was used to meet demand during fruit expansion in early July of the next year. When fruit production was 40 t/ha, the total K uptake was 170 kg/ha. Of that, 43 kg/ha was accumulated from September to the following May, and 125 kg/ha was taken up during the fruit formation period between May and September.

[295] B. van Raij, H. Cantarella, J.A. Quaggio, L.I. Prochnow. 2009. Ion Exchange Resin for Assessing Phosphorus Availability in Soils. Better Crops with Plant Food. Vol 93(1). Page 23 - 25.
Reference ID: 23786
Note: #23786e > S Serial #20251e
Abstract: Soil testing is an important tool for modern agriculture. It represents a link between a remarkable amount of research information on one side and the possibility to solve many plant nutrition problems for specific farmer sites on the other. To be effective, a soil test should give adequate evaluation of soil nutrient bioavailability. In this paper, research data are used to demonstrate that the ion exchange resin procedure is superior to other widely used methods to determine P in routine soil testing. In Brazil, ion exchange resin has been used since 1983 and about 100 laboratories have adopted the method.

[296] O. Walsh, Y. Kanke, D.E. Edmonds, W.R. Raun. 2009. Improving Mid-Season Nitrogen Recommendations for Winter Wheat Using Soil Moisture Data. Better Crops with Plant Food. Vol 93(1).Page 26 - 27.
Reference ID: 23787
Note: #23787e > S Serial #20251e
Abstract: Nitrogen sensor technology has significantly advanced the understanding of site-specific N management in crop production. Combining sensor information with other important yield affecting data has the potential to further improve the capabilities of this technology. Scientists at Oklahoma State University (OSU) are developing means of incorporating soil moisture into winter wheat yield potential determinations, and ultimately N management decisions.

[297] S. Bittman, R. Mikkelsen. 2009. Ammonia Emissions from Agricultural Operations: Livestock. Better Crops with Plant Food. Vol 93(1). Page 28 - 30.
Reference ID: 23788
Note: #23788e > S Serial #20251e
Abstract: The global abundance of N fertilizer has dramatically increased agricultural productivity. However, when N escapes to the atmosphere as ammonia (NH3) gas, NH3 loss can cause undesirable effects. In addition to a loss of a valuable resource, it can have negative impacts on air quality, ecosystem productivity, and human health. Animal production is the largest source of NH3 emission in North America. Improved manure and fertilizer management practices will help reduce volatile losses of this valuable resource.

[298] Y. Zhang, W. Hu, Y. Gao, Y. Yao, M. Tang, G. Hu. 2008. Fertilizing Irrigated Cotton for High Yield and High Nitrogen Use Efficiency. Better Crops with Plant Food. Vol 92(4). Page 6 - 7.
Reference ID: 23789
Note: #23789e > S Serial #20250e
Abstract: Nitrogen was the first limiting factor in a cotton production study in Xinjiang Province, followed by P and then K. Key considerations to maximum N recovery included a top-dress schedule able to sustain adequate N supply throughout flower initiation and boll formation as well as balanced quantities of P and K fertilizer.

[299] G. Stevens, D. Dunn. 2008. New Methods for Managing Midseason Nitrogen in Rice. Better Crops with Plant Food. Vol 92(4). Page 8 - 9.
Reference ID: 23790
Note: #23790e > S Serial #20250e
Abstract: Managing N fertilization in rice production is a challenge throughout the world. In theUSA, a simple method is needed to aid farmers with midseason N decisions in dry-seeded, delayed flood rice. A fast, inexpensive technique called the "yardstick method" lookspromising.

[300] G. Rubio, M.J. Cabello, F.H. Gutiérrez Boem, E. Munaro. 2008. Prediction of Available Soil Phosphorus Increases after Fertilization in Mollisols. Better Crops with Plant Food. Vol 92(4). Page 10 - 12.
Reference ID: 23791
Note: #23791e > S Serial #20250e
Abstract: Accurate critical levels should be accompanied by predictive models on the amount of Prequired to increase P availability to a target value to obtain reliable P recommendations. Based on information on soil properties, we estimated the increase in soil available P after the addition of a unit of P, in pot studies, in an area of homogeneous though geographically distant loess-derived Mollisols of the Pampean Region in Argentina.

[301] D. Mukhopadhyay, K. Majumdar, R. Pati, M.K. Mandal. 2008. Response of Rainfed Rice to Soil Test-Based Nutrient Application in Terai Alluvial Soils. Better Crops with Plant Food. Vol 92(4). Page 13 - 14.
Reference ID: 23792
Note: #23792e > S Serial #20250e
Abstract: Results of 2 years of field experiments evaluating the impact of soil test-based fertilization on rainfed rice showed significant yield increase with balanced use of nutrients. Omission of nutrients caused yield loss between 33 to 50% (- P), 20 to

32% (- K), 15 to 28% (- S), 33to 35% (-Zn), and 31 to 34% (- B) in the Terai alluvial soils of West Bengal. Uptake of all the nutrients significantly correlated with yield, suggesting interdependence of nutrient uptake that influenced yield. Agronomic efficiency of P and K improved with 25% applicationof the nutrients over the optimum treatments. Recovery efficiency followed the same trend for all the nutrients studied.

[302] R. Mikkelsen, T.K. Hartz. 2008. Nitrogen Sources for Organic Crop Production. Better Crops with Plant Food. Vol 92(4). Page 16 - 19.
Reference ID: 23793
Note: #23793e > S Serial #20250e
Abstract: Nitrogen is generally the most difficult nutrient to manage for organic crop production. Cover crops and composts can contribute substantial N for crops, but it is challenging to synchronize N release from these materials with the plant demand. Various commercial organic N fertilizers are available, but their costs may be prohibitive in many situations. Careful management of organic N sources is required to meet crop requirements, while avoiding undesirable N losses to the environment.

[303] K. Bronson. 2008. Nitrogen Use Efficiency of Cotton Varies with Irrigation System. Better Crops with Plant Food. Vol 92(4). Page 20 - 21.
Reference ID: 23794
Note: #23794e > S Serial #20250e
Abstract: Nitrogen use efficiency is generally accepted to be less than 50% for field crops. WestTexas is the largest contiguous cotton producing area in the world, with 4 million acres planted annually. Record high N fertilizer prices require better understanding of N use efficiency. Field research from 2000 to 2007 revealed that recovery efficiency of added N fertilizer ranged from a minimum of 12% in furrow irrigated fields to a maximum of 75% in subsurface irrigated, fertigated fields. Regardless of cotton variety or irrigation system, 40 lb of N in the cotton plant was required per bale (480 lb) of lint production.

[304] R.H. McKenzie, A. Middleton, E. Bremer, T. Jensen. 2008. Nitrogen Fertilization of Winter Wheat - Alternative Sources and Methods. Better Crops with Plant Food. Vol 92(4). Page 24 - 25.
Reference ID: 23795
Note: #23795e > S Serial #20250e
Abstract: Research results evaluating N sources and placement methods at planting in the early fall for winter wheat production show that controlled release urea (CRU) can be either seedrow or side-band placed while regular urea performs better when side-banded. These N fertilizer methods are considered as feasible replacements to the previously recommended practice of applying the majority of N as ammonium nitrate (AN) in early spring.

[305] H.S. Khurana, B. Singh, A. Dobermann, S.B. Phillips, A.S. Sidhu, Y. Singh, 2008. Site-Specific Nutrient Management Performance in a Rice-Wheat Cropping System. Better Crops with Plant Food. Vol 92(4). Page 26 - 28.
Reference ID: 23796
Note: #23796e > S Serial #20250e
Abstract: A site-specific approach to nutrient management was evaluated in 56 on-farm experiments with irrigated wheat and transplanted rice crops in Northwest India. The agronomic and economic performance of this approach was compared with current farmer fertilizer practices for 2 years.

[306] P. He, S. Li, J. Jin. 2008. Optimizing Yield and Benefit in Doublecropped Wheat-Maize Rotations. Better Crops with Plant Food. Vol 92(4). Page 29 - 31.
Reference ID: 23797
Note: #23797e > S Serial #20250e
Abstract: Balanced fertilization based on soil testing generated high crop yields, while mean net returns over common farm practice were significant regardless of the chosen price scenario for grain and fertilizer.

[307] I.P. Berhad. 2017. Nurturing Sustainablility - Annual Report. Sandakan, Sabah, Malaysia. I.P. Berhad. Page 1 - 20.
Reference ID: 23798
Note: S 35.4 #23798

[308] T.S. Murrell, T. Bruulsema. 2008. Principles of Allocating Funds across Nutrients. Better Crops with Plant Food. Vol 92(3). Page 3 - 5.
Reference ID: 23799
Note: #23799e > S Serial #20249e
Abstract: When funds are limited, farmers and advisers should be familiar with the basic principles of crop response. This article discusses general concepts that guide fertilizer investment decisions for one or two nutrients

[309] M. Stewart, S. Phillips, T. Kastens, D. Kastens. 2008. Balanced Fertility still pays in irrigated corn. Better Crops with Plant Food. Vol 92(3). Page 6 - 7.
Reference ID: 23800
Note: #23800e > S Serial #20249e
Abstract: Just a few years ago we were asking questions about the value and economics of fertilization (Stewart, 1999). Today we are asking similar questions, but for much different reasons. Not that long ago we were facing depressed crop prices that caused many to question whether cutting fertilizer rates was advisable. However, over the past year or two grain prices have reached dizzying heights, and fertilizer and other input prices have followed. Although circumstances are dramatically different, the questions being asked are similar,viz.: "Should I reduce fertilizer rates in response to the current price environment?" Thus, it is time again for a review of the role of nutrient inputs in crop production systems, particularly irrigated corn in this instance.

[310] J. Espinosa, J.P. García. 2008. High Fertilizer Prices: What can be done?. Better Crops with Plant Food. Vol 92(3). Page 8 - 9.
Reference ID: 23801
Note: #23801e > S Serial #20249e
Abstract: In tropical areas of the Andean countries, Central America, and Mexico, thousands of hectares are cultivated with corn and rice, but low average yields are common. Production of corn grain is utilized to satisfy dietary needs of the population, but there is also an increasing demand for corn grain to be used as animal feed. From the standpoint of human and animal feed, this crop is strategic for all the countries in the region. During the last few years, global market conditions and low yields made corn production unattractive because corn grain could be imported at cheaper price than the grain produced locally. Conditions were more or less similar for rice in many countries of the region.

[311] H. Wang, P. He, B. Wang, P. Zhao, H. Guo, 2008. Nutrient Management within a Wheat-Maize Rotation System. Better Crops with Plant Food. Vol 92(3). Page 12 - 13.
Reference ID: 23802
Note: #23802e > S Serial #20249e
Abstract: Shanxi Province's maize and wheat rotation contributes greatly to national food security. This study examined the implications of inadequate or imbalanced fertilization within the two cycles of this crop rotation.

[312] T.W. Bruulsema, T.S. Murrell. 2008. Corn Fertilizer Decisions in a high-priced market. Better Crops with Plant Food. Vol 92(3). Page 16 - 18.
Reference ID: 23803
Note: #23803e > S Serial #20249e
Abstract: When prices are high for both fertilizers and corn, producers will be rewarded for spendingmore time on fertilizer decisions, using the tools developed by science to determinethe right product, rate, timing, and placement.

[313] F. García. 2008. Soil Testing and Balanced Fertilization Perform Critical Roles in a High-Priced Market. Better Crops with Plant Food. Vol 92(3). Page 24 - 25.
Reference ID: 23804
Note: #23804e > S Serial #20249e
Abstract: High fertilizer prices have raised many questions from farmers and agronomists regarding fertilizer management. Best management practices (BMPs) for fertilizer use provide adequate responses for these questions. This article discusses the situation for field crops in the Pampas region of Argentina.

[314] S. Phillips, M. Stewart, C.S. Snyder. 2008. Optimizing cotton profitability with efficient nutrient use. Better Crops with Plant Food. Vol 92(3). Page 22 - 23.
Reference ID: 23805
Note: #23805e > S Serial #20249e
Abstract: High fuel prices, increased worldwide demand, and short supplies have driven fertilizer prices to record highs. Nonetheless, targeting high nutrient use efficiency by applying theright nutrient source in the right place at the right rate and right time allows growers to continue to strive for high cotton yields even in economically challenging times.

[315] T. Jensen. 2008. Food Production and Economics of fertilizer use - Tracking the returns in a grain crop. Better Crops with Plant Food. Vol 92(3). Page 26 - 27.
Reference ID: 23806
Note: #23806e > S Serial #20249e
Abstract: Most grain and oilseed producers are pleased to realize the recent increase in crop prices after many years of relatively low and at times depressed grain and oilseed prices. There is an overall feeling of optimism in crop production. However, the accompanying increases infertilizer prices have growers questioning whether or not the changes in crop and fertilizer prices relative to one another justify changes in fertilizer application rates.

[316] V.K. Singh, K.N. Tiwari, M.S. Gill, S.K. Sharma, B.S. Dwivedi, A.K. Shukla, P.P. Mishra. 2008. Economic Viability of Site-Specific Nutrient Management in rice-wheat cropping system. Better Crops with Plant Food. Vol 92(3). Page 28 - 30.
Reference ID: 23807
Note: #23807e > S Serial #20249e
Abstract: The most dominant rice-wheat system of India is showing signs of fatigue, mainly due to inadequate and unbalanced fertilization. The current productivity of 2,130 kg/ha of rice and 2,670 kg/ha of wheat can be doubled by growing hybrid rice and locally recommended high-yielding varieties of wheat and by increasing and balancing fertilizer application rates to correct multiple nutrient deficiencies which are being widely observed. The net return to the extra fertilizer used in SSNM of the rice-wheat system averaged US$732/ha across all nine locations, a return of US$6.1 per US$1 invested.

[317] S.K. Pattanayak, S.K. Mukhi, K. Majumdar. 2008. Potassium unlocks the potential for hybrid rice. Better Crops with Plant Food. Vol 92(2). Page 8 - 9.
Reference ID: 23808
Note: #23808e > S Serial #20248e
Abstract: Researchers adjusted the K application rate within a soil test-based fertilizer recommendation for hybrid rice. Adequate K input was responsible for a 6 t/ha grain yield response and lifted the potential for a two crop system yield to near 14 t/ha - a vast improvement over common farm practice, which struggles to achieve one-third of this level of productivity.

[318] W. Li, G. Cai, H. Dai, S. Tu. 2008. Effect of Long-Term Fertilization on Wheat-Corn-Sweet Potato Rotation in the Sichuan Basin. Better Crops with Plant Food. Vol 92(2). Page 10 - 11.
Reference ID: 23809
Note: #23809e > S Serial #20248e
Abstract: A multi-year study was used to develop a nutrient management scheme capable of improving yields within a prominent cropping system for the Sichuan Basin.

[319] T.W. Bruulsema, C. Witt, F. García, S. Li, N. Rao, F. Chen, S. Ivanova. 2008. A Global Framework for fertilizer BMPs. Better Crops with Plant Food. Vol 92(2). Page 13 - 15.
Reference ID: 23810
Note: #23810e > S Serial #20248e
Abstract: This paper describes a framework designed to facilitate development and adoption of best management practices (BMPs) for fertilizer use, and to advance the understanding of how these practices contribute to the goals of sustainable development. The framework guides the application of scientific principles to determine which BMPs can be adapted to local conditions at the practical level.

[320] R. Mohr, D. Tomasiewics. 2008. Phosphorus Management for Irrigated Potato Production in Manitoba. Better Crops with Plant Food. Vol 92(2). Page 23 - 25.
Reference ID: 23811
Note: #23811e > S Serial #20248e
Abstract: Results of a set of field experiments evaluating potato response to recommended rates of P fertilizer demonstrated yield benefits in 2 of 4 years, and consistent increases in post-harvest Olsen P levels. Findings suggest that petiole critical nutrient concentrations developed in other potato-growing areas may require

regional adaption for Manitoba.

[321] R. Mikkelsen. 2008. Managing Potassium for Organic Crop Production. Better Crops with Plant Food. Vol 92(2). Page 26 - 29.
Reference ID: 23812
Note: #23812e > S Serial #20248e
Abstract: An adequate K supply is essential for both organic and conventional crop production. Potassiumis involved in many plant physiological reactions, including osmoregulation, proteinsynthesis, enzyme activation, and photosynthate translocation. The K balance on many farms is negative, where more K is removed in harvested crops than is returned again to the soil. An overview of commonly used K fertilizers for organic production is provided.

[322] D. Horneck, C. Rosen. 2008. Measuring Nutrient Accumulation Rates of Potatoes - Tools for Better Management. Better Crops with Plant Food. Vol 92(1). Page 4 - 6.
Reference ID: 23813
Note: #23813e > S Serial #20247e
Abstract: Fertilizer can be managed more precisely when both the total nutrient demand and the daily rate of nutrient accumulation of the crop are known. The results of two studies are presented for high-yielding irrigated potatoes grown in Minnesota and in Oregon. Closely matching nutrient availability with crop demand is essential for producing profitable yields of high quality potatoes, while minimizing unwanted nutrient losses to the environment.

[323] Y. Duan, D. Tuo, P. Zhao, H. Li. 2008. Characterizing the response of rained rapeseed to fertilizer application. Better Crops with Plant Food. Vol 92(1). Page 8 - 9.
Reference ID: 23814
Note: #23814e > S Serial #20247e
Abstract: Field experiments on the response of rainfed rapeseed to N, P, and K fertilizer application showed significant yield increases due to their balanced use. Recovery efficiencies averaged31% for N, 12% for P, and 35% for K. Each 100 kg of rapeseed removed 5.5 kg N, 1.7 kg P2O5, and 4.5 kg K2O, respectively.

[324] W.E. Thomason, C.A. Griffey, S.B. Phillips. 2008. Nitrogen and Sulfur Fertilization for Improved Bread Wheat Quality in Humid Environments. Better Crops with Plant Food. Vol 92(1). Page 10 - 11.
Reference ID: 23815
Note: #23815e > S Serial #20247e
Abstract: Bread wheat cultivars with high grain protein provide a higher value market for growers.However, limited knowledge of fertility management strategies exists for these types of cultivars for producers in the Mid-Atlantic region. We evaluated three bread wheat cultivars over nine site years in Virginia and found that application of 30 to 40 lb N/A between Zadoks growth stage (GS) 45 and 54 likely will result in consistent increases in grain protein concentration. Availability of S and a desirable N:S ratio in tissue is critical when considering the positive interaction between N and S on grain protein quantity and quality.

[325] N. Nelson, R. Mikkelsen. 2008. Meeting the phosphorus requirement on organic farms. Better Crops with Plant Food. Vol 92(1). Page 12 - 14.
Reference ID: 23816
Note: #23816e > S Serial #20247e
Abstract: Phosphorus management can be difficult in organic production since approved sources are limited and the consequences of under- or over-fertilization can be significant. Since P is an essential element for plant growth involved in many critical plant metabolic functions, sustainable agricultural production depends on an adequate P supply.

[326] D.E. Edmonds, M.C. Daft, W.R. Raun, J.B. Solie, R.K. Taylor. 2008. Determining mid-season nitrogen rates with ramp calibration strip technology. Better Crops with Plant Food. Vol 92(1). Page 16 - 17.
Reference ID: 23817
Note: #23817e > S Serial #20247e
Abstract: Methodologies currently available for making mid-season fertilizer N recommendations in most crops are not consistent from one region to the next. The use of chlorophyll meters, economic optimums, optical sensor-based yield prediction models, preplant soil testing, and yield goals have all, to some extent, been limited regionally. The methodology discussed in this article is a simple approach for applying preplant N fertilizer in automated gradients used for determining mid-season N rates based on plant response.

[327] P. Bose, D. Sanyal, K. Majumdar. 2008. Balancing Sulfur and Magnesium Nutrition for Turmeric and Carrot grown on red lateritic soil. Better Crop with Plant Food. Vol 92(1). Page 23 - 24.
Reference ID: 23818
Note: #23818e > S Serial #20247e
Abstract: Increasing rates of S and Mg improved the yield and quality of turmeric and carrot in the depleted red lateritic soils of West Bengal. This trend reversed once the optimum rate of Sand Mg application was exceeded, probably due to antagonistic effect of Mg on K uptake.

[328] P.E. Fixen, R.W. Schneider, D.L. Wright, A.P. Mallarino, K.A. Nelson, S.A. Ebelhar, N.A. Slaton. 2008. Implications of Asian Soybean Rust in Nutrient Management - Research Update. Better Crops with Plant Food. Vol 92(1). Page 26 - 28.
Reference ID: 23819
Note: #23819e > S Serial #20247e
Abstract: The increasing threat of Asian soybean rust (ASR) in the U.S. has stimulated significant research on control of soybean diseases. By the end of the 2007 growing season, ASR was verified as far north as central Iowa, where it was detected in a few isolated fields with no impact on yield. In several regions, growers and their advisers debated as to whether the yield loss threat of ASR and other diseases justified the cost of fungicide application. An understanding of the impact of cultural practices on disease development is helpful in such situations. Studies over the last couple of years have demonstrated that nutrient management can at times influence soybean disease development. However, much is yet unknown as to specific effects and if fertilizer BMPs need to be altered when ASR is presentor a threat.

[329] M.J. Ahmad. 2013. The Implication of China Inspection and Quarantine rules on the import of edible palm oil. The Planter. Vol 89 (1044). Page 165 - 166.
Reference ID: 23820
Note: #23820e > S Serial #22263
Abstract: Without doubt, China is an important market outlet for Malaysian palm oil. According to Oil World, in 2011 China imported a total of 6.17 million tonnes of palm oil of which about two-third was from Malaysia. According to the Malaysian Palm Oil Board's (MPOB) statistics the amount of exports to China over the las few years has been impressive. Over the last decade, that country has been the largest importer of Malaysian palm oil growing at an average of 7.6 per cent annually since 2002. In 2002, China imported a total of 3.50 million tonnes of palm oil from Malaysia and this is about 20% from the total Malaysian palm oil exports of 17.57 million tonnes. More importantly, China is the single largest importer of refined, bleached and deodorised (RBD) palm olein in the world. Malaysia simply cannot afford to lose this lucrative market which we have built over these years.