

New Entries to IPNI Library as References

[1] E. Pushparajah. (2013). Threats to the Oil Palm Industry. *The Planter*. 89(1043) pp 93 - 93.

Reference ID: 23821

Note: #23821e > S Serial #22265

Abstract: The threats or challenges to the oil palm industry come from three major sources viz. external (for fear of competitiveness?), biological causes and local shortsightedness (or even greed for short-term quick gains).

[2] Y. Tong, H. Fan. (2007). Phosphorus Absorption and Accumulation in Apple. *Better Crops With Plant Food*. 91(1) pp 4 - 5.

Reference ID: 23822

Note: #23822e > S Serial #20243e

Abstract: Phosphorus concentration and accumulation in field-grown Fuji apple trees showed that fall accumulated P was used to meet demand during fruit expansion in late July. Fertilizer P should be applied in the fall and just prior to fruit expansion.

[3] T.R. Fox, H.L. Allen, T.J. Albaugh, R. Rubilar, C.A. Carlson. (2007). Forest Fertilization and Water Quality in the United States. *Better Crops With Plant Food*. 91(1) pp 7 - 9.

Reference ID: 23823

Note: #23823e > S Serial #20243e

Abstract: When proper best management practices (BMPs) are employed for forest fertilization, changes in streamwater chemistry are very slight and there have been no detectable effects on the composition or productivity of stream aquatic communities. Short-term increases in peak concentrations of NO_3^- , NH_4^+ , HPO_4^{2-} , and H_2PO_4^- in streamwater can occur after forest fertilization. Increases in average concentrations are much lower than the peak values. High concentrations of nutrients in streamwater tend to occur when fertilizers are directly applied to streams, with repeated fertilization, with use of NH_4NO_3 rather than urea as the N source, or with fertilization of "N-saturated" hardwood forests.

[4] B.R. Gupta, T.P. Tiwari, R. Tiwari, K.N. Tiwari. (2007). Rebalancing Nutrient Application in Late-Sown Potato. *Better Crops With Plant Food*. 91(1) pp 10 - 11.

Reference ID: 23824

Note: #23824e > S Serial #20243e

Abstract: Common practice for cropping systems in the Gangetic Plain places a heavy reliance on soil nutrient reserves. Nutrient balances for most crops indicate significant depletion, especially for K. Potato provides one such example of a system in need of revitalization.

[5] D.M. Lambert, J. Lowenberg-DeBoer, G.L. Malzer. (2007). Site-Specific Management of Nitrogen and Phosphorus in a Corn/Soybean Rotation. *Better Crops With Plant Food*. 91(1) pp 12 - 13.

Reference ID: 23825

Note: #23825e > S Serial #20243e

Abstract: Varying N and P together provided the greatest opportunities for yield and profit improvement, compared to a uniform nutrient management strategy in a Midwest study.

[6] D. Dunn, G. Stevens. (2007). Phosphorus Management in a Dry-Seeded, Delayed-Flood Rice Production System. Better Crops With Plant Food. 91(1) pp 20 - 21.

Reference ID: 23826

Note: #23826e > S Serial #20243e

Abstract: "Hidden hunger" for P may exist in a number of Midsouth rice fields. Soil test P has not proven to be a reliable indicator of the need for P fertilization in dry-seeded, delayed-flood rice production systems. Tissue testing for P at pre-flood can identify possible P deficiencies in rice.

[7] B.D. Brown. (2007). Maximizing Phosphorus Removal with winter cereal/corn doubled-crop Forage production. Better Crop With Plant Food. 91(1) pp 22 - 23.

Reference ID: 23827

Note: #23827e > S Serial #20243e

Abstract: Maximizing P removal from soil with intensive cropping can sometimes be advantageous for manure management. Double-cropping with winter forages and silage corn increased total forage production, increased P removal, and reduced soil P concentrations more than with corn alone.

[8] G.E. Lester, J.L. Jifon, W.M. Stewart. (2007). Foliar Potassium Improves Cantaloupe Marketable and Nutritional Quality. Better Crops With Plant Food. 91(1) pp 24 - 25.

Reference ID: 23828

Note: #23828e > S Serial #20243e

Abstract: Potassium is important in optimizing both crop yield and economic quality. Root activity and K uptake are generally reduced during the reproductive phase of crop development. This study has shown that supplementing sufficient soil K with additional foliar K applications during cantaloupe fruit development and maturation improves fruit marketable quality by increasing firmness and sugar content, and fruit human health quality by increasing ascorbic acid, beta-carotene, and K levels.

[9] D. Soldat, A.M. Petrovic, R. Rao, T.W. Bruulsema. (2007). Testing Turfgrass Soils. Better Crops With Plant Food. 91(1) pp 26 - 27.

Reference ID: 23829

Note: #23829e > S Serial #20243e

Abstract: Best management practices for turfgrass fertilizer ensure a vigorous soil cover while minimizing risk of nutrient and sediment losses that harm water quality. While soil testing of home lawns is seldom practiced, a recent survey indicates that two-thirds of turfgrass soils in New York may be limited by P, K, or pH. About 20% require P fertilizer.

[10] M. Stewart. 2017. Plant Nutrition Today - Fall 2017 No.1: Grain Sorghum Fertilization. (3). pp 1 - 2.

Reference ID: 23830

Note: #23830e

Abstract: The Great Plains produces the majority of grain sorghum in the U.S. Kansas is generally the number one state for production followed by Texas. In 2016 Kansas produced 56% of U.S. grain sorghum, and Kansas and Texas combined produced

80%. Most is used in animal feed, but some goes to ethanol and a small but increasing amount goes into the consumer food market. Grain sorghum is considered an exceptionally efficient crop. With a large fibrous root system, it is fit for production across a wide range of environments. Most in the Great Plains is grown under dryland conditions. It is often considered a rather low input crop when it comes to fertilizer, especially compared to corn. Therefore, and all too often, lesser attention is given grain sorghum nutrition. The fact remains though that it is a major crop in the Great Plains, and complete and balanced fertility is necessary to realize yield potential.

[11] S. Zingore. 2017. Plant Nutrition Today - Fall 2017 No.3: Importance Of Secondary and Micronutrients in Sub-Saharan Africa. (3). pp 1 - 2.

Reference ID: 23831

Note: #23831e

Abstract: Crop nutrition research in sub-Saharan Africa (SSA) has largely focused on macronutrients, leading to fertilizer recommendations for field crops that generally cover only nitrogen, phosphorus, and potassium. However, evidence suggests significant effects of secondary and micronutrients (SMN) on crop productivity in SSA. This is expected, given that majority of soils are inherently infertile with low nutrient reserves (due to a bedrock consisting of mostly granites and gneiss). The common practice of continuous cultivation with minimal nutrient applications as fertilizer or organic resources also intensify the depletion of soil SMN.

[12] R. Mikkelsen. 2017. Plant Nutrition Today - Fall 2017 No.2: Avoid Growing Pains for Your Crop. (3). pp 1 - 2.

Reference ID: 23832

Note: #23832e

Abstract: Preteen children sometimes wake up at night complaining of sore legs and an uncomfortable ache that is slow to go away. These growing pains will be different for every child, ranging from no pain to a lot of discomfort. While you won't hear crops complain during their growth spurts, they still need the right supply of nutrients to match their demands for growth and development. Most grain or fruiting crops have distinct peak periods of nutrient uptake that correspond to their growth pattern. Crops such as grasses and forage have a more consistent pattern of nutrient uptake through the growing season.

[13] Q. Zhu, S. Tu, Z. Chen, Z. Wang. (2007). Potassium Balance on Sloping Lands as Affected by Farming Systems. Better Crops With Plant Food. 91(2) pp 6 - 7.

Reference ID: 23833

Note: #23833e > S Serial #20244e

Abstract: This study assessed the available soil K balance under five different farming systems in southern Guizhou from 2000 to 2004. The negative impacts of traditional down slope cultivation were quantified relative to improved systems. Cash crop hedgerows can be highly effective in controlling soil erosion and preserving soil K.

[14] H.J. Mascagni, D. Boquet, B. Bell. (2017). Influence of Starter Fertilizer on Corn Yield and Plant Development on Mississippi River Alluvial Soils. Better Crops With Plant Food. 91(2) pp 8 - 9.

Reference ID: 23834

Note: #23834e > S Serial #20244e

Abstract: Application of in-furrow N-P fertilizers on sandy loam and silt loam soils in Louisiana increased corn yield in 5 of 15 trials. Starter fertilizer consistently increased

early-season plant growth, advanced silking date, and decreased harvest grain moisture.

[15] P. Sen, K. Majumdar, G. Sulewski. (2007). Spatial Variability in Available Nutrient Status in an Intensively Cultivated Village. *Better Crops With Plant Food*. 91(2) pp 10 - 11.

Reference ID: 23835

Note: #23835e > S Serial #20244e

Abstract: Available nutrient status showed wide variation across the study area which was associated with fertilization history and the cropping sequence adopted by individual farmers.

[16] P.E. Fixen. (2007). Potential Biofuels Influence on Nutrient Use and Removal in the U.S. *Better Crops With Plant Food*. 91(2) pp 12 - 14.

Reference ID: 23836

Note: #23836e > S Serial #20244e

Abstract: Nutrient use and management will likely be impacted significantly within the next 5 years through grain-based ethanol production. Beyond that time period, another round of major impact may occur as cellulosic biofuel production is commercialized. A major challenge to the fertilizer industry and those conducting research on nutrient management will be the development of nutrient management approaches focused on ecological crop intensification where productivity is increased to meet growing demand and the environment is improved. Failing to take this challenge seriously will likely lead one day to headlines in the media about the "misadventure" of biofuels and the loss of a tremendous opportunity for agriculture.

[17] S.A. Brandt. (2007). Phosphorus Fertilizer Boosts Yields in Fallow Wheat Production. *Better Crops With Plant Food*. 91(2) pp 15 - 15.

Reference ID: 23837

Note: #23837e > S Serial #20244e

Abstract: Phosphorus fertilizer addition over a 72-year period increased crop yields from 19 to 29% depending on the environmental conditions in each year.

[18] S. Huang, J. Jin, P. He, L. Yang, Y. Bai. (2007). Spatial Variability and Site-Specific Nutrient Management in a Vegetable Production Area. *Better Crops With Plant Food*. 91(2) pp 16 - 18.

Reference ID: 23838

Note: #23838e > S Serial #20244e

Abstract: Soil nutrients showed similar spatial distribution patterns across the study site in Hebei Province and were correlated with vegetable production history and fertilizer application rates. Vegetable crop type and history of fertilizer use were important factors in the development of a regional nutrient management program.

[19] B. Deen, J. Lauzon, T. Bruulsema. (2007). Corn Response to Intensive Crop Nutrition. *Better Crops With Plant Food*. 91(2) pp 20 - 21.

Reference ID: 23839

Note: #23839e > S Serial #20244e

Abstract: A 5-year study of a corn/soybean rotation in Ontario, Canada, shows that increasing inputs above recommended levels significantly increases yield and changes physiology. Transforming physiological changes into economically and environmentally sustainable yield increases will require further research.

[20] Ministry of Agriculture and Co-operatives. (1968). The Malaysian Agricultural Journal Vol.46, No.4. pp 1 - 499.

Reference ID: 23840

Note: S 8.1.1 #23840

Abstract: This journal is designed to present the results of researches, investigations and extension work performed by the various Divisions under the Ministry of Agriculture and Co-operatives, Malaysia, and it draws attention to the results of work of similar nature in other countries. Articles of scientific value resulting from research done outside Malaysia considered to be beneficial to Malaysian Agriculture will be entertained. The journal is published in January and July of each year.

[21] ISEAS, Asean Studies Centre. (2017). ASEAN Focus Vol 16 Issue 4/2017 Jul/Aug 2017. pp 1 - 25.

Reference ID: 23841

Note: S 26.1 #23841 (note: E-copy available is cover only for reference)

[22] M. Thuzar. (2017). Young and Restless in ASEAN: ASEAN's Demographic Trends. ASEAN Focus. 16(4) pp 13 - 15.

Reference ID: 23842

Note: #23842e > S serial #23841 (Article includes Asean's Demographic Trend)

Abstract: Moe Thuzar outlines the socio-economic challenges facing youths across the region

[23] J.W.-J. Yeung. (2017). Demographic Trends in Southeast Asia. ASEAN Focus. 16(4) pp 10 - 12.

Reference ID: 23843

Note: #23843e > S serial #23841

Abstract: Wei-Jun Jean Yeung provides an overview of ASEAN's population in telling numbers.

[24] L.C. Vriesmann, R.F. Teofilo, C.L.D. Petkowicz. (2012). Extraction and characterization of pectin from cacao pod husks (*Theobroma cacao* L.) with citric acid. LWT - Food Science and Technology. 49 pp 108 - 116.

Reference ID: 23844

Note: #23844e

Abstract: Variables that influence the citric-acid extraction of pectins from cacao pod husk were examined. A screening study tested the main parameters influencing pectin yield and uronic acid content by a factorial fractional 3^{3-1} design. Further, response surface methodology was applied using a central composite design to examine the effect of a greater region of variable values on pectin yield and uronic acid content. The yield was optimized by increasing the temperature and time. None of the variables had a significant effect on the uronic acid content, and there was lack of fit of the model to the uronic acid content. From the fitted model, extraction conditions with aqueous citric acid at pH 3.0 for 95 min at 95 °C provided a predicted yield of approximately 9.0 g/100 g dry cacao pod husks. The obtained experimental value for the yield was 10.1 +/- 0.3 g/100 g dry cacao pod husks, with the pectins containing 65.1 +/- 0.8 g uronic acid/100 g fraction, DE 40.3% and DA 15.9%. At 5 g/100 g aqueous solution, the fraction behaved as a concentrated solution and presented a non-Newtonian shear thinning behavior, well described by Cross Model. Additionally, the fraction formed gels at acidic pH and high sucrose content.

[25] A.R. Kumar, N. Kumar. (2007). Sulfate of Potash Foliar Spray Effects on Yield, Quality and Post-Harvest Life of Banana. Better Crops With Plant Food. 91(2) pp 22 - 25.

Reference ID: 23845

Note: #23845e > S serial #20244e

Abstract: The benefits of applying foliar K included increased fruit bunch yields and enhanced physical and market quality traits. Foliar spray in the form of SOP could be economically integrated into banana nutrition strategies.

[26] R.E. Karamonos, J.T. Harapiak, G.A. Kruger. (2007). Long-Term Phosphorus Fertilization Effects on Crop Yields and Soil Phosphorus. Better Crops With Plant Food. 91(2) pp 25 - 27.

Reference ID: 23846

Note: #23846e > S serial #20244e

Abstract: Discontinuing P fertilization after 20 years of annual application of 27 lb P₂O₅/A resulted in significant reduction in barley grain yield, with losses of 21% where P had been applied in the seedrow, 12% where P had been banded with N, and 15% where P had been applied one-third in the seed row and two-thirds banded. While minor benefits to residual soil P were measured from annual application, continued fertilizer P use was required to achieve optimum yields.

[27] N.A. Slaton, R. DeLong, B.R. Golden, M. Mozaffari. (2007). Full-Season, Irrigated Soybean Response to Potassium Fertilization in Arkansas. Better Crops With Plant Food. 91(2) pp 28 - 30.

Reference ID: 23847

Note: #23847e > S serial #20244e

Abstract: Soil test correlation and fertilizer rate calibration studies in Arkansas showed that soil test K is an excellent means of characterizing the need for K fertilization of soybeans on silt loam soils in eastern Arkansas. Significant yield increases with K fertilization occurred at 10 of 19 harvested sites, with soil test K ranging from 46 to 167 ppm. Tissue analyses results indicate 1.8% K may be needed in soybean leaves to achieve 90% of maximum yield.

[28] J. Jin, X. Liu, P. He. (2007). Does Potassium or Chloride Play a Dominant Role in Suppression of Corn Stalk Rot? Better Crops With Plant Food. 91(3) pp 3 - 5.

Reference ID: 23848

Note: #23848e > S serial #20245e

Abstract: Corn stalk rot is a serious and widespread disease in the main corn production areas of China. Previous research has indicated that KCl plays a significant role in suppression of corn stalk rot. This study compared the effects of K and Cl nutrition, and showed that K played an important role in the suppression of the disease.

[29] R.I. Mikkelsen. (2007). Biuret in Urea Fertilizers. Better Crops With Plant Food. 91(3) pp 6 - 7.

Reference ID: 23849

Note: #23849e > S serial #20245e

Abstract: In the past, urea manufacturing processes sometimes resulted in fertilizers with elevated biuret concentrations. In high concentrations, biuret interferes with internal N metabolism and hinders protein formation in plants. Biuret is degraded by many soil microorganisms, but the rate is relatively slow. Modern urea manufacturing

typically results in biuret concentrations less than 1.0 to 1.3%, which does not pose problems for most uses. There are some plant species that appear to be especially sensitive to biuret, so “low-biuret” urea should be used for foliar application in these situations.

[30] A. Nolla, I. Anghinoni. (2007). Liming Indexes for Soybean in Established No-Till Systems. *Better Crops With Plant Food*. 91(3) pp 8 - 10.

Reference ID: 23850

Note: #23850e > S serial #20245e

Abstract: Researchers re-examine the definition of lime requirements for well established no-tillage systems or for those directly established from previously uncultivated natural grasslands.

[31] F. Garcia, M. Boxler, J. Minteguiaga, R. Pozzi, L. Firpo, G.D. Marin, A. Berardo. (2007). Direct and Residual Effects of Balanced Fertilization in Field Crops of the Pampas. *Better Crops With Plant Food*. 91(3) pp 11 - 13.

Reference ID: 23851

Note: #23851e > S serial #20245e

Abstract: A long-term fertilization study in the central pampas of Argentina shows significant yield responses to NPS fertilization in corn, wheat, and full season and double-cropped soybean. Differences between the NPS and check treatments have increased over the past six years. Residual effects of balanced NPS fertilization include improved soil P and organic matter levels.

[32] A. Dobermann, D.T. Walters, M.A.A. Adviento-Borbe. (2007). Global Warming Potential of High-Yielding Continuous Corn and Corn-Soybean Systems. *Better Crops With Plant Food*. 91(3) pp 16 - 20.

Reference ID: 23852

Note: #23852e > S serial #20245e

Abstract: The global warming potential (GWP) of recommended (average) and intensive (high-yield) levels of management for both continuous corn (CC) and corn soybean (CS) rotations was determined in this Nebraska study. Measurements included net changes in soil organic carbon (SOC), intrinsic C costs associated with crop production, and net emissions of greenhouse gases (GHG) such as N₂O and CH₄. Results indicate that intensification of cropping does not necessarily increase GHG emissions and GWP of agricultural systems provided that crops are grown with best management practices (BMPs) and near yield potential levels. In fact, high-yielding CC systems have significant potential for GHG mitigation, particularly when corn is converted to ethanol.

[33] T.S. Murrell. (2007). The Delta Yield Concept: An Update. *Better Crops With Plant Food*. 91(3) pp 20 - 21.

Reference ID: 23853

Note: #23853e > S serial #20245e

Abstract: Delta yield is the measure of crop response. Relating it to fertilizer need may improve fertilizer recommendations in the future by incorporating both yield level and crop responsiveness.

[34] B.R. Gupta, R. Tiwari, T.P. Tiwari, K.N. Tiwari. (2007). Maximizing Yield, Nutrient Use Efficiency, and Profit in Summer Black Gram. Better Crops With Plant Food. 91(3) pp 22 - 23.

Reference ID: 23854

Note: #23854e > S serial #20245e

Abstract: Nutrient demand analysis helps to identify the most profitable response to fertilizer applied to a largely neglected but particularly important pulse crop production system in northcentral India.

[35] F. Chen, J. Lu, D. Liu. (2007). Investigation of Soil Fertility in Citrus Orchards of Southern China. Better Crops With Plant Food. 91(3) pp 24 - 25.

Reference ID: 23855

Note: #23855e > S serial #20245e

Abstract: A recent comprehensive analysis defines complete soil fertility profiles for mandarin and navel orange orchards based on orchard productivity.

[36] E. Malavolta, M.F. Moraes. (2007). Nickel - from Toxic to Essential Nutrient. Better Crops With Plant Food. 91(3) pp 26 - 27.

Reference ID: 23856

Note: #23856e > S serial #20245e

Abstract: Nickel was long considered as either a non-essential or toxic element. However, more is being learned about the role of Ni as a nutrient and its activity in plants. It has shown benefits in pecan production.

[37] T. Bruulsema. (2007). A Research Agenda for Managing Crop Nitrogen for Weather. Better Crops With Plant Food. 91(4) pp 3 - 6.

Reference ID: 23857

Note: #23857e > S serial #20246e (Note: This journal was reproduced in proceedings book 'Managing Crop Nitrogen for Weather' under #18711 > #18698)

Abstract: Weather strongly influences N: its supply in and loss from the soil, and its crop-growth driven demand. A recent soil science symposium identified opportunities for research leading to improvement of current crop N recommendation systems. The proceedings, titled Managing Crop Nitrogen for Weather (IPNI, 2007), describes several approaches to application of process-based models that hold promise for achieving this goal.

[38] B.R. Cleveland, M. Cervantes. (2007). Trends Indicated by Nutrient Analysis of Cotton Tissue. Better Crops With Plant Food. 91(4) pp 6 - 7.

Reference ID: 23858

Note: #23858e > S serial #20246e

Abstract: Cotton leaf tissue analyses at the North Carolina Department of Agriculture and Consumer Services (NCDA&CS) laboratory reflect improved cotton N management the last few years. Yet, there are many fields where farmers and crop advisers have opportunities to significantly improve K nutrition.

[39] W. Xie, J. Zhou, X. Chen, H. Wang. (2007). Effect of Long-Term Fertilization on the Persistence of Cypermethrin in Soil. Better Crops With Plant Food. 91(4) pp 10 - 11.

Reference ID: 23859

Note: #23859e > S serial #20246e

Abstract: Soils from a long-term fertilization field experiment were used to assess the

impact of fertilizer treatment on pesticide (cypermethrin) dissipation in soil. Five fertilization treatments included: organic manure (OM), NPK fertilizer, PK fertilizer, NK fertilizer, and no fertilizer (control). The half-life for cypermethrin under NK application was significantly longer compared to the other treatments.

[40] B. Gordon. (2007). Manganese Nutrition of Glyphosate-Resistant and Conventional Soybeans. *Better Crops With Plant Food*. 91(4) pp 12 - 14.

Reference ID: 23860

Note: #23860e > S serial #20246e

Abstract: This study was conducted to determine if glyphosate-resistant (GR) soybeans respond differently to Mn fertilizer than conventional soybean varieties in an irrigated high-yield environment, and if so to develop fertilization strategies that will prevent or correct deficiencies. Yield of the GR variety was less than the conventional variety without Mn fertilizer. However, Mn application (banded at planting) to the GR variety closed the yield gap. The conventional soybean variety was not responsive to Mn fertilization. Conversely, yield was reduced at the highest rate of Mn. A second phase of the study showed that a combination of Mn applied as starter and foliar application provided maximum yield response.

[41] T.L. Roberts. (2007). Right Product, Right Rate, Right Time, and Right Place...the Foundation of BMPs for Fertilizer. *Better Crops With Plant Food*. 91(4) pp 14 - 15.

Reference ID: 23861

Note: #23861e > S serial #20246e (Note: This journal was reproduced from #15729 'Fertilizer Best Management Practices' proceedings held in Brussels 2007)

Abstract: This article was originally presented as a paper at the International Fertilizer Industry Association (IFA) Workshop on Fertilizer Best Management Practices, March 7-9, 2007, in Brussels, Belgium. It is reprinted here with permission...see reference below.

Fertilizer Best Management Practices. General Principles, Strategy for their Adoption and Voluntary Initiatives vs Regulations. Proceedings of the IFA International Workshop on Fertilizer Best Management Practices, 7-9 March 2007, Brussels, Belgium. Published by International Fertilizer Industry Association, Paris, France, 2007.

[42] C.S. Snyder, T.W. Bruulsema, T.L. Jensen. (2007). Best Management Practices to Minimize Greenhouse Gas Emissions Associated with Fertilizer Use. *Better Crops With Plant Food*. 91(4) pp 16 - 18.

Reference ID: 23862

Note: #23862e > S serial #20246e

Abstract: This article is an Executive Summary of a literature review in preparation by the International Plant Nutrition Institute (IPNI).

Climate change and global warming continue to be topics of considerable scientific debate and public concern. Increasingly, agriculture is viewed as a large contributor to GHG emissions which drive GWP, and fertilizer N use has been identified as a major factor. This paper presents a review of the scientific literature on the impacts of fertilizer use and management on GHG emissions, and represents a brief overview of the current science.

[43] F. Selles, C.A. Campbell, R.P. Zentner, D.E. James, P. Basnyat. (2007). Withholding Phosphorus after Long-Term Additions – Soil and Crop Responses. *Better Crops With Plant Food*. 91(4) pp 19 - 21.

Reference ID: 23863

Note: #23863e > S serial #20246e

Abstract: Soil P change was directly related to the balance between input as fertilizer and output as grain removal in semiarid southwestern Saskatchewan. A change of 6 lb P/A in P balance produced a change of 1 lb P/A in Olsen P. In the absence of P fertilizer additions, Olsen P remained at approximately 15 lb P/A in the surface 6 in. of soil. While fallow-grown wheat responded positively to P applied annually, withholding fertilizer P after soil P buildup did not affect yields. Both N and P were required to optimize the yield of stubble-grown wheat.

[44] G. Stevens, D. Dunn, S. Hefner. (2007). Building Soil Phosphorus and Potassium in a Low-Testing Fescue Field. *Better Crops With Plant Food*. 91(4) pp 22 - 23.

Reference ID: 23864

Note: #23864e > S serial #20246e

Abstract: The objective of this long-term study is to evaluate the effects of P and K build-up periods on tall fescue hay yield and to validate the build-up equations used in the University of Missouri (MU) fertilizer recommendation program.

[45] G. Lafond, S. Brandt, W. May, C. Holzapfel. (2007). Post-Seeding Nitrogen on Spring Wheat and Canola — A Balancing Act. *Better Crops With Plant Food*. 91(4) pp 24 - 25.

Reference ID: 23865

Note: #23865e > S serial #20246e

Abstract: The positive results obtained from this study would support the recommendation that N fertilizer can be managed more precisely with post-emergent N applications provided that 50% is applied as starter N.

[46] V.K. Dua, P.M. Govindakrishnan, S.S. Lal, S.M. Paul Khurana. (2007). Partial Factor Productivity of Nitrogen in Potato. *Better Crops With Plant Food*. 91(4) pp 26 - 27.

Reference ID: 23866

Note: #23866e > S Serial #20246e

Abstract: Partial factor productivity (PFP) and agronomic efficiency (AE) of N in potato were estimated from published literature in India over the years 1968 to 2000. Results revealed that PFP had an increasing trend during this time, which can be attributed to balanced and efficient use of fertilizers in potato in contrast to other crops and the N-efficient cultivars developed over the years.

[47] S. Lakshmi, A. George, G. Raghavan Pillai, T. Nagendran Rao. (2007). Nutrient Needs of Coconut-Based Fodder Production Systems in Homesteads of Kerala. *Better Crops With Plant Food*. 91(4) pp 28 - 29.

Reference ID: 23867

Note: #23867e > S serial #20246e

Abstract: An experiment was conducted in Kerala to assess the nutrient requirements of a unique coconut-based fodder production system using soil testing and crop uptake as criteria. Fodder fertilization also produced a synergistic, yield improving effect within the main coconut crop indicating that appropriate fertilization of the forage intercrop benefited the entire cropping system.

[48] Y.C. Poon, J.A. Varley, J.B. Ward. (1970). The Foliar Composition of the Oil Palm in West Malaysia II. The Relationships between Nutrient Contents. *Experimental Agriculture*. 6 pp 191 - 196.

Reference ID: 23868

Note: H 8.1.1.1 #23868e

Abstract: Total and partial correlations are presented between foliar nutrients in a uniformity trial. The method of principal component analysis is applied to the correlation matrices, comparing values for three fronds (3, 9 and 17). The results are also compared with values obtained elsewhere, and the use of principal components in relating yield to foliar composition is illustrated.

[49] Y.C. Poon, J.A. Varley, J.B. Ward. (1970). Foliar Composition of the Oil Palm in West Malaysia I. Variation in Leaf Nutrient Levels in Relation to Sampling Intensity. *Experimental Agriculture*. 6 pp 113 - 121.

Reference ID: 23869

Note: H 8.1.1.1 #23869e

Abstract: A uniformity trial was carried out at Banting, Selangor in West Malaysia to estimate optimal sampling rates for determining foliar nutrient contents of oil palms. The results suggest that the unit for sampling in this area is greater than 10 acres but less than 50. A comparison of the results with those obtained in Nigeria shows a large measure of agreement. Factors concerned in choosing a sampling rate are discussed. With the information available a rate of 2-3 per cent appears adequate.

[50] J.L. Pires, J.C.M. Cascardo, S.V. Lambert, A. Figueira. (1998). Increasing Cocoa Butter Yield through Genetic Improvement of *Theobroma Cacao* L.: Seed fat content variability, inheritance, and association with seed yield. *Euphytica*. 103 pp 115 - 121.

Reference ID: 23870

Note: H 8.1.4 #23870e

Abstract: Cocoa butter is the major commercial product from seeds of *Theobroma cacao* (cacao). However, most cacao breeding programs have only considered as selection criteria total seed yield per plant and disease resistance. Progress in cocoa butter yield might be possible if variability for fat content exists and its associations with the other production components are established. The average fat content in dry unfermented seeds for 490 accessions of the Centro de Pesquisa do Cacau germplasm collection in Ilhéus, Bahia, Brazil was 53.2%, ranging from 45.4% in CC 57 to 60.3% in NA 312. Fat content averaged over series indicated that genotypes originally collected in the Upper Amazonian region had higher fat levels, while the Trinitario-Criollo and Bahian genotypes tended to have lower fat content. When considering total fat yield plant⁻¹ an opposite trend arose with the series with low fat content having the highest total fat yield. The correlation between fat content and fat yield plant⁻¹ was not significant, while there was a significant negative correlation between dry seed yield plant⁻¹ and fat content. Despite the significant negative association between fat content and dry seed yield plant⁻¹, the correlation coefficient was rather low, and genotypes could be identified with both high fat content and dry seed yield. A significant pollen effect on fat content was observed based on a complete diallel crossing scheme between three genotypes with high and three with low levels. The average fat content values in progenies were similar to the average of the parents, and the segregation range transgressed the distribution of the parents.

[51] MOSTA. (2016). Malaysian Oil Science and Technology MOST Vol 25 No 2 (2016). 25 pp 35 - 121.

Reference ID: 23871

Note: S serial #23871

[52] J. Fry. (2016). Palm Oil in the Commodity Price Cycle. MOST. Malaysia. pp 37 - 41.

Reference ID: 23872

Note: #23872 > S serial #23871

Abstract: Introduction: Making Sense of Today's Market

I start by showing where prices stand vs long run trends. Then I turn to the El Nino. Is this one special? Is CPO output responding this time in line with past experience? How much will world palm oil production fall this year? How much is it likely to rebound during next year? Why didnt the prices go higher? The price band is part of the answer as a large spread between vegetable oil and crude oil prices hit biofuel demand. Indonesia's biodiesel mandate played an important role in this. The availability of other oils, including the sales from China's State Reserve, has been other big factor. I end with a discussion of the outlook for oil prices.

[53] J. Feyertag. (2016). Biodiesel's Role in Palm Oil Expansion. Malaysian Oil Science and Technology MOST. Malaysia. pp 83 - 89.

Reference ID: 23873

Note: #23873 > S serial #23871

Abstract: Introduction

I shall be talking about Mandates, Moratoriums and Anti-Dumping. Mandates are by far most important in their effects on vegetable oils, particularly for palm oil. Biofuel policy and mandates lead to the battle for acres. Then there will be environmental pressure and moratoriums and the resulting policies will determine what is going to happen in the future. There is much debate on many global issues but what we are now focused on is the growing population on one side and the limited land for food supply at the other end.

[54] T.J. Butler, J.P. Muir, T. Provin, W.M. Stewart. (2006). Phosphorus Fertilization of Annual Ryegrass. Better Crops With Plant Food. 90(3) pp 6 - 9.

Reference ID: 23874

Note: #23874e > S serial #20241e

Abstract: Annual ryegrass is an important forage crop in the southern U.S. It has good yield potential and excellent nutritive value. This central Texas study has demonstrated the importance of both nitrogen (N) and phosphorus (P) fertilization in ryegrass production. The optimal rate of P fertilization was either 40 or 60 lb/A, and optimal N rate was 200 or 300 lb/A, both depending on seasonal rainfall distribution. Interestingly, there was relative agreement between removal of P in forage and optimal P fertilizer rate. These results demonstrate, and further confirm, the importance of balancing nutrient inputs in forage production to optimize yield, quality, and grower profit.

[55] J. Heard, C. Cavers, G. Adrian. (2006). Up in Smoke— Nutrient Loss with Straw Burning. Better Crops With Plant Food. 90(3) pp 10 - 11.

Reference ID: 23875

Note: #23875e > S serial #20241e

Abstract: Burning spring wheat, oat, and flax straw resulted in 98 to 100% loss of

nitrogen (N), 70 to 90% loss of sulfur (S), and 20 to 40% loss of phosphorus (P) and potassium (K).

[56] T.R. Fox, H.L. Allen, T.J. Albaugh, R. Rubilat, C.A. Carlson. (2006). Forest Fertilization in Southern Pine Plantations. *Better Crops With Plant Food*. 90(3) pp 12 - 15.

Reference ID: 23876

Note: #23876e > S serial #20241e

Abstract: Forest fertilization is a widespread silvicultural practice in the southeastern U.S. About 1.2 million acres of pine plantations were fertilized with phosphorus (P) or nitrogen (N) plus P in 2004. The average growth response of loblolly pine plantations following midrotation fertilization with N+P is approximately 50 ft³/A/yr for 8 years. Internal rates of return in excess of 10% can be obtained after midrotation fertilization under current market conditions.

[57] P.A.Jr. Moore, D.R. Edwards. (2006). Long-Term Effects of Treating Poultry Litter with Alum on Phosphorus Availability in Soils. *Better Crops With Plant Food*. 90(3) pp 16 - 20.

Reference ID: 23877

Note: #23877e > S Serial #20241e

Abstract: Repeated use of poultry litter as a nutrient source can lead to nutrient imbalances, especially a build-up in extractable phosphorus (P). Addition of aluminum sulfate (alum) to poultry litter has been advocated as a possible means to minimize runoff loss of P from litter when applied to fields. Results from small plot studies showed that P in soils receiving aluminum sulfate-treated (alum-treated) litter was less soluble than P from normal poultry litter, and less P leaching occurred. Larger-scale paired-watershed studies showed significantly less P runoff from fields receiving alum-treated litter compared with normal litter.

[58] P. Bose, D. Sanyal, K. Majumdar. (2006). Balancing Potassium, Sulfur, and Magnesium for Tomato and Chili Grown on Red Lateritic Soil. *Better Crops With Plant Food*. 90(3) pp 22 - 24.

Reference ID: 23878

Note: #23878e > S serial #20241e

Abstract: Potassium (K) improved yield and yield attributes in tomato and chili, as well as post-harvest quality...particularly at higher K rates. In both crops, use of potassium magnesium sulfate ($K_2SO_4 \cdot 2MgSO_4$) in conjunction with potassium chloride (KCl) proved superior to using KCl alone.

[59] H. Wang, J. Jin, B. Wang. (2006). Improvement of Soil Nutrient Management via Information Technology. *Better Crops With Plant Food*. 90(3) pp 30 - 32.

Reference ID: 23879

Note: #23879e > S serial #20241e

Abstract: Site-specific nutrient management (SSNM) can increase incomes in small, family field plot-scale systems through the identification of soil variability and implementation of rational nutrient application.

[60] D.P. Biradar, Y.R. Aladakatti, T.N. Rao, K.N. Tiwari. (2006). Site-Specific Nutrient Management for Maximization of Crop Yields in Northern Karnataka. Better Crops With Plant Food. 90(3) pp 33 - 35.

Reference ID: 23880

Note: #23880e > S serial 20241e

Abstract: On-farm rice, wheat, and chickpea demonstrations conducted across the region show substantial increases in yields and economic returns compared to recommended and common fertilization practices... which lead to stagnant and reduced food production.

[61] S. Tu, Y. Chen, Q. Zhu, Y. Guo, Z. Zhu, L. Xie. (2006). Integrating Cash Crop Hedgerows and Balanced Fertilization to Control Soil and Water Losses from Sloping Farmlands. Better Crops With Plant Food. 90 pp 36 - 40.

Reference ID: 23881

Note: #23881e > S serial 20241e

Abstract: Based on several years of research and demonstrations, adopting cash crop hedgerows and balanced fertilizer technology to combat soil erosion has proven very practical and applicable. It not only reduces soil erosion from sloping farmlands, but also increases crop yield and farmers' income. This integrated new technology has realized the goal of combining social, ecological, and economic benefits, and can thus safeguard sustainable agriculture on sloping lands.

[62] R.A. Schierer, J.G. Davis, J.R. Zimbrunnen. (2006). Predicting Phosphorus Runoff from Calcareous Soils. Better Crops With Plant Food. 90(4) pp 3 - 5.

Reference ID: 23882

Note: #23882e > S serial #20242e

Abstract: Soil calcium carbonate (CaCO_3) has a major impact on soil-phosphorus (P) interactions and can significantly influence levels of plant-available and soluble P in soils. This experiment investigated the effect of manure applications on soil test P (STP) and runoff of P from three soils with CaCO_3 contents ranging from 1 to 9%. The relationship between P added from manure and STP differed among soils, with the highest CaCO_3 soil showing the most resistance to changes in STP. Also, for any given STP level, surface runoff was reduced as soil CaCO_3 level increased. This work shows that soils with high levels of CaCO_3 are well suited as sinks for excess P in manure. Thus, soil CaCO_3 level should be considered in the P index in states with calcareous soils.

[63] C. Welsh, M. Tenuta, D. Flaten, C. Grant, M. Entz. (2006). Organic Crop Management and Soil Phosphorus. Better Crops With Plant Food. 90(4) pp 6 - 7.

Reference ID: 23883

Note: #23883e > S serial #20242e

Abstract: Long-term organic production systems show a deficiency of plant-available phosphorus (P), but not total P. High crop removal of P with alfalfa had the greatest impact on soil P.

[64] T. Zhang, C. Tan, T. Bruulsema. (2006). Fertigation Boosts Optimum Nitrogen for Tomatoes and Peppers. Better Crops With Plant Food. 90(4) pp 8 - 10.

Reference ID: 23884

Note: #23884e > S serial #20242e

Abstract: Fertilizing vegetable crops requires a delicate balance between yield, quality, and environmental impact. Fertigation increases response to nitrogen (N) and

provides greater opportunity to control rates to optimum levels.

[65] P.C. Scharf, S.M. Brouder, R.G. Hoelt. (2006). Chlorophyll Meter Readings Can Predict Corn Nitrogen Need and Yield Response. Better Crops With Plant Food. 90(4) pp 10 - 10.

Reference ID: 23885

Note: #23885e > S serial #20242e (Note: source Agronomical Journals Vol 98 Pg 655-665)

Abstract: Earlier research indicated that chlorophyll meters (CM) can indicate nitrogen (N) stress in corn, but did not address whether the amount needed can be predicted. Based on 66 N rate experiments over a 4-year period in seven northcentral states, CM are highly significant predictors of economically optimum N rate (EONR). Predictions were stronger when based on relative readings, on readings made later in the growing season, and where N fertilizer had not been previously applied. Soil nitrate (NO_3^-) or soil N indices were much weaker predictors of EONR.

[66] C.J. Lovatt, R.L. Mikkelsen. (2006). Phosphite Fertilizers: What Are They? Can You Use Them? What Can They Do? Better Crops With Plant Food. 90(4) pp 11 - 13.

Reference ID: 23886

Note: #23886e > S serial #20242e

Abstract: Interest is growing in phosphite as part of a total production program. Phosphite contains one less oxygen (O) than phosphate, making its chemistry and behavior quite different. Phosphite is more soluble than phosphate, making leaf and root uptake more efficient, thus high concentrations can be toxic for plants. Phosphite also has unique effects on plant metabolism. Phosphite supplied through the soil or foliage is slowly converted to phosphate. Soil and foliar applications are made at relatively low rates to prevent nutrition problems. For some plant species, phosphite may offer some unique benefits not seen with phosphate applications.

[67] G.E. Lester, J.L. Jifon, D.J. Makus. (2006). Supplemental Foliar Potassium Applications with or without a Surfactant Can Enhance Netted Muskmelon Quality. Better Crops With Plant Food. 90(4) pp 14 - 14.

Reference ID: 23887

Note: #23887e > S serial #20242e (Note: source Horticulturae Science Vol 41 No 3 Pg 741-744)

Abstract: USDA-Agricultural Research Service (ARS) and Texas A&M University researchers at Weslaco, Texas, found that supplementing soil potassium (K) with foliar K applications during muskmelon fruit development and maturation improved fruit quality by increasing firmness, sugar content, ascorbic acid, and beta-carotene levels. This glasshouse study compared two K sources: potassium metalosate (KM), which is a glycine- complexed organic form, and potassium chloride (KCl).

[68] D.L. Terry. (2006). Fertilizer Tonnage Reporting in the U.S.— Basis and Current Need. Better Crops With Plant Food. 90(4) pp 15 - 17.

Reference ID: 23888

Note: #23888e > S serial #20242e

Abstract: National fertilizer use statistics are collected and published with cooperation between the Association of American Plant Food Control Officials (AAPFCO) and The Fertilizer Institute (TFI). Although the Commercial Fertilizers report includes some data challenges and limitations, it has tremendous value to the industry and others

interested in nutrient use.

[69] M. Alfaro, F. Salazar, N. Teuber. (2006). Potassium Surface Runoff and Leaching Losses in a Beef Cattle Grazing System on Volcanic Soil. *Better Crops With Plant Food*. 90(4) pp 20 - 22.

Reference ID: 23889

Note: #23889e > S serial #20242e

Abstract: This article presents results of a study on potassium (K) losses through runoff and leaching in permanent pastures under beef production on volcanic soil in southern Chile. Losses due to runoff and leaching were low (4 kg K/ha/yr, on average), with 94% of the losses due to leaching. Increases in the stocking rate did not increase K losses.

[70] F. Su, L. Fu, H. Chen, L. Hong. (2006). Balancing Nutrient Use for Flue-Cured Tobacco. *Better Crops With Plant Food*. 90(4) pp 23 - 25.

Reference ID: 23890

Note: #23890e > S serial #20242e

Abstract: Field trials determined the optimal fertilizer rates for flue-cured tobacco production in Qujing, Yunnan Province. The study identified strategies for enhanced crop yield, quality, and profitability, as well as improved fertilizer use efficiencies.

[71] K.N. Tiwari, B.R. Gupta, R.K. Pathak, H.L. Sharma, T.P. Tiwari. (2006). The Impact of Soil Test-Based Fertilization on Tomato. *Better Crops With Plant Food*. 90(4) pp 26 - 28.

Reference ID: 23891

Note: #23891e > S serial #20242e

Abstract: Current fertilizer use in tomato production in the central plain of Uttar Pradesh is generally confined to nitrogen (N) and phosphorus (P). This situation will not sustain tomato as an important cash crop system for northern India. A research and extension project has begun to effect positive change within the region.

[72] F. Chen, J. Lu. (2006). Identifying Gaps in Mulberry Fertilization in Hubei Province. *Better Crops With Plant Food*. 90(4) pp 29 - 31.

Reference ID: 23892

Note: #23892e > S serial #20242e

Abstract: A recent survey of the province's mulberry gardens identified a wide range of common practices that are significant barriers to sustained productivity.

[73] B.M. Yapo, V. Besson, B.B. Koubala, K.L. Koffi. (2013). Adding Value to Cacao Pod Husks as a Potential Antioxidant-Dietary Fiber Source. *American Journal of Food and Nutrition*. 1(3) pp 38 - 46.

Reference ID: 23893

Note: #23893e

Abstract: Côte d'Ivoire (Ivory Coast) is the world's largest cocoa producer with about 1.2-1.6 million tons per year. This co-generates approximately ten times of fresh cacao pod husks, which are hitherto left unutilized to decompose in plantations. This study aims at evaluating the cacao pod husks potential for antioxidant-dietary fiber compounds. Cacao pod husk product was used for the extraction of dietary fiber and phenolic compounds. The results showed that the cacao pod husk product contained ~ 60.0% of total dietary fiber, of which non-starchy polysaccharides accounted for > 70.0%, and a total phenolic content of ~69.0 mg Gallic acid equivalent/g, thereby

indicating that it was an antioxidant dietary fiber-rich product. It also exhibited interesting antioxidant properties, as judged by 2,2-Diphenyl-1-picrylhydrazyl (85.0% inhibition percentage and EC50 = 25.0 g/g), 2,2'-Azinobis-(3-ethylbenzthiazoline-6-sulphonic acid) diammonium salt (52.0 μ mol Trolox equivalent/g), and Ferric reducing antioxidant power (130.0 μ mol Trolox equivalent/g) assays. The total antioxidant capacity of the cacao pod husk product was significantly higher ($P < 0.05$) than the total antioxidant capacity of fermented-and-roasted cocoa hull and kernel products. The total antioxidant capacity seemed to result from synergistic interactions among various compounds endowed with antioxidant capacity, including soluble phenolics, condensed tannins, and possibly pectic substances. Cacao pod husks therefore appeared to be a valuable source of antioxidant dietary fiber-rich food materials which may be used to significantly reduce the risk of development of miscellaneous free radical-induced diseases.

[74] S.C. Koay, S. Husseinsyah, H. Osman. (2013). Utilization of cocoa pod husk as filler in polypropylene biocomposites: Effect of maleated polypropylene. *Journal of Thermoplastic Composite Materials*. 28(11) pp 1507 - 1521.

Reference ID: 23894

Note: #23894e

Abstract: The aim of the research was to utilize cocoa pod husk (CPH) in polypropylene (PP) biocomposites. Maleated polypropylene (MAPP) was used as coupling agent to improve the properties of PP/CPH biocomposites. The addition of MAPP had increased the stabilization torque of PP/CPH biocomposites. The tensile strength and modulus of PP/CPH with MAPP were higher compared to PP/CPH biocomposites without MAPP, except the elongation at break decreased. The crystallinity and thermal stability of PP/CPH biocomposites with MAPP increased. These improvements were due to the enhanced interfacial bonding between CPH and PP matrix, which were proved by SEM analysis.

[75] V.T. Nguyen, N.H. Nguyen. (2017). Proximate Composition, Extraction, and Purification of Theobromine from Cacao Pod Husk (*Theobroma Cacao* L.). *Technologies*. 5(14) pp 1 - 10.

Reference ID: 23895

Note: #23895e

Abstract: The aims of this study were to determine the proximate composition of cacao pod husk as well as the optimal conditions for extraction and purification of theobromine from cacao pod husk. The results indicated that cacao pod husk had high contents of moisture and carbohydrate (87.06% and 11.03% by fresh weight, respectively), but low contents of crude protein, crude lipid, and ash (0.31%, 0.12%, and 1.48% by fresh weight, respectively). The optimal conditions for extraction of theobromine from cacao pod husk were of 70% ethanol, with an extraction time of 90 min, and 1 as the number of extractions. A concentration of 10% by volume of 10% lead acetate solution was the best selection for purification of the crude extracts containing theobromine from cacao pod husk. Under these optimal conditions, theobromine content obtained from cacao pod husk was 6.79 mg/100 g dry weight. The finding from this study is a valuable contribution for obtaining theobromine from an abundant, inexpensive, renewable, and sustainable source for potential application in the nutraceutical, medical, and pharmaceutical industries.

[76] L.S. Woittiez, M. Slingerland, E. Jacobs, C. Meppelink, K. Zondag, P. Rietberg. (2017). Policy Recommendations: Training Smallholder Oil Palm Farmers in Good Agricultural Practices. The Sustainable Trade Initiative (IDH) Wageningen University.

Reference ID: 23896

Note: #23896e

Abstract: The implementation of Good Agricultural Practice (GAP) is a key component of RSPO certification. The uptake of GAP can improve smallholder yields and provide a financial incentive for certification. Currently, farmer practices are mostly not in line with GAP, and training is required to improve practices. But training large numbers of smallholders in an effective way is challenging.

In our research project, supported by IDH, we carried out a survey among more than 310 farmers in five research areas where trainings had been provided. Based on the survey data and our own experience in the field, we provide a number of policy recommendations on several topics:

- 1.The suitability of different GAP for smallholder oil palm farmers
- 2.Constraints to adopting GAP, and options to overcome these constraints
- 3.Options to improve the smallholder training approach

[77] C. Fidelis, B.K. Rajashekhar Rao. (2017). Enriched cocoa pod composts and their fertilizing effects on hybrid cocoa seedlings. International Journal of Recycling of Organic Waste in Agriculture. 6 pp 99 - 106.

Reference ID: 23897

Note: #23897e

Abstract:

Purpose Composting has the potential to recycle wastes as a means of conserving natural resources. The study was aimed at examining feasibility of producing nutrient-enriched composts from pest infested cocoa pods with chemical amendments and using manure composts as a fertilizing material in cocoa seedling nursery.

Methods Cocoa pod waste was composted in static vessels, aerobically, with chemical enrichments (triple super phosphate charged at 0.4% P or urea charged at 0.8% N or poultry manure charged at 22%) along with a control at the Cocoa and Coconut Institute, Papua New Guinea. The reaction (pH) of the composting mixtures (pH) and macronutrients dynamics was monitored at periodic intervals. Effect of soil incorporation of cocoa pod manure composts at 10 g kg⁻¹ was assessed on the growth and foliar concentration of macro-nutrients in hybrid cocoa seedlings.

Results In the finished manure composts, dry matter loss ranged from 30.6 to 63.3%; greatest in composting mixtures charged with super phosphate and poultry manure. Besides, super phosphate enriched mixture lost small fraction of initial N (6.6%) compared to un-enriched cocoa pod waste (30.2%). Composting mixtures with greater pH values during composting process showed higher losses of N. Super phosphate charged manure compost outperformed the control, in terms of C/N ratio and concentration of macro-nutrients (P, K, Ca, Mg and S). Quality parameters for all the manure composts conformed to the Canadian Compost Guidelines indicating satisfactory standards. Waste cocoa pods enriched with superphosphate did not show any deleterious effects on cocoa seedlings' growth, rather, improved plant height, dry matter production and foliar N concentration.

Conclusion Waste cocoa pods, co-composted with triple super phosphate and poultry manure, produced composts of desirable quality and can be effectively used to fertilize the cocoa seedlings.

[78] A. Pauwels. 2016. Review of the Quality Potential of Cocoa in Southern Vietnam. Faculty of Bioscience Engineering, Belgium. Master of Bioscience Engineering: Food Science and nutrition. pp 1 - 91. Ghent Univeristy.

Reference ID: 23898

Note: #23898e

Abstract: Since a few years, Vietnam's cocoa sector has been static or in decline. To understand this trend and gain insight into possible solutions, this research aimed to provide an overview of the quality potential of cocoa in southern Vietnam. First, an analysis of the current state of the cocoa value chain in Vietnam was made, including suggestions towards increasing farmer income, consolidating cocoa acreage, and raising cocoa quality.

Secondly, quality characteristics of currently unapproved cocoa clones were assessed and the challenge of cocoa acidity in Vietnam was addressed. Two alternative drying methods were tested to reduce the acidity. An expert panel and consumer panel further performed a sensorial analysis to evaluate the efficacy of the drying methods. Vertical integration appeared to be the most viable option to stabilise cocoa production and improve the cocoa quality. At farm level, farmers should focus on intercropping, pruning and timely fertilization. Quality characteristics of clones vary widely between regions, which demonstrates the need for an overview of each clone based on yield, disease resistance and flavour potential. In terms of acidity reduction, standard drying procedures can be maintained as alternative drying methods did not reduce the final acidity in chocolate.

Finally, the alternative drying had no influence on other flavour notes, and the consumer panel did not rate them differently for likeability.

[79] O.A. Fagbenro. (1988). Results of Preliminary Studies on the Utilization of Cocoa-pod Husks in Fish Production in South-west Nigeria. Biological Wastes. 25 pp 233 - 237.

Reference ID: 23899

Note: #23899e

Abstract: Fish feed is one of the most costly factors when culturing fish; therefore the establishment of economically viable fish-culture ventures requires the incorporation of agricultural wastes or by-products as feed ingredients or direct feed (Shang, 1981). Raw cocoa (*Theobroma cacao* L.) fruits consist of a husk containing the bean, which after fermentation and drying, constitutes the cocoa of commerce, a major item of export trade from Nigeria and Ghana (West Africa) to Europe and America for the manufacture of chocolate, cocoa beverages and cocoa butter. The cocoa-pod husk contains a high proportion of potassium and constitutes 52-75% of the pod wet weight (Oyenuga, 1968; Opeke, 1982; Oladokun, 1986) and at present it is an undesirable waste product yet to be economically exploited in cocoa fruit production.

Cocoa-pod husk is known to contain no appreciable amount of theobromine, an alkaloid (Oyenuga, 1968; Opeke, 1984) and biochemical studies have shown that it contains sizeable amounts of useful organic nutrients (Oguntuga, 1975). It has been successfully substituted for maize (*Zea mays* L.) grain in livestock feed rations (Adeyanju et al., 1975). With the rapid advancement in animal (including fish) husbandry in Nigeria, and the consequent increasing demand for feeding stuffs, the utilization of cocopod husk is receiving attention in cocoa-producing areas of Nigeria where over 1.5 million tonnes are wasted annually (Opeke, 1984).

Accordingly, a preliminary assessment was made of cocoa-pod husk as a direct feed for the production of the common carp, *Cyprinus carpio* L. (Pisces, Cyprinidae) in small ponds. *C. carpio* was selected for cultivation due to its capability of efficiently

converting low-quality, inexpensive materials into high-quality proteins (Bard et al., 1976).

[80] B. Liese, S. Isvilanonda, K. Nguyen Tri, L. Nguyen Ngoc, P. Pananurak, R. Pech, T.M. Shwe, K. Sombounkhanh, T. Mollmann, Y. Zimmer. (2014). Economics of Southeast Asian Rice Production. pp 1 - 69.

Reference ID: 23900

Note: #23900e

Abstract: The purpose of this report is to present and analyze the results from the first round of data collection in the “Southeast Asian agri benchmark Rice project”. The initial phase of this initiative was funded and supported by the Food and Agriculture Organization. National agri benchmark partner research institutions in the participating countries established typical farms in major rice producing regions of Cambodia, Laos PDR, Myanmar, Thailand and Vietnam.

The report contains basically three main parts: In chapter 2 the frame work conditions for producing rice in individual countries are presented as well as the key characteristics of the typical farms which have been established. Chapter 3 is devoted to a cross-country comparison of key economic parameter while in chapter 4 main conclusions are drawn.

Substantial differences occurred with regard to rice farm gate prices. This is driven mainly by three factors. First, the price of rice is very much dependent on the variety that is grown. Second, the technical rice quality has a major impact on the price. Differences in the technical quality are caused by moisture content of rice at harvest, related infections with fungi time of harvest and harvest - and threshing techniques. Finally, the location of the typical farm relative to markets has of course an impact on farm gate prices.

The typical farm data show significant differences within rice production systems. While Thailand and Vietnam produce more intensively with high yields and high input levels – in particular as far as the use of fertilizers and seeds is concerned - farms in Cambodia and Myanmar grow rice more extensively while Laos seems to be in an intermediate level. Most farms are performing well from an economical point of view. With regard to the competition on international rice markets the following conclusion can be drawn: total cost per ton is the lowest in Myanmar and Laos, followed by Vietnam. The Thai farms are the most expensive one on a per ton basis. Whether or not this advantage in cost of production implies a competitive edge on international rice markets or not mainly depends on the quality issues mentioned above. This is because this finding coincides with low farm gate prices for those farms which are low in cost of production. To the degree the low farm gate prices reflect quality issues (be it because of taste or technical quality) the low cost of production is not an immediate advantage. In the course of the research for this project anecdotal information was received that the quality issues can be that bad that the produce cannot be sold on international markets at all. Vice versa, the high cost of production for the Thai farms are less important since – at least up until now – farm gate prices are by far the highest in this comparison.

[81] The Royal Society. (2009). Reaping the benefits: Science and the sustainable intensification of global agriculture. pp 1 - 86.

Reference ID: 23901

Note: #23901e

Abstract:

Food security is one of this century’s key global challenges. By 2050 the world will

require increased crop production in order to feed its predicted 9 billion people. This must be done in the face of changing consumption patterns, the impacts of climate change and the growing scarcity of water and land. Crop production methods will also have to sustain the environment, preserve natural resources and support livelihoods of farmers and rural populations around the world. There is a pressing need for the 'sustainable intensification' of global agriculture in which yields are increased without adverse environmental impact and without the cultivation of more land. Addressing the need to secure a food supply for the whole world requires an urgent international effort with a clear sense of long-term challenges and possibilities. Biological science, especially publicly funded science, must play a vital role in the sustainable intensification of food crop production. The UK has a responsibility and the capacity to take a leading role in providing a range of scientific solutions to mitigate potential food shortages. This will require significant funding of cross-disciplinary science for food security.

[82] G. Cruz, M. Pirila, M. Huuhtanen, L. Carrion, E. Alvarenga, R.L. Keiski. (2012). Production of Activated Carbon from Cocoa (*Theobroma cacao*) Pod Husk. Civil & Environmental Engineering. 2(2) pp 1 - 6.

Reference ID: 23902

Note: #23902e

Abstract: Activated carbons were obtained from cocoa pod husk using two different initial particle sizes (ranges 0.25 – 0.50mm and 0.50 – 1.00mm), three chemical activation agents (K_2CO_3 , KOH and $ZnCl_2$) and carbonization under nitrogen atmosphere during two hours at three different temperatures (500°C, 650°C and 800°C). The prepared activated carbons were characterized using Brunauer–Emmett–Teller (BET) and Langmuir surface areas, pore volume, average pore size, bulk density, moisture, ash content, and yield. The five best activated carbons were selected for further experiments according to the chemical activation agent used, high BET surface area, high pore volume and low ash content. Additionally, content of impurities, carbon content and FE-SEM micrographs were determined for these five best activated carbons. As adsorption tests were also carried out with these samples. Results of the experiments show that cocoa pod husk is a material that can be used to produce activated carbon by chemical activation and $ZnCl_2$ showed to be the best chemical activation agent based on the highest BET surface area (780 m²/g in the best case) and pore volume (0.58 m³/g in the best case), the lowest ash content (6.14% in the best case), and the highest carbon content (86.1% in the best case), compared with others chemicals. Carbons activated by $ZnCl_2$ are capable to adsorb As(V), getting As(V) removal levels up to 80% in less than 1 hour in the experimental conditions applied (initial pH 6-7, activated carbon concentration 0.1 g/l and 0.5 g/l, initial As concentration 100 ppb).

[83] F. Rosner. (2016). Economic Assessment of Agricultural Production Systems under Potato Initiative Africa in Kenya and Nigeria. pp 1 - 44.

Reference ID: 23903

Note: #23903e

Abstract:

The following report outlines the results of the agri benchmark economic studies conducted within the Potato Initiative Africa (PIA) project, as well as explains the findings and conclusions that are relevant to the PIA project coordinators and potential follow-up projects. agri benchmark is a global, non-profit network of agricultural economists, advisors, producers and specialists in key sectors of agricultural and

horticultural value chains coordinated at and hosted by the Thünen Institute for Farm Economics in Braunschweig. In order to achieve the aforementioned aims, it is first necessary to explain how the data was collected and draw the framework of these activities. Second, the typical farm data is presented, followed by an economic analysis of potato production on the various typical farms. Finally, the main findings and conclusions are outlined.

[84] O. Adi-Dako, K. Ofori-Kwakye, S.F. Manso, M.E. Boakye-Gyasi, C. Sasu, M. Pobe. (2016). Physicochemical and Antimicrobial Properties of Cocoa Pod Husk Pectin Intended as a Versatile Pharmaceutical Excipient and Nutraceutical. *Journal of Pharmaceutics*. 2016 pp 1 - 13.

Reference ID: 23904

Note: #23904e

Abstract: The physicochemical and antimicrobial properties of cocoa pod husk (CPH) pectin intended as a versatile pharmaceutical excipient and nutraceutical were studied. Properties investigated include pH, moisture content, ash values, swelling index, viscosity, degree of esterification (DE), flow properties, SEM, FTIR, NMR, and elemental content. Antimicrobial screening and determination of MICs against test microorganisms were undertaken using agar diffusion and broth dilution methods, respectively. CPH pectin had a DE of 26.8% and exhibited good physicochemical properties. Pectin had good microbiological quality and exhibited pseudoplastic, shear thinning behaviour, and high swelling capacity in aqueous media. The DE, FTIR, and NMR results were similar to those of previous studies and supported highly acetylated low methoxy pectin. CPH pectin was found to be a rich source of minerals and has potential as a nutraceutical. Pectin showed dose-dependent moderate activity against gram positive and gram negative microorganisms but weak activity against *Listeria* spp. and *A. niger*. The MICs of pectin ranged from 0.5 to 4.0mg/mL, with the highest activity against *E. coli* and *S. aureus* (MIC: 0.5–1.0mg/mL) and the lowest activity against *A. niger* (MIC: 2.0–4.0mg/mL). The study has demonstrated that CPH pectin possesses the requisite properties for use as a nutraceutical and functional pharmaceutical excipient.

[85] R. Saltini, R. Akkerman, S. Frosch. (2013). Optimizing chocolate production through traceability: A review of the influence of farming practices on cocoa bean quality. *Food Control*. 29 pp 167 - 187.

Reference ID: 23905

Note: #23905e

Abstract: Due to recent developments in traceability systems, it is now possible to exchange significant amounts of data through food supply chains. Farming practices applied by cocoa farmers at the beginning of the chocolate supply chain strongly influence several quality parameters of the finished chocolate. However, information regarding these practices does not normally reach the chocolate manufacturer. As a consequence, many specifications of the raw material cannot be taken into consideration in the operational decision making processes related to chocolate production. In recent years many studies have been investigating the influence of certain farming practices on cocoa beans and the subsequent chocolate quality parameters. However, no comprehensive analysis of the process variables in the chain and their effects on the quality can be found. In this paper we review and classify the available literature on the topic in terms of process variables throughout the chain, and their effects on quality and flavour aspects of cocoa beans and the eventual chocolate product. After analyzing the literature, we are able to identify potential

benefits of using data regarding the farming practices into the chocolate production process. These potential benefits especially concern product quality and production yield, giving directions for the future of chocolate production.

[86] H.H. Tao, C. Donough, M.P. Hoffmann, Y.L. Lim, S. Hendra, Rahmadsyah, G. Abdurrohimi, K. Indrasuara, A. Lubis, T. Dolong, T. Oberthür. (2017). Effects of best management practices on dry matter production and fruit production efficiency of oil palm. *European Journal of Agronomy*. 90 pp 209 - 215.

Reference ID: 23906

Note: #23906e

Abstract: Enhancing dry matter production with higher partitioning to fruit bunches is important for sustainable intensification of oil palm. A series of best management practices including site-specific nutrient management, canopy management, and harvesting has been developed for oil palm plantations. However, the effects of these practices on dry matter production and partitioning, and how the effects vary with climatic and soil conditions of plantation sites, remain largely unknown. We established a four-year field trial including 30 paired commercial blocks across Sumatra and Kalimantan, Indonesia. The paired treatments included site-specific best management practices, and standard estate practices as the control. The annual production of aboveground dry matter was $30.0 \pm 0.5 \text{ t ha}^{-1} \text{ yr}^{-1}$ (mean \pm se) under best management practices, higher than $28.8 \pm 0.5 \text{ t ha}^{-1} \text{ yr}^{-1}$ under standard estate practices. The bunch index, an indicator of the fruit production efficiency, increased by 12% under best management practices compared to standard estate practices. Partitioning of dry matter to the fronds decreased by 8% under best management practices, compared to standard estate practices. The positive effect of best management practices on the annual production of total aboveground dry matter was stronger in the plantation site with higher annual rainfall. These results are useful for optimizing management practices to improve sustainable intensification of oil palm.

[87] V.T. Nguyen. 2015. Mass Proportion, Proximate Composition and Effects of Solvents and Extraction Parameters on Pigment Yield from Cacao Pod Shell (*Theobroma cacao* L.). *Journal of Food Processing and Preservation*. 39. pp 1414 - 1420.

Reference ID: 23907

Note: #23907e

Abstract: The aims of this research were to determine mass proportion of cacao pod, proximate composition of cacao pod shell, and effects of solvents and extraction parameters on the pigments yield from cacao pod shell. The results indicated that cacao pod contains shell, husk and bean with pulp at 8.15, 70.15 and 21.70% by fresh weight, respectively. Cacao pod shell has low content of crude protein, crude lipid and ash at 1.26, 0.16 and 2.30% by fresh weight and 9.69, 1.23 and 17.69% by dry weight, respectively. A suitable solvent is suggested to apply for extraction of pigments from cacao pod shell to be 80% methanol. Extraction temperature, extraction time and ratio of solvent to material are also recommended for obtaining both high absorbance of extract and pigments yield from cacao pod shell to be at 60C, 80 min and 10:1 (v/w), respectively.

[88] Anonymous. (2017). InfoSawit Vol XI No 9 September 2017. 11 pp 1 - 56.

Reference ID: 23908

Note: #23908e

[89] I.E. Henson, T. Betitis, Y. Tomda, L.D.C. Chase. (2012). The Estimation of Frond Base Biomass (FBB) of Oil Palm. Journal of Oil Palm Research. 24 pp 1473 - 1479.

Reference ID: 23909

Note: #23909e

Abstract: Increasing attention is being focused on the greenhouse gas (GHG) balance of crop production given the need to minimise emissions associated with global warming and climate change. Such emissions can be countered by growing crops such as oil palm that have a high capacity to sequester carbon. The ability to accurately determine carbon sequestration by the crop thus becomes increasingly important. In the case of oil palm, methods of estimating crop biomass are well developed. However, there are still improvements to be made to ensure a complete assessment of carbon stock. This article examines the role carbon sequestration played by frond bases of oil palm that remain attached to the trunk after frond pruning, and which are frequently ignored when assessing standing palm biomass and carbon stock. Data on frond base biomass (FBB) are reviewed, methods for its assessment are discussed, and its importance for calculating carbon sequestration and net carbon balance of oil palm plantations are examined. Carbon sequestration in the plantation for four mills in Papua New Guinea, with a mean crop rotation time of 21 years in their contributing estates was increased by an average of 11% after including FBB in the calculation of standing carbon.

[90] IPNI. 2007. Research With Impact - Documenting the Need for Potassium in Uruguay. pp 1 - 1.

Reference ID: 23910

Note: #23910e

Abstract:

THE CHALLENGE: Agriculture in Uruguay initially developed in high potassium (K) soils, under conventional tillage and crop rotations that required no K fertilizer. The scenario changed during the last decades driven by increasing grain prices. The annual cropped area tripled between 2002 and 2014, with soybean now sown on 67% of the area. Cropping systems have intensified, shifting from crop-pasture rotations to continuous annual cropping under no-till cultivation.

The K balances in Uruguay (application minus removal) are negative due to the absence of K fertilization. As soybean production increases, the K balance becomes more negative. In addition, agriculture has expanded into marginal soils that are already low in K.

[91] IPNI. 2014. Research with Impact - Nutrient Expert: Making Better Fertilizer Use Decision. 528. pp 1 - 1.

Reference ID: 23911

Note: #23911e

Abstract:

THE CHALLENGE: The preferred method for making fertilizer recommendations is to analyze soils to determine if an adequate nutrient supply exists to support healthy crop growth. However, most farmers in India, even if they have access to soil test information, lack knowledge about managing nutrients within their highly nutrient demanding cereal systems. They often rely on best guesses or generalized official

fertilizer recommendations made by respective state government agencies.

Maize is a very important food crop in India. It is grown on nearly 9 million ha. Average maize productivity in India hovers around 2.5 t/ha, but with proper nutrition and management, maize yields can commonly exceed 5 to 8 t/ha. Unbalanced and inadequate fertilizer use continues to be a major constraint to high yielding maize crops. Current official state fertilizer recommendations generally provide less than optimal results, fail to account for the nutritional demands of new maize hybrids, and cannot be easily adjusted across individual farmer fields.

Farmers increasingly need science-based information on the role of balanced plant nutrition to optimize profitability and minimize environmental impact.

[92] O.S. Ibiremo, O.S.O. Akanbi. (2015). Comparative Assessment of Cocoa Pod Husk Biochar Fortified with NPK Fertilizer Formulations on Kola Seedling Nutrient Uptake and Soil Properties in Ibadan, Nigeria. *International Journal of Plant & Soil Science*. 6(5) pp 303 - 309.

Reference ID: 23912

Note: #23912e

Abstract: A greenhouse trial was carried out at Cocoa Research Institute of Nigeria, Ibadan in 2013 to evaluate the effect of cocoa pod husk (CPH) biochar fortified with NPK fertilizer formulations on kola seedling nutrient uptake and soil properties. The treatments consisted of a control, NPK (3 g) + Biochar (5 g), NPK (Liquid – 3 mls/L of water) + Biochar (5 g), Biochar (5 g), NPK (Solid-3 g), NPK (Liquid – 3 mls/L of water). The six treatments were replicated three times in a completely randomized design and data on nutrient uptake of kola seedlings and soil properties were taken for seven months. Results showed that all the fertilizers irrespective of rates of application and types of NPK formulations enhanced the nutrient uptake of kola seedlings relative to control.

The leaf and root nitrogen uptake of kola seedlings was significantly ($p < 0.05$) enhanced as a result of CPH biochar applied singly (T4) or in combination with NPK liquid fertilizer (T3) compared to when biochar was applied with NPK solid fertilizer. The leaf and stem P-uptake of Kola seedlings was not significantly influenced by CPH biochar and NPK fertilizer formulations. Conversely, the P uptake of root of kola seedlings was significantly ($p < 0.05$) improved as a result NPK (liquid) fertilizer compared to NPK (solid) applied alone. The pH of the soil was significantly ($p < 0.05$) affected due to application of CPH biochar in combination with liquid NPK (T3) and CPH biochar alone (T4) compared to the control and NPK solid (T5). The exchangeable K in the soil was significantly ($p < 0.05$) influenced as a result of CPH Biochar application and NPK fertilizer formulations. CPH biochar alone (T4) significantly ($p < 0.05$) improved the exchangeable potassium in the soil compared to the control. The positive influence of CPH biochar applied either alone or in combination with NPK fertilizers on nutrient uptake of kola seedlings and soil nutrients indicated that integrated use of organic and inorganic fertilizers holds the ace for crop production and soil fertility management in Nigeria. Kola farmers across the growing regions have the privilege of using biochar fortified with NPK fertilizer (liquid) for improved productivity.

[93] R. Verdooren, A.C. Soh, S. Mayes, J. Roberts. (2017). Field Experimentation (Chapter 12 of Oil Palm Breeding: Genetics and Genomics). Book. pp 327 - 350.

Reference ID: 23913

Note: #23913e

[94] O.A. Fagbenro. (1995). Evaluation of heat-processed cocoa pod husk meal as an energy feedstuff in production diets for the clariid catfish, *Claria isheriensis* (Sydenham). Aquaculture Nutrition. 1 pp 221 - 225.

Reference ID: 23914

Note: #23914e

Abstract: Isoproteic and isoenergetic diets containing 0%, 15%, 30% or 45% heat-processed cocoa pod husk meal (CPHM) were fed to *Clarias isheriensis* (16.8 +/- 2.4 g) for 180 days. Growth rates of catfish fed varying levels of CPHM were similar ($P > 0.05$). Differences in feed-gain ratio (FGR) or protein efficiency ratio (PER) between treatments were not significant ($P > 0.05$). Histology of the liver showed no pathological effects of incorporation of CPHM. In a second experiment, *C. isheriensis* (19.1 +/- 3.5 g) were fed isoenergetic diets containing 250, 300, 350 and 400 protein g kg⁻¹ (protein: energy ratios of 21, 25, 29 and 33 mg protein.kJ⁻¹ DE, respectively). Growth rate and FGR improved ($P < 0.05$) in proportion to the dietary protein level. PER decreased with increase in dietary protein. Carcass protein was lowest ($P < 0.05$) in catfish fed 250 g protein kg⁻¹, but did not differ among the other diets ($P > 0.05$). Body fat was highest in catfish fed 250 g protein kg⁻¹ and lowest in fish fed 350 g protein kg⁻¹. These results indicate that CPHM may be a suitable carbohydrate energy source for clariids at a P:E ratio of approximately 29 mg protein.kJ⁻¹ DE.

[95] Y. Zimmer. (2015). Cash Crop Report 2015: Key results of the 2014 agri benchmark farm comparison. Cash Crop Report. Germany. pp 1 - 37.

Reference ID: 23915

Note: #23915e

[96] O. Ekpa, A.A. Akpan, A.E. Udo. (1993). Industrially Important Parameters and Mineral Composition of Cocoa: A Comparative Study of Cocoa Pod Husks and Beans from Plantations in South-Eastern Nigeria. Journal of the Science of Food and Agriculture. 61 pp 47 - 50.

Reference ID: 23916

Note: #23916e

Abstract: The industrially significant parameters of cocoa butters from the F, Amazon, Amelonado, and Trinitario species of cocoa, cultivated in south-eastern Nigeria were studied. The cocoa samples were collected from three different vegetation belts in the region. Three locations were selected to represent each of the belts selected for the study. There were no substantial variations in saponification values, iodine values, acid and fatty acid values, either among species or among locations. The Ca, Na, K and P contents of the husks were substantially higher than those of the beans for all species and all locations. For each of these elements there appeared to be an effect of location, which is the subject of continuing investigation. The pod husk appears to be a good source of P and K which might be used to supplement other sources of these minerals as plant nutrients.

[97] S. Chan, W. Choo. (2013). Effect of extraction conditions on the yield and chemical properties of pectin from cocoa husks. Food Chemistry. 141 pp 3752 - 2758.

Reference ID: 23917

Note: #23917e

Abstract: Different extraction conditions were applied to investigate the effect of temperature, extraction time and substrate–extractant ratio on pectin extraction from cocoa husks. Pectin was extracted from cocoa husks using water, citric acid at pH 2.5 or 4.0, or hydrochloric acid at pH 2.5 or 4.0. Temperature, extraction time and

substrate–extractant ratio affected the yields, uronic acid contents, degrees of methylation (DM) and degrees of acetylation (DA) of the extracted pectins using the five extractants differently. The yields and uronic acid contents of the extracted pectins ranged from 3.38–7.62% to 31.19–65.20%, respectively. The DM and DA of the extracted pectins ranged from 7.17–57.86% to 1.01–3.48%, respectively. The highest yield of pectin (7.62%) was obtained using citric acid at pH 2.5 [1:25 (w/v)] at 95°C for 3.0 h. The highest uronic acid content (65.20%) in the pectin was obtained using water [1:25 (w/v)] at 95°C for 3.0 h.

[98] S.K. Adzimah, E.K. Asiam. (2010). Design of a Cocoa Pod Splitting Machine. *Research Journal of Applied Sciences, Engineering and Technology*. 2(7) pp 622 - 634.

Reference ID: 23918

Note: #23918e

Abstract: This study outlines the design of a very efficient, highly productive, cost-effective, ergonomic and environmentally friendly cocoa splitting machine that will be used by cocoa Farmers world - wide to increase and boost productivity and enhance the quality of coca products to the highest possible level devoid of any hazards, dangers or perils. This machine can be manufactured from locally available scraps and assembled and maintained at a relatively low cost. The knives which do the splitting are actuated by simple hydraulic mechanisms devoid any major stresses, forces or moments acting on them. These mechanisms are powered by simple low - powered lobe positive displacement or hydrostatic hydraulic pumps of power rating of 87.5 kW (65.625 Hp). The machine can be assembled and/or disassembled easily and quickly, and, therefore can be owned patronized by a group of cocoa farmers who can easily bear the low cost of maintenance of the already relative cheap machine.

[99] L.S. Ayeni, M.T. Adetunji, S.O. Ojeniyi, B.S. Ewulo, A.J. Adeyemo. (2009). Comparative and Cumulative Effect of Cocoa Pod Husk Ash and Poultry Manure on Soil and Maize Nutrient Contents and Yield. *American-Eurasian Journal of Sustainable Agriculture*. 2(1) pp 92 - 97.

Reference ID: 23919

Note: #23919e

Abstract: A field study was conducted on the separate and combined effect of two agrowastes namely:- Cocoa pod ash and poultry manure on soil fertility, nutrient content, growth and grain yield of maize on an Alfisol in Southwest Nigeria. Separate and combined effects of the materials were investigated at application rates of 0, 5 and 10t/ha given nine treatments. The effect of treatments on the first crop and residual effect on the second crop was studied. The test soil was low in organic matter (OM), N, P, K, Ca and Zn. Poultry manure had lower C:N ratio and higher N, P, Mg, Fe and Mn concentrations compared with cocoa pod ash which had higher K and Ca concentrations. Cocoa pod ash and poultry manure increased significantly soil OM, soil and maize macro and micro nutrients content on immediate and residual basis. The two materials have cumulative and complementary effect on soil nutrients and nutrient uptake. While poultry manure gave higher values of soil N, P, Ca and Mg and plant N, P, Zn, Fe, Cu and Mn than cocoa pod ash, ash gave higher values of soil Cu, Zn, and Mn and plant K and Ca. Plant N, P, K, Zn and Fe increased with level of poultry manure. The ash and poultry manure increased dry matter yield, height and grain yield of maize significantly, although poultry manure gave higher yield than ash at the same rate. The ash at 5 and 10t/ha increased grain yield by 20 and 31% respectively on immediate basis and by 34 and 74% on residual basis. Poultry manure at 5 and 10t/ha

increased yield by 39 and 43% respectively on immediate basis, and 73 and 93% on residual basis. Combination of 5t/ha cocoa pod ash with poultry manure at 10 and 5t/ha respectively gave highest cumulative yield of 6.51 and 5.58t/ha.

[100] A. Donkoh, C.C. Atuahene, B.N. Wilson, D. Adomako. (1991). Chemical composition of cocoa pod husk and its effect on growth and food efficiency in broiler chicks. *Animal Feed Science and Technology*. 35 pp 161 - 169.

Reference ID: 23920

Note: #23920e

Abstract: Cocoa pod husk (CPH) contained (8 kg⁻¹ dry matter) 76.6 crude protein, 43.1 ether extract, 325 crude fibre, 101 ash, 414 acid detergent fibre, 522 neutral detergent fibre and 108 hemicellulose. The metabolizable energy content was 4.72 MJ kg⁻¹. In comparison with maize, CPH contained less amino acids, except lysine. In a feeding trial, five diets containing 0, 50, 100, 150 and 200 g CPH kg⁻¹, with maize and fishmeal as major ingredients, were given ad libitum to 450 1-week-old broiler chicks (AF Bosbek strain) for 7 weeks. Birds had free access to water. Addition of graded levels of CPH broiler diets increased food intake by nearly 60% for the highest level of inclusion ($r=0.97$), reduced growth ($r=-0.85$) and hence reduced efficiency of food utilization compared with the control ($r=0.96$). Cocoa husk-fed birds consumed more water with a trend toward increased water consumption with each increment of CPH ($r=0.99$). High negative correlation ($r=-0.85$) was observed between the concentration of CPH in the diet and carcass dressing percentage. There were no deaths attributable to CPH in the diet.

[101] R. Li, Q. Xia, M. Tang, S. Zhao, W. Chen, X. Lei, X. Bai. (2012). Chemical composition of Chinese palm fruit and chemical properties of the oil extracts. *African Journal of Biotechnology*. 11(29) pp 9377 - 9382.

Reference ID: 23921

Note: #23921e

Abstract: The proximate composition, mineral concentration of fleshy mesocarp, palm meat (PM) and palm kernel (PK) of oil palm fruit (*Elaeis guineensis* S.L.Dura) produced in Hainan, China were investigated. The fatty acid composition, chemical properties and minor constituents of palm oil (PO) and palm kernel oil (PKO) were also studied. The crude fat of PM and PK were 68.09±3.57% and 49.36±2.61%, respectively. The PM and PK were found to be good sources of minerals. The acid value (AV) and free fatty acid (FFA) of PO extracted from fresh PM were much higher. If the fresh PM were heated at 100°C for 30 min, the AV and % FFA could be reduced to 4.62±0.04 mgKOH/g and 2.72±0.002%, respectively. The major fatty acid of PO was palmitic acid 39.93±1.66% and that of PKO was lauric acid 48.01±0.69%. Tocopherol isomer (α -, ($\beta+\gamma$)- and δ -) contents in PO were 68.8±1.84, 22.8±0.54 and 11.8±0.12 mg/kg, respectively. The β -carotene content in PO was 901.5±11.95 mg/kg. The content of sterols in PO and PKO were 880.0±5.23 and 858.0±4.37 mg/kg, respectively. PO and PKO exhibited good chemical properties and could be used as edible oils and for industrial applications. There are almost no data about Chinese palm fruit now and this study systematically researched on it, which can provide useful information for Chinese oil palm industry.

[102] Z. Daud, A.S. Mohd Kassim, A. Mohd Aripin, H. Awang, M.Z. Mohd Hatta. (2013). Chemical Composition and Morphological of Cocoa Pod Husks and Cassava Peels for Pulp and Paper Production. Australian Journal of Basic and Applied Sciences. 7(9) pp 406 - 411.

Reference ID: 23922

Note: #23922e

Abstract: Non-wood materials which are cassava peels and cocoa pod husks are potential fibre sources of pulp and paper production. These materials were used as pulp for paper production industries to promote the concept “from waste to wealth” and “recyclable material to available product” for reducing the environmental issues. In order to maximize the utilization of non-wood fibres for pulp and paper production, a more complete understanding of its chemistry is required. In this context, the main objective of this work is to improve and investigate the chemical composition of different material fibers used for pulp and papermaking. All the determinations of chemical compositions were in accordance with relevant Technical Association of the Pulp and Paper Industry (TAPPI) Test Method, Kurscher-Hoffner approach and Chlorite method. The holocellulose, cellulose, hemicellulose, lignin, hot water and 1% NaOH solubility, ash and moisture content are parameters that involved in chemical characteristics determination. The scanning electron microscopy (SEM) was used to visualize the surface morphological of materials. In order to propose the suitability of the studied plant as alternative fibre resources in pulp and paper making, the obtained result is compared to other literatures especially wood sources. Results indicated the amount of holocellulose contents in cassava peel (66%) is lower than wood plants. But, cocoa pod husks (74%) are higher than that Pine pinaster (70%) in holocellulose content. Besides that, lignin content (7.5 – 14.7%) of alternative fibre is lower than those wood species (19.9-26.22%). From SEM images, cassava peels contained abundance fibre rather than cocoa pod husks. Cassava peels have impurities in white colour on surface fibre. Besides that, cocoa pod husks have a rough surface to protect their fibre. In conclusion, chemical properties and morphological characteristics of cassava peels and cocoa pod husks indicated that they a promising to be used as an alternative fibre sources for pulp and paper making.

[103] S. Shakila, P.S. Reddy. (2014). Certain Observations on Nutritive Value of Palm Kernel Meal in Comparison to Deoiled Rice Bran. International Journal of Science, Environment and Technology. 3(3) pp 1071 - 1075.

Reference ID: 23923

Note: #23923e

Abstract: Proximate composition, mineral content, metabolizable energy and amino acid contents of palm kernel meal (PKM) were determined and compared with that of de-oiled rice bran (DORB). PKM had numerically higher mean content of protein, crude fibre, nitrogen free extract, calcium, iron, manganese and copper among minerals. Most of the amino acids are numerically higher in PKM than in DORB.

[104] Y. Zimmer. (2008). Cash Crop Report 2008. Cash Crop. pp 1 - 70.

Reference ID: 23924

Note: #23924e

[105] agri benchmark. (2014). Beef and Sheep Season 2014 - a summary of main findings. pp 1 - 14.

Reference ID: 23925

Note: #23925e

[106] C. Deblitz. (2009). Beef Report 2009 - Benchmarking Farming Systems Worldwide. pp 1 - 107.

Reference ID: 23926

Note: #23926e

[107] C. Deblitz. (2011). Beef and Sheep Report 2011 - understanding agriculture worldwide. Beef and Sheep Report. pp 1 - 88.

Reference ID: 23927

Note: #23927e

[108] C. Deblitz. (2013). Beef and Sheep Report 2013 - understanding agriculture worldwide. Beef and Sheep Report. pp 1 - 154.

Reference ID: 23928

Note: #23928e

[109] A.R. Alimon. (2004). The Nutritive Value of Palm Kernel Cake for Animal Feed. Palm Oil Development. 40 pp 1 - 3.

Reference ID: 23929

Note: #23929e

Abstract: In Malaysia, most of the PKC produced are from expeller extraction. Though solvent extraction is also used in the extraction of palm kernel oil but the process is costly and screw press extraction (expeller) is the rule in many palm oil processing plants. The difference in the quality of expeller PKC and solvent extracted is small, although in general expeller PKC contains more oil (4%-8%) than solvent extracted PKC (1%-2%). In this paper, PKC refers to expeller palm kernel cake.

[110] K.S. Chun, S. Husseinsyah. (2014). Agrowaste-based composites from cocoa pod husk and polypropylene: Effect of filler content and chemical treatment. Journal of Thermoplastic Composite Materials. pp 1 - 20.

Reference ID: 23930

Note: #23930e

Abstract: Cocoa pod husk (CPH)-filled polypropylene (PP) composites were prepared via melt compounding. The effect of filler content and chemical treatment using 3-mercaptopropyltrimethoxysilane (MPS) and sodium dodecyl sulfate (SDS) on properties of composites were investigated. The results indicated that the treated composites with MPS and SDS improved the tensile strength, tensile modulus, thermal stability, stabilization torque, water resistivity, and crystallinity of composites. The treated composites with SDS show better tensile properties and water resistivity than composites treated with MPS. Scanning electron microscopic results show that the interfacial bonding between CPH and PP matrix improved with the presence of MPS or SDS.

[111] J.R. Porter. (2010). Agronomy as the science of primary food production. Agro 2010, the XI ESA Congress, Montpellier. pp 41 - 42.

Reference ID: 23931

Note: #23931e

Abstract: In October 2009 the Royal Society of London brought forth a report on global food security (1) on the role of science in the sustainable intensification of global agriculture. In their recommendations they stressed the need to rediscover the disciplines of agronomy and crop physiology - i.e. the sciences of crop production in the field. As a globally acknowledged agronomy society and as members of institutions

that teach and research agronomy, I think the ESA needs to discuss what we mean by scientific agronomy and what it means for future sustainable food production. I am promoting this as a discussion and I start with a definition of the area, follow this with a core agronomic concept and end with two examples of where agronomic understanding has directly influenced agricultural policy in Europe and China.

[112] E.M. Aregheore. (2002). Chemical Evaluation and Digestibility of Cocoa (*Theobroma cacao*) Byproducts Fed to Goats. *Tropical Animal Health and Production*. 34 pp 339 - 348.

Reference ID: 23932

Note: #23932e

Abstract: A study was undertaken to evaluate and compare the chemical composition of the cocoa byproducts CPH (cocoa pod husk), CS (cocoa shell) and CD (cocoa dust), and to establish a rational use of CS and CD in the diets of growing goats. CD had a high crude protein (CP) content of 15.9%, while CS and CPH had 13.8% and 6.7%, respectively. The byproducts were high in crude fibre (CF) content. Among the byproducts, CD had the highest ether extract value (22.0%). Fifteen growing goats, 18-20 months of age, with pre-experimental body weights of 20.9 +/- 0.33 kg, were randomly allotted to three diets in growth studies. In diet 1, dried brewers' grain (DBG) served as the control, while the other two diets had CS or CD plus DBG. The dry matter intake (DMI) was 570, 530 and 486 g/head per day for the control, CS + DBG and CD + DBG diets, respectively. The growth rate differed significantly among the goats offered the diets ($p < 0.05$). Dry matter (DM), crude protein (CP), crude fibre (CF), organic matter (OM) and gross energy (GE) digestibility were significantly higher ($p < 0.05$) in the goats on the control diet than in those on CS + DBG or CD + DBG. The DM, CP and OM in the CS + DBG diet were more digestible ($p < 0.05$) than those in the CD + DBG diet. The inclusion of DBG in the CS and CD diets improved their use by the goats

[113] T.C. Lim, F. Zaharah. 2013. Palm Kernel Cake: Inherent Properties Raise Global Feed Market Opportunities. pp 1 - 3. MPOC.

Reference ID: 23933

Note: #23933e

Abstract: Palm Kernel Cake (PKC) has moved up steeply in the value chain. From an average annual price of US\$50/MT that was traded in 1999, the price of PKC has increased by approximately four times to average at US\$212/MT in 2012. Research into the applications for PKC backed by product promotions and the advertising of its inherent properties, has made possible the price jump. These efforts have both introduced new applications and opened up new market for PKC at a good price, with the good commercial values in PKC supporting this price movement.

[114] L.S. Ayeni. (2010). Effect of Combined Cocoa Pod Ash and NPK Fertilizer on Soil Properties, Nutrient Uptake and Yield of Maize (*Zea mays*). *Journal of American Science*. 6 pp 79 - 84.

Reference ID: 23934

Note: #23934e

Abstract: Field experiments were conducted in two cropping seasons (March and September, 2007) at two locations to determine the effect of cocoa pod ash (5 and 10 t ha⁻¹) and NPK 20:10:10 fertilizer (150 and 300 kg ha⁻¹) on soil chemical properties, nutrient uptake and yield of maize in southwest Nigeria. The experiments were sited at Adeyemi College of Education Research Farm, Ondo and Okegun both Alfisol.

Ondo soil was sandy clay, deficient in OM, N, P and K while Okegun soil was clay loam, deficient in OM, N and K. The treatments were laid out in randomized complete block design with three replications. Combined cocoa pod ash and NPK 20:10:10 fertilizer significantly ($p < 0.05$) increased soil OM, N, P and K at Ondo and OM, P and K at Okegun than cocoa pod ash and NPK 20:10:10 fertilizer singly applied. Plant N, P and K were also increased significantly compared with single application of cocoa pod ash and NPK 20:10:10 except 300 kg ha⁻¹ at the two locations as well as plant height, grain, stover and dry root yields. At Adeyemi (sandy clay), compared with control, the percentage increase in grain yield were C10F150 (81%), F300 (74.76%), C5F150 (65.71), C10 (47.62%), C5 (38.5%) and F150 (32.28%). For Okegun (clay loam), grain yield significantly increased ($p < 0.05$) by C10F150 (75.85%), F300 (54.36%), C5F150 (42.46%), C10 (8.10%), C5 (19.84%) and F150 (17.06%). Treatment C10F150 gave the highest increases in soil nutrient values and growth parameters of maize. Soil total N, available P and exchangeable K tended to increase as the level of the treatment combinations increased at both locations. Cocoa pod ash combined with reduced level of NPK 20:10:10 was more effective than single application of cocoa pod ash and NPK 20:10:10 fertilizer in both locations. Sandy clay responded to application of cocoa pod ash than clay loam in this experiment.

[115] J. Zhang, X. Zhou, W. Yan, Z. Zhang, L. Lu, Z. Han, H. Zhao, H. Liu, P. Song, Y. Hu, G. Shen, Q. He, S. Guo, G. Gao, G. Wang, Y. Xing. (2015). Combinations of the Ghd7, Ghd8 and Hd1 genes largely define the ecogeographical adaptation and yield potential of cultivated rice. *New Phytologist*. 208 pp 1056 - 1066.

Reference ID: 23935

Note: #23935e

Abstract:

-Rice cultivars have been adapted to favorable ecological regions and cropping seasons. Although several heading date genes have separately made contributions to this adaptation, the roles of gene combinations are still unclear.

-We employed a map-based cloning approach to isolate a heading date gene, which coordinated the interaction between Ghd7 and Ghd8 to greatly delay rice heading. We resequenced these three genes in a germplasm collection to analyze natural variation.

-Map-based cloning demonstrated that the gene largely affecting the interaction between Ghd7 and Ghd8 was Hd1. Natural variation analysis showed that a combination of loss-of-function alleles of Ghd7, Ghd8 and Hd1 contributes to the expansion of rice cultivars to higher latitudes; by contrast, a combination of pre-existing strong alleles of Ghd7, Ghd8 and functional Hd1 (referred as SSF) is exclusively found where ancestral Asian cultivars originated. Other combinations have comparatively larger favorable ecological scopes and acceptable grain yield.

-Our results indicate that the combinations of Ghd7, Ghd8 and Hd1 largely define the ecogeographical adaptation and yield potential in rice cultivars. Breeding varieties with the SSF combination are recommended for tropical regions to fully utilize available energy and light resources and thus produce greater yields.

[116] Z. Zainal. 2005. How can palm oil be modified to give improved dietary benefits? Cardiff School of Biosciences. Cardiff, UK. Doctor of Philosophy. pp 1 - 315. Cardiff University.

Reference ID: 23936

Note: #23936e

Abstract: Arthritis is a chronic inflammatory disease which can be partly alleviated by antiinflammatory compounds (such as non-steroidal anti-inflammatory drugs) or

dietary components such as n-3 polyunsaturated fatty acids (n-3 PUFAs). Bovine chondrocyte cells cultures represent an experimental system that can be used to study arthritis in vitro and this was used in the work reported here. The relative effectiveness of different fatty acids in reducing inflammatory responses was studied using these cultures. Eicosapentaenoic acid (EPA) proved to be most effective n-3 PUFA compared to docosahexaenoic (DHA) or α -linolenic acid (ALA), in suppressing the levels of mRNA for pro-inflammatory proteins (COX -2, IL -1a, IL -b, TNF-1a), aggrecanase (ADAMTS-4 and ADAMTS-5) and matrix metalloproteinases (MMP-3 and MMP-13) in the bovine monolayer cultures which had been induced by IL-1a. Arachidonic Acid (AA), an n-6 PUFA, had no effect on these mRNA levels. Similarly, hydrolysed palm olein had no consistent effect, showing that neither of these fatty acid preparations could be regarded as anti-inflammatory.

[117] Yezin Agricultural University (YAU). 2014. Journal of Agricultural Research December 2014 Vol: 1 - Issue 1. Yangon. 1. (1). pp 1 - 98. Daw Tin Tin Aye (14961) Ywetsaine Sarpay.

Reference ID: 23937

Note: S serial #23937e

[118] Yezin Agricultural University (YAU). 2015. Journal of Agricultural Research June 2015 Vol: 2 - Issue 1. Yangon. 2. (1). pp 1 - 94. Daw Tin Tin Aye (14961) Ywetsaine Sarpay.

Reference ID: 23938

Note: S serial #23938e

[119] Yezin Agricultural University (YAU). 2016. Journal of Agricultural Research June 2016 Vol: 3 - Issue 1. Yangon. 3. (1). pp 1 - 112. U Kyaw Kyaw Wai (00047) Ywetsaine Sarpay.

Reference ID: 23939

Note: S serial #23939e

[120] J. Soe, H.Y. Lwin, N.E.M. The, S.S. Mar. (2016). Fertilizer supply chain and market structure: A case study in Tatkon Township, Nay Pyi Taw. Journal of Agricultural Research. 3(1) pp 90 - 97.

Reference ID: 23940

Note: #23940e > S 26.1.6 #23939e

Abstract: This study was attempted to observe marketing activities of fertilizer market structure such as marketing channel, marketing cost and marketing margin in Tatkon Township. Totally 33 market intermediaries were interviewed in which 6 local wholesalers, 5 village retailers, 2 company agents and 20 farmers in 3 sample villages were included. Based on the research findings, it was found that imported registered urea fertilizer from China was the main fertilizer supply in Tatkon Township, followed by registered and unregistered compound fertilizers. Among many fertilizers, urea fertilizer was largely utilized by farmers. Supply of domestically produced urea fertilizer did not influence well in the fertilizer market. Several registered compound fertilizers such as Awba, Armo, Golden Cock and Mahkota were the most popular brands. The fertilizer supply chain was well composed of four main market intermediaries; local wholesalers, village retailers, company agents and farmers. In fertilizer market structure, Mandalay was the major fertilizer supply to Tatkon Township. There were three main fertilizer marketing channels in Tatkon Township. The marketing channel (I) was the major channel which sold the largest amount of fertilizer in the study area.

In this channel, marketing links were existed among all market participants and local wholesalers were the main players.

[121] Yezin Agricultural University (YAU). 2016. Journal of Agricultural Research December 2016 Vol: 3 - Issue 2. Yangon. 3. (2). pp 1 - 116. Daw Tin Tin Aye (14961) Ywetsaine Sarpay.

Reference ID: 23941

Note: S serial #23941e

[122] P.P. Win, K. Toe, M.M. Aung, S.S. Mar. (2016). Evaluation of groundnut (*Arachis hypogaea* L.) varieties under researchers and farmers management practices in Magway Area. Journal of Agricultural Research. 3(2) pp 1 - 6.

Reference ID: 23942

Note: #23942e > S 26.1.6 #23941e

Abstract: Exploiting the knowledge on Genotype x Environment (G x E) will maximize specific farm productivity, and particular farmers may use the most adapted variety of their choice. The objectives of this study were to identify high yielding, and adapted groundnut genotypes under farmers and researchers management conditions and to assess farmers' preferences on the different groundnut varieties. Eight groundnut genotypes were evaluated in wet season, 2014 at four different locations (Oilseed Crop Research Center, Kanhla, Sartaingkan and Makyeeakan villages at Magway Area) by using randomized complete block design with three replications. These varieties were also evaluated by farmers' participatory approach in these villages. According to additive main effects and multiplicative interaction (AMMI) biplot, genotypes YZG-04123, ICGV-00350 and YZG-00020 were suited for research farm and Kanhla village. Genotypes ICGV-00350, YZG-04123 and Sinpadetha-12 were adapted for Sartaingkan village, and ICGV-00350, YZG-04123 and Magway-15 were suited for Kanhla. Therefore genotypes ICGV-00350 and YZG-04123 were more adapted to both researchers and farmers management practices. In the current study, when the farmers have themselves selected the best suited variety, they considered soil and climatic conditions in their regions, individual farmer's resource availability and preferences. Accordingly, farmers preferred genotypes ICGV-00350, YZG-04123, YZG-00020 and Sinpadetha-7 in these locations of Magway area.

[123] K.Z. Win, H. Than, N.H. Hom, H.H. Oo, K.K. Win. (2016). Evaluation of potato (*Solanum tuberosum* L.) varieties for yield and processing quality in Heho, Southern Shan State. Journal of Agricultural Research. 3(2) pp 22 - 28.

Reference ID: 23943

Note: #23943e > S 26.1.6 #23941e

Abstract: Field experiments were conducted to evaluate yield and yield components and to assess the processing (frying) qualities of six potato varieties tested at Heho Farm, Department of Agriculture, Kalaw Township, Southern Shan State during summer and post-monsoon, 2014. Randomized complete block design was used with 4 replications in both experiments. The highest numbers of stems and tubers hill were found in Kufri Jyoti in both experiments. In the experiment carried out in summer, the highest total tuber yield was observed in Kufri Jyoti. The highest average tuber weight was obtained from Atlantic and the highest marketable yield was resulted from L-11 (CIP-393371.157). In the experiment conducted in post-monsoon, Hermes gave highest average tuber weight, marketable tuber yield and total tuber yield. Lady Rosetta had high specific gravity, dry matter content (%) and starch content (%) in both experiments. Based on general acceptability, oiliness and texture, Atlantic and

Hermes were above fair in chip quality in both experiments. In French fries quality, consumers prefer Atlantic and Hermes than other varieties in the experiment conducted in summer but all varieties were low for acceptance in the experiment carried out in post-monsoon.

[124] Yezin Agricultural University (YAU). (2017). Proceedings of the Tenth Agricultural Research Conference. Tenth Agricultural Research Conference 11-12 January 2017 Nay Pyi Taw. Myanmar. pp 1 - 287.

Reference ID: 23944

Note: S 26.1.6 #23944e

[125] S.S. Myint, K. Ngwe. (2017). Evaluation of Indigenous Soil Nutrient for Reaching Towards Optimum Productivity To Enhance the Climate Smart Agriculture. Tenth Agricultural Research Conference, Yezin Agricultural University. pp 48 - 55.

Reference ID: 23945

Note: #23945e > S 26.1.6 #23944e

Abstract: One of the portions of climate smart agriculture is sustainably increased productivity to achieve food security. Climate change threatens the production stability and productivity. In order for stabilization of productivity, the management of natural resources (land, water, soil and soil nutrients) must be more emphasized to obtain higher efficiency of inputs. Soil contamination resulting from overused of chemicals must to be reduced or eliminated. For that purpose, result and analysis related to climate change (CC) is needed in Myanmar's agricultural sector and CC outreach program and activities are required. To fulfill these requirements, the study was carried out in farmer's field at Mandalay, Nay Pyi Daw, Magwe and Ayeyarwaddy regions to estimate the indigenous nutrient level through omission plot for reaching toward optimum productivity in Rice. The cultivar used in this study was Sinthukha. Experiments were laid down R.C.B design with 5 replications and treatments were full plot (NPKS), -N(PKS), -P(NKS), -K(NPS), S(NPK) and +Zn (NPKSZn). Applied rate of fertilizers were 213.32 kg urea, 107.78 kg TSP, 98.80 kg MOP, 148.20 kg gypsum and 23, 57 kg Zifer per hectare that's common in R.T.O.P design. The result showed that indigenous level of major nutrient were greater in Minbu and Wakhama where there are alluvial soil than in Yamethin and Zayathiri those are meadow gleysols soil. According to the study, fertilizer recommendation rate for gleysols are 95-110 kg/ha Urea, 34-38 kg/ha TSP and 34-54 kg/ha MOP while 90-100 kg/ha Urea, 30-34 kg/ha TSP, 20-25 kg/ha MOP for alluvial soil for rice to meet target yield. And requirement of S becoming crucial role and that of Zn for some area were found clearly. Fertilizer requirement for target yield of rice can be recommended from this study. In this way, productivity will be increased and fertilizer can be used efficiently without adverse environmental affect.

[126] C.M. Htwe, K. Ngwe, K.K. Win, S.S. Mar. (2017). Assessment of Soil Indigenous Nutrient Supply as a Natural Resource Management in Rice Production towards Climate Resilience Agriculture. Tenth Agricultural Research Conference, Yezin Agricultural University. Myanmar. pp 159 - 178.

Reference ID: 23946

Note: #23946e > S 26.1.6 #23944e

Abstract: Effective dissemination of new natural resource management (NRM) technologies and principles that have potential to increase rice production in lowland rice is a challenge. The consecutive rice cropping in irrigated system was investigated using a randomized complete block design with different fertilization treatments,

including control (no fertilizer application), PK, NK, NP, and NPK fertilization with four replications at Myanmar Rice Research Center (MRRC). Pale Thwe-1 (hybrid) and Yadanar Toe (HYV) were used to assess the supply of indigenous nutrients and the requirement of N, P and K fertilizer, to evaluate soil status after four seasons rice cultivation and to determine the acquisition efficiency of two rice varieties. Myanmar Rice Research Center provides at least 2-4 t ha⁻¹ of grain yield even without application of exogenous nutrients. The responses of two rice varieties were differed to indigenous nutrients supply. On average four seasons, the amount of N, P and K that provided by indigenous sources were about 1-1.5 bag of Urea, 1 bag of triple super phosphate (TSP) and 2-2.5 bag of muriate of potash (MOP) ha⁻¹ in irrigated rice cultivation. The P and K addition is made, native soil P and K that can supply for rice growth at most can only maintain 1-2 crops without yield loss significantly. Fertilizer requirements were calculated for specific location as seasonal application of N (each cropping season) and annual applications (one season per year) of P and K could be an option to improve fertilizer management, rice production and profitability. Omission treatments showed considerable soil N, P and K depletion by omitting such nutrient. Thus, rice cultivation without N, P and/or K application cannot maintain soil fertility in long term. Although Pale Thwe-1 had greater nutrient use efficiency and Yadanar Toe showed greater acquisition efficiency. Omission nutrient technique with selection of best acquisition rice varieties adaptable to spatial and temporal variation can be a way to reduce chemical fertilizer rates in irrigated rice cultivation. It can also reduce methane emission mostly due to overload used of chemical fertilizers in rice cultivation and this in turn enhance the resilience of Myanmar Agriculture without deteriorating soil and environmental quality.

[127] K.K. Shwe, K. Ngwe. (2017). Impact of Mulching and Calcium Sources on Groundnut Yield and Soil Water Storage in a Sandy Loam Soil. Tenth Agricultural Research Conference, Yezin Agricultural University. pp 267 - 278.

Reference ID: 23947

Note: #23947e > S 26.1.6 #23944e

Abstract: Addition of calcium to low calcium soils improves yield, increases the percentage of sound mature kernels (SMK), and improves germination and vigor. Calcium is typically applied to the pegging zone as lime or gypsum. Soil water is considered to be one of the most important factors affecting plant growth and development. Even a small change in soil water storage could greatly affect crop productivity. A variety of materials can be used as mulch, including organic residues. Field experiments were conducted during monsoon season of 2016 at Yezin Agricultural University Farm to evaluate the effect of mulching and calcium sources on yield and yield components of groundnut variety Simpadathar-11 and soil water storage in sandy loam soil. The experiment was laid out in a split-plot design with three replications. The main plot factor was two mulchings and the sub-plot factor was three sources of calcium. Groundnut yield was influenced significantly due to mulching, viz. no mulching and mulching. The mulching treatment gave higher yield than no mulching treatment. Growth, yield and yield components of groundnut were increased significantly due to application of calcium sources. viz. no calcium (control), gypsum and lime. Result of the investigation revealed that the plant height was not significantly different between calcium sources. Addition of gypsum (200 kg ha⁻¹) recorded the largest shelling percentage, 100 seed weight and yield (3423 kg ha⁻¹). There was no significant difference in soil water storage between no mulching and mulching. However, the soil water storage in mulching treatment was higher than that of no mulching. The soil water storage was not significantly increased among calcium

sources. The combine application of mulching and calcium source gave the maximum yield and soil water storage in this experiment.

[128] Y. Mon, N.M. Htwe, N.H. Hom. (2014). Identification of Maintainer Lines and Restorer Lines for Male Sterile Lines of Rice (*Oryza sativa* L.). Journal of Agricultural Research. 1(1) pp 3 - 12.

Reference ID: 23948

Note: #23948 > S serial #23937e

Abstract: Testcross was conducted to verify maintainer line and restorer line adapted to Myanmar climatic condition, to select apparently heterotic rice hybrids and to give information to the breeders for future use of promising parent combination for hybrid seed production.

[129] P.N. Kyaw, N. Nyo, T.T. Soe, K.T. Myint, T.O.M. Win. (2014). Effects of Wrapping Materials and Potassium Permanganate on Postharvest Characteristics of Mango (*Mangifera indica* L.) cv. Sein Ta Lone. Journal of Agricultural Research. 1(1) pp 13 - 25.

Reference ID: 23949

Note: #23949 > S serial #23937e

Abstract: The effects of wrapping materials and potassium permanganate on postharvest characteristics of mango (*Mangifera indica* cv. Sein Ta Lone) were assessed at ambient condition. The fruits wrapped with polyethylene (PE) bag, polystyrene (PS) tray and net sack, and non-wrapped (control) fruits were treated with and without potassium permanganate.

[130] Y.M. Soe. (2014). Comparison of Saturated Hydraulic Conductivity on Salt-Affected Soils and Optimizing the Effective Reclamation Methods. Journal of Agricultural Research. 1(1) pp 26 - 35.

Reference ID: 23950

Note: #23950 > S serial #23937e

Abstract: The proposed problem soils of Tat-Ma-Kone, WunDwin Township, Mandalay Region, Nyaung-Pin-Zauk, Pale Township, and Bone-Kone, Shwe Bo Township, Sagaing Region were investigated whether these soils were salt affected or not using pH, electrical conductivity of saturation extract E_{Ce} (dSm⁻¹) and sodium adsorption ratio (SAR) and the saturated hydraulic conductivity.

[131] W.W. Lwin, V. Srilaong. (2014). Maintaining the quality of bunching onion (*Allium fistulosum*) by cold shock treatment and packaging. Journal of Agricultural Research. 1(1) pp 36 - 57.

Reference ID: 23951

Note: #23951 > S serial #23937e

Abstract: To investigate the effect of cold shock treatment for maintaining quality of bunching onion which had 30 minutes cold shock treatment and control were used to compare their effects on quality of bunching onions stored at 4°C. Changes of physical and chemical parameters were determined just after treatment and at two day intervals during storage. The present study showed that 30minutes cold shock treatments significantly reduced the visual quality, weight loss percentage, respiration rate and ethylene production of bunching onion as compared to the control.

[132] Y.Y. Tun, H.-J. Kang. (2014). The Impact of Farm Mechanization on Production Efficiency in Myanmar Rice Farming: Parametric and Non-parametric Approaches. Journal of Agricultural Research. 1(1) pp 58 - 82.

Reference ID: 23952

Note: #23952 > S serial #23937e

Abstract: The objective of this study is to obtain a better understanding of the current rice production condition in Myanmar through the use of efficiency analysis, especially, to examine the impact of farm mechanization on production efficiency. For representation of efficiency and its determinants, this paper uses both data envelopment approach with VRS and stochastic frontier approach with VRS. After estimating the efficiency of the rice production and subsequently investigating the determinants factors based on the estimated efficiency level of these sample farmers. The empirical evidence finds that farm mechanical tools are significantly improve the Myanmar rice production efficiency in both DEA and SFA analysis

[133] E.M.T. Kyaw, T. Myint. (2014). Environmental Awareness of Tomato Farmers in Inle Lake, Myanmar. Journal of Agricultural Research. 1(1) pp 83 - 89.

Reference ID: 23953

Note: #23953 > S serial #23937e

Abstract: The study analyzes to investigate the demographic characteristic and environmental awareness index of selected tomato farmers in Inle Lake. Totally 107 tomato farmers in seven villages were chosen by using simple random sampling method. The respondents were classified three groups based on tomato yield levels. By comparing of three groups, average ages of the sampled farmers were around 40 years old and they have middle education level. Lowest yield producers had smallest pesticide experience about 13 years. Most of the farmers applied pesticide between 11-20 times during crop season. Farmers had high awareness for the environmental conservation based on awareness index (0.78-0.87) and there is no difference in awareness index within three groups. Therefore, high farmer's environmental awareness index would be the major driven force for policy package of environmental conservation in Inlay Lake for the long term development.

[134] T.T. Oo, H.Y. Lwin. (2014). Economic Assessment on Cabbage and Cauliflower Production in Tatkon Township, Nay Pyi Taw. Journal of Agricultural Research. 1(1) pp 90 - 97.

Reference ID: 23954

Note: #23954 > S serial 23937e

Abstract: This study was investigated the socio-economic characteristics, cost and benefit and the practices of pesticide application on cabbage and cauliflower production of selected farmers in Tatkon Township, Nay Pi Taw. According to the results, urea fertilizers used by the sampled farmers were mainly imported from China.

[135] M. Tun, N. Htwe, K.K. Win. (2015). Impact of Flood on Agricultural Production in Seikphyu Township, Magwe Region. Journal of Agricultural Research. 2(1) pp 1 - 10.

Reference ID: 23955

Note: #23955 > S serial #23938e

Abstract: To investigate the losses of agricultural production of farmers before and after flood, the study was conducted at Seikphyu Township, Magway Region in July 2012. A total of 120 respondents from 10 villages were interviewed with structural interview questionnaire. The study area was separated into three groups: Group I

(seriously affected area), Group II (moderately affected area), and Group III (less affected area).

[136] N.M. Htwe, N.H. Hom. (2015). Characterization and Evaluation of Early Maturing Rice Germplasm. *Journal of Agricultural Research*. 2(1) pp 11 - 23.

Reference ID: 23956

Note: #23956 > S serial #23938e

Abstract: The present investigation was carried out at Department of Plant Breeding, Physiology and Ecology, Yezin Agricultural University (YAU) during 2014 dry season to characterize early maturing rice germplasm and to estimate the standard heterosis for yield and its component traits in rice.

[137] A.K. Thu, S.S. Thein, A.K. Myint, K. Toe. (2015). Study of Soil Moisture Conservation in Farm Level and Dryland Cropping Patterns of Magway Township. *Journal of Agricultural Research*. 2(1) pp 24 - 32.

Reference ID: 23957

Note: #23957 > S serial #23938e

Abstract: Dry land agriculture is highly dependent on aberrant rainfall as the only source of water. The objective of this study was conducted to investigate the commonly used dryland cropping patterns in Magway Township and to collect the information on local agricultural practices on soil moisture management.

[138] C.M. Htwe, K. Ngwe, K.K. Win, S.S. Mar. (2015). Evaluation of Soil Nutrient Supply Capacity for Rice (*Oryza sativa* L.) Production by Site-Specific Nutrient Management. *Journal of Agricultural Research*. 2(1) pp 33 - 40.

Reference ID: 23958

Note: #23958 > S serial #23938e

Abstract: Site-specific nutrient management (SSNM) provides the plants with nutrients to optimally match their spatial and temporal need for supplemental nutrients by conducting omission treatments.

[139] M. Zaw, N.L. Oo, Z.M. Tun, T.A.A. Naing. (2015). Evaluation of Different Rice Genotypes against Rice Blast Disease in Yezin Area. *Journal of Agricultural Research*. 2(1) pp 41 - 45.

Reference ID: 23959

Note: #23959 > S serial #23938e

Abstract: A destructive fungal disease, rice blast caused by *Pyricularia grisea* is common in three major rice ecosystems, namely irrigated, rainfed upland and lowland area. It is one of the major fungal rice diseases of rice in Myanmar. In this study, 67 different rice genotypes were evaluated for resistance to rice blast disease in Yezin Agricultural University (YAU).

[140] K.S. Aye, N. Win, H.W. Hnin, M.Z. Aung, W.M. Sai, T.T. Maung, S.S. Aye, T.A.A. Naing. (2015). Occurrence of Rice Diseases in Nay Pyi Taw Council Area. *Journal of Agricultural Research*. 2(1) pp 46 - 56.

Reference ID: 23960

Note: #23960 > S serial #23938e

Abstract: Disease is pointed out as a major constraint of rice production in some area of paddy fields. The present study was carried out to investigate the prevalence of rice diseases in Nay Pyi Taw Council area during November 2013 to July 2014. Disease survey was conducted in three different seasons namely early-summer season, late-

summer and rainy seasons at five different townships in Nay Pyi Taw Council area.

[141] S.T.W. Myint, K.K. Than, T.T. Oo. (2015). Weight Losses of Stored Rice and Paddy Caused by Combined Effect of Packing Materials, Moisture Contents and Maize Weevil. *Journal of Agricultural Research*. 2(1) pp 57 - 64.

Reference ID: 23961

Note: #23961 > S serial #23938e

Abstract: The experiments were conducted under laboratory condition at the Department of Entomology and Zoology, Yezin Agricultural University during 2013 to 2014. This study was carried under ambient laboratory conditions of 30°C +/- 2°C and 60%-78% relative humidity in rice and 30°C +/- 2°C and 65%-73% relative humidity in stored paddy to determine four packing materials; open basket, ordinary poly-sack bag, IRRI super bag and IRRI super bag + CO₂ with three moisture contents (12%, 14% and 16%) during five months storage period.

[142] M.P.P. Thu, A.A. Thwe, K.T. Myint. (2015). Effects of Storage Materials on Seed Storage Quality of China Aster Varieties. *Journal of Agricultural Research*. 2(1) pp 65 - 73.

Reference ID: 23962

Note: #23962 > S serial #23938e

Abstract: Storage materials have profound effect on seed storage quality of the crops. To determine the effects of seed storage materials on seed storage quality of China aster, this experiment was carried out at the Department of Horticulture and Agricultural Biotechnology, Yezin Agricultural University from March to August 2014.

[143] Z.Y. Mon, M.Z.N. Aung, S.S. Myint, K.T. Myint. (2015). Fruit Characteristics of Netted Melon (*Cucumis melo* L., 'Dandy-449') as Affected by Gibberelic Acid (GA₃) Application and Scheduled Irrigation. *Journal of Agricultural Research*. 2(1) pp 74 - 85.

Reference ID: 23963

Note: #23963 > S serial #23938e

Abstract: Netted muskmelon (*Cucumis melo* L.) is a high-value fruit being lavishly produced in dry season in Myanmar. Nonetheless, not all the fruits harvested consistently show desirable market quality in regard to fruit characteristics in response to improper production practices in farmers' field. Therefore, this study was conducted to investigate the effects of gibberelic acid (GA₃) application (+ and -) and scheduled irrigation (optimum irrigation, OI and deficit irrigation, DI) on fruit characteristics at fruit growth stage 1 and 3 of cultivar 'Dandy-449'.

[144] M.S. Aye, T. Myint, C.C. San. (2015). Willingness to Accept of Vegetable Farmers by Gender Perspective towards Organic Farming in Pyin Oo Lwin Township, Myanmar. *Journal of Agricultural Research*. 2(1) pp 86 - 93.

Reference ID: 23964

Note: #23964 > S serial #23938e

Abstract: The study attempted to observe farmers' existing knowledge on soil conservation measures and cultural practices, the constraints of using organic materials and producing organic farming, environmental awareness index and the willingness to accept (WTA) the organic farming of vegetable production in Pyin Oo Lwin. Totally 55 vegetable farmers and farm labors were interviewed in 2 sample villages by using simple random sampling method.

[145] I.E. Kurniawan. (2017). *Transparan & Terlacak Hingga Kebun Sawit: Cargill Tropical Palm Holdings PTE. LTD., 2020: 100% Sustainable Palm Oil (Transparent and Traceable to Oil Palm Plantations)*. *Infosawit*. XI(9) pp 10 - 12.

Reference ID: 23965

Note: #23965e > S serial #23908e (In Indonesian)

Abstract: Sebagai perusahaan perkebunan kelapa sawit Cargill Tropical Palm Holdings PTE. LTD., memiliki komitmen kuat untuk menjadi produsen minyak sawit berkelanjutan. Tahun 2020 menjadi target bagi perusahaan untuk menjadi produsen 100% hasilkan minyak sawit berkelanjutan. Caranya, melalui produksi minyak sawit yang transparan dan dapat terlacak rantai pasoknya dari perkebunan.

[146] A. Yulianto I. (2017). *Jejak Cargill Tropical Palm Holdings PTE. LTD. di Indonesia (Traces of Cargill Tropical Palm Holdings PTE.LTD. In Indonesia)*. *Infosawit*. 9(9) pp 20 - 21.

Reference ID: 23966

Note: #23966e > S serial #23908e (In Indonesian)

Abstract: Cargill Inc, sebagai salah satu perusahaan produk pangan dan pertanian asal AS, semenjak era 1974 mulai melebarkan sayapnya ke Asia, termasuk Indonesia. Perkebunan, pertanian dan pakan ternak jadi sektor yang dikembangkan yang berdasarkan empat prinsip Cargill.

[147] Anonymous. (2017). *Solusi Kebutuhan SDM Sawit Nasional (Solutions for National Manpower needs in Oil Palm): Politeknik Kelapa Sawit Citra Widya Edukasi*. *Infosawit*. 9(9) pp 44 - 48.

Reference ID: 23967

Note: #23967 > S serial #23908e (in Indonesian)

Abstract: Pertumbuhan industri kelapa sawit nasional tercatat sangat pesat nampak dari terus bertambahnya areal lahan perkebunan. Kondisi demikian justru mendorong kebutuhan Sumber Daya Manusia (SDM) yang mumpuni di sektor ini. Untungnya Politeknik Kelapa Sawit CWE telah hadir dengan program studi yang fokus dan kurikulum berbasis kompetensi, yang siap memenuhi kebutuhan pasokan SDM kelapa sawit nasional.

[148] I.E. Kurniawan. (2017). *Replanting Dukung Kesejahteraan Petani Kelapa Sawit (Replanting supports the welfare of oil palm farmers)*. *Infosawit*. 9(9) pp 28 - 30.

Reference ID: 23968

Note: #23968e > S serial #23908e (In Indonesian)

Abstract: Komitmen akan pembangunan berkelanjutan juga berasal dari daerah Kabupaten Musi Banyuasin, Provinsi Sumatera Selatan. Pembangunan berkelanjutan yang telah menjadi komitmen itu, juga mendapat dukungan dari berbagai pihak, seperti pengusaha dan Lembaga Swadaya Masyarakat (LSM).

[149] M. Darto. (2017). *Petani Sawit Dan Makna Kemerdekaan (Oil Palm Farmers and the Meaning of Independence)*. *Infosawit*. 9(9) pp 26 - 27.

Reference ID: 23969

Note: #23969e > S serial #23908e (In Indonesian)

Abstract: Sudah 72 tahun Indonesia merdeka, kita layak memberikan apresiasi bagi penyelenggara negeri ini yang telah bertarung dengan berbagai tantangan yang dihadapi oleh Indonesia. Salah satu tantangan itu adalah terkait perkebunan kelapa sawit Indonesia.

[150] A. Yulianto I. (2017). "Juq Kehje Swen" Pulau Untuk Orangutan ("Juq Kehje Swen" Island for Orangutan): Yayasan Borneo Orangutan Survival (BOS) dan PT Nusaraya Agro Sawit (Palma Serasih Group). *Infosawit*. 9(9) pp 40 - 42.

Reference ID: 23970

Note: #23970e > S serial #23908e (In Indonesian)

Abstract: Pulau seluas 82, 84 ha baru saja diresmikan sebagai kegiatan pra pelepas liaran orangutan. Pemanfaatan pulau pra pelepasliaran ini terwujud atas kerjasama Yayasan BOS dan PT Nusaraya Agro Sawit (NUSA), anak perusahaan Palma Serasih Group. Peresmian ditandai dengan dilepas liarkannya 10 orangutan di pulau Juq Kehje Swen.

[151] A. Yulianto I. (2017). ISPO Dianggap Masih Belum Sesuai Harapan (ISPO is considered not as expected). *Infosawit*. 9(9) pp 22 - 25.

Reference ID: 23971

Note: #23971e > S serial #23908e (In Indonesian)

Abstract: Pada akhir Agustus 2017 lalu, Sekretariat Indonesia Sustainable Palm Oil (ISPO) kembali memberikan sertifikat kepada 40 perusahaan perkebunan kelapa sawit. Sayangnya sampai saat ini ISPO belum bisa memenuhi harapan pelaku, ditengah upaya perbaikan dan penguatan praktik budidaya kelapa sawit ala Indonesia.

[152] A. Yulianto I. (2017). Cargill Football Festival: Merasakan Latihan Singkat Dari Pelatih Chelsea FC Foundation (Feel the short exercise from the Chelsea FC foundation coach). *Infosawit*. 9(9) pp 14 - 16.

Reference ID: 23972

Note: #23972e > S serial #23908e (In Indonesian)

Abstract: Tiga pelatih Chelsea FC Foundation, berkesempatan melakukan latihan singkat di Musi Banyuasin. Ini terwujud atas kerjasama Cargill Tropical Palm Holdings Pte. Ltd., guna mendorong potensi yang dimiliki generasi muda di sekitar areal perkebunan kelapa sawit.

[153] A. Yulianto I. (2017). Kampanye "Say Yes to Sustainable Palm Oil" Di China: RSPO Memperluas Pasar Minyak Sawit Berkelanjutan (Campaign Say Yes to Sustainable Palm Oil in China: RSPO Expands Sustainable Palm Oil Market). *Infosawit*. 9(9) pp 52 - 53.

Reference ID: 23973

Note: #23973e > S serial #23908e (In Indonesian)

Abstract: Lewat kampanye dan aktivitas interaktif yang unik, Roundtable on Sustainable Palm Oil (RSPO) mengajak konsumen di China untuk beralih mengkonsumsi produk-produk yang menggunakan minyak sawit berkelanjutan, termasuk memberikan informasi yang mendalam mengenai dampak positif dari kepedulian terhadap penggunaan produk berkelanjutan.

[154] A.A. Raksodewanto, A. Kismanto, M.D. Soklikhah, Y. Heryana, F. Karuana. (2017). Bio Crude Oil (BCO) Dari Biomassa Kelapa Sawit (Bio Crude Oil from Oil Palm Biomass). *Infosawit*. 9(9) pp 50 - 51.

Reference ID: 23974

Note: #23974e > S serial #23908e (In Indonesian)

Abstract: Biomassa kelapa sawit faktanya belum maksimal dimanfaatkan menjadi sumber energi baru dan terbarukan. Dengan lewat proses pirolisa cepat, biomassa dikonversi menjadi bio crude oil (BCO) yang dapat digunakan sebagai minyak bakar.

[155] A. Yulianto I. (2017). Terapkan Praktik Budidaya Berkelanjutan: Cargill Tropical Palm Holdings PTE.LTD. (Apply Sustainable Cultivation Practices). Infosawit. 9(9) pp 17 - 19.

Reference ID: 23975

Note: #23975e > S serial #23908e (In Indonesian)

Abstract: Komitmen lingkungan yang tinggi mendorong Cargill Tropical Palm Holdings Pte. Ltd., menerapkan praktik budidaya layak lingkungan dan sosial untuk seluruh anak usahanya, baik yang berlokasi di Sumatera Selatan maupun yang di Kalimantan Barat.

[156] C. Lee. (2017). Turut Kembangkan Daerah: Colin Lee, Director of Corporate Affairs, Cargill Tropical Palm Holdings PTE.LTD. (Actively Develop Region). Infosawit. 9(9) pp 13 - 13.

Reference ID: 23976

Note: #23976e > S serial #23908e (In Indonesian)

Abstract: Dimana perusahaan kami beroperasi, maka kami akan berusaha untuk mengembangkan berbagai potensi masyarakat di sekitarnya

[157] V. Andresen. (2017). Changing the World through Good Product Stewardship. Argus FSU Fertilizer 2017. Minsk. IFA.

Reference ID: 23977

Note: #23977e

[158] IPNI. 2015. Research with Impact - Improving Yields and Profit with Controlled-Release Urea on Rice and Eggplant in Hubei. HB46. pp 1 - 1.

Reference ID: 23978

Note: #23978e

Abstract:

THE CHALLENGE:

China is the world's leader in both rice and eggplant production. These crops are both economically important for Hubei province. Farmers in the region prefer to use commercial, soluble fertilizers such as urea and compound fertilizers; however, nitrogen (N) is frequently over used and phosphorus (P) and potassium (K) are commonly under applied. The excessive use of N fertilizer on cropland results in problems such as groundwater and surface water contamination, eutrophication, ammonia loss, and low N fertilizer use efficiency.

[159] R. Norton. 2017. Plant Nutrition Today - Fall 2017 Issue 3 No 4: Fertilizers and Soil Organic Matter. (3). pp 1 - 2.

Reference ID: 23979

Note: #23979e

Abstract: Feed the soil or feed the crop? Well – it depends on what the goal is? Many fertility programs are focused—quite rightly— on ensuring high yield and nutritious crop products. These programs identify the needs of the particular crops and balance the soil supply with additional nutrients.

[160] C. Snyder, T. Maaz. 2017. Plant Nutrition Today - Fall 2017 Issue 3 No 5: Something Fooling Your Greenness Sensor? (3). pp 1 - 2.

Reference ID: 23980

Note: #23980e

Abstract: When crop prices are low, most farmers tend to manage their resources

more conservatively; and some may whittle their fertilizer inputs to just one or two major nutrients. If recent soil fertility management and nutrient rates have been excellent, then slight fertilizer cutbacks may only modestly short-change plant nutrition. However, if that strong fertilization history is not the case on your farm, cutbacks in nutrient inputs can be costly. Cutting back on nitrogen (N)—the real “horsepower” in crop nutrition—may severely penalize yields, crop quality, and profits.

[161] N.N. Lwin, K.K. Win, H. Than, A.A. Than, M.M. Kyu. (2016). Evaluation of morphological traits related to lodging of rice varieties under different applied nitrogen rates in Bago (West) Region. *Journal of Agricultural Research*. 3(1) pp 1 - 7.

Reference ID: 23981

Note: #23981 > S serial #23939e

Abstract: The experiments were conducted to find out the suitable rate of applied nitrogen without lodging and to evaluate the morphological traits related to lodging of tested rice varieties. Five levels of nitrogen fertilizer rate (0, 29, 57, 86 and 114 kg N ha⁻¹) in main plot and two varieties (Sinthwelatt, Kyawzeyya) in sub plot were laid out in split plot design with four replications.

[162] T. Hlaing, H.H. Oo, K.K. Win, A.A. Than, M.M. Kyu. (2016). Evaluation of seed priming methods on growth, yield and yield components of Mungbean (*Vigna radiata* L. Wilczek). *Journal of Agricultural Research*. 3(1) pp 8 - 16.

Reference ID: 23982

Note: #23982 > S serial #23939e

Abstract: Pot and field experiments were conducted at Department of Agronomy, Yezin Agricultural University during the rainy season from May to August 2014 and the winter season from October 2014 to January 2015. Randomized complete block design was used with 5 and 3 replications in pot and field experiment, respectively. The tested mungbean cultivar was Yezin 14 (67 days).

[163] N. Moe, N.N. Htwe, K.K. Win, M.M. Kyu, T. Lin, N.M. Aung. (2016). Farmers' practices for seed management and seed quality of rice (*Oryza sativa* L.) in Tatkon Township. *Journal of Agricultural Research*. 3(1) pp 17 - 24.

Reference ID: 23983

Note: #23983 > S serial #23939e

Abstract: To examine farmers' seed management and seed quality of rice, the study was conducted at Tatkon Township, Nay Pyi Taw Council Area. A total of 120 respondents from 13 villages were interviewed in January 2014 and seed samples of most widely grown varieties were collected from farmers for seed quality tests.

[164] T.T. Htay, H. Than, N.H. Hom, H.H. Oo, K.K. Win, M.M. Kyu. (2016). Effect of different rates of nitrogen and potassium fertilizers application on growth and yield of Yezin-10 Hybrid Maize (*Zea mays* L.). *Journal of Agricultural Research*. 3(1) pp 25 - 32.

Reference ID: 23984

Note: #23984 > S serial #23939e

Abstract: The experiments were conducted in Yezin Agricultural University during rainy and winter seasons, 2015 to evaluate the effect of different rates of nitrogen and potassium fertilizers application on growth and yield of hybrid maize and to observe the relationship between nitrogen and potassium fertilizers for hybrid maize variety.

[165] K.M. Aung, T.T. Khaing, T. Lin, A. Win. (2016). Genetic architecture and heterosis of seed yield and yield contributing traits in mungbean (*Vigna radiata* (L.) Wilczek). Journal of Agricultural Research. 3(1) pp 33 - 40.

Reference ID: 23985

Note: #23985 > S serial #23939e

Abstract: Fifteen crosses resulting from 6 x 6 half diallel with parents were studied to know the genetic effects, variances and gene action and otherwise the magnitude of standard heterosis for yield and its components in mungbean. The result of simple analysis of the variance for all characters showed significant differences among genotypes and pointed the existence of variation in these characters for all tested genotypes.

[166] N.W. Lwin, T.T. Khaing, N.H. Hom, N.N. Htwe. (2016). Estimation of genetic repeatability and family x environment interactions in sugarcane (*Saccharum* spp. L.). Journal of Agricultural Research. 3(1) pp 41 - 46.

Reference ID: 23986

Note: #23986 > S serial #23939e

Abstract: Genotype x environment interaction complicates identification of superior varieties. The large genotype x environment interaction affects heritability negatively, as a consequence of reduction in selection efficiency. This study aimed at to estimate variance components and genetic repeatability of different selection environments for can yield and its components and to study nature of family x environment interaction effects in sugarcane.

[167] N. Aung, T.T. Khaing, H. Than, M.T. Zar. (2016). Evaluation of hybrid maize (*Zea mays* L.) performance crossing within inbreds developed by composite line selection method. Journal of Agricultural Research. 3(1) pp 47 - 54.

Reference ID: 23987

Note: #23987 > S serial #23939e

Abstract: Ten maize inbred lines developed by composite line selection method were crossed to obtain 45 F₁ hybrids. The experiment was conducted to evaluate general combining ability (GCA) of inbreds and specific combining ability (SCA) of crosses and to investigate high yielding hybrid combinations.

[168] S.S. Sein, N.M. Htwe, K. Toe, Y.M. Soe. (2016). Response of cultivars and seedling ages to morphological traits and yield of rice (*Oryza sativa* L.). Journal of Agricultural Research. 3(1) pp 55 - 61.

Reference ID: 23988

Note: #23988 > S serial #23939e

Abstract: Field experiments were carried out to study the appropriate seedling age to obtain maximum rice yield at the Department of Plant Breeding, Physiology and Ecology, during wet seasons 2013 and 2014. Three levels of seedling ages (21, 28 and 35 days old seedlings) and four high yielding rice varieties (Yadanar Toe, Sin Ekari-3, Sin Thwe Latt and Himawbi-5) were laid out in factorial randomized complete block design with three replications.

[169] T.M. Htay, N.M. Htwe, K. Toe, M.M. Aung. (2016). Genetic analysis of maize (*Zea mays* L.) inbreds and hybrids under normal irrigation and water deficit conditions. Journal of Agricultural Research. 3(1) pp 62 - 69.

Reference ID: 23989

Note: #23989 > S serial #23939e

Abstract: The 42 F₁ experimental hybrids and seven parental lines were investigated for the gene action of yield and morphological traits under normal and winter deficit conditions. The plant height, grain yield and anthesis-silking interval was recorded. The analysis of variance revealed that all characters were significantly different under both conditions.

[170] A.A. Tun, H.Y. Lwin, T. Than, T.M.Y. Aung. (2016). Assessment of rural livelihood in Kyaukpadaung Township as affected by PACT microfinance program. *Journal of Agricultural Research*. 3(1) pp 70 - 76.

Reference ID: 23990

Note: #23990 > S serial #23939e

Abstract: This study was conducted to assess the livelihood of rural households as affected by PACT microfinance program in Kyaukpadaung Township. The data were collected through personal interview in sample six villages in October 2014. Sample households were differentiated into participant and non-participant households in PACT microfinance program.

[171] W.W. Kyaw, Y.Y. Tun, Y. Hein, M.K. Thu. (2016). Profitability and marketing activities of maize growers in Tatkon Township. *Journal of Agricultural Research*. 3(1) pp 77 - 82.

Reference ID: 23991

Note: #23991 > S serial #23991e

Abstract: This study investigated the socio-economic characteristics, cost and return and marketing activities of maize production of selected farmers in Tatkon Township. The farm level survey and the market intermediary level survey were conducted in October-November 2014. Descriptive, cost and return and marketing margin analysis were used.

[172] T.W. Maung, C.C. San, T.D. Min, Y. Hein. (2016). Study on food security status on coping strategies of rural households in Myingyan Township, Dry Zone Area. *Journal of Agricultural Research*. 3(1) pp 83 - 89.

Reference ID: 23992

Note: #23992 > S serial #23939e

Abstract: This study was emphasized to estimate the food security status and coping strategies employed to food insecurity and better understanding of major determinants of per capita food expenditure at household level in Myingyan Township. The sample of 120 farm households and 77 landless households were interviewed in 6 villages by using simple random sampling method.

[173] S.A. Moe, S.M. Than, C.C. San. (2016). The impact of world palm oil price changes on edible oil industry of Myanmar: Case study on groundnut oil. *Journal of Agricultural Research*. 3(1) pp 98 - 104.

Reference ID: 23993

Note: #23993 > S serial #23939e

Abstract: The study attempted to investigate the influence of palm oil inflow and its price changes on market price of domestic groundnut oil, sesame oil and palm oil, to determine the relationship between world palm oil price and domestic palm oil price, to determine the inter-relationship between world palm oil price changes and demand of groundnut oil in Myanmar edible oil market. The study used secondary data only. Monthly data for edible oil prices of different types of oil in Myanmar, world palm oil prices, amount of palm oil import to Myanmar and total edible oil consumption in

Myanmar were collected from different sources from 2000 to 2013.

[174] M. Moh, C.C. San, T. Linn, N.M. Aung, K. Ngwe. (2016). Impact of land consolidation on profitability of rice production in the selected townships, Nay Pyi Taw. *Journal of Agricultural Research*. 3(1) pp 105 - 112.

Reference ID: 23994

Note: #23994 > S serial #23939e

Abstract: This study was investigated the socio-economic characteristics, the profitability of rice cultivation, the determinants of rice production and major constraints of rice production of participant and non-participant households.

[175] S.T. Shwe, K. Toe, M. Thuzar, M.Z.N. Aung. (2016). Effect of different concentrations of gibberellic acid (GA₃) and naphthalene acetic acid (NAA) on growth and yield of rice (*Oryza sativa* L.). *Journal of Agricultural Research*. 3(2) pp 7 - 15.

Reference ID: 23995

Note: #23995 > S serial #23941e

Abstract: The experiments were conducted to investigate the response of two hormones and different concentrations on growth and yield of rice. The experiments were laid out in split-plot design with three replications.

[176] E.E. Khaing, T.M. Htun, M. Aye, Y.Y. Min, N.H. Hom. (2016). Combining ability of maize (*Zea mays* L.) inbred lines for resistance to northern corn leaf blight caused by *Exserohilum turcicum*. *Journal of Agricultural Research*. 3(2) pp 16 - 21.

Reference ID: 23996

Note: #23996 > S serial #23941e

Abstract: This research was carried out to study the combining ability and heterosis for yield, yield components and resistance to northern corn leaf blight (NCLB) of maize inbred lines and experimental hybrids.

[177] T.Y. Soe, M.K. Thu, S.M. Than, T.T. Latt, K.T. Myint. (2016). Study on supply chain of cucumber in Mon State. *Journal of Agricultural Research*. 3(2) pp 29 - 36.

Reference ID: 23997

Note: #23997 > S serial #23941e

Abstract: Inefficiency in the supply chain leads to supply chain losses and wastages which finally results in higher prices paid by final consumers and less income to the farmers and other stakeholders. The study was done to analyze the structure of production costs and profit share of key actors along the chain and to identify constraints for the improvement of vegetable supply chain for the benefits of all key actors.

[178] M.Z. Myint, N.N. Htwe, T.D. Min, K.K. Win. (2016). Stacking habits of rice farmers in Phyu Township, Bago (East) Region. *Journal of Agricultural Research*. 3(2) pp 37 - 42.

Reference ID: 23998

Note: #23998 > S serial #23941e

Abstract: Stacking of rice after harvest on bunds is commonly practiced by farmers in rice-pulses growing area to catch up their second crop. Stacking of harvested rice on the bund increases exposure to rain and results in deterioration of grain. This study was conducted to understand farmer's stacking habits and their perception on stacking of rice after harvest in rice growing area.

[179] T.H. Thu, M.M. Aung, N.M. Htwe, S.S. Mar. (2016). Inventory and diversity of neglected and underutilized plant species in Magway District. *Journal of Agricultural Research*. 3(2) pp 43 - 50.

Reference ID: 23999

Note: #23999 > S serial #23941e

Abstract: The study was conducted in 18 villages of six townships in Magway district during 2013 - 2014. A total of 180 farmers and 54 key informants were surveyed to identify the distribution and quantify the diversity of neglected and underutilized species (NUS) at homestead and on-farm, to determine the factors that affect on species richness and plant density and to study their ethnobotanical uses.

[180] K.M. Hein, S.S. Aye, T.A.A. Naing. (2016). Host plant resistance of sugarcane varieties to Red Rot disease caused by *Colletotrichum falcatum*. *Journal of Agricultural Research*. 3(2) pp 51 - 56.

Reference ID: 24000

Note: #24000 > S serial #23941e

Abstract: Sugarcane is one of the major industrial crops in Myanmar and red rot is regarded as an important disease limiting the yield. This study was conducted to evaluate the resistant levels of different sugarcane varieties against *Colletotrichum falcatum* in Myanmar Kawlin, Khin-U and Thandwe isolates of *C. Falcatum* were used in this pot experiment.

[181] E. Ei, M. Lin, T.A.A. Naing. (2016). Response of selected corn varieties to different nitrogen levels against Northern Leaf Blight caused by *Exserohilum turcicum*. *Journal of Agricultural Research*. 3(2) pp 57 - 64.

Reference ID: 24001

Note: #24001 > S serial #23941e

Abstract: Northern corn leaf blight (NCLB) caused by the fungus *Exserohilum turcicum* is one of the most serious diseases and occurs on corn throughout the world. In Myanmar, the systematic studies and the information regarding the management of this pathogen on corn are limited and NCLB may inflict heavy losses to the crop in the country.

[182] N.N. Oo, N.K.K. Win, T.A.A. Naing. (2016). Morphological and cultural variability and mycelial compatibility among *Sclerotium rolfsii* isolates. *Journal of Agricultural Research*. 3(2) pp 65 - 71.

Reference ID: 24002

Note: #24002 > S serial #23941e

Abstract: *Sclerotium rolfsii* Sacc. isolates were collected from ten host plants of different locations in Yezi Nay Pyi Taw during 2014 - 2015. Ten isolates were studied for morphological and cultural characters, and mycelial compatibility. Most of them were fluffy colonies while the chickpea isolate was less fluffy.

[183] T. Cung, A.A. Thwe, M.Z.N. Aung, K. Toe, K.T. Myint. (2016). Plant growth and yield performance of broccoli (*Brassica oleracea* var. *italica*) as influenced by gibberellic acid. *Journal of Agricultural Research*. 3(2) pp 72 - 78.

Reference ID: 24003

Note: #24003 > S serial #23941e

Abstract: Plant growth regulators (PGRs) have a great influence on plant growth, development and yield. To determine the effects of gibberellic acid (GA3) on plant growth and yield of broccoli, the experiment was carried out at two locations

(Department of Horticulture and Agricultural Biotechnology, Yezin Agricultural University (YAU), Nay Pyi Taw and Nwe Yit village (NY), Tatkone township, Nay Pyi Taw) from October 2012 to February 2013.

[184] T.N.N. Zaw, S.S. Myint, N.H. Hom, T.M.Y. Aung, K.T. Myint. (2016). Growing status and species distribution of traditional vegetables in Pyinmana area. *Journal of Agricultural Research*. 3(2) pp 79 - 88.

Reference ID: 24004

Note: #24004 > S serial #23941e

Abstract: Traditional vegetables are of great values for both nutritional security and breeding programs. This survey was conducted to observe and document the growing status and species distribution of traditional vegetables (TVs) in Pynimmana area.

[185] M.M. Kyi, K. Ngwe, T.T. Khaing, N.M. Htwe, N.H. Hom. (2016). Performance of cotton varieties (*Gossypium hirsutum* L.) for yield and fiber quality characters under two micro-environment. *Journal of Agricultural Research*. 3(2) pp 89 - 94.

Reference ID: 24005

Note: #24005 > S serial #23941e

Abstract: Present study was carried out to evaluate the response of cotton varieties to two nitrogen levels on yield and yield components characters along with fiber quality traits in Lungyaw Cotton Research and Production Farm, Kyaukse Township during 2013-2014 post monsoon season.

[186] C.C. San, Y.Y. Min, T.A.A. Naing. (2016). Evaluation of effectiveness of different disease control measures on banded leaf and sheath blight of maize caused by *Rhizoctonia solani*. *Journal of Agricultural Research*. 3(2) pp 95 - 102.

Reference ID: 24006

Note: #24006 > S serial #23941e

Abstract: Banded leaf and sheath blight (BLSHB) of maize is caused by the fungus *Rhizotonia solani*. Effective control methods are still essential to minimize the disease infection in order to reduce grain yield loss qualitatively and quantitatively.

[187] T.T.S. Min, S.S. Aye, T.A.A. Naing. (2016). Varietal response of groundnut to *Cercospora* leaf spots and rust diseases. *Journal of Agricultural Research*. 3(2) pp 103 - 110.

Reference ID: 24007

Note: #24007 > S serial #23941e

Abstract: The study was conducted to evaluate varietal response of some groundnut varieties to major fungal foliar diseases at the field of Yezin Agricultural University during the rainy season, June-September 2014 and the winter season, November-February 2014-2015.

[188] Y. Yamamoto. (2017). Rice Cultivation and Current Research Topics in Japan with Special Reference to Global Warming. Tenth Agricultural Research Conference. pp 1 - 11.

Reference ID: 24008

Note: #24008 > S 26.1.6 #23944e

Abstract: Rice cultivation in Japan is characterized by the well-developed irrigation system and mechanization. The mechanization was drastically reduced the working hours for rice cultivation. At present (2012), the planted area, yield and production of rice in Japan are 1.58 million ha, 5.4t (brown rice=6.75t as paddy)/ha and 8.5 million

ton (brown rice=10. million ton as paddy). Due to the over-production of rice caused by reduction of rice consumption rate of the people, ca. 0.9 million ha paddy field is converted into other crop field or left some area uncultivated.

[189] M.S. Hla. (2017). Some Heavy Metal Contents in Selected Plants from Irrigated Farmlands in Taungoo Area. Tenth Agricultural Research Conference. pp 12 - 25.

Reference ID: 24009

Note: #24009 > S 26.1.6 #23944e

Abstract: There are small scale farmlands along the Sittaung River bank in Taungoo area. Taungoo is located at the west bank of Sittaung River, Bago Region. It is situated on northern part of central alluvial plane of Sittaung River basin. In this study, six soil samples from farmlands along the Sittaung River bank in Taungoo area were collected together with four selected plants viz, bean (*Phaseolus vulgaris*), brinjal (*Solanum melongena*), spinach (*Spinacia oleracea*) and asparagus (*Asparagus officinalis*) for some heavy metals (cadmium, chromium, lead, copper, manganese and zinc) investigation by using atomic absorption spectrophotometer.

[190] T.M. Htay. (2017). Climate Change Indices for Myanmar. Tenth Agricultural Research Conference. pp 26 - 38.

Reference ID: 24010

Note: #24010 > S 26.1.6 #23944e

Abstract: Extreme climate events usually have strong impacts on society, water resources, health, and agriculture sectors. Small changes in the mean condition can cause a large change in the likelihood of an extreme. In this study, we have run RCLimDex software in order to calculate climate indices based on 27 indices parameters. Input data are daily temperature (maximum and minimum) and precipitation data for 9 stations in Department of Meteorology and Hydrology, Myanmar, the period from 1970 to 2013.

[191] N.N. Htwe, M.D. Thant, S.P. Oo, T.M.Y. Aung, T. Myint, K.K. Win, K. Oo. (2017). Impact of Climate Change on Livelihood Assets in Farming Community: A Case Study in Selected Townships in Central Dry Zone of Myanmar. Tenth Agricultural Research Conference. pp 39 - 47.

Reference ID: 24011

Note: #24011 > S 26.1.6 #23944e

Abstract: Rural populations are undergoing rapid changes in both their livelihoods and land uses, with associated impacts on ecosystems, global biogeochemistry, and climate change. This study was conducted at Tatkon, Nyaung U and Meiktila Townships in October 2015, April 2016 and November 2016. The objectives of this study were to identify the livelihoods of the farmers, and to assess the impact of climate change on livelihood assets in farming community in selected township

[192] H.A. Shein. (2017). The Integrated Crops Management on Climate Friendly Agriculture in Myanmar's Food Security. Tenth Agricultural Research Conference. pp 55 - 60.

Reference ID: 24012

Note: #24012 > S 26.1.6 #23944e

Abstract: Agriculture in Myanmar's Food Security is depend on activities of Department of Agriculture by high-yielding and quality seed production, training and education activities for good agricultural practices and research and development activities on Myanmar promotio of productivity in agriculture. Development of

appropriate agro-technology through proper research on soil, seeds, water, fertilizer, pest & diseases, weeds management (Integrated Crops Management) especially varietal improvement and good agricultural practices (GAP) in order to increase the production of major crops.

[193] M.S. Thein. (2017). Diversity Assessment and Indigenous Selection of Paw San Rice (*Oryza sativa* L.) Germplasm. Tenth Agricultural Research Conference. pp 61 - 87.

Reference ID: 24013

Note: #24013 > S 26.1.6 #23944e

Abstract: Myanmar is one of the centers of genetic diversity of rice and consists of diverse local varieties. Among the local varieties, Meedon group including Paw San rice varieties are important for local adaptability, low nitrogen requirement and premium price, and have been cultivated for a long time in rainfed lowlands area in Myanmar. Out-crossing by other local varieties and/or common wild rice and negative mutation may lead to varietal degradation.

[194] H.H. Aung, K. Toe, T.D. Min, N.M. Htwe, A.N. Oo. (2017). Genetic Variability, Correlation and Path Analysis for Grain Yield in Four Promising Rice (*Oryza sativa* L.) Recombinant Inbred Lines from (Ayeyar Min/Yadanar Toe). Tenth Agricultural Research Conference. pp 88 - 101.

Reference ID: 24014

Note: #24014 > S 26.1.6 #23944e

Abstract: In analysis of four rice RILs derived from Ayeyar Min and Yadanar Toe, together with Yadanar Toe in two growing seasons (2015-16 summer and 2016-17 rainy), grain yield, plant height and panicle number per plant were significant differences between genotypes in each and both seasons. Highly significant differences among seasons were occurred in plant height and panicle length.

[195] K.K. Aung, K. Toe, T.D. Min, N.M. Htwe, A.N. Oo. (2017). Path Coefficient Analysis of Salt Tolerance Characters in Different Cotton Genotypes. Tenth Agricultural Research Conference. pp 102 - 117.

Reference ID: 24015

Note: #24015 > S 26.1.6 #23944e

Abstract: This study was aimed to evaluate salt tolerance characters among diverse cotton genotypes. Climatic factors may accelerate salinization. As salinity stress is becoming one of the major constraints in agricultural productivity and a substantial variation in tolerance to salinity among cotton genotypes, screening of salinity tolerance related characters is important in cotton reproduction.

[196] H.M. Thant, A.A. Thwe, M.K. Thu, N.M. Htwe, K.T. Myint. (2017). Collection, Characterization and Evaluation of Eggplant (*Solanum* spp.) Germplasm in Myanmar. Tenth Agricultural Research Conference. pp 118 - 137.

Reference ID: 24016

Note: #24016 > S 26.1.6 #23944e

Abstract: In Myanmar, the specific attempt in collection and identification of eggplant germplasm was rarely found. To identify the morpho-physiological diversity of 40 germplasm, the experiment was conducted at Horticulture Section, Department of Agricultural Research (DAR), Yezin from May to October, 2016. Randomized Complete Block Design (RCBD) with three replications was used. Morpho-physiological divergence among 40 eggplant germplasm was estimated using cluster

and principal component analysis (PCA).

[197] H.S. Mon, K.M. Swe, T. Linn, Y.Y. Lin, A.M. Thant, C.C. Mar, M.T. Aung, A.A. Thein, S. Moe, K.S. Aung, S.W. Tin, T.K. Oo, T.M. Aung, N.M. Htwe. (2017). Genetic Divergence of Quantitative Traits in F₆ Generations of Rice (*Oryza Sativa* L.). Tenth Agricultural Research Conference. pp 138 - 147.

Reference ID: 24017

Note: #24017 > S 26.1.6 #23944e

Abstract: Selection among recombinant inbred lines is considered as desirable genetic resources for the production of new varieties. The purpose of this study was to estimate the genetic variability and diversity of recombinant inbred lines developed through pedigree method of selection; and to determine the genotypic and phenotypic correlation of grain yield with yield components traits.

[198] K.K. Oo, K.T. Myint, T.T. Khaing, S.S. Shwe. (2017). *In Vitro* Regeneration of Selected Potato Cultivars using Different Plant Growth Regulators and Different Culture Systems. Tenth Agricultural Research Conference. pp 148 - 158.

Reference ID: 24018

Note: #24018 > S 26.1.6 #23944e

Abstract: Potato (*Solanum tuberosum* L.) belongs to the family Solanaceae and it is the fourth largest food crop after rice, wheat and maize. In Myanmar, potato is also one of the main culinary crops and a promising profitable crop to growers, so cultivation of potato has been being extended to the arable lands. Mass production of disease free, high quality seed tubers for potato growers is demanded. Moreover, rapid and economically feasible tissue culture technology for potato shoot multiplication needs to be explored.

[199] A.K. Thu, S.S. Thein, A.K. Myint, K. Toe, K.M. Htay. (2017). Effects of Crop Residues Mulching on Soil Water Status, Water Use Efficiency and Crop Yield under Different Cropping Patterns in Magway. Tenth Agricultural Research Conference. Myanmar. pp 178 - 200.

Reference ID: 24019

Note: #24019 > S 26.1.6 #23944e

Abstract: Dryland farming is farming where the soil moisture becomes the limiting factor for the crop to grow and to produce in some periods in a year. Four consecutive seasons field experiments (monsoon and post monsoon seasons of 2014 and 2015) were conducted at the Oilseed Crop Research Center, Magway, Central Dryzone of Myanmar. The experimental design was RCB factorial arrangements with three replications.

[200] K.L. Swe, K. Ando. (2017). Rice Production in Salt Affected Areas of Central Dry Zone, Myanmar. Tenth Agricultural Research Conference. Myanmar. pp 201 - 212.

Reference ID: 24020

Note: #24020 > S 26.1.6 #23944e

Abstract: Summer rice program was introduced in 1992 in Myanmar and almost all irrigated areas were encouraged for double rice cropping. After about three to five years were encouraged for double rice cropping. After about three to five years of Kinda Dam Irrigation, which started in early 1990s in the Central Dry Zone, rice farmers started facing the salinity problems with a significant yield loss. Considerable rice areas in several village tracts were abandoned due to the strong salinity.

[201] M. Mya, S.N. Win, M.M. Thin. (2017). Creating Climate Resilient Crop Management by Enhancing Arbuscular Mycorrhizal Fungi Associations in Coffee. Tenth Agricultural Research Conference. Myanmar. pp 213 - 228.

Reference ID: 24021

Note: #24021 > S 26.1.6 #23944e

Abstract: Arbuscular mycorrhizae symbiotic association formed between the roots of most plant species and fungi is one of the approach in creating climate resilient agriculture. These symbiosis are characterized by bi-directional movement of nutrients where carbon flows to the fungus and inorganic nutrients move to the plant, thereby providing a critical linkage between the plant root and soil. Research data on arbuscular mycorrhizal association in coffee seedlings in Myanmar are summarized in this paper.

[202] K.K. Than. (2017). The Response of the Growth and Flowering of Chrysanthemum to Burned Soil and Vermitea Compared with Chemical Fertilizer. Tenth Agricultural Research Conference. pp 229 - 241.

Reference ID: 24022

Note: #24022 > S 26.1.6 #23944e

Abstract: This study was carried out at Yezin Agricultural University (Mawlamyine campus) in order to use natural fertilizers such as Mon-people practicing burned soil and local earthworm producing vermites as alternative to compound fertilizer (15-15-15) on the marketable flower production and plant growth of chrisanthemum.

[203] Y.Y. Khaing, N.K.K. Win, T.A.A. Naing. (2017). Effect of Different Fungicides on *Ustilaginoidea virens* in vitre and Inoculation Techniques for False Smut Dsease of Rice. Tenth Agricultural Research Conference. pp 242 - 254.

Reference ID: 24023

Note: #24023 > S 26.1.6 #23944e

Abstract: During raining season of 2015, the disease occurrence of false smut (FS) was surveyed in the fields of Yezin and Sein Sar Pin areas. The disease incidence and severity varied significantly among the five varieties in those areas.

[204] H.M. Khaing, A.N. Oo, S.S. Thein, K.K. Win, S.S. Win, K. Ngwe. (2017). Different Fertilizers Management Practices on Yield and Yield Components of Three Rice Varieties in Daik-U and Maubin Townships. Tenth Agricultural Research Conference. pp 255 - 266.

Reference ID: 24024

Note: #24024 > S 26.1.6 #23944e

Abstract: Field experiments were conducted to find out the appropriate use of NPK fertilizer on yield for the three varieties of rice by studying yield and yield components using different rates of NPK fertilizer in Daik-U and Maubin Townships during November 2015 to April 2016.

[205] I. Subekti, N. Khumaida, S.W. Ardie. (2017). Identification of potentially high yielding irradiated cassava 'Gajah' genotype with different geographic coordinates. IOP Conference Series: Earth and Environmental Science. 54 pp 1 - 8.

Reference ID: 24025

Note: #24025e

Abstract: Cassava is one of the main and important carbohydrate producing crops in Indonesia. Thus cassava production and its tuber quality need to be improved. 'Gajah' genotype is a local genotypes cassava from East Kalimantan, has high potential yield

(> 60 ton Ha⁻¹). However, the harvest time of this genotype is quite long (>= 12 months). The objective of this research was to identify the high yielding cassava mutants from the gamma rays irradiated 'Gajah' genotype at M1V3 population and potential yield at different location. Several putative cassava mutants (12 mutants) were planted in Cikabayan Experimental Field, IPB from March 2015 to March 2016 and the yields compared with the same genotype grown at different location by seeing its coordinates to observe the potential yield. Our result showed that the fresh tuber weight per plant of some putative mutants could reach more than 8 kg (yield potential of 64 ton Ha⁻¹). The harvested tubers also had sweet flavor, although the tubers of some putative mutants were bitter. Based on previous research study, the different geographic coordinate has resulted variability on fresh tuber yield. It seems that it needs to observe the stability of 'Gajah'- irradiated mutants in several location in Java Island.

[206] W. Qin, C. Hu, O. Oenema. (2015). Soil mulching significantly enhances yields and water and nitrogen use efficiencies of maize and wheat: a meta-analysis. Nature Scientific Report. pp 1 - 13.

Reference ID: 24026

Note: #24026e

Abstract: Global crop yields are limited by water and nutrient availability. Soil mulching (with plastic or straw) reduces evaporation, modifies soil temperature and thereby affects crop yields. Reported effects of mulching are sometimes contradictory, likely due to differences in climatic conditions, soil characteristics, crop species, and also water and nitrogen (N) input levels. Here we report on a meta-analysis of the effects of mulching on wheat and maize, using 1310 yield observations from 74 studies conducted in 19 countries. Our results indicate that mulching significantly increased yields, WUE (yield per unit water) and NUE (yield per unit N) by up to 60%, compared with no-mulching. Effects were larger for maize than wheat, and larger for plastic mulching than straw mulching. Interestingly, plastic mulching performed better at relatively low temperature while straw mulching showed the opposite trend. Effects of mulching also tended to decrease with increasing water input. Mulching effects were not related to soil organic matter content. In conclusion, soil mulching can significantly increase maize and wheat yields, WUE and NUE, and thereby may contribute to closing the yield gap between attainable and actual yields, especially in dryland and low nutrient input agriculture. The management of soil mulching requires site-specific knowledge.

[207] A.P. De Souza, L.N. Massenburg, D. Jaiswal, S. Cheng, R. Shekar, S.P. Long. (2017). Rooting for cassava: insights into photosynthesis and associated physiology as a route to improve yield potential. New Phytologist. pp 50 - 65.

Reference ID: 24027

Note: #24027e

Abstract: As a consequence of an increase in world population, food demand is expected to grow by up to 110% in the next 30–35 yr. The population of sub-Saharan Africa is projected to increase by > 120%. In this region, cassava (*Manihot esculenta*) is the second most important source of calories and contributes c. 30% of the daily calorie requirements per person. Despite its importance, the average yield of cassava in Africa has not increased significantly since 1961. An evaluation of modern cultivars of cassava showed that the interception efficiency (ϵ_i) of photosynthetically active radiation (PAR) and the efficiency of conversion of that intercepted PAR (ϵ_c) are major opportunities for genetic improvement of the yield potential. This review examines

what is known of the physiological processes underlying productivity in cassava and seeks to provide some strategies and directions toward yield improvement through genetic alterations to physiology to increase ϵ_i and ϵ_c . Possible physiological limitations, as well as environmental constraints, are discussed.

[208] S. Schittenhelm. (2010). Effect of Drought Stress on Yield and Quality of Maize/Sunflower and Maize/Sorghum Intercrops for Biogas Production. Journal of Agronomy and Crop Science. 196 pp 253 - 261.

Reference ID: 24028

Note: #24028e

Abstract: Intercropping represents an alternative to maize (*Zea mays* L.) monoculture to provide substrate for agricultural biogas production. Maize was intercropped with either sunflower (*Helianthus annuus* L.) or forage sorghum [*Sorghum bicolor* (L.) Moench] to determine the effect of seasonal water supply on yield and quality of the above-ground biomass as a fermentation substrate. The two intercrop partners were grown in alternating double rows at plant available soil water levels of 60–80 %, 40–50 % and 15–30 % under a foil tunnel during the years 2006 and 2007 at Braunschweig, Germany. Although the intercrop dry matter yields in each year increased with increasing soil moisture, the partner crops responded quite differently. While maize produced significantly greater biomass under high rather than low water supply in each year, forage sorghum exhibited a significant yield response only in 2006, and sunflower in none of the 2 years. Despite greatly different soil moisture contents, the contribution of sorghum to the intercrop dry matter yield was similar, averaging 43 % in 2006 and 40 % in 2007. Under conditions of moderate and no drought stress, sunflower had a dry matter yield proportion of roughly one-third in both years. In the severe drought treatment, however, sunflower contributed 37 % in 2006 and 54 % in 2007 to the total intercrop dry matter yield. The comparatively good performance of sunflower under conditions of low water supply is attributable to a fast early growth, which allows this crop to exploit the residual winter soil moisture. While the calculated methane-producing potential of the maize/sorghum intercrop was not affected by the level of water supply, the maize/sunflower intercrop in 2006 had a higher theoretically attainable specific methane yield under low and medium than under high water supply. Nevertheless, the effect of water regime on substrate composition within the intercrops was small in comparison with the large differences between the intercrops.

[209] Y. Du, W. He, C. Deng, X. Chen, L. Gou, F. Zhu, W. Guo, J. Zhang, T. Wang. (2016). Flowering-Related RING Protein 1 (FRRP1) Regulates Flowering Time and Yield Potential by Affecting Histone H2B Monoubiquitination in Rice (*Oryza Sativa*). Plos One. 11(3) pp 1 - 19.

Reference ID: 24029

Note: #24029e

Abstract: Flowering time is a critical trait for crops cultivated under various temperature/photoperiod conditions around the world. To understand better the flowering time of rice, we used the vector pTCK303 to produce several lines of RNAi knockdown transgenic rice and investigated their flowering times and other agronomic traits. Among them, the heading date of FRRP1-RNAi knockdown transgenic rice was 23–26 days earlier than that of wild-type plants. FRRP1 is a novel rice gene that encodes a C3HC4-type Really Interesting Novel Gene (RING) finger domain protein. In addition to the early flowering time, FRRP1-RNAi knockdown transgenic rice caused changes on an array of agronomic traits, including plant height, panicle length

and grain length. We analyzed the expression of some key genes associated with the flowering time and other agronomic traits in the FRRP1-RNAi knockdown lines and compared with that in wild-type lines. The expression of Hd3a increased significantly, which was the key factor in the early flowering time. Further experiments showed that the level of histone H2B monoubiquitination (H2Bub1) was noticeably reduced in the FRRP1-RNAi knockdown transgenic rice lines compared with wild-type plants and MBPFRRP1-F1 was capable of self-ubiquitination. The results indicate that Flowering Related RING Protein 1 (FRRP1) is involved in histone H2B monoubiquitination and suggest that FRRP1 functions as an E3 ligase in vivo and in vitro. In conclusion, FRRP1 probably regulates flowering time and yield potential in rice by affecting histone H2B monoubiquitination, which leads to changes in gene expression in multiple processes.

[210] P.S. Carberry, W. Liang, S. Twomlow, D.P. Holzworth, J.P. Dimes, T. McClelland, N.I. Huth, F. Chen, Z. Hochman, B.A. Keating. (2013). Scope for improved eco-efficiency varies among diverse cropping systems. PNAS. 110(21) pp 8381 - 8386.

Reference ID: 24030

Note: #24030e

Abstract: Global food security requires eco-efficient agriculture to produce the required food and fiber products concomitant with ecologically efficient use of resources. This eco-efficiency concept is used to diagnose the state of agricultural production in China (irrigated wheat–maize double-cropping systems), Zimbabwe (rainfed maize systems), and Australia (rainfed wheat systems). More than 3,000 surveyed crop yields in these three countries were compared against simulated grain yields at farmer-specified levels of nitrogen (N) input. Many Australian commercial wheat farmers are both close to existing production frontiers and gain little prospective return from increasing their N input. Significant losses of N from their systems, either as nitrous oxide emissions or as nitrate leached from the soil profile, are infrequent and at low intensities relative to their level of grain production. These Australian farmers operate close to ecoefficient frontiers in regard to N, and so innovations in technologies and practices are essential to increasing their production without added economic or environmental risks. In contrast, many Chinese farmers can reduce N input without sacrificing production through more efficient use of their fertilizer input. In fact, there are real prospects for the double-cropping systems on the North China Plain to achieve both production increases and reduced environmental risks. Zimbabwean farmers have the opportunity for significant production increases by both improving their technical efficiency and increasing their level of input; however, doing so will require improved management expertise and greater access to institutional support for addressing the higher risks. This paper shows that pathways for achieving improved eco-efficiency will differ among diverse cropping systems.

[211] T.A.M. Pugh, C. Muller, J. Elliott, D. Deryng, C. Folberth, S. Olin, E. Schmid, A. Arneth. (2016). Climate analogues suggest limited potential for intensification of production on current croplands under climate change. Nature Communications. 7 pp 1 - 8.

Reference ID: 24031

Note: #24031e

Abstract: Climate change could pose a major challenge to efforts towards strongly increase food production over the coming decades. However, model simulations of future climate-impacts on crop yields differ substantially in the magnitude and even

direction of the projected change. Combining observations of current maximum-attainable yield with climate analogues, we provide a complementary method of assessing the effect of climate change on crop yields. Strong reductions in attainable yields of major cereal crops are found across a large fraction of current cropland by 2050. These areas are vulnerable to climate change and have greatly reduced opportunity for agricultural intensification. However, the total land area, including regions not currently used for crops, climatically suitable for high attainable yields of maize, wheat and rice is similar by 2050 to the present-day. Large shifts in land-use patterns and crop choice will likely be necessary to sustain production growth rates and keep pace with demand.

[212] I.E. Henson. (2010). Oil Palm: Ecophysiology of Growth and Production. Book. pp 253 - 286.

Reference ID: 24032

Note: #24032e > S 8.1 #23367 (Chapter 10)

Abstract: Cultivation of the oil palm (*Elaeis guineensis* Jacq.) has expanded tremendously in recent years such that it has now become a major source of the world supply of vegetable oil, and is one of the most important tree crops in the humid tropics, with its main centre of production in Southeast Asia. Oil palm is the world's most productive oil crop and is, in addition very versatile, producing two distinct oils, mesocarp (palm) oil and palm kernel oil, which find a variety of food and non-food applications, as well as palm kernel cake (used as animal feedstuff) and a number of other products of fruit processing that find use as fertilizers, soil conditioners and as a source of fuel. Biological features recognized as critical to the high productivity of the crop include its perennial and evergreen nature (resulting in a continuous year-round canopy that intercepts a high proportion of incoming solar radiation, a year-round production of fruit bunches and a high partitioning of total assimilates into harvested products. It has also, for a C₃ plants, a relatively high rate of photosynthesis. This chapter examines these features, the relationships between vegetative and reproductive growth, and the sensitivity of the crop to environmental conditions.

[213] M. Reynolds, D. Bonnett, S.C. Chapman, R.T. Furbank, Y. Manes, D.E. Mather, M.A.J. Parry. (2011). Raising yield potential of wheat. I.: Overview of a consortium approach and breeding strategies. *Journal of Experimental Botany*. 62(2) pp 439 - 452.

Reference ID: 24033

Note: #24033e

Abstract: Theoretical considerations suggest that wheat yield potential could be increased by up to 50% through the genetic improvement of radiation use efficiency (RUE). However, to achieve agronomic impacts, structural and reproductive aspects of the crop must be improved in parallel. A Wheat Yield Consortium (WYC) has been convened that fosters linkage between ongoing research platforms in order to develop a cohesive portfolio of activities that will maximize the probability of impact in farmers' fields. Attempts to increase RUE will focus on improving the performance and regulation of Rubisco, introduction of C₄-like traits such as CO₂-concentrating mechanisms, improvement of light interception, and improvement of photosynthesis at the spike and whole canopy levels. For extra photo-assimilates to translate into increased grain yield, reproductive aspects of growth must be tailored to a range of agroecosystems to ensure that stable expression of a high harvest index (HI) is achieved. Adequate partitioning among plant organs will be critical to achieve favourable expression of HI, and to ensure that plants with heavier grain have strong

enough stems and roots to avoid lodging. Trait-based hybridization strategies will aim to achieve their simultaneous expression in elite agronomic backgrounds, and wide crossing will be employed to augment genetic diversity where needed; for example, to introduce traits for improving RUE from wild species or C4 crops. Genomic selection approaches will be employed, especially for difficult-to-phenotype traits. Genome-wide selection will be evaluated and is likely to complement crossing of complex but complementary traits by identifying favourable allele combinations among progeny. Products will be delivered to national wheat programmes worldwide via well-established international nursery systems and are expected to make a significant contribution to global food security.

[214] I.S. Tokatlidis. (2001). The effect of improved potential yield per plant on crop yield potential and optimum plant density in maize hybrids. *Journal of Agricultural Science*. 137 pp 299 - 305.

Reference ID: 24034

Note: #24034e

Abstract: Honeycomb selection in the F₂ generation of maize (*Zea mays* L.) hybrid PR 3183, based on line performance per se in the absence of competition, led to recycled hybrids with improved potential yield per plant (mean yield per plant in the absence of competition). In the present study six S₆ x S₆ recycled hybrids and two commercial single-cross hybrids (PR 3183 and B73xMo17) were tested at three plant densities (25000, 41667 and 83333 plants/ha), in two locations (Technological Education Institute farm of Florina, Greece and University farm of Thessaloniki, Greece), for 2 years (1998, 1999). The study was undertaken to assess indirectly the potential yield per plant (p), the crop yield potential (Y_{max}), and the optimum plant density (D_{opt}) of the hybrids. Estimate of p and Y_{max} were obtained through linear regression analysis of yield per plant (Y_p) on plant density (D), expressed by the equation $Y_p = p - qD$, with Y_{max} being equal to $(1/4)p^2q^{-1}$. Optimum plant density was assessed through linear regression analysis of natural logarithm of yield per plant on plant density, expressed by the equation $\ln(Y_p) = \alpha - bD$, with D_{opt} being equal to $1/b$. The recycled hybrids had higher estimated potential yield per plant (p), than the two check hybrids, with p values being positively correlated with yield per plant of hybrids obtained experimentally in the absence of competition. Results indicated that the higher potential yield per plant decreases the optimum plant density, and renders the hybrids less density-dependent.

[215] V.S. Santhosh Mithra, J. Sreekumar, C.S. Ravindran. (2013). Computer simulation of cassava growth: a tool for realizing the potential yield. *Archives of Agronomy and Soil Science*. 59(4) pp 603 - 623.

Reference ID: 24035

Note: #24035e

Abstract: In this article, a process model (SIMCAS) for simulating the growth of cassava is proposed. Crop phenology was simulated as a function of growing degree days (GDD). New algorithms are used in this model to simulate different components of crop phenology. Branching is simulated as a function of the number of leaves and total dry matter produced. Standard methods were followed to compute solar radiation and photosynthesis. Sensitivity analysis confirmed the importance of canopy size on tuber yield. Algorithms for estimating stress due to a shortage of water, nitrogen and potassium are also included in this model. An attempt was made to predict the final yield under field conditions by multiplying stress values by potential yield. The model was tested under different environments. The tuber yield predicted by this model is in

good agreement with the corresponding observed values in most of the cases. Estimation of stress due to a shortage of nitrogen, potassium and water is the key aspect of this model. This information can be used to manage stress and thereby achieve the potential yield. By improving the stress algorithm, this model will serve as a useful tool for achieving maximum cassava yield at optimum input level.

[216] University of Turin. (1997). Capsicum & Eggplant Newsletter. 16 pp 1 - 137.

Reference ID: 24036

Note: #24036e

[217] G.M.S. Sartori, E. Marchesan, C.F. Azevedo, N.A. Streck, R. Roso, L.L. Coelho, M.L. de Oliveira. (2013). Rendimento de grãos e eficiência no uso de água de arroz irrigado em função da época de semeadura: Grain yield and water use efficiency in irrigated rice according to sowing date. *Ciência Rural*. 43(3) pp 397 - 403.

Reference ID: 24037

Note: #24037e (note Journal is in Portuguese, journal title in e-library is in English)

Abstract: RESUMO: Uma das práticas desafiadoras de manejo é aumentar a produção de arroz utilizando menos água. O experimento foi realizado nas safras de 2010/11 e 2011/12 na área experimental da Universidade Federal de Santa Maria, Rio Grande do Sul. O objetivo foi avaliar o rendimento de grãos e a eficiência do uso de água na semeadura no início e final da época recomendada. Os tratamentos foram as épocas de semeadura (01/10/10 e 01/12/10) safra 2010/11, e (27/09/11 e 07/12/11) safra 2011/12, com cinco repetições, e a cultivar utilizada foi a 'IRGA 424'. Não houve diferença no volume de água aplicado entre as épocas de semeadura, com volume médio de 5757 e 8420m³ ha⁻¹, respectivamente, para safra 2010/11 e 2011/12. A época de semeadura afetou o rendimento de grãos, com rendimento de 13 e 24% a mais nas semeaduras do início da época (01/10/10 e 27/09/11), comparado às semeaduras do final da época (01/12/10 e 07/12/11), respectivamente. A semeadura realizada no início da época recomendada (início de outubro) proporciona maior rendimento de grãos e maior eficiência no uso de água.

ABSTRACT: One of the challenging management practices is to increase rice production using less water. The study was conducted during the harvest of 2010/11 and 2011/12 in the experimental field of Universidade Federal de Santa Maria, Rio Grande do Sul State, Brazil. The objective was to evaluate the yield and water use efficiency at sowing at beginning and end of the recommended time. Treatments were at planting dates (10/01/10 and 12/01/10) 2010/11 harvest, and (9/27/11 and 12/07/11) 2011/12 harvest, with five replicates, the cultivar used was the 'IRGA 424'. There was no difference in the amount of applied water between sowing times, with an average of 5757 and 8420m³ ha⁻¹, respectively for season 2010/11 and 2011/12. The sowing date affected grain yield, with yields of 13 and 24% more in the beginning of the sowing season (10/01/10 and 9/27/11) compared to the end of the sowing date (12/01/10 and 12/07/11), respectively. Sowing early in the recommended period (early October) provides greater yield and more water use efficiency.

[218] X. Wei, J. Xu, H. Guo, L. Jiang, S. Chen, C. Yu, Z. Zhou, P. Hu, H. Zhai, J. Wan. (2010). DTH8 Suppresses Flowering in Rice, Influencing Plant Height and Yield Potential Simultaneously. *Plant Physiology*. 153 pp 1747 - 1758.

Reference ID: 24038

Note: #24038e

Abstract: The three most important agronomic traits of rice (*Oryza sativa*), yield, plant height, and flowering time, are controlled by many quantitative trait loci (QTLs). In this

study, a newly identified QTL, DTH8 (QTL for days to heading on chromosome 8), was found to regulate these three traits in rice. Map-based cloning reveals that DTH8 encodes a putative HAP3 subunit of the CCAAT-box-binding transcription factor and the complementary experiment increased significantly days to heading, plant height, and number of grains per panicle in CSSL61 (a chromosome segment substitution line that carries the nonfunctional DTH8 allele) with the Asominori functional DTH8 allele under long-day conditions. DTH8 is expressed in most tissues and its protein is localized to the nucleus exclusively. The quantitative real-time PCR assay revealed that DTH8 could down-regulate the transcriptions of Ehd1 (for Early heading date1) and Hd3a (for Heading date3a; a rice ortholog of FLOWERING LOCUS T) under long-day conditions. Ehd1 and Hd3a can also be down-regulated by the photoperiodic flowering genes Ghd7 and Hd1 (a rice ortholog of CONSTANS). Meanwhile, the transcription of DTH8 has been proved to be independent of Ghd7 and Hd1, and the natural mutation of this gene caused weak photoperiod sensitivity and shorter plant height. Taken together, these data indicate that DTH8 probably plays an important role in the signal network of photoperiodic flowering as a novel suppressor as well as in the regulation of plant height and yield potential.

[219] M. Huang, X. Yin, L. Jiang, Y. Zou , G. Deng. (2015). Raising potential yield of short-duration rice cultivars is possible by increasing harvest index. *Biotechnologie Agronomie Societe Et Environnement*. 19(2) pp 153 - 159.

Reference ID: 24039

Note: #24039e

Abstract:

Description of the subject. Further increases in rice yield potential are generally thought to require greater biomass assimilation. This study presents a new cultivar that draws greater yield from increased harvest index (HI).

Objectives. Our objective was to identify the physiological traits that are critical to the high yield of a recently developed short-duration rice cultivar Guiliangyou 2 (GLY2).

Method. GLY2 and a check cultivar Yuxiangyouzhan (YXYZ) were grown in a field at the Experimental Farm of Guangxi University, Guangxi province, southern China in early and late rice-growing seasons in 2013. Grain yield, yield components, canopy characteristics including leaf area index (LAI), leaf N content (LNC), leaf area duration (LAD) and assimilation rate (NAR), biomass accumulation, and harvest index were determined for each cultivar in each season.

Results. GLY2 produced 17–38% higher grain yield than YXYZ with the same growth duration. Spikelets per m² and grain weight were higher in GLY2 than in YXYZ by 11–13% and 6–17%, respectively. GLY2 had higher LAI and LAD but lower LNC and NAR than YXYZ. As a consequence of the compensation between the canopy characteristics, there was no significant difference in biomass accumulation between the two cultivars. Harvest index of GLY2 was 13–23% higher than that of YXYZ. Large sink size, high remobilization of stored reserves and maintained biomass production after heading were responsible for the high HI of GLY2.

Conclusions. Our study suggests that it is possible to increase HI together with grain yield by improving the potential sink size and the remobilization of stored reserves while maintaining high LAI and LAD in short-duration rice.

[220] P.J. Gregory. (2014). R.A. (Tony) Fischer, Derek Byerlee and Greg O. Edmeades: Crop yields and global food security: will yield increase continue to feed the world? Food Security. 6 pp 903 - 904.

Reference ID: 24040

Note: #24040e (note this is a book review on #20215)

Abstract: This is a substantial work with regards to both length and attention to detail in analyzing yield trends from diverse sources. Although it is published by an Australian agency, this is a publication that looks well beyond that country and is worthy of an international readership.

[221] J. Sumberg. (2012). Mind the (yield) gap(s). Food Security. 4 pp 509 - 518.

Reference ID: 24041

Note: #24041e

Abstract: This paper explores the origin of the notion of “yield gap” and its use as a framing device for agricultural policy in sub-Saharan Africa. The argument is that while the yield gap of policy discourse provides a simple and powerful framing device, it is most often used without the discipline or caveats associated with the best examples of its use in crop production ecology and microeconomics. This argument is developed by examining how yield gap is used in a selection of recent and influential agricultural policy documents. The message for policy makers and others is clear: “mind the (yield) gap(s)”, for they are seldom what they appear.

[222] H. Ikeda, A. Kamoshita, J. Yamagishi, M. Ouk, B. Lor. (2008). Assessment of management of direct seeded rice production under different water conditions in Cambodia. Paddy and Water Environment. 6 pp 91 - 103.

Reference ID: 24042

Note: #24042e

Abstract: In order to assess direct seeding of rice technology to cope with future agricultural labor shortage in Cambodia, agronomic experiments were conducted in 2005 and 2006 to compare direct seeding with transplanting under three water conditions (non-flooded, shallow flooded, and deep flooded conditions) with/without weed control by herbicides (bentazone and cyhalofop-butyl) for two Cambodian rice varieties (shorter stature and early maturity Sen Pidao, taller stature and longer maturity Phka Rumduol). Average rice yield in 2 years was lower in direct seeding (341 g m^{-2}) than transplanting (404 g m^{-2}), but interaction components with year, varieties, water conditions, and weed management were significant, and the attained maximum yield of direct seeding (510 and 464 g m^{-2} for Phka Rumduol variety in shallow flooded condition with weeding in 2005 and 2006, respectively) was similar to that of transplanting. Plant length and dry weight of rice were reduced in non-flooded and deep flooded conditions compared with shallow flooded condition, and grain yield was the highest in shallow flooded condition. Yield advantage of Phka Rumduol over Sen Pidao increased under direct seeding, particularly under non-flooded conditions in 2005 because weed infestation was more suppressed in Phka Rumduol even without weeding. Increase in 100 g m^{-2} of weed infestation prior to heading (dry weight basis) reduced about 20% of attainable yield with weed control. This study identified importance of stature and growth duration of rice varieties and presence of standing water as well as the weed control, in order to develop and extend direct seeding in the Cambodia.

[223] T. Meng, H. Wei, C. Li, Q. Dai, K. Xu, Z. Huo, H. Wei, B. Guo, H. Zhnag. (2016). Morphological and physiological traits of large-panicle rice varieties with high filled-grain percentage. *Journal of Integrative Agriculture*. 15(8) pp 1751 - 1762.

Reference ID: 24043

Note: #24043e

Abstract: Understanding the morphological and physiological traits associated with improved filling efficiency in large-panicle rice varieties is critical to devise strategies for breeding programs and cultivation management practices. Information on such traits, however, remains limited. Two large-panicle varieties with high filled-grain percentage (HF) and two check large-panicle varieties with low filled-grain percentage (LF) were field-grown in 2012 and 2013. The number of spikelets per panicle of HF and LF both exceeded 300, and the filled-grain percentage (%) of HF was approximately 90, while that of LF was approximately 75 over the two years. The results showed that when the values were averaged across two years, HF yielded 12.9 t ha⁻¹, while LF yielded 11.0 t ha⁻¹. HF had a greater leaf area duration, biomass accumulation and transport of carbohydrates stored in the culm to the grains from heading to maturity compared with LF. HF exhibited a higher leaf photosynthetic rate, more green leaves on the culm, and higher root activity during filling phase, especially during the middle and late filling phases, in relative to LF. The length of HF for upper three leaves was significantly higher than that of LF, while the angle of upper three leaves on the main culm was less in both years. Meanwhile, specific leaf weight of HF was significantly higher when compared with LF. In addition, the grain filling characteristics of HF and LF were investigated in our study. Our results suggested that a higher leaf photosynthetic rate and root activity during filling phase, greater biomass accumulation and assimilate transport after heading, and longer, thicker and more erect upper three leaves were important morphological and physiological traits of HF, and these traits could be considered as selection criterion to develop large-panicle varieties with high filled-grain percentage.

[224] A. Susanti, A. Maryudi. (2016). Development narratives, notions of forest crisis, and boom of oil palm plantations in Indonesia. *Forest Policy and Economics*. 73 pp 130 - 139.

Reference ID: 24044

Note: #24044e

Abstract: Indonesia experienced massive deforestation in the last decades where rapid oil palm expansion has been considered as one of the main drivers. This article shows that the process of deforestation and the rapid oil palm expansion cannot be viewed in isolation from broader development contexts. Various actors at local, national, and global levels have used development narratives and poverty alleviation through various policies and institutional setting to create spaces and opportunities for oil palm development. These actors also deliberately created the notion of forest crisis by omitting the values of forest environmental services to justify forest conversion into oil palm plantations. These multiple factors shaped the speed and the direction of oil palm expansion in Indonesia. This rapid oil palm expansion in Indonesia has resulted in massive LUCC and serious environmental problems. Given these complexities, a single policy will not be sufficient when it comes to managing the consequences of rapid oil palm expansion in Indonesia.

[225] R. Khatun, M.I. Hasan Reza, M. Moniruzzaman, Z. Yaakob. (2017). Sustainable oil palm industry: The possibilities. *Renewable and Sustainable Energy Reviews*. 76 pp 605 - 619.

Reference ID: 24045

Note: #24045e

Abstract: Cruel oil or green gold is a dilemma for the oil palm industry. The oil palm industry (planting and milling) has a devastating impact on the environment and ecosystems. Oil palm plantations and expansion cause deforestation, habitat loss, forest fragmentation, biodiversity loss, food chain disruption, soil property changes, water and air pollution, conversion of wetlands and arable lands, and increased greenhouse gas (GHG) emissions, resulting in annual fires as well as increasing both subsidence and flood risk. Palm oil mill effluents (POME) are toxic compounds that cause eutrophication and acidification, pollute terrestrial and aquatic systems and release greenhouse gases. However, the oil palm industry is a million-dollar industry that ensures food security (oil and fat). There is increasing demand for palm oil due to population growth and for use as a biofuel feedstock. Significant higher production per hectare in comparison to other oil crops is the main advantage of oil palm. The anthropogenic pressure on the environment is increasing to fulfil the demand and increasing susceptibility to natural disasters. Therefore, the sustainability of this industry is an urgent need. This critical review identified gaps and researched ways for the oil palm industry to be sustainable. Maintaining ecological integrity (ecological health, connectivity, resilience); justifying land allocation (ecosystem service mapping); providing awareness, good management practices, no/minimum production gaps, high yield and disease resistant cultivar generation and plantations, supplemental forms of alternative sources, zero-waste milling technology; and locating plantations on suitable land without further deforestation can fulfil the oil palm industry's present and future demands without impairing the ecosystem or environment.

[226] J.D.C. Medina, A. Woiciechowski, A.Z. Filho, M.D. Nosedá, B.S. Kaur, C.R. Soccol. (2015). Lignin preparation from oil palm empty fruit bunches by sequential acid/alkaline treatment – A biorefinery approach. *Bioresource and Technology*. 194 pp 172 - 178.

Reference ID: 24046

Note: #24046e

Abstract: Lignin is an important raw material for the sustainable biorefineries and also the forerunner of high-value added products, such as biocomposite for chemical, pharmaceutical and cement industries. Oil palm empty fruit bunches (OPEFB) were used for lignin preparation by successive treatment with 1% (w/w) H₂SO₄ at 121 °C for 60 min and 2.5% NaOH at 121°C for 80 min resulting in the high lignin yield of 28.89%, corresponding to 68.82% of the original lignin. The lignin obtained was characterized by gel permeation chromatography (GPC), Fourier transform infrared spectroscopy (FTIR) and nuclear magnetic resonance (NMR). The results indicated a lignin with molecular masses ramping from 4500 kDa to 12,580 kDa. FTIR and NMR of these lignins showed more syringyl and p-hydroxyphenyl than guaiacyl units. Moderate acid/alkaline treatment provided lignin with high industrial potential and acid hydrolyzates rich in fermentable sugars and highly porous cellulosic fibers.

[227] L.K. Ong, A. Kurniawan, X.L. Chun, Y. Ju, S. Ismadji. (2013). Bio-oil from cassava peel: A potential renewable energy source. *Bioresource and Technology*. 145 pp 157 - 161.

Reference ID: 24047

Note: #24047e

Abstract: In this work, liquid biofuel (bio-oil) was produced by pyrolyzing cassava peel. The experiments were conducted isothermally in a fixed-bed tubular reactor at temperatures ranging from 400 to 600°C with a heating rate of 20°C/min. The chemical compositions of bio-oil were analyzed by a gas chromatography mass spectrometry (GC–MS) technique. For the optimization of liquid product, temperature was plotted to be the most decisive factor. The maximum yield of bio-oil ca. 51.2% was obtained at 525 °C and the biofuel has a gross calorific value of 27.43 MJ/kg. The kinetic-based mechanistic model fitted well with experimental yield of pyrolysis products with the mean squared error (MSE) of 13.37 ($R^2 = 0.96$) for solid (char), 16.24 ($R^2 = 0.95$) for liquid (bio-oil), and 0.49 ($R^2 = 0.99$) for gas.

[228] W.P.Q. Ng, H.L. Lam, F.Y. Ng, M. Kamal, J.H.E. Lim. (2012). Waste-to-wealth: green potential from palm biomass in Malaysia. *Journal of Cleaner Production*. 34 pp 57 - 65.

Reference ID: 24048

Note: #24048e

Abstract: This paper gives an overview of the green potential of the palm biomass industry, which contributes to Malaysia's economic and sustainable development. An overall picture of the green development indicators of the country is provided based on the authors' experiences in policy making, research and business development. The emerging palm biomass industry in Malaysia is foreseen to dominate the country's directional development in the coming years, particularly when the sustainability issue is raised globally. With the increasing volume of palm oil residue accumulation due to palm oil production, palm biomass is gaining significant attention and being increasingly utilised to produce various green products as well as highly valuable biochemicals, such as bioethanol, vitamins, etc. The palm oil industry has been identified as the key industry for expansion to achieve economic advancement along with the development of greener production processes in the country. Research on palm biomass, which is actively being carried out by both private and public institutions, is categorised. Furthermore, actions and policies to promote the implementation of green technology in Malaysia, while simultaneously defending both environmental and ecological health and promoting technology transformation, are summarised. Challenges and concerns over the green future of the country are discussed, as well as the business trend in the Malaysian palm biomass industry.

[229] MOSTA. (2017). Malaysian Oil Science and Technology MOST Vol 26 No 1 (2017). 26 pp 1 - 57.

Reference ID: 24049

Note: S serial #24049

[230] P. Gautam, B. Lal, R. Raja, R. Tripathi, M. Shahid, M.J. Baig, C. Puree, S. Mohanty, A.K. Nayak. (2015). Effect of simulated flash flooding on rice and its recovery after flooding with nutrient management strategies. *Ecological Engineering*. 77 pp 250 - 256.

Reference ID: 24050

Note: #24050e

Abstract: Rice grown in flood-prone areas must have submergence tolerance characteristics either through varietal selection or by management options like nutrient application. This study is conducted to investigate the effect of application methods of nitrogen and phosphorus on submerged rice productivity and nutrient absorption. The effect of basal phosphorus and post-flood nitrogen (six different nutrient schedules) on the performance of Sub1 (IR-64 Sub1 and Swarna Sub1) and non-Sub1 (IR-20) cultivars of rice was tested under clear and turbid water submergence for their tolerance to submergence. Photosynthesis, yield and N concentration of rice subjected to complete submergence for 15 days was decreased significantly over non-submerged rice plants. Turbid water submergence was fatal in terms of photosynthesis, stomatal conductance, effective tillers and yield because of low light and dissolved oxygen underwater. Rice plants fertilized with P tolerated flooding better and produced significantly higher grain yields than no P application. The crop fertilized with N produced more number of effective tillers and grain yield than the unfertilized crop under complete submergence at maximum tillering (MT) stage. When post-flood N was applied alone, grain yield was 25.8, 17.8 and 17.1% lower in IR-20, IR-64 Sub1 and Swarna Sub1, respectively, as compared to N and basal P application. Urea foliar spray after desubmergence significantly enhanced the photosynthesis and narrowed down the flowering time which led to higher grain yield and productivity. The findings of the study suggest that a simple alteration in the time and method of N application with basal P can significantly contribute to higher rice yield in flash-flood prone areas.

[231] S.M. Haefele, Y. Kato, S. Singh. (2016). Climate ready rice: Augmenting drought tolerance with best management practices. *Field Crops Research*. 190 pp 60 - 69.

Reference ID: 24051

Note: #24051e

Abstract: Drought stress is one of the most important limitations for rice production in rainfed lowland systems. This is the case in rainfed systems now, and will probably even be more important in the near future given the changing climate. Recent advances in rice breeding provide much improved drought tolerance in modern rice cultivars as has already been shown in farmers' fields. To accompany these new cultivars, complementary crop management practices and diversified production systems have an important role to help farmers minimize risks and raise productivity and profitability. To evaluate the options we reviewed a wide range of studies investigating management options for rainfed lowland rice with a specific focus on drought-prone environments. To introduce the environment we provide an overview of general characteristics with a more detailed analysis of soil quality in rice-based rainfed lowlands around the world. Reviewed management technologies to mitigate drought stress include water management options, the choice of appropriate germplasm, adjusted cropping systems, improved nutrient management, different crop establishment options, better field management and soil amelioration. Several of these technologies do offer important advantages but their usefulness and applicability is dependent on site and system characteristics. Thus, a combination of germplasm x environment x management is necessary to choose the best management for a given rainfed lowland system. Getting this right can transform rice-based systems in rainfed lowlands, make them more productive, and increase and stabilize farmers' income.

[232] Y. Kato, R. Tajima, A. Toriumi, K. Homma, N. Moritsuka, T. Shiraiwa, J. Yamagishi, P. Mekwatanakern, V. Chamarek, B. Jongdee. (2016). Grain yield and phosphorus uptake of rainfed lowland rice under unsubmerged soil stress. *Field Crops Research*. 190 pp 54 - 59.

Reference ID: 24052

Note: #24052e

Abstract: Rainfed lowland rice often grows in unsubmerged soil conditions during dry spells. Even if the drought effect is negligible, nutrient uptake and rice yield may decrease because of chronic unsubmerged soil stress on coarse-textured soil. The objective of this study was to evaluate the effect of unsubmerged soil conditions on N and P uptake, biomass accumulation and grain yield of 20 diverse rice genotypes. Unsubmerged and submerged field trials were conducted at the Ubon Ratchathani Rice Research Center in northeast Thailand in the wet seasons of 2010 and 2011. In the unsubmerged trial, rice was grown aerobically by draining the perched water; soil moisture at 20-cm depth fluctuated between -10 and -30 kPa. On average, the yield decline in unsubmerged soil conditions was 47% compared with submerged soil conditions (3.75 vs. 1.99 t ha⁻¹), which was attributable to reduced biomass accumulation and N and P uptake. Unsubmerged soil stress had minimal effect on harvest index, days to heading and N concentration. In unsubmerged soil conditions, N and P uptake and N-use efficiency (biomass/N uptake) positively correlated with biomass accumulation at heading stage. Rice plants showed severe P deficiency because of unsubmerged soil stress, which limited the contribution of P-use efficiency to biomass accumulation. Our results showed that the physiological traits improving P uptake and plant P nutrition under unsubmerged soil stress would be important targets for future research. We suggest that genotype screening under unsubmerged soil stress on coarse-textured soil may further improve rainfed lowland rice for the drought-prone plains.

[233] S.K. Sarangi, B. Maji, S. Singh, D.K. Sharma, D. Burman, S. Mandal, U.S. Singh, A.M. Ismail, S.M. Haefele. (2016). Using improved variety and management enhances rice productivity in stagnant flood-affected tropical coastal zones. *Field Crops Research*. 190 pp 70 - 81.

Reference ID: 24053

Note: #24053e

Abstract: Rice is the major food crop in most flood-prone areas of South and Southeast Asia. Growing other crops during the wet season (monsoon/kharif, June–December) is difficult due to waterlogging caused by heavy rain. Lowland rice faces stagnant flooding (SF) risk during most of the wet season. Apart from that, farmers in coastal regions often implement suboptimal crop management leading to poor yields. Development of suitable management practices along with improved varieties is therefore, of prime importance for increasing rice productivity in tropical coastal regions. One on-station and five on-farm studies were conducted over two years to assess the effect of variety, seedling density and nutrient management on yield and economic benefits under rainfed lowland conditions. Improved variety (Amal-Mana) combined with improved management practices established in on-station trials were then evaluated in farmers' fields. The best management practices were established as fertilizer rate of 50–20–10 kg N-P₂O₅-K₂O + 5 t farmyard manure (FYM) ha⁻¹ and transplanting of 2 seedlings hill⁻¹ at spacing of 15 × 15 cm. This package was found to be optimum for increasing productivity and economic returns of transplanted kharif rice in coastal rainfed lowlands. Application of more than 50 kg N ha⁻¹ through inorganic fertilizers did not increase grain yield, yet increased production cost. The variety Amal-

Mana is tolerant of SF and performed better (yield 0.5–1.0 t ha⁻¹ more) than other local varieties, both in on-station and on-farm studies. Combining improved management and tolerant variety resulted in higher grain yield (4.51 t ha⁻¹) compared with farmers' management and varieties (2.55 t ha⁻¹) and increased the benefit-cost ratio from 1.32 for farmers' management and varieties to 1.82. These yield advantages were consistent across locations with variable stagnant flooding stress of 38–62 cm during 2013 and 28–47 cm during 2014. Association of grain yield with stagnant flooding water depth was strongest with farmer's management and farmer's variety ($R^2=0.81^{**}$), but weaker for improved management combined with improved variety ($R^2=0.015$), suggesting water depth becomes less significant when a tolerant variety and good management were combined. These technologies will help in sustaining higher productivity and profitability of rice-based cropping systems in the stagnant flood-prone coastal zones.

[234] M. Dingkuhn, M.R.C. Laza, U. Kumar, K.S. Mendez, B. Collard, K. Jagadish, R.K. Singh, T. Padolina, M. Malabayabas, E. Torres, M.C. Rebolledo, B. Manneh, A. Sow. (2015). Improving yield potential of tropical rice: Achieved levels and perspectives through improved ideotypes. *Field Crops Research*. 182 pp 43 - 59.

Reference ID: 24054

Note: #24054e

Abstract: Improving the genetic yield potential (YP) of tropical, irrigated rice varieties is a priority objective of rice breeding programs worldwide in the interest of achieving food security and maintaining political stability. But YP has stagnated at about 10 Mg ha⁻¹ since the Green Revolution. We present a survey of researchers' current top yields across different environments and countries, experimentally investigate YP-related traits and radiation use efficiency (RUE) of 12 elite materials, and use a simple model to explore traits that would raise the yield ceiling. The survey indicated that maximal grain yield is between 5 and 12 Mg ha⁻¹ depending on radiation during flowering and grain filling. The experiments conducted in several environments in the Philippines indicated that (1) different morphologies in terms of panicle number and size and leaf size lead to similar YP due to trait–trait compensation, and (2) differences in RUE are partly attributable to variation in terminal senescence which is strongly environment dependent. Simulations thus focused on post-floral physiological processes, namely dynamics of light interception, carbon assimilation and maintenance burden. Scenarios of different degree of stay-green indicated that terminal senescence is essential to limit N requirements and maintenance burden, but partial stay-green would strongly benefit RUE and YP, particularly if accompanied with increased leaf photosynthetic capacity. The need to increase pre-floral C and N reserves for grain filling is discussed, resulting in a concept to refine current ideotypes such as IRRI's New Plant Type and China's Super Hybrid Rice. In conclusion, current best tropical breeding products do not have higher YP than some varieties dating 30–40 years, and new concepts are needed in rice breeding. Breeding for such plants should be done under high N inputs.

[235] J.E. Sheehy, P.L. Mitchell. (2015). Calculating maximum theoretical yield in rice. *Field Crops Research*. 182 pp 68 - 75.

Reference ID: 24055

Note: #24055e

Abstract: Simple quantitative relationships can be useful in highlighting the characteristics that are key to taking yield towards its theoretical limit. Likewise, calculating maximum yields can be useful in suggesting attainable goals for plant

breeders and agronomists. For this purpose we define how the core physiological drivers of yield combine to produce maximum yield. We make simplifications to produce three main equations that trace yield from solar energy through crop photosynthesis and biomass and then using harvest index to maximum grain yield. We focus our investigation on three types of canopy, taking as a starting point the C3 semidwarf elite rice cultivar IR72. We define an ideotype with a canopy of very erect leaves and large leaf area called Vela and consider it both as a C3 and a C4 photosynthetic canopy. We calculate the maximum daily photosynthetic rates and yields of the three canopy types for tropical and subtropical conditions.

Owing to the effects of temperature on quantum yield and maintenance respiration, the conversion of photosynthate to shoot biomass is 40% larger in the subtropics than the tropics. In the tropics, the predicted maximum yields are 12.9 t ha⁻¹ (semidwarf), 14.4 t ha⁻¹ (C3 Vela) and the 17.9 t ha⁻¹ (C4 Vela). In the subtropics those yields are: 20.1 t ha⁻¹, 22.4 t ha⁻¹ and 25.0 t ha⁻¹, respectively. The key factors taking rice yields towards their ultimate limit are canopy architecture, quantum yield, maintenance respiration, and minimizing loss of photosynthetic capacity as lower leaves senesce and nitrogen is recycled to grain after peak photosynthesis has been reached.

[236] R.T. Furbank, W.P. Quick, X.R.R. Sirault. (2015). Improving photosynthesis and yield potential in cereal crops by targeted genetic manipulation: Prospects, progress and challenges. *Field Crops Research*. 182 pp 19 - 29.

Reference ID: 24056

Note: #24056e

Abstract: Since the ground breaking work of Norman Borlaug in the 1960s produced large increases in yields of our major cereal crops, we have seen a gradual decline in annual yield progress. The genetic potential of the yield components harvest index and grain number, which were targeted in the “green revolution” and subsequently by cereal breeders have largely been optimised in our two largest global cereal crops, rice and wheat. Physiologists and breeders are turning to the biomass portion of the yield equation and in particular radiation use efficiency, as a means to push the yield potential barrier. Consequently, in the last decade a large effort has been initiated to identify targets to improve photosynthetic performance both using non-transgenic Phenomics approaches and transgenic technologies. Efficiency of light interception, harvesting and energy utilisation have been targeted but most efforts have so far focussed on improving photosynthetic capacity and efficiency in photosynthetic carbon metabolism in rice, wheat and model plants. Here the targets for improving light harvesting and carbon fixation are reviewed, the progress thus far evaluated and the likelihood of success of these activities in improving crop yields discussed in the context of modelling and scaling from the leaf to the canopy.

[237] T. Inthavong, S. Fukai, M. Tsubo. (2014). Estimation of separate effects of water and nutrient limitation for rainfed lowland rice within a province in the Mekong region. *Field Crops Research*. 163 pp 100 - 108.

Reference ID: 24057

Note: #24057e

Abstract: Drought and low soil fertility are major constraints for high yield in rainfed lowland rice in Laos. To examine the separate effects of low water and nutrient availability and then to provide regional-scale fertilizer recommendations for rainfed lowland rice, a simulation study, together with field measurements, was carried out for Savannakhet province in the 2007 and 2008 seasons. To achieve this, a soil nutrient model QUEFTS (Quantitative Evaluation of the Fertility of Tropical Soils) was

combined with a recently developed soil water balance (SWB) model. The nutrient model was used to estimate yield from N, P and K uptake under various supply of nutrient in the soil, and then yield reduction due to water stress was calculated from the water balance model. The combined model was validated with the yield results of field experiments conducted in the dry season with no water limitation and also with yields obtained from 101 farms across the province in two wet seasons where both water and nutrient may have been limiting yield. The yield under inherent nutrient supply without fertilizer input was calculated from soil organic carbon, available P and K, and pH, and without water limitation, and was estimated to range widely between 1 and 2 t ha⁻¹ for the central Lao province of Savannakhet. Yield was estimated to increase on average from 1.6 t ha⁻¹ to 2.9 t ha⁻¹ with the recommended fertilizer application rate of 60–13–16 N–P–K kg ha⁻¹, and up to around 6 t ha⁻¹ under non-limited nutrient conditions. Yield reduction due to water stress alone, estimated from the soil water balance model, was 4–12%. These results indicate that the influence of water stress on the yield estimated for the two wet seasons was rather small, compared with that of nutrient stress. Fertilizer rates to achieve a particular yield target, which were calculated by subtracting inherent nutrient supply from nutrient uptake required for the yield target and then dividing by fertilizer nutrient taken up per kg applied, were also estimated to determine the variability of nutrient requirements at different locations. In most of the rice-growing areas, nitrogen, phosphorus and potassium required to achieve the yield target of 3 t ha⁻¹ varied widely between 20 and 70 kg ha⁻¹, 5 and 35 kg ha⁻¹ and 10 and 30 kg ha⁻¹, respectively, suggesting the importance of utilizing the site-specific fertilizer recommendation for rainfed lowland rice.

[238] W. Mekuria, K. Getnet, A. Noble, T.H. Chu, M. McCartney, S. Langan. (2013). Economic valuation of organic and clay-based soil amendments in small-scale agriculture in Lao PDR. *Field Crops Research*. 149 pp 379 - 389.

Reference ID: 24058

Note: #24058e

Abstract: At a farm level, economic returns are the single most important attributes that drive farmers to adopt agricultural technologies. This study was carried out at the Naphok and Veunkham villages, Lao PDR, to evaluate the yield response of a maize mono-cropping system to soil amendments and analyze the economic return of such interventions. The amendments were rice husk biochar, bentonite clay, compost, clay-manure compost, and rice husk biochar compost, in isolation and in various combinations. Over a period of two cropping seasons (2011–2012), the enhancement of maize yield due to soil amendments ranged from 0.77 to 3.79 t ha⁻¹ at Naphok and from 1.21 to 5.14 t ha⁻¹ at Veunkham, resulting in net revenues ranging from -794 to 841 and -331 to 1391 US\$ ha⁻¹, respectively. Soils amended with low-cost amendments such as compost, rice husk biochar, rice husk biochar compost, and clay-manure compost were economically viable within the first cropping season. In contrast, soils amended with higher-cost amendments such as bentonite clay requires up to five years to be economically viable. Such variations indicate that taking into account maize yield revenues only does not provide sufficient incentives to farmers to adopt higher-cost soil amendments. We conclude that there is a possibility to sustainably increase agricultural productivity and improve the income of smallholders using locally available low-cost soil amendments. Our findings provide important information for decision makers to promote the adoption of low-cost soil amendments, and, thereby, to contribute to productivity growth and food security through sustainable intensification.

[239] K.H. Lim. (1990). Soil Erosion Control under Mature Oil Palms on Slopes. International Palm Oil Development Conference. Module II. Agriculture. Kuala Lumpur, Malaysia. pp 191 - 198.

Reference ID: 24059

Note: #24059e > S 8.1.1 #39

Abstract: Mature oil palms may exhibit a close canopy, but still there can be severe soil erosion, especially on sloping land. This is due to mainly to the accumulation of rain water on the frond tips to form larger drops. These large rain-drops (frond drips) when falling from tall palms, have a high kinetic energy causing soil detachment, decreased infiltration and increased surface runoff resulting in erosion. This is especially severe where the terraces/platforms constructed earlier had flattened off.

[240] T. Oberthur, C.R. Donough, H. Sugianto, Y.L. Lim, J. Cock, S.P. Kam, M.J. Fisher. (2017). Plantation Intelligence Applied Oil Palm Operations: Unlocking Value by Analysing Commercial Data. The Planter. 93(1094) pp 339 - 351.

Reference ID: 24060

Note: H 8.1.1.8 #24060e > S serial #24130

Abstract: Plantation intelligence [PI] applies the concept of business intelligence, which is analysis of company data, to oil palm production. Plantations already have collected monthly data of block yield but do not use them to enhance financial performance. These data were analysed for a whole plantation to rank individual blocks according to their ability to respond to applied fertiliser. Blocks were classified according to their average fertiliser productivity (AFP), which was associated with the block's soil management group (SMG). AFP varied between years depending on rainfall and SMG. The ranking was used to guide fertiliser management by diverting fertiliser from unresponsive blocks to those that are more responsive. Although the inferences lack statistical validity they appear robust from a practical viewpoint. They are easy to evaluate in the field, since they require no upscaling from or interpretation of experimental data.

They provide managers with a tool to evaluate the variable effect of fertiliser over the whole plantation in different years and to improve financial performance.

[241] V.T. Nguyen. (2017). State Management on Fertilizer and The Future's Orientation. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24061

Note: #24061e (slides available in English and Vietnamese) (in folder Argus NPK Fertilizer Conference)

[242] T. Oberthur, M.S. Tan. (2017). Fertilizer supply vis-a-vis crop nutrient demands. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24062

Note: #24062e (in folder Argus NPK Fertilizer Conference)

[243] A. Duyck. (2017). Use of Water Soluble Nutrients in Southeast Asia/Vietnam. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24063

Note: #24063e (in folder Argus NPK Fertilizer Conference)

[244] T.S. Pham. (2017). Vietnam Fertilizer Market: Production and Demand Overview. Argus NPK Fertilizer Conference Saigon, Vietnam.

Reference ID: 24064

Note: #24064e (in folder Argus NPK Fertilizer Conference)

[245] D.J. Kennes. (2017). "Yield gaps" between researchers' and farmers' practice - Management of nutrient input decision with crop production margins. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24065

Note: #24065e (in folder Argus NPK Fertilizer Conference)

[246] C. Roache. (2017). Regional NPK trade flows and the outlook for raw materials. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24066

Note: #24066e (in folder Argus NPK Fertilizer Conference)

[247] K. Ngwe. (2017). Role of Fertilizer Policies in Transforming Agriculture and Fertilizer Formulations to Myanmar. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24067

Note: #24067e (in folder Argus NPK Fertilizer Conference)

[248] F. Colucci. (2017). Use of Indirect Plate Heat Exchangers to Increase Plant Competitiveness by Reducing Energy Consumption. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24068

Note: #24068e (in folder Argus NPK Fertilizer Conference)

[249] V.T. Pham. (2017). Review on agronomy and nutrition requirements of main crops in Vietnam. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24069

Note: #24069e (slides available in English and Vietnamese version) (in folder Argus NPK Fert Conference)

[250] C.A. Yap. (2017). Best nutrient management practices for pepper - understanding soil conditions in the region. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24070

Note: #24070e (in folder Argus NPK Fertilizer Conference)

[251] R. Ward. (2017). Polysulphate: a new multi nutrient fertilizer and a strategic component in NPK's Formulation. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24071

Note: #24071e (in folder Argus NPK Fertilizer Conference)

[252] D.N. Nguyen. (2017). Using and Developing Organic-Mineral Fertilizer in Vietnam. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24072

Note: #24072e (slides available in English and Vietnamese version) (in folder Argus NPK Fert Conference)

[253] A. Pacholski. (2017). Enhanced efficiency NPK - from basics to advanced technologies. Argus NPK Fertilizer Conference. Saigon, Vietnam.

Reference ID: 24073

Note: #24073e (in folder Argus NPK Fertilizer Conference)

[254] M.M. Alam, M.R. Karim, J.K. Ladha. (2013). Integrating best management practices for rice with farmers' crop management techniques: A potential option for minimizing rice yield gap. Field Crops Research. 144 pp 62 - 68.

Reference ID: 24074

Note: #24074e

Abstract: The major cereal cropping system in Bangladesh is rice (*Oryza sativa* L.) in the dry season (Boro) – rice in the wet season (Aman). The average productivity (7 t ha⁻¹) of this system is far below attainable yields (14 t ha⁻¹) in farmers' fields, resulting in a large yield gap mainly due to farmers' traditional management practices. We evaluated a set of selected best management practices (BMP) along with two N management options in the farmers' crop management practices for rice in numerous farmers' fields across 24 villages over 5 contiguous seasons during 2006–2008. Across years, BMP and two N management options increased grain yields compared with the farmers' practice (FP) by 0.73 t ha⁻¹ in both Aman and Boro seasons. The higher yield response (24.6% in Aman and 8.6% in Boro season) occurred with BMP in combination with leaf color chart (LCC) aided N management (BMP–LCC) than BMP with Urea Super Granule as N source (BMP–USG). Best management practices and two N management options reduced the yield gap of FP by 45%, with an average of 1.5 Mg ha⁻¹. The average added net returns with BMP were US\$22 to US\$120 ha⁻¹ in the wet season and US\$93 to US\$115 ha⁻¹ in the dry season. Our study shows that the integration of BMP and either LCC-aided N management or USG as an N source with the farmers' management techniques and its adoption has the potential to boost rice yield and profit and total rice production in Bangladesh.

[255] C. Kreye, B.A.M. Bouman, A.R. Castaneda, R.M. Lampayan, J.E. Faronilo, A.T. Lactaoen, L. Fernandez. (2009). Possible causes of yield failure in tropical aerobic rice. Field Crops Research. 111 pp 197 - 206.

Reference ID: 24075

Note: #24075e

Abstract: Aerobic rice is a water-saving rice production system for water-short environments with favorable soils and adapted, potentially high-yielding varieties that are direct dry seeded. Soils remain aerobic but supplementary irrigation is applied as necessary. In the dry season of 2004 and 2005, a water by N experiment was set up at the location "Dapdap" in central Central Luzon, Philippines, to explore water and N management strategies in aerobic rice. The experiment was laid out as a split-plot design on a loamy sand soil with three water treatments (irrigation twice per week, once per week, and once in two weeks with modifications) and 5 N levels (0–200 kg ha⁻¹). Average seasonal soil moisture tension ranged from 9.2 to 20 kPa but yield hardly responded to the treatment combinations and ranged from 0 to 2 t ha⁻¹. In addition to trial-specific parameters, root knot nematodes and micronutrients (2005) were monitored. Galling of roots due to nematodes was assessed through a rating scale of 0–5, with 0 = no galling and 5 = >75% of the root system galled. The degree of galling reached a level of 5 at flowering and harvest in 2004, and 3 at tillering and 4 at harvest in 2005. Results of a plant tissue analysis at midtillering for Fe, Mn, and Zn showed on average values above critical levels; individual replicates, however, indicated deficiencies for Mn. In addition to actual field observations, we used

simulation modeling (ORYZA2000) as a tool to estimate attainable yield under actual water conditions and N inputs to explore how yield failure set in. Simulation results matched observed values for total above-ground biomass and leaf area index quite well when no N was applied. When high rates of N (200 and 165 kg ha⁻¹) were applied, simulated values matched actual field data only until about the panicle initiation stage; afterward, observed values remained below the simulation. We interpreted this as evidence that growth-limiting factors other than water or N affected the crop from this growth stage on. Observations made in the field on root knot nematodes and micronutrients suggested that these two factors, especially root knot nematodes, may have been major constraints to crop development in this experiment.

[256] K.D. Subedi, B.L. Ma. (2009). Assessment of some major yield-limiting factors on maize production in a humid temperate environment. *Field Crops Research*. 110 pp 21 - 26.

Reference ID: 24076

Note: #24076e

Abstract: Despite the availability of modern hybrids and better agronomic practices, there existed large gaps between attainable yield of maize (*Zea mays* L.) grown with recommended practices and producers' harvest yields in the humid temperate regions of eastern Canada. A field experiment was conducted for 3 years in Ottawa, Canada, to determine the most important management yield-limiting factor(s) on rainfed maize grain production. A package of recommended practices (RP) was composed with the recommended levels of nitrogen (N), phosphorus (P), potassium (K), micronutrients, chemical weed control, and plant population density (PPD). Each factor was modified from the RP, making a total of 11 treatments. Under the low occurrence of diseases or insects, weed infestation was the most important yield-limiting factor, which reduced grain yield by 27–38%. While lack of preplant N application (100 kg ha⁻¹) reduced yield by 10–22%, there was no yield increment with additional sidedressing N (50 kg N ha⁻¹). Grain yield was reduced by 8-13% with low PPD (60,000 plants ha⁻¹) in all years, whereas increasing PPD to 90,000 plants ha⁻¹ did not improve yield, compared with the RP. Withhold P application did not affect yield in all years, but yield was reduced by up to 13% in the absence of K, and by 10% and 12% without Zn or Mn, respectively, in 1 year. Our results indicated that lack of weed control (i.e. herbicide use) was the major yield-limiting factor followed by fertilizer N and PPD. The responses of grain yield to K, Zn, and Mn were site and/or year specific. Our study provided experimental data and an insight understanding of yield gap between genotype's yield potential achievable with recommended practices and yields with producers' practices.

[257] M. Tollenaar, E.A. Lee. (2002). Yield potential, yield stability and stress tolerance in maize. *Field Crops Research*. 75 pp 161 - 169.

Reference ID: 24077

Note: #24077e

Abstract: Average commercial maize yield in the US has increased from about 1 Mg/ha in the 1930s to about 7Mg/ha in the 1990s. Although the increase has been the result of both genetic and agronomic-management improvements, we contend that most of this improvement is the result of the genotype x management interaction. The genetic improvement in maize yield is associated neither with yield potential per se, nor with heterosis per se, but it is associated with increased stress tolerance, which is consistent with the improvement in the genotype x management interaction.

[258] J.G. Benjamin, D.C. Nielsen, M.F. Vigil, M.M. Mikha, F. Calderon. (2015). Cumulative deficit irrigation effects on corn biomass and grain yield under two tillage systems. *Agricultural Water Management*. 159 pp 107 - 114.

Reference ID: 24078

Note: #24078e

Abstract: Deficit irrigation (DI) is sometimes used to cope with dwindling irrigation water supplies or limited water allocations. A study at Akron, Colorado, USA from 2001 to 2006 investigated the effects of consecutive years of DI on soil water use, soil water content, biomass production, grain yield and water use efficiency (WUE) in a continuous corn system. In 2001, DI and full irrigation (FI) had the same grain yield. In 2002, DI reduced grain yield by 20% relative to FI. By 2006, continued DI reduced grain yield by 65% compared with FI. Significant increases in soil water storage during the non-crop period occurred only in 2005 and 2006. This resulted in a slow but continual decrease in soil water storage as the years progressed. By 2006, soil water storage in the 60- to 90-cm depth remained lower for DI than for FI during the entire growing season. WUE declined for DI compared with FI over the years. WUE was the same for DI and FI in 2001, but WUE for DI declined to only 65% of FI by 2006. DI may be an option for short term or emergency situations when insufficient irrigation water is available for FI in one year. However, long-term use of DI, without replenishment of stored soil water during the non cropped period, was detrimental to both corn production and water use efficiency under these experimental conditions.

[259] A. Ertek, B. Kara. (2013). Yield and quality of sweet corn under deficit irrigation. *Agricultural Water Management*. 129 pp 138 - 144.

Reference ID: 24079

Note: #24079e

Abstract: The present study was conducted to determine the effects of different irrigation levels (I_{100} : full irrigation; I_{85} : 15% deficit; I_{70} : 30% deficit; I_{55} : 45% deficit and I_{40} : 60% deficit) on yield and yield components, sugar and protein content of fresh sweet corn during the years of 2011 and 2012. Experiments were carried out in a randomized complete-block design with three replications. The lowest and the highest plant water consumptions (E_1) were found in I_{40} (240–406 mm) and I_{100} (348–504 mm) treatments in both years. Water deficit affected on maize fresh ear yields, yield components, quality and water use efficiencies. The lowest fresh ear yields (11515.7 and 10952.3 kg ha⁻¹) were determined in I_{40} treatments in both years, respectively. The highest fresh ear yields (14857.7 and 14712.7 kg ha⁻¹) were obtained from I_{100} treatments in 2011 and 2012 years, respectively. Maize fresh ear yields were significantly affected by water deficits. Low irrigation levels decreased the ear yields. However, it was clearly observed that I_{70} treatment could be a water-saving treatment without a significant decrease in yield. In addition, the highest protein content and sugar amount was also observed in I_{70} treatment. I_{70} treatment seems to have lowest impact on yield and higher quality for sweet corn.

[260] N. Nipattummakul, I.I. Ahmed, A.K. Gupta, S. Kerdsuwan. (2011). Hydrogen and syngas yield from residual branches of oil palm tree using steam gasification. *International Journal of Hydrogen Energy*. 36 pp 3835 - 3843.

Reference ID: 24080

Note: #24080e

Abstract: Wastes produced during oil palm production from agro-industries have great potential as a source of renewable energy in agriculturally rich countries, such as Thailand and Malaysia. Clean chemical energy recovery from oil palm residual

branches via steam gasification is investigated here. A semi-batch reactor was used to investigate the gasification of palm trunk wastes at different reactor temperatures in the range of 600 to 1000 °C. The steam flow rate was fixed at 3.10 g/min. Characteristics and overall yield of syngas properties are presented and discussed. Results show that gasification temperature slightly affects the overall syngas yield. However, the chemical composition of the syngas varied tremendously with the reactor temperature. Consequently, the syngas heating value and ratio of energy yield to energy consumed were found to be strongly dependent on the reactor temperature. Both the heating value and energy yield ratio increased with increase in reactor temperature. Gasification duration and the steam to solid fuel ratio indicate that reaction rate becomes progressively slower at reactor temperatures of less than 700 °C. The results reveal that steam gasification of oil palm residues should not be carried out at reactor temperatures lower than 700 °C, since a large amount of steam is consumed per unit mass of the sample in order to gasify the residual char.

[261] L. Willocquet, S. Savary, L. Fernandez, F. Elazegui, P. Teng. (2000). Development and evaluation of a multiple-pest, production situation specific model to simulate yield losses of rice in tropical Asia. *Ecological Modelling*. 131 pp 133 - 159.

Reference ID: 24081

Note: #24081e

Abstract: A yield loss simulation model for rice was developed to simulate injury mechanisms due to pathogens, insects, and weeds, and the yield losses they cause in a range of production situations. The structure of the model is simple, flexible, and involves as few parameters as possible. The model consists of two linked components. The first simulates the dynamics of the rice crop, with accumulation of biomass and its daily partitioning towards leaves, stems, roots, and panicles. The second component simulates the dynamics of tillering, tiller maturation, panicle formation, and tiller death. Coupling functions representing damage mechanisms due to sheath blight, stem borers, and weeds were developed and parameterized from published and experimental data. Each of these injuries corresponds to a set of damage mechanisms, some of which are specific to the injury considered, while others are common to several injuries. The parameters required to simulate attainable growth and attainable yield were determined, using specific field experiments, under three different production situations representing those commonly occurring in the Philippines and in Vietnam. Yield loss simulations due to the different injuries, considered alone or in combination, were tested under these different production situations. The model accurately simulated attainable rice growth and development, and adequately accounted for the yield-reducing effects of the different injury mechanisms considered. Results from sensitivity analyses conducted at varying levels of injuries are discussed. This model can be used as a tool to set research priorities for novel plant protection strategies for rice in tropical Asia.

[262] A.F.N. Abdul-Manan. (2017). Lifecycle GHG emissions of palm biodiesel: Unintended market effects negate direct benefits of the Malaysian Economic Transformation Plan (ETP). *Energy Policy*. 104 pp 56 - 65.

Reference ID: 24082

Note: #24082e

Abstract: Biodiesel expansion can lead to unintended effects that offset the direct GHG benefits of biofuels. Two documented unintended effects are the indirect land use change (ILUC) and indirect energy use change (IEUC). ILUC has been included in many lifecycle GHG studies of biofuels, but IEUC has remained relatively elusive.

This paper presents an updated assessment of the lifecycle GHG emissions of palm biodiesel from Malaysia and, for the first time, incorporating the two estimated indirect effects simultaneously. Future GHG emissions of palm biodiesel are projected by taking into account of Malaysia's Economic Transformation Programme (ETP) that aims to reform the oil palm industry in order to achieve a high-income nation. Uncertainties associated with lifecycle GHG models were dealt with using Monte Carlo simulation in order to identify the breadth and likelihood of GHG reductions relative to petroleum-based fuels in the context of the European directives. This study has shown that the ETP, if successfully implemented, can significantly improve the direct GHG emissions of palm biodiesel, but the benefits are offset by the rise in global emissions due to ILUC and IEUC. Biofuel policies should also include IEUC, in addition to ILUC, to avoid GHG emissions leakages.

[263] N.V.L. Rajarajeswari, K. Muralidharan. (2006). Assessments of farm yield and district production loss from bacterial leaf blight epidemics in rice. *Crop Protection*. 25 pp 244 - 252.

Reference ID: 24083

Note: #24083e

Abstract: The damage from natural epidemics of bacterial leaf blight (BLB) of rice caused by *Xanthomonas oryzae* pv. *oryzae* was examined in 400 farmers' fields in four rice-growing districts of India during the wet seasons between 1995 and 1998. One hundred contiguous farm fields were rated for BLB on a 0–9 scale. Disease prevalence at levels above the economic threshold (score 45) ranged from 7 to 39%. Studies were made with samples from representational farms taken at the rate of one farm for every 10% disease prevalence out of 100 farms per district. The spatial pattern of BLB development within and among rice hills was either random or uniform. On the representational farms, the mean BLB severity was 65–71%. Disease injury caused highly significant reductions in the well-filled grains harvested. In the Cramer method, the per cent yield loss was derived by dividing the difference between the means for wellfilled grains in healthy and diseased by the potential yield, i.e., actual yield from healthy plants to which the difference was added. The yield loss calculated by the Cramer method was 17–31% for BLB epidemics in all four districts. Partially filled grains and chaff/hill showed minor variations, but their influence on grain harvest was negligible. In the representational farms investigated, there was a highly significant and negative relationship between well-filled grains/hill and BLB severity. The yield loss estimated on the attainable yield using regression models ranged from 31 to 44%. In the linear models, the coefficient of determination R² ranged from 0.61 to 0.68 on three farms, and was 0.21 and 0.39 on two other farms. The Cramer and regression methods gave similar estimates for loss of potential yield in only one farm, located in Karnal district. In calculating production loss, the actual production in the entire district is usually taken, assuming damage from disease at all farms, and this leads to an over-estimation. A modification was made to consider disease prevalence as a percentage of farms with disease above the economic threshold level in a district. This adjustment enabled the production loss estimate to be tailored to the actual area damaged by the pathogen. By multiplying district production estimates by the disease prevalence (%), production loss in a district was precisely derived. In BLB epidemics, the most conservative estimates for production yield losses in districts were 3–16%. The production losses during the four epidemics were considerably different, ranging from 92,000 to 105,000 tons in Nellore, 30,000 to 36,000 tons in West Godavari, and 46,000 tons in Karnal to 22,000 tons in Rangareddy district.

[264] F. Nurdiansyah, L.H. Denmead, Y. Clough, K. Wiegand, T. Tschardtke. (2016). Biological control in Indonesian oil palm potentially enhanced by landscape context. *Agriculture, Ecosystems & Environment*. 232 pp 141 - 149.

Reference ID: 24084

Note: #24084e

Abstract: Oil palm plantation expansion is occurring at a rapid pace. However, substantial yield losses from pest attacks are becoming major threats to the oil palm industry, while the potential role of conservation biological control, a sustainable and environmentally friendly solution for pest control, is still largely unknown. The type of vegetation surrounding oil palm plantations is likely to influence pest predation, and we tested this in Indonesia (Sumatra), the world's largest palm oil producer. We studied six different vegetation types adjacent to oil palm plantations: another oil palm plantation (control), weedy oil palm, weedy rubber, scrub, jungle rubber, and secondary forest. Each border type was replicated eight times. We quantified predation rates and predator occurrences using dummy caterpillars and mealworms 20 m inside of the adjacent vegetation (OUT 20) as well as 20 m (IN 20) and 50 (IN 50) m inside the oil palm plantation. Ants and bush crickets were the most prominent predators in the plantations, whereas birds, bats, monkeys, beetles, and molluscs played a minor role. Mean percentage of ant and cricket predation rate in control border OUT 20 were 16.39% and 7.16% respectively, IN 20 were 16.03% and 6.1%, and IN 50 were 14.47% and 7.48%, while for other borders other than control, mean percentages OUT 20 m were 28.90% and 12.26% respectively, IN 20 m were 26.61% and 12.40%, and IN 50 m were 22.93% and 10.58%.

Predation rates were ~70% higher in non-oil palm habitat, indicating the need for improved vegetation diversification inside plantations. Overall predation rates in oil palm decreased slightly but significantly with distance to the border. Our results suggest that maintaining non-oil palm vegetation in the areas adjacent to plantations and promoting weedy strips within the plantations are potentially effective management tools for conserving and developing biological control in oil palm in the future.

[265] B. Gao, X. Ju, Q. Meng, Z. Cui, P. Christie, X. Chen, F. Zhang. (2015). The impact of alternative cropping systems on global warming potential, grain yield and groundwater use. *Agriculture, Ecosystems & Environment*. 203 pp 46 - 54.

Reference ID: 24085

Note: #24085e

Abstract: The large consumption of groundwater for irrigating winter wheat has resulted in a continuous decline in the groundwater table on the North China Plain in recent decades. Alternative cropping systems have been proposed to substitute for the conventional winter wheat–summer maize rotation system for the sustainable use of groundwater in the future. However, the impact of these cropping systems on net global warming potential (net GWP), and greenhouse gas emissions on the basis of per unit of yield (greenhouse gas intensity, GHGI) is poorly documented. Measurements of greenhouse gases were conducted over a four-year period to gain insight into net GWP and GHGI on a crop rotation scale based on an ongoing long-term field experiment on the North China Plain. The cropping systems investigated include one conventional winter wheat–summer maize system (Chem. W/M) as the control and four alternative cropping systems, namely an optimized winter wheat–summer maize system (Opt. W/M), two winter wheat–summer maize (or soybean)–spring maize system with three crops in two years (W/M–M, W/S–M), and a single spring maize per year (M). Compared with the Chem. W/M control, the grain yields in

Opt. W/M increased significantly by 19% while the net GWP, GHGI and fertilizer N decreased by 29%, 40% and 40%, respectively, but still consumed as much groundwater (264mm³yr⁻¹) as Chem. W/M. In the two-year rotation cycle fertilizer N, groundwater use, net GWP and GHGI in W/M–M, W/S–M and M declined by 56–70%, 43–63%, 50–58% and 30–50%, respectively, compared to Chem. W/M. Moreover, these cropping systems consumed only 108–159mm³yr⁻¹ groundwater for irrigation, a value close to the theoretical value of 150mm³yr⁻¹ to avoid a continuing decline in the groundwater table in this region. However, W/S–M treatment had grain yield reductions of -23% and M treatment had -30%, and only W/ M–M maintained grain yields relative to Chem. W/M. We therefore recommend the W/M–M management package as a preferred option to maintain grain yields together with low GWP and GHGI while mitigating the decline in the groundwater table in areas with a high water deficit.

[266] K. Saswattecha, C. Kroeze, W. Jawjit, L. Hein. (2017). Improving environmental sustainability of Thai palm oil production in 2050. *Journal of Cleaner Production*. 147 pp 572 - 588.

Reference ID: 24086

Note: #24086e

Abstract: Palm oil production has increased in Thailand with considerable environmental impacts. The aim of this study is to analyse possibilities to examine how the environmental sustainability of Thai palm oil production can be improved in the coming decades. To this end, we integrated a sectoral and a landscape model in order to analyse scenarios for 2050. We do this with a focus on options to reduce (1) the effects of land-use-change on ecosystem services, and (2) the environmental impact of oil palm plantations and palm oil mills. Four future scenarios are developed; business-as-usual (BAU), current-policy (CP), strong growth (GRT) and green-development (GRN). The BAU scenario indicates that environmental impacts may double without additional improvement options. The CP scenario shows that current plans to increase palm oil production would considerably increase environmental impacts. Implementing only cost-effective options, as in the GRT scenario, is also not enough to avoid an increase in environmental impacts if the export of palm oil increases faster than currently envisaged. The GRN scenario assumes implementation of a combination of effective options, regardless of their costs. This would considerably reduce environmental impacts. Thus it is technically possible to improve environmental performance of palm oil production in Thailand.

[267] D. Afriyanti, C. Kroeze, A. Saad. (2016). Indonesia palm oil production without deforestation and peat conversion by 2050. *Science of the Total Environment*. 557-558 pp 562 - 570.

Reference ID: 24087

Note: #24087e

Abstract: Palm oil is a promising source of cooking oil and biodiesel. The demand for palm oil has been increasing worldwide. However, concerns exist surrounding the environmental and socio-economic sustainability of palm oil production. Indonesia is a major palm oil producing country. We explored scenarios for palm oil production in Indonesia until 2050, focusing on Sumatra, Kalimantan and Papua. Our scenarios describe possible trends in crude palm oil production in Indonesia, while considering the demand for cooking oil and biodiesel, the available land for plantations, production capacity (for crude palm oil and fresh fruit bunches) and environmentally restricting conditions. We first assessed past developments in palm oil production. Next, we analysed scenarios for the future. In the past 20 years, 95% of the Indonesian oil palm

production area was in Sumatra and Kalimantan and was increasingly cultivated in peatlands. Our scenarios for the future indicate that Indonesia can meet a considerable part of the global and Asian demand for palm oil, while avoiding further cultivation of peatlands and forest. By 2050, 264–447 Mt crude palm oil may be needed for cooking oil and biodiesel worldwide. In Indonesia, the area that is potentially suitable for oil palm is 17 to 26 Mha with a potential production rate of 27–38 t fresh fruit bunches/ha, yielding 130–176 Mt crude palm oil. Thus Indonesia can meet 39–60% of the international demand. In our scenarios this would be produced in Sumatra (21–26%), Kalimantan (12–16%), and Papua (2%). The potential areas include the current oil palm plantation in mineral lands, but exclude the current oil palm plantations in peatlands.

[268] P.L. Poulton, T. Vesna, N.P. Dalgliesh, V. Seng. (2015). Applying Simulation to Improve Rice Varieties in Reducing the On-Farm Yield Gap in Cambodian Lowland Rice Ecosystems. *Expl. Agric.* 51(2) pp 264 - 284.

Reference ID: 24088

Note: #24088e

Abstract: Achieving export growth in rice production from variable rainfed lowland rice ecosystems is at risk if depending on conventional breeding or genetic development alone. Sustained, long-term production requires building adaption capacity of smallholder farmers to better manage the challenges of seasonal climate variability and future climate change. Better understanding of the risks and constraints that farmers face in managing their current cropping system helps develop strategies for improving rice production in Cambodia. System models are now considered valuable assessment tools for evaluating cropping systems performance worldwide but require validation at the local level. This paper presents an evaluation of the APSIM-Oryza model for 15 Cambodian rice varieties under recommended practice. Data from a field experiment in 2011, conducted in a non-limiting water and nutrient environment, are used to calibrate varietal-specific coefficients and model input parameters. An independent dataset is then used to validate the model performance for a 'real-world' situation using on-farm data for six rice varieties planted in 54 farmer fields on 32 farms in two villages of Southeastern Cambodia. From this analysis, the APSIM-Oryza model is shown to be an acceptable tool for exploring the mismatch between current on-farm yields and potential production through yield gap analysis and the exploration of cropping system options for smallholder farmers to increase production, adapt to seasonal climate variability and be prepared for potential climate changes.

[269] K. Kubo. (2013). Rice Yield Gap between Myanmar and Vietnam: A Matter of Price Policy or Public Investment in Technology? *Asian Journal of Agriculture and Development.* 10(1) pp 1 - 24.

Reference ID: 24089

Note: #24089e

Abstract: This paper examines the rice yield gap between Myanmar and Vietnam, two countries that show a stark contrast in terms of rice production in the past two decades. It considers the impact on yield of price policies and public investments in production technology. While domestic rice prices were once controlled in both countries, no clear deterioration or improvement in terms of trade for rice producers were confirmed in the past two decades. Rather, the widening yield gap in this period might be attributable to differences in technological changes due to public investments. It is implied that Myanmar needs more effective public investments in agriculture to upgrade production technology. Furthermore, the experience of the two

countries suggests that delegating the budget to local governments might raise the effectiveness of public investments.

[270] J.V. Silva, P. Reidsma, A.G. Laborte, M.K. van Ittersum. (2017). Explaining rice yields and yield gaps in Central Luzon, Philippines: An application of stochastic frontier analysis and crop modelling. *European Journal of Agronomy*. 82 pp 223 - 241.

Reference ID: 24090

Note: #24090e

Abstract: Explaining yield gaps is crucial to understand the main technical constraints faced by farmers to increase land productivity. The objective of this study is to decompose the yield gap into efficiency, resource and technology yield gaps for irrigated lowland rice-based farming systems in Central Luzon, Philippines, and to explain those yield gaps using data related to crop management, biophysical constraints and available technologies. Stochastic frontier analysis was used to quantify and explain the efficiency and resource yield gaps and a crop growth model (ORYZA v3) was used to compute the technology yield gap. We combined these two methodologies into a theoretical framework to explain rice yield gaps in farmers' fields included in the Central Luzon Loop Survey, an unbalanced panel dataset of about 100 households, collected every four to five years during the period 1966–2012. The mean yield gap estimated for the period 1979–2012 was 3.2 ton ha⁻¹ in the wet season (WS) and 4.8 ton ha⁻¹ in the dry season (DS). An average efficiency yield gap of 1.3 ton ha⁻¹ was estimated and partly explained by untimely application of mineral fertilizers and biotic control factors. The mean resource yield gap was small in both seasons but somewhat larger in the DS (1.3 ton ha⁻¹) than in the WS (1.0 ton ha⁻¹). This can be partly explained by the greater N, P and K use in the highest yielding fields than in lowest yielding fields which was observed in the DS but not in the WS. The technology yield gap was on average less than 1.0 ton ha⁻¹ during the WS prior to 2003 and ca. 1.6 ton ha⁻¹ from 2003 to 2012 while in the DS it has been consistently large with a mean of 2.2 ton ha⁻¹. Varietal shift and sub-optimal application of inputs (e.g. quantity of irrigation water and N) are the most plausible explanations for this yield gap during the WS and DS, respectively. We conclude that the technology yield gap explains nearly half of the difference between potential and actual yields while the efficiency and resource yield gaps explain each a quarter of that difference in the DS. As for the WS, particular attention should be given to the efficiency yield gap which, although decreasing with time, still accounted for nearly 40% of the overall yield gap

[271] E. Beza, J.V. Silva, L. Kooistra, P. Reidsma. (2017). Review of yield gap explaining factors and opportunities for alternative data collection approaches. *European Journal of Agronomy*. 82 pp 206 - 222.

Reference ID: 24091

Note: #24091e

Abstract: Yield gap analysis is gaining increased scientific attention, as estimating and explaining yield gaps shows the potential for sustainable intensification of agricultural systems. Explaining yield gaps requires detailed information about the biophysical environment, crop management as well as farmer characteristics and socio-economic conditions in which farmers operate. However, these types of data are not always available, mostly because they are costly to collect. The main objective of this research is to assess data availability and data collection approaches for yield gap analysis, and to summarize the yield gap explaining factors identified by previous studies. For this purpose, a review of yield gap studies (50 agronomic-based peer-reviewed articles) was performed to identify the most commonly considered and

explaining factors of the yield gap. Besides a global comparison, differences between regions, crops and methods were analysed as well.

The results show that management and edaphic factors are more often considered to explain the yield gap compared to farmer characteristics and socio-economic factors. However, when considered, both farmer characteristics and socio-economic factors often explain the yield gap. Fertilization and soil fertility factors are the most often considered management and edaphic factors. In the fertilization group, factors related to quantity (e.g. N fertilizer quantity) are more often considered compared to factors related to timing (e.g. N fertilizer timing). However, when considered, timing explained the yield gap more often. Explaining factors vary among regions and crops. For example, while soil fertility is considered relatively much both in Africa and Asia, it is often explaining in Africa, but not in Asia. Agronomic methods like crop growth simulation models are often used for yield gap analysis, but are limited in the type and number of factors that can be included. Qualitative methods based on expert knowledge can include the largest range of factors. Although the data included in yield gap analysis also depends on the objective, knowledge of explaining factors, and methods applied, data availability is a major limiting factor. Bottom-up data collection approaches (e.g. crowdsourcing) involving agricultural communities can provide alternatives to overcome this limitation and improve yield gap analysis.

[272] H. Liang, K. Hu, W. Qin, Q. Zuo, Y. Zhang. (2017). Modelling the effect of mulching on soil heat transfer, water movement and crop growth for ground cover rice production system. *Field Crops Research*. 201 pp 97 - 107.

Reference ID: 24092

Note: #24092e

Abstract: Soil-crop system models often failed to simulate the effect of plastic film mulching (FM) on soil heat transfer, water movement and crop growth due to lack of appropriate method and the measured data in the fields. The objectives of this study were to (i) improve the Soil Water Heat Carbon Nitrogen Simulator (WHCNS) model to simulate soil temperature, water content and rice growth under FM condition, and (ii) to analyze the effect of FM on water balance and water use efficiency (WUE) under different water and nitrogen (N) management, using the data of a two-year field experiment with a factorial design of two water (W_{sat} and $W_{80\%}$, soil water content was kept at saturation and 80% field capacity) and three N levels (N1: zero-N fertilizer; N2: 150 kg urea N ha⁻¹; and N3: 75 kg urea N ha⁻¹ plus 75 kg N ha⁻¹ as manure) treatments. The results showed that the modified model accurately simulated the changes in soil temperature, soil water content, LAI, dry matter and yield under FM condition. The normalized root mean square error (nRMSE) were 4.7%, 4.5%, 24.5%, 16.5% and 7.9%, respectively, which were significantly smaller than the results simulated by the original model. Importantly, although there were no significant differences in average crop yields between two water input levels ($W_{80\%}$ and W_{sat}), the amounts of irrigation and evaporation under $W_{80\%}$ treatment were reduced significantly by 71.9% and 36.2%, respectively. And the WUE of $W_{80\%}$ (1.13 kg m⁻³) was higher than that of W_{sat} (0.84 kg m⁻³). The ranking of WUE under different N management for W treatments was N2 ≈ N3 > N1. In conclusion, the modified WHCNS model performed significantly better in simulating the dynamics of water, heat, and crop growth under FM. Reduced irrigation with 80% field capacity and applying 75 kg urea N ha⁻¹ plus 75 kg N ha⁻¹ as manure can achieve “more yield with less water”.

[273] A.M. Stuart, A.R.P. Pame, J.V. Silva, R.C. Dikitanan, P. Rutsaert, A.J.B. Malabayabas, R.M. Lampayan, A.M. Radanielson, G.R. Singleton. (2016). Yield gaps in rice-based farming systems: Insights from local studies and prospects for future analysis. *Field Crops Research*. 194 pp 43 - 58.

Reference ID: 24093

Note: #24093e

Abstract: The important contribution of rice to global food security requires an understanding of yield gaps in rice-based farming systems. However, estimates of yield gaps are often compromised by a failure to recognize the components that determine them at a local scale. It is essential to define yield gaps by the biological limitations of the genotype and the environment. There exist a number of methods for estimating rice yield gaps, including the use of crop growth simulation models, field experiments and farmer yields. We reviewed the existing literature to (i) assess the methods used to estimate rice yield gaps at a local scale and to summarize the yield gaps estimated in those studies, (ii) identify practical methods of analysis that provides realistic estimates of exploitable rice yield gaps, and (iii) provide recommendations for future studies on rice yield gaps that will allow accurate interpretation of available data at a local level.

Rice yield gap analysis can be simplified without sacrificing precision and context specificity. This review identifies the comparison of the attainable farm yield (the mean of the top decile) with the population mean, as a practical and robust approach to estimate an exploitable yield gap that is highly relevant at the local level, taking into account what is achievable given the local socio-economic conditions. With this method we identified exploitable yield gaps ranging from 23 to 42% for one particular season in four different rice growing areas in Southeast Asia. To enable accurate estimation and interpretation of yield gaps in rice production systems, we propose a minimum dataset needed for rice yield gap assessment. Future studies on rice yield gaps should consider the region, season and crop ecosystem (e.g. upland rainfed, lowland irrigated) as a minimum to facilitate decisions at a local level. In addition, we recommend taking into account the cultivar, soil type, planting date, crop establishment method and nitrogen application rates, as well as field topography and toposequence for rainfed systems. A good understanding of rice yield gaps and the factors leading to yield gaps will allow better targeting of agricultural research and development priorities for livelihood improvement and sustainable rice production

[274] M. Marcaida III, T. Li, O. Angeles, G.K. Evangelista, M.A. Fontanilla, J. Xu, Y. Gao, Z. Li, J. Ali. (2014). Biomass accumulation and partitioning of newly developed Green Super Rice (GSR) cultivars under drought stress during the reproductive stage. *Field Crops Research*. 162 pp 30 - 38.

Reference ID: 24094

Note: #24094e

Abstract: Drought is a major abiotic threat in rice production; thus, there is a need to develop adaptable rice varieties that can withstand drought stress and still produce high yield in non-stressed environments. Green Super Rice (GSR) cultivars address this issue. These cultivars are bred through an innovative introgression breeding strategy that requires less irrigation water and chemical inputs without compromising grain quality and yield. This study verified the physiological efficiency and performance of newly developed GSR cultivars that previously showed favorable response to drought during advanced yield trials. Five drought-tolerant GSR cultivars and two checks were subjected to continuously flooded (CF) and drought-stressed environments during the dry seasons of 2011 and 2012 at the International Rice

Research Institute (IRRI) experimental farms in Los Banos, Philippines. The cultivars' ability to allocate assimilates and accumulate biomass under drought stress during the reproductive stage was verified. Leaf area index (LAI), biomass dry weight, and panicle yield were measured at the panicle initiation (PI), flowering (FL), and physiological maturity (PM) of the sample cultivars. All the cultivars performed satisfactorily in the CF environment with grain yield ranging from 5 to 11.5 tons ha⁻¹. Water stress during the reproductive stage significantly reduced grain yield by 75–88% in the moderate drought (soil water tension between 100 and 300 kPa in upper 15 cm soil layer) and 77–96% in the severe drought (soil water tension >300 kPa in upper 15 cm soil layer) experiments. The shortened reproductive duration mainly contributed to the significant reduction in yield under drought stress. Two GSR cultivars, GSR IR1-5-S10-D1-D1 and IR83142-B-19-B, responded well in severe drought environments, with grain yield almost similar to the drought check (1.79 tons ha⁻¹). Under moderate drought stress, there was a relative yield advantage of 25% and 40% for the two GSR cultivars over the drought check, respectively. Yield advantage across environments, varying from fully irrigated to drought-stressed, was 31–36%. These two GSR cultivars were effective in mobilizing stored carbohydrates from the vegetative organs to the panicles and not shortening the duration from flowering to maturity, to allow all reserved carbohydrates be allocated to storage organs as a mechanism to cope with drought stress. Lower leaf area index (LAI), which allowed balanced biomass accumulation and lower transpiration, without a significant decrease in grain filling duration, was another drought-coping strategy. These physiological responses and characteristics apparently enabled the GSR cultivars to withstand drought stress; these are key indicators for varietal selection in drought-prone environments, particularly in severe drought stress in the reproductive stage. Despite the poor ability of some cultivars to cope with severe drought, three out of five selected GSR cultivars produced grain yield (2.0–2.9 tons ha⁻¹) that was the same or higher than the drought check in moderate drought stress. The introgression breeding technique applied in the newly developed drought-tolerant cultivars through the GSR breeding strategy was found to be effective. It could produce high yields in both CF and water-limited environments, and thus, it could serve as a model for other breeding programs to adopt.

[275] C.R. Alberto, R.J. Buresh, T. Hirano, A. Miyata, Wassmann. R., J.R. Quilty, T.Q. Correa Jr, J. Sandro. (2013). Carbon uptake and water productivity for dry-seeded rice and hybrid maize grown with overhead sprinkler irrigation. *Field Crops Research*. 146 pp 51 - 85.

Reference ID: 24095

Note: #24095e

Abstract: A growing scarcity of irrigation water could progressively lead to changes in rice production to systems using less irrigation water for rice or more crop diversification. A shift from current production of rice on flooded soils to production of rice on non-flooded soil with water-saving irrigation or to production of more water-efficient crops will have profound effects on carbon, water, and energy exchanges. This study used the eddy covariance technique to examine C uptake and water use efficiencies for watersaving, dry-seeded rice production and production of hybrid maize under overhead sprinkler irrigation as an alternative to flooded rice during two growing seasons. Maize with its C4 physiology has greater photosynthetic capacity than rice. In 2011, maize had 1.4 times higher net C uptake than rice and twice as much grain yield as rice (10.4 vs 5.3 Mg ha⁻¹). In 2012, lower solar radiation due to increased cloudiness and heavy rainfall during critical growth stages (late vegetative

to early reproductive) decreased LAI and resulted to about 20% less net C uptake and maize yield (8.2 Mg ha⁻¹), but the rice yield was unchanged (5.3 Mg ha⁻¹) presumably because of improved crop management which included effective crop establishment at lower seed rate and efficient N application using fertigation. Canopy light use efficiency, crop water productivity (WPET), and photosynthetic water use efficiency were 1.8, 1.9, and 1.6 times higher for maize than rice, respectively, despite sensitivity of maize to excess water. Net C uptake, evapotranspiration, and WPET of dry-seeded rice under overhead sprinkler irrigation were comparable to those reported elsewhere for flooded rice. Average total water input (irrigation + rainfall) for rice was only 908 mm, as compared to 1300–1500 mm reported in literature for typical puddled transplanted rice.

[276] R.P.R.K. Amarasingha, L.D.B. Suriyagoda, B. Marambe, W.M.U.K. Rathnayake, D.S. Gaydon, L.W. Galagedara, R. Punyawardena, G.L.L.P. Silva, U. Nidumolu, M. Howden. (2017). Improving water productivity in moisture-limited rice-based cropping systems through incorporation of maize and mungbean: A modelling approach. *Agricultural Water Management*. 189 pp 111 - 122.

Reference ID: 24096

Note: #24096e

Abstract: Crop and water productivities of rice-based cropping systems and cropping patterns in the irrigated lowlands of Sri Lanka have not been researched to the degree warranted given their significance as critical food sources. In order to reduce this knowledge gap, we simulated the water requirement for rice, maize, and mungbean under rice-based cropping systems in the Dry Zone of Sri Lanka. We evaluated the best combinations of crops for minimum water usage while reaching higher crop and water productivities. We also assessed the risk of cultivating mungbean as the third season/sandwich crop (i.e. rice-mungbean-rice) in different regions in Sri Lanka. In the simulation modelling exercise, APSIM-Oryza (rice), APSIM-maize and APSIM-mungbean modules were parameterised and validated for varieties grown widely in Sri Lanka. Moreover, crop productivities and supplementary irrigation requirement were tested under two management scenarios i.e. Scenario 1: irrigate when plant available water content in soil fell below 25% of maximum, and Scenario 2: irrigate at 7-day intervals (current farmer practice). The parameterised, calibrated and validated model estimated the irrigation water requirement (number of pairs of observations (n) = 14, R² > 0.9, RMSE = 66 mm season⁻¹ha⁻¹), and grain yield of maize (n = 37, R² > 0.95, RMSE = 353 kg ha⁻¹) and mungbean (n = 26, R² > 0.98, RMSE = 75 kg ha⁻¹) with a strong fit in comparison with observed data, across years, cultivating seasons, regions, management conditions and varieties. Simulated water requirement during the cropping season reduced in the order of rice (1180–1520 mm) > maize and mungbean intercrop = maize sole crop (637–672 mm) > mungbean solecrop (345 mm). The water productivity of the system (crop yield per unit water) could be increased by over 65% when maize or mungbean extent was increased. The most efficient crop combinations to maximise net return were diversification of the land extent as (i) 50% to rice and 50% to mungbean sole crops, or (ii) 25%, 25% and 50% to rice, maize and mungbean sole crops, respectively. Under situations where water availability is inadequate for rice, land extent could be cultivated to 50% maize and 50% mungbean as solecrops to ensure the maximum net return per unit irrigation water (115 Sri Lankan Rupees ha⁻¹mm⁻¹). Regions with high rainfall during the preceding rice cultivating season are expected to have minimum risk when incorporating a third season mungbean crop. Moisture loss through evapotranspiration from the third season mungbean crop was similar to that of a fallowed site with weeds.

[277] Sahoo. B.C., S.N. Panda. (2014). Rainwater harvesting options for rice-maize cropping system in rainfed uplands through root-zone water balance simulation. Biosystems Engineering. 124 pp 89 - 108.

Reference ID: 24097

Note: #24097e

Abstract: A root-zone water balance model was used to simulate the soil moisture storage of maize (*Zea mays* L.) and rice (*Oryza sativa* L.) fields in rainfed uplands of eastern India. The simulation study revealed that short duration (95 days) rice fields in uplands remained under ponding condition for a period of 32 days during the entire growing season. Based on the ponding depth requirement in rice fields (50 mm), excess ponding was found for seven days only out of the 32 days of ponding. In contrast, the maize field under similar length of growing season (95 days) and topographic condition could produce harvestable runoff for 23 days. Furthermore, the rice crop was to remain under moisture stress for eight days during its mid-season stage, whereas the maize was found to be without stress during entire growing season. Before sowing of winter crops, the soil moisture in the seeding zone was determined to be depleted below germination soil moisture for 18 and 19 years out of 30 years of simulation in rice and maize fields, respectively. This implies that a second crop, following withdrawal of monsoon, is not possible without pre-sowing irrigation in three out of five years in rainfed uplands. Thus, complete substitution of rice by maize in uplands would create a better scope for rainwater harvesting. Alternatively, partial replacement of rice could be a viable option for meeting both rice demand of the people and harvesting of adequate rainwater for supplemental irrigation to crops in rainy and winter seasons.

[278] T. Soliman, F.K.S. Lim, J.S.H. Lee, L.R. Carrasco. (2016). Closing oil palm yield gaps among Indonesian smallholders through industry schemes, pruning, weeding and improved seeds. Royal Society Open Science. 3 pp 1 - 9.

Reference ID: 24099

Note: #24099e

Abstract: Oil palm production has led to large losses of valuable habitats for tropical biodiversity. Sparing of land for nature could in theory be attained if oil palm yields increased. The efficiency of oil palm smallholders is below its potential capacity, but the factors determining efficiency are poorly understood. We employed a two-stage data envelopment analysis approach to assess the influence of agronomic, supply chain and management factors on oil palm production efficiency in 190 smallholders in six villages in Indonesia. The results show that, on average, yield increases of 65% were possible and that fertilizer and herbicide use was excessive and inefficient. Adopting industry-supported scheme management practices, use of high-quality seeds and higher pruning and weeding rates were found to improve efficiency. Smallholder oil palm production intensification in Indonesia has the capacity to increase production by 26%, an equivalent of 1.75 million hectares of land.

[279] J. Yahaya, S. Ahmad, S.W. Kennedy. (2006). Impacts of Biodiesel Development on the Palm Oil Industry. Malaysian Journal of Economic Studies. 43 pp 113 - 140.

Reference ID: 24100

Note: #24100e

Abstract: This paper examines the impacts of biodiesel growth on the palm oil industry. The implications of biodiesel growth are discussed within the context of the overall oil seeds industry. Insufficient supply of the most major oil seed used for biodiesel-rape seed has given rise to a raw material supply gap. In this context, the

complementary role of palm oil is expected to become more significant. Major producers of palm oil are keen to use biodiesel as a stock management mechanism for palm oil which is currently perceived to be undervalued in terms of pricing. Ongoing work to increase yield through sustainable plantation practices and improvement of planting materials is being intensified in anticipation of strong palm oil demand.

[280] L.H. Denmead, K. Darras, Y. Clough, P. Diaz, I. Grass, M. Hoffman, F. Nurdiansyah, R. Fardiansah, T. Tscharntke. (2017). The role of ants, birds and bats for ecosystem functions and yield in oil palm plantations. *Ecology*. 98(7) pp 1945 - 1956.

Reference ID: 24101

Note: #24101e

Abstract: One of the world's most important and rapidly expanding crops, oil palm, is associated with low levels of biodiversity. Changes in predator communities might alter ecosystem services and subsequently sustainable management but these links have received little attention to date. Here, for the first time, we manipulated ant and flying vertebrate (birds and bats) access to oil palms in six smallholder plantations in Sumatra (Indonesia) and measured effects on arthropod communities, related ecosystem functions (herbivory, predation, decomposition and pollination) and crop yield. Arthropod predators increased in response to reductions in ant and bird access, but the overall effect of experimental manipulations on ecosystem functions was minimal. Similarly, effects on yield were not significant. We conclude that ecosystem functions and productivity in oil palm are, under current levels of low pest pressure and large pollinator populations, robust to large reductions of major predators.

[281] Gérard. A., M. Wollni, D. Hölscher, B. Irawan, L. Sundawati, M. Teuscher, H. Kreft. (2017). Oil-palm yields in diversified plantations: Initial results from a biodiversity enrichment experiment in Sumatra, Indonesia. *Agriculture, Ecosystems & Environment*. 240 pp 253 - 260.

Reference ID: 24102

Note: #24102e

Abstract: The expansion of oil-palm plantations threatens tropical biodiversity and ecosystem functioning. While the expansion of oil palm has been associated with positive welfare effects, the strong dependence of local livelihoods on a single crop species also entails social and economic risks. Alternative management strategies could be important in mitigating negative ecological and socio-economic consequences. Yet, there is little empirical knowledge on the biological effectiveness and economic viability of such approaches. To bridge this gap, we experimentally established tree islands in varying sizes (25, 100, 400, and 1600 m²) within a conventional oil-palm plantation and reduced the oil-palm density on these islands by thinning. After two years, we found enhanced yields per oil palm inside and also directly adjacent to the experimental plots. Estimating the net yield changes including opportunity costs and spillover effects for different sizes of tree islands, we found evidence that - in particular for larger tree islands - yield gains at least compensated for the reduced number of oil palms. Though these effect on yields may change as trees grow taller, the results obtained during the early phase of tree island establishment are promising in terms of identifying sustainable management options for oil palm that reconcile ecological and economic functions.

[282] Indonesia Ministry of Agriculture. 2017. The Indonesian Palm Oil Platform: InPOP. pp 1 - 12.

Reference ID: 24103

Note: #24103e

Abstract: Based on an inclusive and transparent dialogue process, the Indonesia Palm Oil Platform provides a neutral space to create a multistakeholder national action plan for the long-term sustainability of palm oil.

[283] Indonesia Ministry of Agriculture. 2015. Indonesia Palm Oil Platform (InPOP) Newsletter. 2015. (1). pp 1 - 4.

Reference ID: 24104

Note: #24104e

[284] World Bank. 2016. The Cost of Fire: An Economic Analysis of Indonesia's 2015 Fire Crisis: Indonesia Sustainable Landscapes Knowledge Note: 1. 103668. 1. pp 1 - 12.

Reference ID: 24105

Note: #24105e

Abstract: According to the government, 2.6 million hectares of Indonesian land burned between June and October 2015, an area four and half times the size of Bali. Man-made fires – more than 100,000 of them– were used to prepare land for agriculture and to gain access to land cheaply. Absent controlled burning measures or sufficient law enforcement, the fires grew out of control, fed by drought and exacerbated by the effects of El Niño. This vast economic and environmental crisis is repeated year after year, as a few hundred businesses and a few thousand farmers profit from land and plantation speculation practices, while tens of millions of Indonesians suffer health costs and economic disruptions. In 2015, fires cost Indonesia an estimated USD 16.1 billion (IDR 221 trillion). Adding in regional and global costs mean the actual figure is much higher. The government has prioritized a response and the president has called for action. Now is the time for Indonesia to address the underlying drivers of man-made fires, enforce laws and revise policies in order to reduce the risk of these economic disasters from recurring.

[285] Sime Darby Plantation. 2014. Palm Oil Facts & Figures. pp 1 - 8.

Reference ID: 24106

Note: #24106e

[286] PricewaterhouseCoopers Indonesia. 2017. Palm Oil Plantation: Industry landscape, regulatory and financial overview. pp 1 - 16.

Reference ID: 24107

Note: #24107e

[287] X. Zheng, Y. Koyama, C. Nagai, H. Ashihara. (2004). Biosynthesis, accumulation and degradation of theobromine in developing *Theobroma cacao* fruits. Journal of Plant Physiology. 161 pp 363 - 369.

Reference ID: 24108

Note: #24108e

Abstract: We have studied the purine alkaloid content and purine metabolism in *Theobroma cacao* fruits at differing growth stages: Stage A (young small fruit, fresh weight, ca. 2 g); stage B (medium size fruit, fresh weight, ca. 100g) and stage C (large size, fresh weight, ca. 500 g). The major purine alkaloid in stage A fruits (mainly

pericarp) was theobromine ($0.7 \mu\text{mol g}^{-1}$ fresh weight), followed by caffeine ($0.09 \mu\text{mol g}^{-1}$ fresh weight). The theobromine content of the pericarp decreased sharply with tissue age, and the caffeine content decreased gradually. A large amount of theobromine ($22 \mu\text{mol g}^{-1}$ fresh weight) had accumulated in seeds (mainly cotyledons) of stage C fruits. Theobromine was found also in the seed coat and placenta. Tracer experiments with $[8-^{14}\text{C}]$ adenine show that the major sites of theobromine synthesis are the young pericarp and cotyledons of *T. cacao* fruits. Limited amounts of purine alkaloids may be transported from the pericarp to seed tissue, but most purine alkaloids that accumulated in seeds appeared to be synthesised in cotyledons. Degradation of $[8-^{14}\text{C}]$ theobromine and $[8-^{14}\text{C}]$ caffeine to CO_2 via 3-methylxanthine and ureides (allantoin and allantoic acid) was detected only in the pericarp of stage C fruits.

[288] R.L. Whistler, E.Jr. Masak, R.A. Plunkett. (1956). Cacao Polysaccharides. Journal of American Chemical Society. 78 pp 2851 - 2853.

Reference ID: 24109

Note: #24109e

Abstract: Two distinct hot-water-soluble polysaccharides are extractable from mature Caracas cacao fruit husk and seed. Preliminary work indicates the husk polysaccharide to be composed mainly of L-rhamnose, L-arabinose, D-galactose and D-mannose plus small amounts of glucose, xylose and an unidentified pentose. The seed polysaccharide contains the same major components but in different proportions.

[289] I. Abdulai, P. Vaast, M.P. Hoffmann, R. Asare, L. Jassogne, P. Van Asten, R.P. Rotter, S. Graefe. (2017). Cocoa agroforestry is less resilient to sub-optimal and extreme climate than cocoa in full sun. Global Change Biology. 2017 pp 1 - 14.

Reference ID: 24110

Note: #24110e

Abstract: Cocoa agroforestry is perceived as potential adaptation strategy to sub-optimal or adverse environmental conditions such as drought. We tested this strategy over wet, dry and extremely dry periods comparing cocoa in full sun with agroforestry systems: shaded by (i) a leguminous tree species, *Albizia ferruginea* and (ii) *Antiaris toxicaria*, the most common shade tree species in the region. We monitored micro-climate, sap flux density, throughfall, and soil water content from November 2014 to March 2016 at the forest-savannah transition zone of Ghana with climate and drought events during the study period serving as proxy for projected future climatic conditions in marginal cocoa cultivation areas of West Africa. Combined transpiration of cocoa and shade trees was significantly higher than cocoa in full sun during wet and dry periods. During wet period, transpiration rate of cocoa plants shaded by *A. ferruginea* was significantly lower than cocoa under *A. toxicaria* and full sun. During the extreme drought of 2015/16, all cocoa plants under *A. ferruginea* died. Cocoa plants under *A. toxicaria* suffered 77% mortality and massive stress with significantly reduced sap flux density of $115 \text{ g cm}^{-2} \text{ day}^{-1}$, whereas cocoa in full sun maintained higher sap flux density of $170 \text{ g cm}^{-2} \text{ day}^{-1}$. Moreover, cocoa sap flux recovery after the extreme drought was significantly higher in full sun ($163 \text{ g cm}^{-2} \text{ day}^{-1}$) than under *A. toxicaria* ($37 \text{ g cm}^{-2} \text{ day}^{-1}$). Soil water content in full sun was higher than in shaded systems suggesting that cocoa mortality in the shaded systems was linked to strong competition for soil water. The present results have major implications for cocoa cultivation under climate change. Promoting shade cocoa agroforestry as drought resilient system especially under climate change needs to be carefully reconsidered as shade tree species such as the recommended leguminous *A. ferruginea* constitute

major risk to cocoa functioning under extended severe drought.

[290] ISP. (2017). The Planter Vol 93 No 1093 April 2017. 93 pp 233 - 324.

Reference ID: 24126

Note: S serial #24126

[291] M.A. Abd Manif, D.A. Abang Masli, Z. Ramli, A.M. Mat Yunus, S. Mohammed, F.H. Lim, N. Abdul Wahab, O. Abdul Rasid, R. Sambanthamurthi, G.K. Ahmad Parveez. (2017). Biotechnology for Diversification and Improved Resilience of the Oil Palm. The Planter. 93(1093) pp 237 - 249.

Reference ID: 24127

Note: #24127e > S serial #24126

Abstract: Oil palm is one of the most important crops in Malaysia and has brought about significant economic and social development to the country. Nevertheless, there are major drawbacks and challenges faced by the industry such as shrinking availability of arable land, labour issues, and pest and disease.

[292] T. Seng, S.H. Mohamed Saad, L. Leao, S. Krishnan, M.F. Abdul Rahim, V. Rao, E Ritter, S.S.R. Syed Alwee. (2017). Marker-Assisted Selection and Its Application in Breeding for High Yielding Short Palms: The FGV Approach. The Planter. 93(1093) pp 255 - 268.

Reference ID: 24128

Note: #24128e > S serial #24126

Abstract: While the primary objective of oil palm breeding is high yield it is also desirable to have slower growing palms, hence, the various attempts to breed for shorter height increment. The breeding challenge is that all known genetically short palms are generally low yielding whereas current breeding stocks for high yield DxP are also for relatively tall palms.

[293] N.D. Lakey, J.M. Ordway, N. Jiang, S.W. Smith, A. Favello, L.C.L. Ooi, R. Singh, R. Nookiah, E.T.L. Low, M. Ong-Abdullah, R. Sambanthamurthi. (2017). Increasing Oil Palm Industry Profit, Malaysian Gross National Income and Government Tax Revenue with Breakthrough DNA Tests. The Planter. 93(1093) pp 273 - 279.

Reference ID: 24129

Note: #24129e > S serial #24126

Abstract: The sequencing and assembly of the oil palm genome, by a team led by the Malaysian Palm Oil Board (MPOB), rapidly resulted in the discovery of the SHELL gene which controls the tenera, dura or pisifera fruit-form phenotype of oil palm, a major contributor to mesocarp oil yield. This milestone allowed development of genetic tests capable of predicting fruit-form phenotype at the prenursery stage. Here, we explain a proposed cost effective strategy for staged SHELL genetic testing and discuss the economic impacts of implementing SHELL testing for molecular precision agriculture in the oil palm industry.

[294] ISP. (2017). The Planter Vol 93 No 1094 May 2017. 93 pp 335 - 390.

Reference ID: 24130

Note: S serial #24130

[295] Y.L. Cheong, K.C. Prastyo, E.K Saw, L.H. Ooi. (2017). The Status of Two Species of Subterranean Termites, *Coptotermes curvignathus* and *Coptotermes sepangensis* in Oil Palm. The Planter. 93(1094) pp 357 - 362.

Reference ID: 24131

Note: #24131e > S serial #24130

Abstract: An investigation was carried out to determine whether the subterranean termite, *Coptotermes sepangensis* is a pest of oil palm planted on organic soil. Termites, found on the standing oil palm were collected, preserved in 70 per cent alcohol and identified to their species. These palms were observed for 12 months and then felled to check for the presence of termites and damage caused by them. It was confirmed that *C. sepangensis* was not a pest of oil palm. Its close relative, *C. curvignathus*, was confirmed infesting living palms, building nests and causing hollows in the trunk of oil palms.

[296] L.C. Vriesmann, R.D. de Mello Castanho Amboni, C.L. de Oliveira Petkowicz. (2011). Cacao pod husks (*Theobroma cacao* L.): Composition and hot-water-soluble pectins. Industrial Crops and Products. 34(1) pp 1173 - 1181.

Reference ID: 24132

Note: H 8.1.4 #24132

Abstract: The composition of cacao pod husks (CPHs), the main waste product of cocoa production, and some of the characteristics of their water-soluble pectins were investigated. Milled and dried CPHs were submitted to hot aqueous extractions (50 and 100 °C, 90 min, 1:25, w/v). The obtained fractions (labeled 50W and BW, respectively) yielded 7.5 and 12.6% pectins, respectively. The monosaccharide composition revealed the predominance of uronic acid, followed by galactose, rhamnose and arabinose, characteristic of pectins. Chemical and spectroscopic analyses (FT-IR and ¹³C NMR) showed that both fractions contained high acetyl contents (DA 29.0 and 19.2%, respectively) and are composed of low methoxyl homogalacturonans (DE 37.0 and 42.3%, respectively) with rhamnogalacturonan insertions carrying side chains containing mainly galactose. Rheological analyses were carried out with 50W and BW. Solutions of both fractions at 5% (w/v) had a non-Newtonian shear-thinning behavior, however that of 50W showed higher apparent viscosity than that of BW. Dynamic oscillatory analyses showed that 5% (w/w) 50W pectin had weak gel behavior whereas at the same concentration, BW pectin behaved as a concentrated solution. Although further investigations are required, CPH seems be a potential source of both pectins and other natural agents such as fibers and phenolics, and its use is particularly justified by growing environmental awareness.

[297] T. Zeller. (1911). Die D□ngungsfrage für die Kultur des Kakao und der Ölpalmen in Kamerun: The Question of Education for the Culture of Cocoa and Oil Palm in Cameroon. Der Tropenpflanzer. 7 pp 345 - 359.

Reference ID: 24133

Note: H 27 #24133 > #23500e

Abstract: Die notwendigkeit der dungung für die kultur tropischer gewächse wird neuerdings immer scharfer betont, und wo nachdenkliche Pflanzler an der Arbeit sind, werden sie die Mahnrufe der Wissenschaft nicht ungehört verklängen lassen, auch da nicht, wo man fruchtbaren Boden bebaut, wie in den meisten Pflanzungen Kameruns. (translated in english via google translate: The necessity of training for the culture of tropical growth has lately been increasingly emphasized, and where thoughtful planters are at work, they will not let the admonitions of science fade away unhindered, even where they cultivate fertile soil, as in most plantations Cameroon.

[298] B.K.W. Kwan. (1994). The Effect of Planting Density on the First Fifteen Years of Growth and Yield of Oil Palm in Sabah. pp 1 - 26.

Reference ID: 24134

Note: H 8.1.1.1 #24134e

Abstract: Fifteen years' yield and growth results from an oil palm spacing trial evaluating a range of planting densities on riverine alluvium are reported.

Density affected most of the growth parameters significantly. The most notable effects were an increase in rachis length, height increment and a decrease in stem diameter and the rate of frond production. Vegetative dry matter production per palm also decreased with increasing planting densities but mean leaf area and petiole cross section area were not affected. There is a drastic reduction of FFB yield per palm with increasing planting densities due to reduced bunch number and mean bunch weight. The concept of optimum densities was also discussed. The optimum densities for maximum cumulative yield and maximum cumulative profit with discount factor over the fifteen years period were calculated.

[299] A. Moradi, C.B.S. Teh, K.J. Goh, A.H. Mohd Hanif, C.F. Ishak. (2012). Evaluation of Four Soil Conservation Practices in a Non-Terraced Oil Palm Plantation. *Agronomy Journal*. 104(6) pp 1727 - 1740.

Reference ID: 24135

Note: H 8.1.1.1 #24135

Abstract: In Malaysia, four soil conservation practices are often recommended for non-terraced oil palm (*Elaeis guineensis* Jacq.) plantations. These practices are oil palm empty fruit bunches (EFB), Ecomat (a compressed EFB mat; ECO), and pruned oil palm fronds. These three oil palm residues are used as organic mulching materials. The fourth method is silt pits (SIL) which are soil trenches to collect nutrients from runoff water and later redistribute them back into the soil. Nonetheless, the relative effectiveness of these four methods in improving soil and oil palm properties have never been studied. A 3-yr field experiment was consequently conducted to determine their relative effects on increasing soil chemical properties (pH, cation exchange capacity, organic C, total N, available P, and exchangeable K, Ca, and Mg) and oil palm nutrition levels (N, P, K, Ca, and Mg). Biomass decomposition rate and nutrients release rate in the field by the three mulching materials were also determined. Results showed that EFB mulching was significantly better than the other three soil conservation practices in improving nearly all of the measured soil and plant parameters. Empty fruit bunches was most effective partly because of the combined effects of higher amounts of dry matter added and the higher nutrient concentrations in the EFB than in other mulching materials. Silt pitting was found not to be as effective as EFB because SIL could only trap and return nutrients back into the soil, whereas EFB could do both: trap nutrients and release additional nutrients into the soil as it decomposes.

[300] A.R. Zaharah, K. C. Lim. (2000). Oil palm empty fruit bunch as a source of nutrients and soil ameliorant in oil palm plantation. *Malaysian Journal of Soil Science*. 4 pp 51 - 66.

Reference ID: 24136

Note: H 8.1.1.1 #24136

Abstract: A lysimeter study on the decomposition and nutrient release from oil palm empty fruit bunch (EFB) component parts (spikelet, stalk and mixture of stalk and spikelet) was carried out with and without mineral N fertilizers under field conditions over a period of nine months. A field experiment was also conducted where 17 year-

old oil palms were treated with different N and K inorganic fertilizer rates, with and without EFB mulching. Two years of yield data were collected and at the end of this period, the soils were collected and analyzed for pH, exchangeable Ca, Mg and K and organic C content. It was observed that the EFB component parts decomposed at a significantly different rates in the order of stalk > mixture > spikelet. The decomposition pattern for all the parts conforms to the double exponential model by which most organic materials decompose. Lignin, polyphenol, carbon and nitrogen content in the EFB showed good correlation with soil N dynamics. The model identified was: $\text{soil min N} = 20.45 - 25.02\text{RN} + 0.388\text{PP} + 0.47 \text{LIG} - 0.40 \text{LIG/N}$ ($R^2 = 0.80$). Application of EFB parts lead to complete soil N immobilization for the entire 36 weeks of experimental period accompanied by 80 - 88% loss of K, Mg and Ca. In mature oil palm, application of inorganic N, EFB and N + EFB significantly increase EFB yield. The soil chemical characteristics like pH, organic C and exchangeable K were significantly improved with EFB application, making EFB a suitable ameliorant in improving soil quality for sustainable oil palm production.

[301] D.R. Kala, A.B. Rosenani, L.A. Thohirah, I. Fauziah, S.H. Ahmad. (2012). Oil Palm Waste-Sewage Sludge Compost as a Peat Substitute in a Soilless Potting Medium for Chrysanthemum Global Journal of Science Frontier Research Agriculture & Biology. 12(2) pp 37 - 44.

Reference ID: 24137

Note: H 8.1.1.2 #24137e

Abstract: Co-composting oil palm wastes, particularly the empty fruit bunch (EFB), frond and trunk with sewage sludge could be potentially converted into value added product. The objective of this study was to determine the best formulation using oil palm wastes and sewage sludge in producing a composted material to be used as a potting media in horticulture. Shredded oil palm wastes (EFB, frond and trunk) were mixed with sewage sludge in 3 different ratios (1:0, 3:1 and 4:1 ratio) using a polystyrene box and adjusted to 60% moisture content. At week 12, oil palm trunk with sewage sludge at 4:1 ratio was found to be the most optimum compost as potting media for ornamental plants because of its texture suitable for potting media, not stringent or stiff, had high nutrient contents (2.05 % N, 0.640 % P, 1.39 % K, 0.705 % Ca, 0.229% Mg), pH 6.2 and low C/N ratio, 19. Oil palm trunk + sewage sludge compost (OPTSC) was used as as a complete or partial substitute to peat and possible enhancing effect with Agrobland and Grofas chemical fertilizer in the production of potted chrysanthemum. The design used was a randomized complete block design (RCBD) with 9 treatments, replicated 5 times giving a total of 45 pots

[302] S Adam, S.S.N. Syd Ahmad, N.M. Hamzah, N.A. Darus. (2016). Composting of Empty Fruit Bunch Treated with Palm Oil Mill Effluent and Decanter Cake. pp 437 - 445.

Reference ID: 24138

Note: H 8.1.1.2 #24138

Abstract: Malaysia is a major exporter of palm oil however it created abundance of oil palm waste particularly empty fruit bunch (EFB) and palm oil mill effluent (POME). Composting of EFB and POME is one of the alternative ways to reduce the amount of by-product and towards the zero emission programs in palm oil mill industry. These by-products are good sources of plant nutrients and could be recycled into the fields as organic fertilizers. This study was conducted to determine the optimum rate of POME plus oil palm decanter cake (OPDC) on composting EFB. Composted EFB with different rate of POME and OPDC was carried out in composting plant at FELCRA

Mill, Maran. Shredded EFB was partially treated with POME from anaerobic pond in four different ratio (1:0, 1:2, 1:3 and 1:3:0.2) with 60 % moisture content. The composting materials were also mixed on a weekly basis. The 10-weeks old composts were dark in colour with earthy smell and the pH of compost keep increasing from moderate alkaline to strongly alkaline. The temperature and C/N ratio were found to decrease significantly while N, P and K content increased significantly. The compost formed from the addition of OPDC (1:3:0.2) found to be the most optimum compost with low C/N ratio (23.64), pH 8.4 and high nutrient content (N 1.57 %, P 0.21 %, K 0.65 %). In conclusion, the addition of OPDC as a nitrogen source can speed up composting process by reducing the C/N ratio value. The use of these oil palm wastes could reduce environmental damage and enhance economic benefits in the oil palm industry.

[303] MPOB. (2017). PIPOC 2017: Agriculture Biotechnology&Sustainability: Treasuring the Past, Charting the Future - 100th Anniversary Malaysia Palm Oil Industry. PIPOC 2017.

Reference ID: 24139

Note: #24139e (In folder in e-library, publications logged. [Thumbdrive](#) in audiovisual library)

[304] MPOB. (2017). Book of Abstracts PIPOC 2017: Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. PIPOC 2017. Kuala Lumpur. pp 1 - 178.

Reference ID: 24140

Note: #24140e > #24139e (in folder PIPOC 2017 #24139)

[305] MPOB. (2017). Proceedings of PIPOC 2017: Agriculture, Biotechnology & Sustainability Vol 1 - Treasuring the Past, Charting the Future. PIPOC 2017. Kuala Lumpur, Malaysia. pp 1 - 204.

Reference ID: 24141

Note: #24141e > #24139e (in folder PIPOC 2017 #24139)

[306] MPOB. (2017). Proceedings of PIPOC 2017: Agriculture, Biotechnology & Sustainability Vol 2 - Treasuring the Past, Charting the Future. PIPOC 2017. Kuala Lumpur, Malaysia. pp 1 - 416.

Reference ID: 24142

Note: #24142e > #24139e (in folder PIPOC 2017 #24139)

[307] T. Oberthur, C Donough, H. Sugianto, Y.L. Lim, M.S. Tan. (2017). Nutrient Use Efficiency (NUE) of Oil Palm. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 18 - 20.

Reference ID: 24143

Note: #24143 > #24141e (in folder PIPOC 2017 #24139) #24143e are slides from conference. Please note: Abstract only

Abstract: A2 - Global demand for vegetable oil will almost double in 2050, approaching 240Mt (Corley, 2009a), and oil palm is expected to contribute most to the additional requirements. Global consumption of palm oil has already reached 61Mt (2015 data reported by EuPOA, 2016). In the last two decades, expansion of the production area underpinned the required growth in supply of palm oil, with only marginal contributions from improved productivity. Today, the industry works towards a paradigm shift that places emphasis on intensification of production to satisfy

demand. To this end, Corley (2009a) suggests a yield target of 5.2 t palm oil/ha (compared to current 4 t palm oil/ha) to minimize as much as possible the requirements for new production area. Donough et al (2011) demonstrated such productivity increases in existing plantations with best management practices (BMP) driving the intensification. With 95% oil palm in Southeast Asia cultivated soils with suboptimal fertility characteristics (Mutert, 2001), external nutrients, commonly supplied with inorganic and organic fertilizers, are indispensable for intensification. Kee & Goh (2006) summarized responses of yield to nutrient application rates from numerous Malaysian fertilizer trials that attempt to maximize yield. At the same time, commercial plantations need to balance the economic (Veloo et al, 2013) and environmental (Chandran, 2001) costs of fertilizer use for palm oil production. Optimizing the crop's use efficiency of fertilizer-supplied nutrients is critical for this process. Fixen et al (2014) introduced the concept of Nutrient Use Efficiency (NUE) to assess the performance of nutrient management in crop production systems. Several indicators can be deployed to operationalize the NUE concept. Their common goal is to increase the overall performance of the cropping system by matching crop as precisely as possible nutrient needs, while minimizing environmental impacts.

[308] A. Kushairi. (2017). A Vision for Transformation of the Oil Palm Industry. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. Kuala Lumpur. pp xvii - xviii.

Reference ID: 24144

Note: #24144 > #24141e and #24142e (in #24139e folder) Abstract only, #24144e are slides= available in e-library

Abstract: PL1 - From its humble beginning in Malaya as a plantation crop in 1917, the oil palm has grown to over 5.7 million hectares by 2016, uplifting the economy and livelihood of Malaysians over the last 100 years. The industry has made significant strides by incorporating germplasm material sourced from its centre of origin in Africa and South America into on-going breeding programmes. This resulted in the development of 13 new genetic materials (PS series) by MPOB that have been distributed to the industry. An active tissue culture programme has facilitated cloning of the highest yielding palms, where uniformity of the clones generated offers the opportunity to increase yields up to 30%.

[309] M. Kaltschmitt. (2017). Biomass within the Global Energy System – Developments and Trends. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp xix - xix.

Reference ID: 24145

Note: #24145 > #24141e and #24142e (in folder #24139e) Abstract only. #24145e are the slides in e-library (Note: slides titled Bioenergy instead of Biomass)

Abstract: PL2 - Biomass from agriculture and forestry is used within the food and fodder sector, manifold markets for raw materials (e.g. construction wood, pulp and paper, cotton clothing, bioplastics) and as a renewable energy source. And the use of biomass within these three partly competing markets have been realized since ancient times. As a result, biomass is today the most widely used renewable energy source worldwide. Biomass provides almost 100% of the world's renewable fuels, over 90% of modern renewable heat and around 8% of renewable electricity (i.e. second largest contribution after hydropower). Thus in many countries bioenergy replaces the use of fossil fuel energy and thus contributes to the reduction of imports of fossil fuel energy as well as to greenhouse gas (GHG) reduction and environmental protection.

[310] T.A. Beardslee. (2017). One Step in Transforming the Chemical Industry from Petroleum to Bio-based. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp xx - xx.

Reference ID: 24146

Note: #24146 > #24141e and #24142e (in folder 24139e) Abstract only. #24146e are the slides from conference.

Abstract: PL3 - The great majority of materials in consumer goods today are made from petroleum-based chemicals. The petrochemical industry has employed a wide array of technologies to convert petroleum into all of the things that contribute to our current standard of living.

[311] A. Ismail. (2017). Rethinking Saturated Fat. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp xxi - xxiii.

Reference ID: 24147

Note: #24147 > #24141e and #24142e (in folder #24139e) #24147e are slides from conference

Abstract: PL4 - When a baby is born, the best food for the baby is its mother's milk which is saturated fat. Ironically, as the baby grows older and becomes an adult, most doctors believe that saturated fat consumption will be bad for his health.

[312] Z.A. Zainal Aminuddin. (2017). A Global Perspective of Agricultural Research Developments and Future Directions for the Oil Palm. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. Kuala Lumpur, Malaysia. pp 3 - 6.

Reference ID: 24148

Note: #24148 > #24141e (in folder #24139e) #24148e are slides from conference

Abstract: LP1 - Due to global demand for palm oil, there will be constant pressure for yield improvements and additional land conversion for decades to come. The oil palm sector should prioritise and invest R&D in crop production, management, soil, fertiliser, mechanisation, remote sensing and advanced biotechnology. An agro-climatic forecast system can provide information for critical operational decisions and preparations. Satellite and aerial data, can also support and revolutionise the management of the oil palm industry, bringing both business and environmental benefits. The oil palm genome sequencing, is a breakthrough which allows identification of genes influencing important agronomic traits. These traits can be further exploited to gain higher yield. Water, is another critical aspect in ensuring high and sustainable yield. In drier areas, a suitable irrigation infrastructure need to be optimised to ensure continuous good yield harvested throughout the year. Shortage of labour has led to longer harvesting rounds, unharvested bunches, losses of loose fruits leading to overall yield loss and reduction in oil extraction rates. Therefore, a more efficient harvesting system which includes ergonomic machines and tools would undoubtedly transform our plantation into a highly skilled and high income generating sector. If these and other measures can be addressed thoroughly, the output would certainly expedite the quantum leap which the industry needs, to meet future challenges.

[313] B. Bek-Nielsen. (2017). A Century of Economic Sustainability of Palm Oil in the Global Oils & Fats Complex. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. Kuala Lumpur. MPOB.

Reference ID: 24149

Note: #24149e > #24139e

[314] MPOB. (2017). PIPOC 2017 Evening Forum. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. Kuala Lumpur Malaysia. MPOB.

Reference ID: 24150

Note: #24150e > #24139e

[315] R. Moslim, S.A. Mohamad, N. Kamarudin, M.R. Sulaiman. (2017). Managing Fruit Set – is the Pollinating Weevil, *Elaeidobius kamerunicus* to be Blamed? PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 9 - 17.

Reference ID: 24151

Note: #24151 > #24141e (#24151e are slides from conference) in folder #24139e

Abstract: A1 - The African pollinating weevil, *Elaeidobius kamerunicus* was introduced in Malaysia in 1981 as to increase pollination of oil palm. A few years after that the weevil population multiplied and spread rapidly in oil palm plantations all over Malaysia. The weevil was then further introduced in oil palm producing countries in South-East Asia. In Malaysia, the weevils contributed in huge cost saving due discontinuing assisted hand pollination. Two years after the introduction, the fruit set was significantly improved up to 30% in Peninsular Malaysia and 50% in Sabah. After 35 years away from their origin country, the role of the *E. kamerunicus* in oil palm pollination seem to be reduced, not only in Malaysia, but also in Indonesia. Reduction in pollination was indicated by poor fruit set formation as well as low oil extraction rate. Possible factors associated with poor weevil activities and fruit set formation were identified, but the impact yet to be confirmed. These factors included climate (high rainfall), natural enemies (nematodes), infestation of pests (rats and bunch moths), over usage of insecticides, poor pollen viability, high yielding planting materials and low level of estragole emitted by the female inflorescences. Strategies to solve the problems were currently being researched. For a short-term solution, assisted pollination using hatch and carry techniques are needed especially in the badly affected areas where poor fruit set was consistently problematic. For more longer-term solutions, in-depth studies are needed to improve understanding on factors affecting activities and behaviour of the pollinator. With the genetic diversity among weevil population in Malaysia are available, reintroducing the pollinating weevil within Malaysia ecosystem could significantly increase population. For last resort and if needed, efforts should be focused to find the alternative pollinators to *E. kamerunicus* by importing them from the African countries.

[316] B. Singh. (2017). Integrating Soil/Crop Health and Management Strategies to Enhance Farm Productivity and Sustainability. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 21 - 22.

Reference ID: 24152

Note: #24152 > #24141e (in folder #24139e) #24152e are slides from conference.

Note: Abstract only

Abstract: A3 - The world's demand for food is expected to increase by 50% in volume

and 77% in monetary value by 2050. This represents a global challenge. However, agricultural productivity has been in structural decline globally (i.e. further resource inputs such as additional fertiliser application does not lead to yield gains in many farming regions), particularly within industrialised countries, since the mid-1990"s. If we don"t address this productivity decline in the face of rising demand, we will see higher food prices, lower profitability for farmers, negative impacts on national economies, and adverse environmental and social outcomes. Additional challenges for industry and policy advisors include producing more food from the shrinking arable land. Yield gains are further constrained by climate change and extreme weather events. The current scientific paradigm suggests that harnessing soil and plant microbiomes (microorganisms that live in the soil and on different parts of plants/crops) is the best possible approach to achieve sustainable increases in farm productivity. This opportunity has now been recognised by international government agencies and multinational companies including agrochemical giants.

[317] T.A. Jackson, S.D.G. Marshall. (2017). Managing the Threat of CRB-G, a New Variant of the Coconut Rhinoceros Beetle, in the Asia-Pacific Region. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 25 - 30.

Reference ID: 24153

Note: #24153 > #24141e (in folder #24139e) #24153e are slides from conference

Abstract: A4 -The coconut rhinoceros beetle (CRB), *Oryctes rhinoceros* is a pest of coconut and oil palm in the Asia-Pacific region. The beetle is endemic to the tropical regions of SE and S. Asia from where it has spread with invasions of palm producing areas in the Pacific and Indian oceans. In the 1970s and 80s the invasive populations were brought under control by release of the biocontrol *Oryctes rhinoceros nudivirus* (OrNV) in the outbreak areas and no further significant outbreaks were reported for the next 30 years. In 2007, a new outbreak of CRB was reported from the island of Guam where the beetles have since caused extensive damage. Genetic analysis revealed that the outbreak was caused by a new variant of rhinoceros beetle designated CRB-G which was unaffected by OrNV. New, highly damaging, outbreaks of rhinoceros beetle have since been reported from PNG, Hawai'i and Solomon Islands with all conforming to the CRB-G haplotype. Populations of CRB-G have since been discovered in Palau, the Philippines and Indonesia. CRBG is vigorous, invasive, highly damaging and poses a new threat palm production in the Asia- Pacific region. While most damage from CRB-G to date has affected coconut palms, oil palm is also susceptible, particularly in the early stages after replanting. A coordinated effort from the Asia and Pacific regions is required to find a solution to the threat posed by CRB-G.

[318] H.M. Romero, M. Herrera, J. Ochoa, K. Avila, G. Sarria, C. Montoya, S. Guataquira, I. Ayala. (2017). Advancement of Technologies in Bud Rot Disease Control in Colombia. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 31 - 39.

Reference ID: 24154

Note: #24154 > #24141e (in folder #24139e) #24154e are slides from conference

Abstract: A5 - The African oil palm (*Elaeis guineensis*) is the most important source of fats and oils in the world. The largest producers are Malaysia and Indonesia, although it is cultivated in Latin America, especially in Colombia, Ecuador, Brazil, Costa Rica, Guatemala, Peru, and the southern part of Mexico. In the Americas, the crop is affected by several diseases such as the Bud Rot disease (BR), which is

caused by *Phytophthora palmivora* and has destroyed thousands of hectares. There are not proven sources of resistance to BR in African oil palm, however Cenipalma has developed agronomic practices that allow the management and control of the disease. Nevertheless, to have a perdurable and sustainable management of the disease it is necessary to develop resistant cultivars. To accomplish this objective, Cenipalma has been researching several aspects of the *P. palmivora* – *E. guineensis* relationship. Here we show the results of the studies on the molecular and biochemical aspects of the relationship, including the molecular aspects of *P. palmivora* pathogenesis, the physiological and biochemical responses of the palm to *P. palmivora* attack, and the gene expression analysis of the plant-pathogen interaction. Finally, advances on breeding, including early screening tests and selection of resistant progenies, are given.

[319] S. Sundram, I.N.A. Mohamed Azni, I. Abu Seman, M.S. Mohamed. (2017). South American Bud Rot Disease: A Biosecurity Threat to South East Asia Oil Palm. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 40 - 52.

Reference ID: 24155

Note: #24155 > #24141e (in folder 24139e) #24155e are slides from conference

Abstract: A6 - Diseases affecting oil palm with significant economic impact have been confined according to the region where the crop is established. Yield losses reported by these diseases are higher than the losses caused by other pests in the crop. Oil palm planted in South East Asia is devastated by the deadly white rot fungus, *Ganoderma* spp. while in Africa, *Fusarium oxysporum* spp. causes the catastrophic Vascular Wilt. Among these, Bud rot affecting the South American industry is deemed the worst due to the speed of the spread and its economic impact. Initial reports associated abiotic factors to the outbreak but after an extensive studies, researchers from Colombia proved that a biotic agent is responsible for the disease. *Phytophthora palmivora* was identified as the causal agent although the finding is still being challenged. The pathogen however, has a cosmopolitan distribution recording significant disease damages in some of the commodity crops in Malaysia; cocoa, durian, jackfruit, papaya and black pepper. A Biosecurity alert was immediately pursued in Malaysia resulting in various activities to reduce the potential threat presented by the pathogen. Although phylogenetic analysis of the local *P. palmivora* isolates showed the isolates are closely related to the Colombian isolates based on ITS region, preliminary pathogenicity tests with the local isolates on oil palm resulted in negative infection. This paper reviews the disease, potential risk involved to the multibillion dollar industry and outlines mitigating steps to avoid accidental introduction to the country.

[320] M. Mohd Abidin, A. Makhdzir, M. Mardan. (2017). Drone-enabled Services for Oil Palm Plantations. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 55 - 55.

Reference ID: 24156

Note: #24156 > #24141e (in folder #24139e) Abstract only. #24156e are slides from conference

Abstract: A7 - Drone is fast becoming a crucial tool that enables precision in agriculture. The extra precision benefits farmers or plantations by allowing them to either save cost, increase yield, or speed up productivity. This paper will talk about applications of drone technology to enable precision farming for oil palm plantations. Some of the applications are palm tree counting, terrace planning, and pest control

and monitoring. Due to the importance of oil palm to the country, accurate and reliable information is needed not only for maintaining oil palm plantations but also increasing the profitability and improve the management primarily monitoring characteristics of oil palm plantation such as crop health, yield forecasting and plant inventory. Availability of this information would also help detection of pest and disease and optimised the control action through the right strategy. Drone can also be used to control oil palm pest such as bagworm. Currently, bagworm infestation is the major oil palm insect threats for the crop losses. In 2017, the number of infested area has escalated and it has been reported that more than 20 000 ha of oil palm small holders have been attacked by the pest and this number keeps increasing if not mitigated in time. Spraying of bio-insecticide using drone is one of the alternatives to control bagworm infestation rather than ground spraying. Sprayer drone does not replace existing bagworm control methods entirely but synergize with others. For large infested area, manned aircraft crop duster such as Thrush aircraft is the best approach as it can spray 1,000ha per day. For smaller area, spraying using drone provides quick deployment and ability to access remote areas such as hilly or swamp area. The drone also allows aerial monitoring after treatment is done in order to assess the treatment efficacy.

[321] T.T. Vu. (2017). Advancement of Remote Sensing for Oil Palm Precision Agriculture. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 56 - 60.

Reference ID: 24157

Note: #24157 > #24141e (in folder #24139e) #24157e are the slides from conference.

Abstract: A8 - Providing timely and relevant products, remote sensing has been widely used in agricultural monitoring and management. As the global demand on palm oil increases and as a result, oil palm areas have been expanded in tropical region, we observed the plethora of remote sensing uses in oil palm plantation industry. This paper aims to review the latest remote sensing technology development and discuss how oil palm plantation industry can benefit from these developments. Better spatial, spectral and temporal resolutions of satellite remote sensing images together with other airborne- and ground-based sensors enable better possibilities to acquire essential information for precision agriculture.

[322] A.R. Shuib, M.R. Khalid, Z. Mahfur. (2017). Boosting Worker Productivity Through Mechanisation. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 61 - 74.

Reference ID: 24158

Note: #24158 > #24141e (in folder #24139e) #24158e are sliders from conference

Abstract: A9 - Future survival of the palm industry in Malaysia is very much dependent on extensive automation-mechanisation in all the field operations in the plantation. Machine development may take some time to be matured and be acceptable to the industry. It has to be designed to suit the local requirement and thoroughly tested by the industry in different estate management environment before the industry can adopt of such a machine. Bukit Bujang Estate located at Segamat, Johor, was chosen by the Malaysian Palm Oil Board (MPOB) as a pioneer project for the model plantation for mechanisation which began in May 2015. The main focus of this model plantation is to showcase some of technologies that already been commercialised where it will be run as a commercial arrangement. Works were conducted in two prong-strategies, (1) make use of the available technologies and (2) designing and developing new technologies based on what is required on the particular site. A 432 ha undulating area

was selected as a model plot. Along the commercially available machines that were introduced, the mechanical cutter (Cantas) for harvesting, the mini-tractor grabber with hi-lift trailer for in-field evacuation of Fresh Fruit Bunches (FFB) and the hook lift and bin system for the mainline transportation. Several new machine prototypes i.e. Hydra Porter, 6WD and 4WS FFB transporter, Loose Fruits Collecting Machine were also tested in the field. Results show that there are possibilities to reduce the number of worker without sacrificing the output. Cost cutting was not the priority but this programme was rather focusing on labour reduction. The outcome of this model will be the establishment of a guidelines or standard operating procedures (SOP) that becomes a benchmark of all the technology and system that are tested and used. This will further facilitate the industry to choose and adopt the right machine and system to be used in their respective plantations. The model will also give some indication on the labour to land ratio that can help the industry to increase workers' productivity as outlined in NKEA programme.

[323] A.P. Ghulam Kadir, R. Singh, M. Ong-Abdullah, U.S. Ramli, L.E. Low, O. Abdul Rasid, M.A. Abd Manaf. (2017). Impact of Biotechnology on the Sustainable Development of the Oil Palm Industry - from Research to Application. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 77 - 86.

Reference ID: 24159

Note: #24159 > #24141e (in folder #24139e) #24159e are slides from conference

Abstract: LP2 - Biotechnological tools are essential for improving the efficiency of oil palm breeding, clonal propagation and diversify the application of palm oil. Appropriate tools that can help the palm meet and/or exceed its genetic potential are necessary to meet the growing demand for palm oil, especially considering the diminishing availability of arable land and the increase in cultivations costs. Research and development (R&D) efforts to further improve the productivity of oil palm received a boost when its genome was sequenced and released in 2013. This laid the foundation for applying genomic based technologies in oil palm research. The successes have been notable, especially the isolation of genes linked to important agronomic traits such as the oil fruit form and colour of the exocarp. For the first time diagnostic assays known as the SURESAWITTM SHELL and SURESAWITTM VIR, that have direct and important applications in commercial seed production and improving breeding efficiency have been made available. Building on this success, the epigenome of oil palm was also unravelled in order to examine DNA methylation alterations in clonal palms. This led to the unravelling of the molecular mechanism associated with "mantled" phenotype observed in clonal palms. The subsequent development of the SURESAWITTM KARMA assay as a quality control tool to weed out "mantled" palms early before field planting has now made large scale tissue culture of oil palm commercially viable. However, to further uncover the complexities and diverse physiological processes in the oil palm, an integrative "omics" approach which complements genome knowledge with proteomics and metabolomics data would be advantageous. Complex traits such as yield, disease resistance and adaptation to abiotic stresses require a combined "omics strategy" to uncover the complex molecular regulatory systems that govern these traits. In the case of the oil palm, an integrated omics approach is under taken to understand the interaction between *Ganoderma boninense* and the host with the aim of linking the phenotype of resistant/tolerant materials to their respective genotypes. Production of industrial oils via genetic engineering of the palm adds an extra dimension to the conventional and traditional exploitation of palm oil.

[324] M. Marjuni, R. Nookiah, M.D. Amiruddin, Z. Yaakub, N. Abdullah, F.A. Malike, S. Mustafa, M. Ong-Abdullah, G. Saleh, A.K. Din. (2017). Mining the Exotic Nigerian Population 12. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 89 - 105.

Reference ID: 24160

Note: #24160 > #24141e (in folder #24139e) #24160e are slides from conference

Abstract: A10 - Expedition to Nigeria was commenced in 1973 under Malaysian Agricultural Research and Development INSTITUTE (MARDI). The Nigerian collection later was transferred to Palm Oil Research Institute of Malaysia (PORIM in 1979 and later to Malaysian Palm oil Board or MPOB) in 2000. The exploration was carried out due to a very narrow genetic base of materials for oil palm breeding programme in Malaysia. Under this situation, it is much difficult to improve yield and other economic traits as the variability is limited in current breeding materials. The way to broaden the genetic variability is through introgression of these materials with selected materials from germplasm developed by MPOB. Through the new recombination, the best materials could be further assessed and later exploit them for future commercial seed production. Therefore, in the late 1990's until now, a new introduction of hybrid duras (Deli duras x Nigerian duras), teneras (Nigerian-based teneras) and Nigerian pisiferas are being tested as new parental materials. Nigerian palms have shown a great potential. They could yield up to 10-12 tons of oil per hectare per year, which is at least double of the average oil yield currently obtained. Nigerian palms also showed height increment of 20-25 cm yr⁻¹ compared to the current planting material (45-75 cm yr⁻¹). PORIM Series was developed and tested using Nigerian germplasm as their base which included PS1-type (high yield, dwarf) PS2 (high IV), PS3 (high kernel), PS7 (high bunch index), PS8 (high vitamin E) and PS12 (high oleic). The renowned Nigerian-based germplasm was the Nigerian population 12 material and its contribution to oil palm breeding programme in Malaysia from 1980-2015, is covered in this paper. Through thorough research and development, its high oil yield and low height increment potential could be transmitted to other oil palm populations with the future aim to produce high yield and a lower height increment DxP planting materials.

[325] A.T. Hashim, Z. Ishak, S.K. Rosli, M. Ong-Abdullah, S.E. Ooi, M.N. Husri, D. Abu Bakar, J.T.Y. Pang, S.R. Abdul Rahman, M.I. Zainol Abidin. (2017). Realizing Clonal Potential: Current Status. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 106 - 126.

Reference ID: 24161

Note: #24161 > #24141e (in folder #24139e) #24161e are slides from conference

Abstract: A11 - With limited land for expansion, the most sustainable way to increase productivity is by improving yield per hectare. The tissue culture system is by far the most viable approach to vegetatively propagate elite palms. After more than 35 years of Research and Development, reliable protocols for both solid and liquid culture systems coupled with various innovative technologies were established. Biomarkers such as those related to embryogenesis as well as KARMA were developed as a predictive tool and quality assurance respectively for clonal production. To date, clonal trials have been extensively conducted and the results were encouraging. This has enabled selection of clones with special characteristics for future recloning. MPOB's vast germplasm collection is a valuable resource for developing improved planting materials and cloning facilitates through fast tracking the breeding programme. Currently, utilisation of clonal planting materials is limited. In order to encourage smallholders to invest in planting oil palm clones, a new concept of contract farming is introduced. Despite the issues and challenges, cloning of superior palms provide

uniformed higher yielding planting materials, sparking the „second wave“ in yield improvement, in tandem with the current national aspiration of increasing productivity to 26.2 t ha⁻¹ yr⁻¹ FFB and 23% OER as documented in NKEA.

[326] R. Mishra, K. Zhao. (2017). Genome Editing Technologies and Their Potential Applications in Crop Improvement. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 127 - 127.

Reference ID: 24162

Note: #24162 > #24141e (in folder #24139e) #24162e are slides from conference. #24162 is abstract only.

Abstract: A12 - Crop improvement is very essential to meet the increasing global food demands and enhance food nutrition. Conventional crop breeding methods like random mutation, cross breeding methods and use of genetically modified (GM) crops have contributed a lot towards world food security. But they have certain limitations such as taking lot of time and resources, and causing biosafety concerns. These limitations could be overcome by the recently emerged genome editing tools that can precisely modify DNA sequences at the genomic level by using sequence specific nucleases (SSNs). The artificially engineered SSNs such as Zinc finger nucleases (ZFNs), transcriptional activator-like effector nucleases (TALENs) and clustered regularly interspaced short palindromic repeats (CRISPR)-associated endonuclease Cas9 (CRISPR/Cas9) have proven to be highly effective for genome editing in a wide variety of organisms including plants. The CRISPR/Cas9 system is the most recently developed targeted genome modification system and seems to be more efficient, inexpensive, easy, user friendly and rapidly adopted genome editing tool. Large-scale genome editing has not only improved the yield and quality but also has enhanced the disease resistance ability in several model and other major crops. Increasing case-studies suggest that genome editing is an efficient, precise and powerful technology that can accelerate basic and applied research towards crop improvement. In this review, we briefly overviewed the structure and mechanism of genome editing tools and their potential applications in crop plants. We have also discussed the broad applications of the targeted genome editing tools and their future prospects towards the improvement of agronomic traits in crops.

[327] T. Durand-Gasselin, B. Cochard. (2017). A Century Efforts in Improving Oil Palm Planting Materials. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 130 - 132.

Reference ID: 24163

Note: #24163 > #24141e (in folder 24139e) Note: Abstract only. #24163e are slides from conference

Abstract: A13 - In 1909 Henry Fauconnier create a plantation company with the help of Adrien Hallet, a Belgium banker. They then become friends. Mr Hallet was aware of oil palm potential to produce vegetable oil which need was increasing every day in Europe. Around the same time, the first industrial oil mill was established in 1909 in Mamfé, on the banks of the Cross river, in the west region of Cameroon; crunched bunches were collected in wild oil palm grove. The idea of developing oil palm plantations in Asia rises from Mr Hallet after he has seen the oil yield potential of *Elaeis guineensis* planted in ornamental alley in Sumatra as compare to wild grove palms in Africa. In 1910/1911, he launched the first large commercial plantation in Sumatra, using local seed. Jagoe estimate, that 6500 acres of oil palm plantation exist in Sumatra in 1914.

[328] S.C. Cheah. (2017). Genomic Solutions for the *Ganoderma* Menace. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 133 - 133.

Reference ID: 24164

Note: #24164 > #24141e (in folder #24139e) Abstract only, no slides

Abstract: A14 - Increasing occurrence and severity of the basal stem rot (BSR) disease in oil palm in Southeast Asia warrant studies that have the potential to provide deeper insights into the pathogen, *Ganoderma boninense*, which causes this disease and how it interacts with the host and the environment. Such studies have been the focus of our company's research efforts geared towards searching for solutions to control and eradicate the disease. After sequencing the oil palm genome in 2008, we turned our attention to the sequencing of the genome of *G. boninense* to lay the foundation for genetic investigations that could lead to applications in the control of the disease. We completed the sequencing of the first ganoderma genome in 2010 using both Sanger sequencing and next generation sequencing (NGS). Our experience in sequencing the oil palm genome was helpful in overcoming the difficulties encountered in sequencing the ganoderma genome. Through the metagenomic approach, we caught a glimpse of the microbial diversity in the environment in which ganoderma was actively infecting the oil palm. As for controlling the pathogen itself, the strategy that we adopted was to apply high throughput genome sequencing techniques to dissect the pathogen and reveal mechanisms of its interaction with the host. These efforts have been worthwhile as the decoding of the *G. boninense* genome and host-pathogen interaction provided clues that helped in the understanding of the genetic and molecular basis of pathogenesis. Such understanding has facilitated the development of applications useful for controlling the disease.

[329] H.F. Teh, B.K. Neoh, N. Ithnin, L.D.J. Daim, Y.C. Wong, T.E.K. Ooi, D.R. Appleton. (2017). The Role of Biochemical Omics Research for Oil Crop Improvement. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 134 - 137.

Reference ID: 24165

Note: #24165 > #24141e (in folder #24139e) #24165e are slides from conference.

Abstract: A15 - Crop yield improvement is essential for feeding the growing world population without concomitant increases in land allocated to agriculture. Oil crops are a critical component of food supply as well as non-food applications, and oil palm is of particular value due to its significantly higher yield per unit area of land. Research into the identification of genetic markers for yield and other traits in oil palm has attracted significant effort in recent years and is now reaching maturity. Biochemical „omics“ technologies can provide a complementary approach to identify important gene regions and variants for traits such as oil yield and indicate new relevant „intermediate traits“ - bridging the gap between genome sequence information and yield. In many cases the biochemical information obtained provides insights into the regulation of key biological processes involved in fruit lipid biosynthesis and photosynthesis. Future oil crop improvement will need to go beyond classical trait selection, and omics research needs to go beyond looking at oil biosynthesis and fruit development. We need to explore carbon supply and flux, plant stress response, nutrient uptake and water use through a combination of genetics, biochemistry, epigenetics and gene interaction coupled to more detailed and continuous phenotypic data analysis.

[330] J.C.Y. Tek. (2017). The Way Forwards Towards Ensuring Sustainability in Oil Palm. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 140 - 141.

Reference ID: 24166

Note: #24166 > #24141e (in folder #24139e) Note: Abstract only, no slides

Abstract: LP3 - This year marks the centennial commemoration of oil palm commercialisation in Malaysia. The oil palm industry has helped to transform this country to become a commercial powerhouse in tropical plantation agriculture. The journey and the collective roles played by the growers together with other stakeholders along the supply chain along with affirming support from the policy-makers have been a long one, albeit a successful saga. There were many celebrated moments and achievements in which the plantation fraternity can be proud. Centennial-old, the oil palm industry has also transformed Malaysia into a driving force in the global edible oil market while nurturing the national economy and remaining as an indispensable pillar in the socio-political landscape especially in rural development. Notwithstanding the fact that palm oil is a commodity - which subjects it to be a price taker and not a price maker, the industry remained steadfast, providing employment opportunities, spawning many spin-off undertakings, generating significant foreign exchange while the entire supply chain has also contributed substantial taxes to the government's coffer. In essence, this is sustainability-per se. We can sing tribute to our visionaries and pioneers, while we take stock of the realities and set the directions for the industry set against the present issues and challenges posed under the ambit of sustainability.

[331] S Paramanathan. (2017). Role of the Malaysian Unified Classification of Organic Soil (MUCOS) in the MSPO Certification Scheme. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 144 - 151.

Reference ID: 24167

Note: #24167 > #24141e (in folder #24139e) #24166e are the slides from conference

Abstract: A16 - The Malaysian Unified Classification of Organic Soils is far superior than the USDA's Histosol (Organic Soils Classification), Soil Survey Staff, 2014; the World Resource Base and that of the Committee for the Standardisation for Soil Survey and Evaluation for Malaysia for the classification of tropical organic soils. This Malaysian classification follows the structure of the USDA's Soil Taxonomy and allow very detailed mapping of Organic Soils to the soil phase level. To facilitate field mapping, a Key to the Identification of Lowland Organic Soils. For use in the Malaysian Sustainable Palm Oil (MSPO) Certification Scheme, an Organic Soil Management Scheme to help identify the main limitations, management practices and providing peak yield potentials have been prepared for use.

[332] Z. Aman, A.R. Abdul Rahim, H. Mat Taib. (2017). Cultivating Entrepreneurship Among the Gen-Y Smallholder. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 152 - 160.

Reference ID: 24168

Note: #24168 > #24141e (in folder #24139e) #24168e are slides from conference

Abstract: A17 - This paper will discuss the concept of entrepreneurship among oil palm independent smallholders in Malaysia. Traditionally, consciously or not, they are agriculture entrepreneurs. This paper also discusses the sub-topic related to entrepreneurship in the oil palm industry, and the skills in entrepreneurship. The roles of extension officer for entrepreneurship development will also be discussed. Hence, the role of generation Y will be elaborate. Are they willing to replace their family as

traditional oil palm growers or to become the contemporary entrepreneur in the oil palm industry? Finally, the author will make a summary of the above matter.

[333] R.S. Chauhan. (2017). Sustainable Development of Oil Palm Industry in Africa. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 161 - 165.

Reference ID: 24169

Note: #24169 > #24141e (in folder #24139e) #24169e are slides from conference

Abstract: A18 - It is a well-known fact in the oil palm industry that Africa is the home base of the oil palm and it is from there that oil palm seeds and later even the pollinating vector were sourced for starting and developing oil palm in Asia. All along, the oil palm has continued to grow in its home geography and has remained a part of the local culture and lore. The big names in Africa oil palm culture include Nigeria, Cote d'Ivoire, Ghana, Cameroon, Liberia, DR Congo, and oil palm remains native to many more countries in those neighbourhoods.

Oil palm in Africa has existed in the context of weak economic conditions and the redeeming fact for oil palm in its homelands has been that it did not carry the allegations of corporate greed and environmental ravage which have blighted the sector in Asia.

Over the years, research and advice by CIRAD and associated local structures have supported the sector. It is true that oil palm in Africa lost some large global corporates and even World Bank group's support during the new millennium. All along, palm oil has been part of local cuisine, the oil palm tree has remained in the local culture and traditions and Africa's edible oil deficit has been covered in the large part by imports of palm oil from Asia.

This paper will cover the journey and the current status of Sustainability in oil palm sector in Africa.

[334] L.K. Kho, S. Paramanathan, E. Anak Rumpang, M.H. Harun, N. Kamarudin. (2017). Comparative Soil CO₂ Efflux on Tropical Organic Soil Management Group in Oil Palm Plantation. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 168 - 176.

Reference ID: 24170

Note: #24170 > #24141e (in folder 24139e) #24170e are slides from conference

Abstract: A19 - Tropical organic soil stores considerably large terrestrial organic carbon and are known to be highly dynamic under various land uses, but there has been little evidence of comprehensive determination of carbon emissions from oil palm plantation on tropical organic soil. We present the soil CO₂ efflux of two oil palm estates planted on tropical organic soil in Sebauh in south-eastern Bintulu, Sarawak, Malaysia. In particular, we present, for the first time, the rate of soil CO₂ efflux from two major organic soil management groups and soil series in oil palm plantation. We measured soil CO₂ efflux and other environmental factors at weekly intervals for three consecutive weeks in August 2015. The soil CO₂ efflux was between 2.63 Mg CO₂ ha⁻¹ yr⁻¹ (0.03 g CO₂ m⁻² hr⁻¹) and 287.52 Mg CO₂ ha⁻¹ yr⁻¹ (3.28 g CO₂ m⁻² hr⁻¹) (mean ± standard deviation) across two oil palm plots. The rate of soil CO₂ efflux showed different magnitude but little or no variation between the different soil management groups or soil series, particularly between fibric and sapric material. However, the respond of soil CO₂ efflux to different soil series and soil management groups showed stronger variation across different locality. This potentially suggests that across broader geographical extent, soil CO₂ efflux may be primarily driven by the decomposition level of the fine fraction as indicated by the soil management groups,

and thus suggests the linkage to environmental factors, peat formation and physico-chemical characteristics of tropical organic soil.

[335] J.-P. Caliman, E.C. Turner, A. Dwiadvento, J. Hinsch, A. Ary, A. Hood, M. Naim, S.H. Luke, W.A. Foster. (2017). Prospects for Enhancing Ecosystem Services to Oil Palm in Indonesia. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 177 - 178.

Reference ID: 24171

Note: #24171 > #24141e (in folder #24139e) #24171e are slides from conference. Note: Abstract only in Conference Proceedings

Abstract: A20 - Oil palm expansion has often been associated with the destruction of rainforest, loss of biodiversity, and consequent modification of ecosystems. This has resulted in many conflicts during the last two decades between oil palm developers and environmentalists. However, the longevity and relative structural complexity of oil palm agro-systems allows it to support high levels of biodiversity compared with many other crop systems. Furthermore, in some cases, high biodiversity levels can provide valuable ecosystem services which increase production, therefore allowing the potential for a win-win for both industry and for improving the environmental value of the plantation. Here we highlight the role of biodiversity and ecosystems in services and the value of this contribution to the oil palm industry in Indonesia. We discuss the existence of additional services that still remain to be quantified, and suggest field practices that might enhance the efficiency of these services. We also discuss ongoing investigations that focus on the potential impact of climate change on these beneficial factors.

[336] N.L. Ibrahim, N. Razi, N. Kamarudin, M. Zakaria, C.L. Puan, S. Nurhidayu, B. Azhar. (2017). Insectivorous Bird Richness Reduce Damages by Bagworms in Oil Palm Plantations. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 179 - 184.

Reference ID: 24172

Note: #24172 > #24141e (in folder #24139e) #24172e are slides from conference.

Abstract: A21 - Oil palm agro-ecosystems are exposed to the use of chemical pesticides to control pest insects. To protect the environment, oil palm certification schemes require commercial growers to reduce the use of pesticides. Farmland biodiversity is essential for providing ecosystem services that can improve agricultural productivity. We predicted that insectivorous birds can play an important role as biological control agent for herbivorous insects. We sampled insectivorous birds in outbreak and non-outbreak of bagworm (*Pteroma pendula*) areas within oil palm plantations in Peninsular Malaysia. Damage inflicted on crown cover and leaf was visually estimated from the study sites. Our results indicate that both crown cover and leaf damage decreased with the number of insectivorous bird species richness. The findings suggest that the presence of various insectivorous bird species richness is beneficial to oil palm agriculture. Therefore, the conservation of farmland birds and their habitat in production landscapes is highly recommended for oil palm growers.

[337] I.A. Seman, M.S. Ibrahim, Idris. N., I. Abdul Wahab, D.N. Shahari, N. Kamarudin. (2017). Technology Adoptions in Management of Ganoderma Disease in Malaysia. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 187 - 191.

Reference ID: 24173

Note: #24173 > #24141e (in folder #24139e) #24173e are slides from conference

Abstract: A22 - Until 2016, the Malaysian Palm Oil Board (MPOB) has developed and disseminated 33 technologies on Ganoderma research related to the biology, detection, control and management of Ganoderma for the advantage of oil palm industry in Malaysia. These technologies have been disseminated to the oil palm industry through the seminars, field demonstrations and hands-on training. A survey was conducted by MPOB to know the status of adoption of technologies on controlling and managing of BSR disease by the Malaysian oil palm estates. Survey questionnaires were dispatched to more than 5060 estates in Malaysia including Peninsular, Sabah and Sarawak. As at August 2017, out of 5060 estates contacted, a total of 975 estates (19.3%) responded to the survey questionnaires. Estates contacted owned by plantation groups, government agencies and independent estates. The estates were requested to report BSR disease incidence and adoption of control and management strategies on Ganoderma disease. The oil palm trees confirmed BSR disease based on visual symptoms, i.e. the presence of foliar symptoms, rotting trunk at the base and appearance of fruiting body of Ganoderma. Technologies on control and management of BSR disease in existing plantings through soil mounding (67 estates; 704.67 ha), fungicide hexaconazole (35 estates; 116.22 ha) and removal of diseased palms (80 estates; 1134.86 ha) have been adopted in several oil palm plantations, government agencies and independent estates. At replanting, sanitation technique either completely sanitation by removal of all old oil palm stands (59 estates; 24 806.83 ha) or partial sanitation by removal of old oil palm stands confirmed BSR disease (60 estates; 19 286.77 ha) only using excavator were implemented. It was widely practiced in Sabah, Sarawak, Johor, Melaka, Negeri Sembilan, Selangor, Perak and Kedah. The use of biological control agents and fertilizer with beneficial elements will gain more important in the coming year. These technologies towards implementation of Integrated Ganoderma Management (IGM) in managing Ganoderma disease in oil palm plantation in order to reduce losses due to this disease.

[338] R. Singh, M. Ong-Abdullah, L.E.T. Low, M.A. Abd Manaf, R. Nookiah, N. Lakey, S. Smith, J. Ordway, R. Sambanthamurthi. (2017). Rapid Screening Technologies to Improve Oil Palm Productivity. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 192 - 196.

Reference ID: 24174

Note: #24174 > #24141e (in folder #24139e) #24174e are slides from conference

Abstract: A23 - The conventional breeding and cloning processes to generate new and improved varieties of oil palm are laborious, expensive and until recently lacked real time quality control tools for early screening. Efforts in this direction gained momentum when the oil palm genome was sequenced in 2013. The genome build was instrumental in the identification of genes influencing three key economic traits in oil palm. These discoveries led to the development of three molecular diagnostic assays, namely SureSawit™ VIR, SureSawit™ KARMA and SureSawit™ SHELL for early and rapid screening to improve the efficiency of breeding, tissue culture and commercial seed production. The three diagnostic assays allow for molecular-based precision agriculture, which will significantly boost oil palm productivity within existing planted area and support sustainable development of the industry worldwide.

[339] A.C. Er, A. Albanya. (2017). The Social Sustainability Dynamics of Oil Palm Smallholders. PIPOC 2017 - Agriculture, Biotechnology & Sustainability Conference - Treasuring the Past, Charting the Future. pp 197 - 197.

Reference ID: 24175

Note: #24175 > #24141e (in folder #24139e) Note: Abstract only. #24175e are slides from conference

Abstract: A24 - The aim of this paper is to analyse and evaluate the social dynamics of independent oil palm smallholders in Lahad Datu, Sabah. The Tungku sub-district, a remote area in Lahad Datu, was selected as the area of study as it poses more challenges in attaining social sustainability as compared to a more urban setting. The findings indicated that the social indicators of basic needs and facilities of respondent smallholders have a relatively health well-being. This is reflected in the high home ownership, grid electricity connection, water and sanitation, and improvement in infrastructural facilities. For social indicators of interactions with immediate external stakeholders, disinterest in attending briefings pertaining to sustainable practices in oil palm cultivation and involvement in community decision-making are shortcomings. However, this is alleviated by the close neighbourliness and high concern for home and neighbourhood safety, thus contributing to community cohesion. On an aggregated basis, the social dynamics of this group of respondent smallholders in Tungku reflect having a relatively healthy social well-being

[340] L. Davies, C. Deblitz. (2010). Sheep Report 2010. Sheep Report. pp 1 - 23.

Reference ID: 24176

Note: #24176e