

3RD IDRC-SEARCA FELLOWSHIP *PLUS* CONFERENCE WORKSHOP

16-18 January 2016
Phnom Penh, Cambodia

CONFERENCE REPORT



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Conference Report

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EXECUTIVE SUMMARY

About 500 researchers, academicians, and members of the scientific community gathered for the 3rd IDRC-SEARCA Annual Fellowship Plus Conference-Workshop held in conjunction with the 7th International Conference on Environment and Rural Development (ICERD) on 16-17 January 2016 at the Royal University of Agriculture (RUA) in Phnom Penh, Cambodia.

Jointly organized by the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), International Development Research Centre of Canada (IDRC), RUA, International Society of Environmental and Rural Development (ISERD), Institute of Environmental Rehabilitation and Conservation (ERECON), and the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS), the Conference was the finale in a series of annual fellowship plus conference-workshops under the Southeast Asian Upland Agriculture Fellowship.

A five-year collaboration between IDRC and SEARCA, the fellowship project was built as a capacity-building program that will address food security and sustainable agriculture in the uplands by strengthening the knowledge and research skills of professionals in Cambodia, Lao PDR, Myanmar, and Vietnam. The annual roving fellowship plus conference-workshops is a unique feature of the project that serves as a venue for knowledge sharing with partner institutions, informal networking among the scholars, and first-hand experiences through upland site visits.

Focusing on the theme, “Environmentally-friendly Agricultural and Rural Development,” the two-day Conference included parallel sessions, poster presentations, and a field tour. Each discussion elaborated on the five thematic areas of the conference, namely: education for sustainable development, environmental management, rural development, agricultural systems, and infrastructural systems. Accordingly, the Conference contributed towards the discussion on the development of suitable and effective processes and strategies for sustainable rural development.

Thirty-one scholars attended the Conference with 11 participating as oral presenters. Out of the 11 scholars who presented, Mr. Bouavonh Biachampah and Ms. Sreyneang Chheun

were recognized with the “Excellent Paper Award” during the awarding ceremonies of the Conference. Both IDRC-SEARCA alumni discussed the results of their individual researches to an international panel of experts.

Together with Dr. Maria Cristeta N. Cuaresma, SEARCA’s Program Head for Graduate Education and Institutional Development and Project Leader for The Southeast Asian Upland Agriculture Fellowship, members of the Advisory Committee were also in attendance, namely: Dr. Prasit Wangpakapattanawong, Professor of Chiang Mai University; Dr. Seng Mom, Vice Rector of RUA; Dr. Vo-Tong Xuan, Rector of Nam Can Tho University; Dr. Oscar B. Zamora, Professor Emeritus of the University of the Philippines Los Baños; and Dr. Percy E. Sajise, SEARCA Senior Fellow.

Dr. Cuaresma also delivered a message on behalf of SEARCA Director Dr. Gil C. Saguiguit, Jr., during the opening program and served as co-chair for the session on Education for Sustainable Development. Dr. Prasit, Dr. Mom, Dr. Zamora, and Dr. Sajise also chaired other sessions of the conference.

Complementing the oral and poster presentations, a field tour to the Chambok Community Based Ecotourism Project (CBET) in Kampong Speu Province in Southwest Cambodia was held on the second day of the Conference.

After the two-day Conference, a special session was held exclusively for the IDRC-SEARCA scholars on 18 January 2016 where 20 of them presented their research proposals for the comments of the Advisory Committee. Another Advisory Committee member Dr. Silinthone Sacklokham, Vice Dean of the National University of Laos, was also present together with Dr. Annie S. Wesley, Senior Program Specialist, who represented IDRC during the whole-day session. The special session was facilitated by Dr. Somsak Srisontisuk, who served as resource person and is currently the International Program Head of the Master of Rural Development Management program under the Graduate School of Khon Kaen University in Thailand.

ORAL SESSION

Impact Assessment of Land Use Change on Ecosystem Services and Livelihood Security of Rural Highland Communities in Lao PDR

Mr. Bouavonh Biachampah

MS Agricultural Systems Management, Chiang Mai University

Co-authored by: Dr. Budsara Limnirankul, Faculty of Agriculture, CMU

It is widely recognized that land use changes are affecting provision of ecosystem services as well as people's livelihoods, especially in rural areas where people are highly dependent on local ecosystem services. This study developed an integrated methodological framework by combining a diversity of corresponding frameworks and concept, such as Driver-Pressure-State-Impact-Response (DPSIR), Ecosystem Services (ES), Sustainable Livelihood Framework (SLF), and Agro-Ecosystem Analysis (AEA). This integrated framework was used together with a combination of Participatory Rural Appraisal (PRA) method and spatio-temporal analysis. The objectives of this study were to detect land use change and identify its drivers and assess the impact on provisioning ES and livelihood security of rural highland communities in Saysathan District, Sayaboury Province, Lao PDR. As part of the research result, land use change analysis highlighted a large decrease in forest areas during the past decade. The reduction of forest cover was associated with significant decline of provisioning security of the local communities, especially natural capital. By taking the trajectory of forest cover change and the importance of provisioning ES into account, it is essential for stakeholders to integrate ES indicators into land use management planning as well as socio-economic development to maximize benefits from natural resources to the communities.

Keywords: land use change, ecosystem services, livelihood security, integrated methodological framework, rural highland communities, Lao PDR

Improving Upland Rice Production for Sustainability of Rice Self-Sufficiency, Ratanakiri Province, Cambodia

Mr. Sophal Var

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Co-authored by: Dr. Edna A. Aguilar, College of Agriculture, UPLB

Rice is the staple food and major source of income of resource poor farmers in rural areas of Cambodia, including the Ratanakiri province. Rice self-sufficiency is an important concern of the government given that the population of the province is dramatically increasing while the yield trend has been declining over the last decade. The study was conducted to better understand the upland rice production systems of the area and rice consumption in Lum Choar Commune, Ou Ya Dav District, Ratanakiri Province, Cambodia and to identify yield improvement options. A total of 90 upland rice growing households were randomly selected and interviewed. Results indicated that 7.8 percent of the households experienced rice insufficiency. These household possessed small farms (less than 2 ha of rice field) and have a large household size (4-5). About 62.2 percent were rice self-sufficient and 30 percent had rice surplus. It is noteworthy that none of those rice-insufficient families experienced hunger as they have coping mechanisms such as buying rice from the market or asking from their neighbor and/or relatives. The linear multiple regression model showed that rice sufficiency of upland rice households was strongly dependent on rice yield. Traditional upland rice production practices by majority of farmers resulted to poor rice productivity (average yield of 1.45-ton ha⁻¹ which is lower compared with the 3.1-ton ha⁻¹ nationwide). Thus, to meet and sustain rice self-sufficiency in the upland area of Ratanakiri Province, several management practices need to be improved such as the use of good seeds (with high purity, germination, and vigor), increasing seeding rates, use of improved variety, improving planting practices, and improving nutrient management including fertilization. Technologies are already available for adoption to improve productivity and sustainability of upland rice production. Moreover, strategies to increase their adoption through on-farm demonstration and strengthening extension support systems are also needed.

Keywords: poor productivity, upland community, Ou Ya Dav, nutrient management, rice sufficient

Appropriate Extension Approaches in Disseminating Livestock Production Technology in Cambodia

Mr. Putheany Ung

MS Animal Science, University of the Philippines Los Baños

Co-authored by: Dr. Rommel C. Sulabo, College of Agriculture, UPLB

Cambodia relies on agricultural extension to increase production of rice and other crops, and livestock, and consequently the income of poor farmers. Cambodia's agricultural extension system can be characterized as pluralistic. With the government's limited funds to hire extension agents for an extensive reach of the number of farmers, other institutions are taking the role as service providers using various approaches and methods for effective technology sharing especially to poor farmers. However, with the increasing population and diverse needs of farmers, combined efforts of extension service providers remain insufficient. Identifying the extension approach in disseminating a livestock technology is critical before employing related extension activities. The study presents an extension work plan by a technical staff, an affiliate to a government institution on livestock production that specifically discusses the framework used in identifying the appropriate extension approaches suitable to Cambodia's local situation. For the primary data, a structured questionnaire was used to interview a total of seven key informants from four extension-providers in Cambodia representing different agricultural institutions such as the government, NGO, and the academe. Additionally, secondary data on extension approaches/methods implemented in Cambodia were collected from libraries of research institutes, universities, agricultural extension sectors, and online sources. It was observed that the local situation tends to fit the participatory approach in combination with other approaches. Identifying the extension approaches is part of the extension work plan to be implemented by the affiliated institution.

Keywords: agricultural extension, extension approaches, livestock production, technology dissemination, participatory extension approach, Cambodia

Drought Tolerance and Nitrogen Use Efficiency of Upland Rice (*Oryza sativa* L.) Genotypes Grown Under Varying Water and Nitrogen Regimes

Mr. Raby Nget

MS Agronomy, University of the Philippines Los Baños

Co-authored by: Dr. Pompe C. Sta. Cruz, College of Agriculture, UPLB

Three screen house experiments were conducted at the Crop Science Cluster, College of Agriculture, University of the Philippines Los Baños (UPLB) to evaluate drought tolerance and nitrogen (N) use efficiency of selected upland rice (*Oryza sativa* L.) genotypes grown under varying water and nitrogen regimes, based on growth and yield parameters. Results showed that sufficient soil moisture content (SMC) and high N level caused optimum growth of the genotypes. On the other hand, deficient water and N supply both retarded growth of rice. Philippine Seed Board Rice (PSB Rc) 14, P42, and P38 had high number of tillers, number panicles per hill, number of spikelets per panicle, relative growth rate (RGR), water use efficiency (WUE), harvest index (HI), straw yield, grain weight, and grain yield at field capacity (FC). These genotypes also had high values in the aforementioned growth and yield parameters at 120 kg N ha⁻¹ treatment. In terms of the efficiency in the use of N as indicated by agronomic efficiency of nitrogen application (AEN), recovery efficiency of nitrogen application (REN), and internal efficiency of nitrogen application, PSB Rc14, P42, and P38 still performed better than the rest of the genotypes tested. The evaluation of the combined effect of water and N application showed that PSB Rc14, P42, and P38 significantly produced high grain yields among the genotypes under SMC at FC with 120 kg N ha⁻¹ which suggests that water plays a fundamental role in rice growth in combination with N.

Keywords: nitrogen use efficiency, genotypes, spikelets, agronomic efficiency, recovery efficiency and soil moisture content

The Cassava Marketing in Pailin Province, Cambodia

Ms. Sreyneang Chheun

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This study was conducted at the farm and intermediary market levels to examine the efficiency of cassava marketing system in Pailin Province, Cambodia. It specifically aimed to: 1) describe the socio-economic characteristics of market participants, 2) analyze the marketing channels of cassava, 3) evaluate marketing costs and margins of the different players in the marketing system, 4) determine the efficiency of cassava marketing, and 5) recommend improvements in the cassava marketing system. A total of 120 cassava farmers and 20 traders were randomly selected for the study. The analysis included the tracing method, marketing margin, mark-up, price share and Shepherd's Index. Results reveal that majority of the cassava (73.28%) was exported to Thailand. Farmers, local collectors, and wholesalers were the major marketing agents involved in delivering cassava from the farm to local processing firms and Thai importers. Cassava price was determined by the buyers and was based on the prevailing market price and quality. Marketing channel for cassava is short having only two intermediaries — the local collectors and wholesalers — with the latter earning more profit and incurring the least marketing cost. Farmers claimed a higher share to end-user's price (45.11%) followed by local collectors (29.60%) and wholesalers (19.65%). Among marketing channels, channel III obtained the highest margin while channel V was considered the most efficient, with the highest marketing efficiency index of 3.85. It also distributed the highest volume of cassava compared to other channels. Marketing cost has a negative effect to the profit of cassava marketing agents. In order to improve the marketing efficiency of cassava in Pailin Province, marketing cost at farm and intermediaries level should be minimized. Policy directions like the establishment of an effective market information system, promotion of local processing firms, establishment of required post-harvest facilities, and improvement of road infrastructure are suggested.

Keywords: marketing efficiency, marketing cost, marketing margin

Impacts of Flash Flood on Farmers' Livelihoods in Upland Areas: A Case Study of Rice Production in Nathen Village, Kasi District, Vientiane Province, Lao PDR

Mr. Phomma Thammavong

Master of Rural Development Management, Khon Kaen University

Co-authored by: Dr. Suchint Simaraks, Faculty of Agriculture, KKU

Lao PDR is located in the tropical monsoon climate and is geographically divided into two land zones, namely upland and lowland. Upland area lies approximately in the Northern part of the country, and lowland lies in the Southern part of the country. Most of upland provinces are vulnerable to tropical depressions and typhoons originating in the Pacific Ocean or the South China Sea. Majority of upland areas are occupied by small and poor farm holders owning about 0.9 ha land area. Schiller et al (2006) found that in the upland area, low temperature is normal accompanied by heavy rain that causes flash flood and affects rice productivity. Therefore, this paper aims at fulfilling two main objectives namely, 1) to study the impacts of flash flood on the farmers' livelihood, particularly rice production; and 2) to identify the coping strategies of the farmers against the flash flood. The research includes both primary and secondary data. A questionnaire and in-depth interview were performed in this study. Nathen Village, Kasi District, Vientiane Province, Lao PDR was selected as the location for this case study. Forty households affected by flash-flood were interviewed using the questionnaire. Fifteen farmers and five key informants which include government officials, the village chief, and NGO leaders were interviewed. Furthermore, two focus group discussions were conducted with 10 respondents, which included the village head, a committee to prevent and control disasters of the village, an NGO staff, a local government official, the head of youth union, the head of women union, and four villagers. The findings indicated that out of the 40 households interviewed, 97.5 percent experienced severe flash floods caused by heavy rain and from a powerful water flow from the Lik river. Such flood badly affected their agricultural production areas, rice production, livestock, household assets, health care, and other facilities. Therefore, the households prioritized coping strategies for survival throughout the years such as, settlement changing, occupational readjustment, and crop diversification.

Keywords: flash-flood, farmers' livelihoods, upland, strategic, Lao PDR

POSTER SESSION

Economic Assessment of Upland Farming by Smallholder Farmers: Case Study in Ouheng Village, Phnom Kravanh, Pursat

Ms. Sodany Thoung

Master of Rural Development Management, Khon Kaen University

Co-authored by: Dr. Pongchompu Supaporn, Faculty of Agriculture, KKU

Despite small plots of farmland and labor security, farmers still consider farming an important income source, harnessing the soil to its full potential. Yet agriculture varies greatly from floodplain to mountainous areas, and while many studies have been done in lowland agriculture, understanding both upland cultivation and economic activities may contribute towards improved upland use. Thus, this study aims to explore upland farming characteristics and economically assess the farming systems, through the case study of Ouheng Village in Phnom Kravanh, Pursat Province, where upland farming is common. From June to September 2015, the study was carried out by categorizing 30 people into a major farming system based on analyses of agro-ecological mapping and farmers' interest. Key informants, group discussion, transect walk, village mapping, and in-depth interviews were employed. The findings show that the farming system is diversified and are operated on small scale, comprising of a mixture of rainy season rice, cassava, home-garden vegetables, and poultry and cattle-raising. The agricultural labor per household amounts to three persons, while land size averages 1.5 hectares. The interconnection among the subsystems is loosely related because feed and fertilizer are mainly derived from commercial companies, making farmers invest largely on inputs. Despite its popularity, rice ranks second representing 38.91 percent of the overall income, surpassed by cassava accounting for 53.16 percent. Home-garden vegetables and animal production collectively produced a marginal income of about 10 percent of the annual earnings. Despite yearly 1,000-dollar earnings, farming households have to spend 45 percent back. Both per-capital revenue and land economic returns are quite low, 219 and 146 dollars, respectively. In conclusion, this upland farming system is still on subsistence basis, suggesting that the standard of living is still low. Therefore, on-site technical assistance, infrastructure development, and marketing should be locally promoted to improve the existing farming system of rural livelihood.

Keywords: farming system, Ouheng village, agro-ecological conditions, economic assessment

Assessment of Farmers' Food Insecurity and Coping Strategies in Rubber Farming, Oudomxay Province, Lao PDR

Mr. Xayasinh Sommany

MS Agricultural Systems Management, Chiang Mai University

Co-authored by: Dr. Budsara Limnirankul, Faculty of Agriculture, CMU

Rubber plantation is a challenge to food security in Northern of Lao PDR as more farms shift cultivation to address poverty. Thus, the study aims to assess the impact of cropping system changes on food insecurity at household level. The Participatory Rural Appraisal (PRA) method was employed in this study. A focus group discussion was conducted to map out the location of farm and determine the district socio mapping, key indicators of food insecurity, and to classify the farmers into three types: upland rice farm (URF) with other crop, upland rice with rubber plantation (URRP), and rubber plantation (RP). Sixty households were selected in each farm type with the total 180 households. Results showed that over 65 percent of the agricultural land has shifted land use in Namo and Xay District. RP areas comprise 35 percent of land use, URF 30 percent, and land area for maize and job's tear occupy 32 percent. The potential of food crop production has declined due to the introduction of RP. The problems of food security are being faced as shown in proportion of food sharing: 1) rice production in URF comprise 58.4 percent and 41.6 percent in URRP; 2) vegetables grown in URF are 69.2 percent and 30.8 percent in URRP; 3) non-timber forest products (NTFPs) were shared roughly above 30 percent in each farm types; and, 4) livestock was raised in two farm types (URF 88.4% and URRP 11.6%). RP found food sharing only in NTFPs. Thus, upland rice farming with subsistence agriculture farming is a good coping strategy to food insecurity. It can also provide a good source of income to meet household food consumption needs. In addition, land management has a role for food availability and food access in the region. It was concluded that shifting from traditional upland rice subsistence farming to rubber farming has changed crop production pattern and agricultural areas, resulting to declining opportunity to grow food crops and increase risk of future cultivation.

Keywords: coping strategy, food security, rubber, upland rice

Farmers' Soil Conservation Practices of Maize Production, Paklay District, Sayabouly Province, Lao PDR

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Co-authored by: Dr. Budsara Limnirankul, Faculty of Agriculture, CMU

Soil degradation is a big problem in hilly slopes of Lao PDR where maize is considered as a main crop. With a maize yield lower than 3.8 ton/ha, the environment is also impacted. Thus, Soil Conservation Practice (SCP) is seen as an important alternative for soil conservation in slope land. The objective of this study is to examine farmer soil conservation practices in maize production in Paklay District, Sayabouly Province. The sample was obtained through participatory rapid appraisal (PRA) method and data was collected through focus group discussion and semi-structured interview from three villages (Village 1: Ban Palay 46 households, Village 2: Ban Boumlao-Phakeo 90 households, and Village 3: Ban Senphon 25 households, or a total of 161 households). Key informant interviews were conducted with the staff of the District Agriculture and Forestry Office (DAFO) and the village headman. The result showed that farmers in V1, V2, and V3, adopted SCP at 89.1 percent, 83.3 percent, and 88 percent, respectively. SCP showed increasing soil fertility, improvement in maize yield, and prevented soil erosion in hilly slopes. Majority of maize farmers who adopted SCP applied the legume rotation method. The legume (i.e. groundnut, red bean, mungbean, and black bean) was intercropped for two weeks before harvesting maize and the crop residue was used for mulching soil (conserved soil moisture and soil nutrition). It is recommended that DAFO staff train the farmers on the SCP systems including use of chemicals, crop residual, intercropping, mulching, tillage, and chemical soil contamination.

Keywords: maize, soil conservation practice, crop rotation, legume intercrop

Variation in Grain Morphology of Upland Rice Varieties from Luangprabang Province, Lao PDR

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Co-authored by: Dr. Chanakan Prom-U-Thai, Faculty of Agriculture, CMU

This study evaluated variation in grain morphological characteristics of upland rice varieties from Luangprabang Province, Lao PDR. The samples were collected from two villages each of three districts, namely Ponxay (PX), Pak-Ou (PO), and Xieng Ngeun (XNg). Grain morphological characteristics were measured in size (length, width, and thickness), weight and pericarp color, and grain. The samples from 60 varieties were collected and separated into 26, 10, and 24 samples from PX, PO, and XNg, respectively. Among these samples, 42 and 18 samples were glutinous and non-glutinous endosperm types, respectively. Pericarp color found in 51 samples were non-pigmented, 4 in red and 5 in black. There was variation of grain size among 60 samples. Grain length, width, and thickness ranged from 8.6 to 11.6, 2.6 to 4.2, and 1.9 to 2.4 mm, respectively. By using the ratio between grain length/width, most samples (58 varieties) were distinguished to be as large grain type and the others as slender type. One hundred grain weight also varied from 2.0 to 4.0 g among brown rice of 60 samples. The grain weight varied with grain length, width, and thickness in multiple regressions of $y = 0.39 (\text{grain length}) + 0.53 (\text{grain width}) + 1.42 (\text{grain thickness}) - 5.52$ at $R^2 = 0.89$ ($p < 0.05$). This study demonstrated the variation in grain morphological characteristics of upland rice varieties from Luangprabang Province, Lao PDR. This basic information would be useful for the selection traits of rice varieties in future breeding programs.

Keywords: Luangprabang, rice varieties, rice grain morphological characteristics, color, weight, village

Influence of Pig Breeds on Growth Performance and Immunity in Pre-Weaning Period

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A study was conducted to find out the influence of pig breeds on growth performance and immunity during pre-weaning period. A total of 297 piglets from 105 Thai native (TN), Meishan (MS), Large white x Landrace (LW+LR) sows were used in the experiment. Piglets were weighed daily until weaning at 21 days of age and were calculated their average daily gain (ADG). After farrowing, blood samples were collected at 12- and 24-hour interval for IgG measurement using the enzyme-linked immunosorbent assay (ELISA) technique. In pre-weaning period, body weights of all treatments were increased. The body weight of TN piglets was lowest compared with the MS and LW+LR at all studied ages. In terms of growth performance, piglets of LW+LR were significantly ($p<0.01$) higher at birth and seven days (1.43 ± 0.20 and 2.67 ± 0.20 , respectively) compared with piglets of TN (0.65 ± 0.15 and 1.12 ± 0.15 , respectively) and MS (1.07 ± 0.02 and 1.97 ± 0.37 , respectively), but piglets of MS were non-significant ($p<0.01$) with LW+LR at 14 and 21 days of ages. ADG of MS and LW+LR were significantly ($p<0.01$) higher during the lactation period. However, the MS piglets had the highest ADG at 14 days. The results indicate that the breed affects growth performance and ADG among piglets. Moreover, this study showed that low birth weight of piglet can cause low growth performance and ADG.

Keywords: piglet, breed, immunity, body weight

SPECIAL SESSION

Effects of Concentrate Supplementation Using Paper Mulberry Leaves as a Basal Diet on Growth Performance of Local Goat in Lao PDR

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This study aims to investigate the effect of concentrate supplementation on growth performance of local goats in Lao PDR. The different levels (0, 200, 300 and 400g/d) of concentrate were supplanted using paper mulberry leaves as basal diet. The feed intake, average daily gain (ADG) and feed conversion ratio (FCR) were monitored in 24 female goats using a randomized complete block design and was conducted for 92 days. Average total feed intake were significantly different ($P<0.01$) between treatments. Total feed intake was highest in goats supplemented with 400g/d of concentrate (T4) but was not significantly different with goats at 300g/d of concentrate (T3) (3461.07 vs 3539.57 g/day). ADG of goats supplemented with 400g/d of concentrate was not significantly different with goats with 300g/d of concentrate (65.22 vs 58.70 g/day); while ADG of goats fed with paper mulberry leaves *ad libitum* (T1) was lowest (35.69 g/day). FCR of goats fed with paper mulberry leaves *ad libitum* (T1) was highest (91.28), while FCR of goats tend to decline as the level of concentrate supplementation (64.45, 60.17 and 55.02 kg, respectively) increased, but were not significantly different. In conclusion, supplementing with 400g/d of concentrate and paper mulberry leaves as basal diet improved weight gain (ADG) and lowered the feed conversion ratio (FCR) of local goats in Lao PDR.

Keywords: paper mulberry, concentrate, feed intake, average daily gain, feed conversion ratio

Development of a Low-cost Sorting Machine for Mandarin (*Citrus reticulata* Blanco) Using Mechatronics

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The task of packaging, which includes sorting and grading of fruits, can be carried out using manual labor which is not only prone to errors but also incurs extra labor cost. Therefore, the use of fast and accurate vision methods for sorting and grading is highly desirable. According to Piccardi and Jan (2003), machine vision system has increased its performance at the system level in recent years. Faster microprocessors, faster and larger memories, and faster and wider buses have made computer vision affordable on a wider scale. The availability of affordable hardware and software has opened the way for new and pervasive applications of computer vision. The objectives of the study are to assess the status of machine vision technology with special focus on agricultural production and to develop a low-cost sorting machine with appropriate image processing algorithm to sort mandarin based on class and size. The study will use low-cost webcam and Microsoft Visual C#, a free programming language, and will require no frame grabber hardware in the machine vision system. Thus, it will make the overall system cheaper and flexible from the design point of view. The study will have two phases, namely: 1) classification-based orange sorting by determining the shape, acceptable percent bruise, and conditions for color index with the image processing and computer vision technologies, and 2) size-based orange sorting using mechanical sizer. The study plans to develop image processing algorithms and the prototype system in the sorting analysis of orange fruit. It will not only result in labor savings, but also improve inspection objectivity in the agricultural and food industry.

Keywords: machine vision system, postharvest, Mandarin, packaging

Performance Evaluation of Single Cylinder Engine Using Different Blends of *Ethanol* as Fuel

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Myanmar is the largest country in mainland of South East Asia, with territorial area covering of 676,577 square kilometers. The country is likewise endowed with rich natural resources for production of commercial energy, with crude oil, natural gas, hydroelectricity, biomass and coal as available energy sources as of date. However, the rapid depletion of petroleum fuels, coupled with an era of ever increasing oil has led to an intensive search for alternative renewable fuels. Bio-fuels are attracting growing interest around the world, as a way to reduce both greenhouse gases (GHG) and dependence on petroleum-based fuels. The most promising substitutes for petroleum fuels are alcohols mainly, ethanol and methanol for extending additive and replacing gasoline.

Ethanol (C_2H_5OH) or ethyl alcohol can be produced by fermentation of carbohydrates, which occur naturally and abundantly in some plants like sugar cane and from starchy materials like maize and potatoes. Hence, these fuels can be produced from highly reliable and long lasting, renewable raw materials. Ethanol is an attractive alternative fuel and ethanol-gasoline blends can be used as fuel substitute for gasoline-powered engines.

This research deals with experimental comparative performance evaluation of gasoline engine using commercial gasoline (E10), anhydrous ethanol (E15) and hydrous alcohol fuels at blended rate of (hE95) on conventional internal combustion (IC), spark ignition (SI), and gasoline engine of different compression ratios.

Keywords: commercial gasoline (E10), anhydrous ethanol (E15), hydrous alcohol (hE95)

Ecotourism as a Sustainable Development Strategy for Natural Resource Management in Dong Na Tard Protected Area, Savannakhet Province, Lao PDR

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This research proposal will study ecotourism as a sustainable development strategy for natural resource management and improving of local people's livelihood in Dong Na Tard Protected Area (DNT PA), Savannakhet Province, Lao PDR. This will be realized by describing the condition of ecotourism, socio-economic characteristics, and natural resource management status in the area; examining the influence of ecotourism on the livelihood and natural resource management activities; evaluating the participation of local community in ecotourism; and making recommendations to promote sustainable ecotourism activities within PAs.

The study area are the villages of That Ing Hang and Phon Sim Villages in Kaisone Phomvihane District, Savannakhet Province, Lao PDR. The key informants will be from the village administration committee and households active in the tourism activity. Structured questionnaires and focus group discussion will be employed for this study. The data from primary and secondary sources will be analysed using both qualitative and quantitative methods, and data from observation and focus group discussions are foreseen to contribute to the qualitative analysis.

The results of this study will hopefully help policy makers set the appropriate framework within the local people level. The framework is anticipated to focus on local community's participation in ecotourism and conservation, show the importance of ecotourism sustainable development in rural development especially the local income derived that can in turn minimize the threats of using natural resources. The findings of the study can also determine how ecotourism influences the conservation activities which can contribute to DNT PA policy, and will provide the information on how ecotourism in DNT PA affects local people, conservation activities, and the attitude of local people towards the sustainability, in general.

Keywords: ecotourism, sustainable development, biodiversity conservation, activities within protected area, and natural resource management

Improving Upland Rice Production Management Systems Among Rural Households in Southern Shan State, Myanmar

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Myanmar is a predominantly agricultural economy with rice as its major crop both in the upland and lowland. Upland areas play an important role for rice production as well as watersheds ecosystem in terms of water resources conservation for upland community. Proper management of upland areas is therefore a key issue in the successful and sustainable utilization of land resources for rice production in Myanmar. Currently, the most common problems encountered in upland farming are soil erosion due to high slope, deforestation and less of soil conservation, lack of knowledge about crop management patterns, failure to adopt Good Agricultural Practices (GAP), and climate change treats. Effective crop management systems are an important point for reducing the risks associated with upland rice production and increasing the productivity. The research will be conducted in selected upland rice farms of three villages in Aung Pan Township, Southern Shan State, Myanmar. It will describe the bio-physical features of the study area and the socio-economic characteristics of upland farmers; investigate current upland rice production management systems in the study area and; recommend more productive and sustainable upland rice-based crop management systems. Data collection will be based on field survey by using structured questionnaire for primary data, while secondary data will be requested from respective government agencies. Through this research, the current rice production management systems and related constrains in selected area will be documented. The study assumes that upland rice productivity can increase together with the farmer's income and living standard of rural communities if the suggested recommendations can be implemented successfully in the upland areas.

Keywords: upland rice, management systems, rural development, households

Formal Loan Management of Rice Farmers in Rakhine State, Myanmar

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Capital investment is one of the main inputs for farm productivity improvement. In Myanmar, the Government through the Myanmar Agriculture Development Bank (MADB) has been providing seasonal loans for agriculture in Southern Rakhine State of Myanmar. Nevertheless, the supply of formal loans is still limited and delayed. It was estimated that MADB finance usually less than 40 percent of the total production cost of each crop. As a result, farmers still rely on informal credit to support the cover production cost, as well as personal needs, which pulls them into debt traps. This study aims to investigate loan management of the rice farmers in Rakhine State, Myanmar. Qualitative and quantitative research methods will be used. The study should reveal loan situation among rice farmers and the role of loan in rice production and marketing. This study will identify the management of loans by rice farmers. At the same time, education, income, contacts to networks, land ownership, types of loans and uses, repayment rates are proposed factors to be investigated. In addition, the study will include relationship between formal and informal loan as well as the proportion of formal and informal loan is an important factor for credit management. These research findings will help identify lessons learned which will help improve working procedures of formal credit institutions and in turn develop agriculture production of rural farmers in Rakhine State.

Keywords: formal loan, management, rice farmer, types of loan and uses, repayment rates, informal loan

Agroforestry-Related Decision Making Practice Among Ethnic Households in Northern Area of Lao PDR: A Case Study in Kachet Village

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Improving agricultural productivity is a key component of community development in upland area of Lao PDR. Aside from food security, it can also address deforestation in rural community. Kachet village is a Kamu ethnic community located in upland area where agroforestry has been practiced. This research was conducted to identify the patterns of agroforestry practices among upland villagers in Kachet village, Lao PDR. Qualitative approach was used for this research; data collection was done through in-depth interview and observation of 11 key informants. Results revealed two patterns of agroforestry practices in the village, which significantly contributes to the reduction of deforestation, and to the improvement of villager's livelihood through rice production for household consumption and the collection of non-timber forest production for earning cash income to serve household needs.

Keywords: agroforestry, ethnic community, shifting cultivation

The Correlation Between Upland Agriculture and Food Security in Paletwa Township, Chin State, Myanmar

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Chin state is found in the western part of Myanmar. The region has a population of about 478,690 residing on the 36,019 sq. km wide mountain land, with a population density of 13 per sq. km. This represents over 1 percent of Myanmar population in 5 percent of the country's land. Its poverty rate of 73 percent is one of the highest in the country. Paletwa, a township in Chin State, is the poorest out of more than 300 townships in Myanmar. It is in the westernmost part of Myanmar and has a population of only 85,893. This study will observe the township's upland agriculture, evaluate its food security status, and identify the most suitable upland agriculture practice to address food insecurity. The survey will be conducted in three villages and two quarters in Paletwa. Primary data will be collected using focus group discussions and face-to-face interviews. The expected information to be collected include the state of agriculture system and upland agriculture in the area and the advantages and disadvantages of upland agriculture in relation to food security. These research findings can be useful for in upland agriculture strategic planning towards achieving food security in Chin state.

Keywords: food security, upland agriculture, correlation, Paletwa, Chin State, Myanmar

Assessment of Existing Knowledge and Practices on Soil Conservation of Local Farmers in Taungtha Township, Myingyan District, Mandalay Division, Myanmar

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The Dry Zone of Myanmar is a vast semi-arid low land between two higher regions – the Shan plateau in the East and the Rakhine Yoma and Chin hills in the west – and covers large parts of the Magway, Mandalay, and lower Sagaing Divisions. The most pressing problems for the Central Dry Zone agriculture are stagnating crop yields and declining productivity in a range of food crops and gradually decreasing soil fertility. According to Carucci (2001), the entire area of the Myanmar Dry Zone is considerably affected by various levels of soil erosion. Land degradation and erosion rates of Taungtha Township are also severe, leading to chronic food insecurity and various degrees of poverty. Farmers need to manage soil fertility degradation by developing alternative strategies that include the use of organic residues, crop rotation, growing crops with contour ploughing, and growing windbreak and cover crops. Before conducting projects, it is important to seek the existing knowledge, cooperation and opinions of farmers. The constraints to adoption and farmers' perceptions of the declining soil productivity could be understood better by involving farmers at an earlier stage. In most cases, the complexity of farmers' communities creates a gap between the scientists and the farmers to disperse better agricultural techniques among the farmers' community. In particular, this study will be conducted to: 1) assess farmers' knowledge and practices on soil conservation, and 2) identify problems and constraints faced by the farmers for soil conservation measures in Taungtha Township. The rural population comprise about 93 percent of the study area. Five villages out of 243 villages will be selected for this study. The outcome from this research survey could provide baseline data for government organizations (GOs) and non-governmental organizations (NGOs) in the implementation of development programs.

Keywords: soil conservation, assessment, farmers' knowledge, Central Dry Zone, Taungtha

Household and Community Level Practices Towards Sustainability of Community-Based Irrigation System in Sekong Province, Lao PDR

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Reliable water resource is a key element for the well-being of local villagers, for both household needs and agricultural production. Towards effective water resources management, this study takes a closer look at the operation and maintenance of a sustainable community irrigation system being used by local villagers. In particular, the study chose the community-based irrigation system project implemented in Sekong Province, Lao PDR. The study indicated that irrigation system really needs effective management system with an active participation of local villagers. The analyses also showed that the management of community-based irrigation system, the accessibility and uses of water resources among local villagers contribute to the improvement of agricultural production and livelihood.

Keywords: community-based irrigation system, public participation, Sekong province

Survey on Agroforestry System and Household Socio-Economic Development of Upland Farming in Nakai Resettlement Villages, Khammouan Province, Lao PDR

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Lao PDR is a Southeast Asian country neighboring China, Vietnam, Cambodia, Thailand, and Myanmar. The country has a population of an approximately 6.4 million, and income mainly based on agriculture. This sector, mostly subsistence rice farming, dominates the economy, employing an estimated 85 percent of the population and producing 51 percent of gross domestic product (GDP). However, a significant part of the GDP comes from hydroelectricity resources. Official data show that hydroelectricity contributes up to 6 percent of the Laotian GDP and is expected to reach more than 10 percent in the coming ten years. The biggest dam is the Nam Theun 2 Project in the Khammouan Province, with a capacity of 1,070 megawatts. This dam covers a total of 4,500 km² area resulting to the resettlement of 1,310 households from 16 villages. In order to mitigate the environmental and social impacts of the project, the Nam Theun Power Company has been supervising livelihood development programs on agriculture, livestock, forestry, fishery, and off-farm business. Among these programs, the agroforestry farming has been adopted by the farmers in Nakai resettlement area. Agroforestry is viewed as a sustainable farming practice that could simultaneously enhance the ecosystem services and ensure attainment of food security. This pioneering study in Nakai aims to assess the impacts of agroforestry practice in establishing and scaling up the system's adoption. Specifically, this study seeks to: 1) describe the socioeconomic condition of the upland farmers based on the agroforestry farm system; 2) determine food security of upland farms; 3) characterize the farm development pathways of upland farms; and 4) determine the relationship of sub-farms A and B and C. The study area will be in the resettlement sites of new hamlets in Nakai Plateau where majority are farming in the upland area. However, the inherent poor soil quality of the area resulted to a very low and diminishing rice yield, which is not even enough for household consumption. To address this food insecurity, agroforestry program initiatives were implemented in 2013. The research entails a participatory research with farmers as main respondents. A structured questionnaire will be used together with the actual characterization and assessment of the biophysical condition of the agroforestry farm. Other stakeholders will also be included in the survey to solicit their perception and/or awareness on agroforestry including their social preparedness to promote and adopt agroforestry in Nakai.

Keywords: agroforestry system, socio-economic development, upland farming, rice production

Social and Cultural Effects Associated with the Maize Farming in Phine District, Savannakhet Province, Lao PDR

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About 36.23 percent of 690 hectares devoted to crops in Phine District is planted to maize. One of the goals of the Lao PDR Ministry of Agriculture and Forestry is to encourage people to produce crops, especially maize, both quantity and quality, to supply factory requirements. As the take-off crop, maize is foreseen by the Ministry as a means to ensure food security, enhance agricultural potential, and further develop agriculture to contribute to the national economy. However, while the labor and market support for maize production are being strengthened, these still have inherent weaknesses such as risk in chemicals, climate change vulnerability, price inelasticity, low yields, the attitude of participation, responsibilities, and social obligations.

This study will look at the social and cultural factors that enhance or hinder the development of maize production. Specifically, the study will describe the maize farming system, determine the impact of maize farming on livelihood, and review the potential impact of maize farming on farmers' cultural values. It will be conducted in Lao PDR, through combined quantitative and qualitative approach such as survey, primary and secondary data, semi-structured questionnaires, focus group discussions with identified stakeholders, and interviewing farmers who participate in maize farming. By understanding the social and cultural vulnerabilities of these farmers, this study can aid decision-makers and other stakeholders in planning and policy development.

Keywords: maize farming, socio-economic, cultural values, impact, Lao PDR

Quality Evaluation of Hydrolytic Products from Cassava (*Manihot esculenta* Crantz) Starch Using Malted Rice (*Oryza sativa* L.) and *Rhizopus oryzae* Isolated from Cambodia's Dried Starter Culture (*Dambae*)

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This study focuses on evaluating the quality of hydrolytic products from cassava (*Manihot esculenta* Crantz) starch using malted rice (*Oryza sativa* L.) Sen Pidao cv. produced by the Cambodian Agriculture Research and Development Institute (CARDI) and *Rhizopus oryzae* isolated from Cambodia's dried starter culture (*Dambae*). The best germination time of rice grains will be identified by determining amylase enzyme activity in rice seedlings in every consecutive day until day 11. For cassava starch hydrolysis using malted rice as a source of amylase, the amount of cassava starch (g) and water (ml) will be fixed but malted rice and pH of solution will be varied with 8g, 10g and 4,5, and 6, respectively. The same amount of the mixture will be used in the case of mold *R. oryzae* as source of amylase. The amount of *R. oryzae* cell suspensions will be fixed at two tubes/treatment. Proximate composition (moisture content, crude ash, crude protein, crude fat, crude fiber, and carbohydrate) and physicochemical properties [pH, total soluble solids (TSS), color, viscosity, reducing sugar, and dextrose equivalent] of hydrolytic products as well as sensory properties will also be determined. All experiments will be done in triplicate. Triangle test and quality descriptive analysis will be employed to test the intensity of the particular attribute (color, viscosity, aroma, sweetness and overall acceptability). Statistical analysis of sensory evaluation and the significant difference between treatments and variables will be performed using Analysis of Variance (ANOVA) and Least Significant Difference (LSD), respectively, at $P \leq 0.05$.

Keywords: maltose syrup, cassava starch, malted rice, *Rhizopus oryzae*, dextrose equivalence (DE), *Dambae*

Disease Survey of Rice in Lao PDR and Study on Control of Sheath Blight Diseases

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Biotic constraints to rice production include insects, diseases and weeds. This study aims to evaluate and control important pest diseases of rice in Lao PDR. The samples were collected from two provinces in Sayabouly Province and Vientiane Capital, during the wet and dry seasons. From a total of 29 rice cultivar samples collected, *Rhizoctonia* isolates were found in 19 samples based on their morphological characteristics. In particular, the species *Rhizoctonia solani*, *Rhizoctonia oryzae* and *Rhizoctonia oryzae-sativae*. The samples were found and confirmed by molecular technique using the primers ITS1 and ITS4. The base sequences were compared with the Gene Bank database using Blasts program. Studies on control method was carried out in the laboratory, with particular focus on *Rhizoctonia solani*. Testing antagonist in the laboratory showed that three out of the seven isolates of *Trichoderma* sp. (T13, T18, T67) could suppress mycelium growth of *R. solani* (83%, 88%, 81%, respectively). Furthermore, the use of chemicals Carbendazin, Terrachor, Benomyl could likewise suppress mycelium growth of *R. solani* (92%, 92%, 92% , respectively).

Keywords: rice, sheath blight, control, antagonist, chemical

Changes in Soil Chemical Properties Affecting Plant Response Under 20-Year Application of Contrasting Quality Organic Residues With and Without Chemical Fertilizers

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The application of locally available organic residues on the soil is considered as a good management practice particularly under long-term conditions. It can improve chemical and physical properties of soil. Moreover, quality of organic residues is important in nutrient mineralization and organic matter restoration in the soil. These nutrients can be reserved for plant growth. The objective of this study is to assess the effect of 20 years' continuous application of contrasting organic residues in sandy soil on its chemical properties and plant uptake. A field experiment will be carried out at a research station in the Office of Agriculture and Co-operatives at Tha Phra Subdistrict, Khon Kaen Province, Northeast Thailand (16° 20.685' N; 102° 49.449' E). The experiment has been conducted for 20 successive years since 1995. In addition, a plant test under controlled conditions (greenhouse pot experiment) will be conducted using corn to study plant response to long-term application of contrasting quality organic residues with and without chemical fertilizer. There are two levels of chemical fertilizer 1) without fertilizer input and with fertilizer input; and 2) five-levels of soil influenced organic residues application factor, namely: (1) no application or control (CT), (2)-(5) with applications of contrasting quality organic residues, rice straw (RS), (3) groundnut stover (GN), (4) dipterocarp leaf litter (DP) and (5) tamarind leaf + petiole litter (TM). A 2x5 factorial arrangements in Completely Randomized Design (CRD) with four replications. The partial result of this study show that organic amendments increased the content of soil organic matter and total nitrogen compared with no addition leading to increase in cation exchange capacity and soil fertility. Furthermore, soil tested with organic material was able to enhance the effectiveness chemical fertilizer when organic and inorganic fertilizer were combined.

Keywords: organic residues, long-term, sandy soil, chemical properties, application, Northeast Thailand

Impact of Vegetables Production on Food Security and Livelihood of Farmers in Shan State, Myanmar

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The Shan Plateau in Eastern Myanmar is an extensive, mountainous upland ranging from 1000 to 2300 m in height. Home-based vegetable production has been recognized as a nutrition- and gender-sensitive intervention that has the potential to improve nutrition in developing countries, yet evidence is lacking. Vegetables production as home-gardening contributes to increased production and consumption of vegetables for rural people, which are necessary preconditions for improving nutrition. It can also be viewed as a way to enhance household food security and nutrition. Home gardens are an integral part of local food systems and the agricultural landscape of developing countries all over the world. In part, it provides for the rural people's social, economic, and environmental contributions to communities in various socio-economic contexts. Positive impacts of home-gardening (vegetables production) towards addressing food insecurity and malnutrition as well as providing additional benefits include income and livelihood opportunities for resource-poor families and delivering a number of ecosystem services. While the livelihood of farmers in upland region is mainly on shifting cultivation, most crops like upland rice, sugarcane, potato, maize, and garlic are grown for industrial use. The other source of income is from selling forestry products such as bamboo and wood and hunting. Vegetables are sourced by buying from other places or if not easily available, the local people will substitute their diets with wild foods such as roots, leaves, shoots, mushrooms, seeds, and fruits. Farmers are not interested in vegetables production because they fail to realize its benefit. Therefore, this research is being proposed to encourage farmers to engage in vegetables production not only for food security but also as a source of livelihood.

Keywords: vegetable production, food security, rural development, upland agriculture, home garden

Energy Utilization Analysis of Rice Production in Selected Municipalities of Laguna, Philippines

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Rice is one of the important crops in the Philippines, Southeast Asia, and many countries in Asia. Under the increasing world population, energy consumption will also be increasing. Across various stages, rice production is dependent on oil-based energy inputs. As oil prices increase, so will production costs which in turn decreases farmers' income. On the other hand, the burning of fossil fuel oil from the use of machines leads to emission of greenhouse gases like carbon dioxide and nitrous oxide from fertilizer application. Minimizing the use of fossil fuel energy or utilizing it more efficiently is crucial in reducing production costs and increasing farmers' income as well as in reducing greenhouse gas emission from rice production.

To be conducted in three selected municipalities of Laguna, Philippines where the rice farmers are into varying adjustments in energy utilization in their rice production practices, this study aims to: 1) determine the direct and indirect energy usage in the various stages of rice production; 2) determine the energy use efficiency and energy productivity by using appropriate analysis and computation methods; and 3) recommend effective ways in improving the energy productivity and energy use efficiency of rice production in the selected municipalities. Primary data will be gathered through field surveys by using pre-tested structured questionnaire and secondary data will be collected from respective local government units. Direct energy inputs like fuels and fertilizers, and indirect energies such as labor (man, animal) for the land preparation, planting, fertilizing, weeding, spraying, and harvesting operation will be accounted. Analysis and computation of energy coefficients will be based on the procedures of Pimentel (1980), and from relevant literatures. From this study, the direct and indirect energy usage and energy use efficiency for production in selected area will be known. Based from the results of this study, recommendation(s) regarding efficient energy use in rice production could be made.

Keywords: direct and indirect energy, energy use efficiency, rice productivity

Agricultural Production Systems Simulator (APSIM) Model: Simulation on Impacts of Climate Change on Soya Bean Yield in Laguna, Philippines

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Soybean [*Glycine max* (L.) Merrill] has become as one of the major rainy season oilseed cash crops in the tropical region. In spite of its phenomenal growth in this agro-climatic zone, the average productivity of soybean has remained more or less at 1 ton/ha due to several abiotic, biotic, and socio-economic factors. The climate change such as increase in temperature, CO₂ concentration, and rainfall will affect not only the soybean crop productivity but also the agricultural crop production. Therefore, the appropriate crop management practices such as optimum planting time, suitable plant population density, and use of nutrients will play important roles in soybean crop productivity. Simulation models with demonstrated accuracy and reliability provide an alternative method of investigating both short- and long-term agricultural methods with less time and cost. Hence, this study aims at applying the APSIM model in the decision-making process to evaluate the impact of climate change on soybean yield.

To get the optimum sowing date and appropriate planting density for the simulation study, the experiment that includes two sowing dates (last week of January and first week of February) and two row spacing (30 cm and 40 cm) with three replications will be conducted at the UPLB field by using a randomized complete block design. For weather information, solar radiation, maximum and minimum temperatures, and rainfall will be recorded. For soil information data, albedo, first-stage evaporation, drainage, field capacity, wilting point, texture will be collected. By using these data, a well-calibrated and validated APSIM model will be used for long-term simulation on the impact of temperature and rainfall pattern on soybean yield at the Laguna province. The simulation results obtained from this study will reveal the new alternative management practices to get the higher productivity of soybean yield in this region.

Keywords: soybean, APSIM model, sowing date, planting density, temperature, rainfall

Assessment of CERES-maize Model's Performance in Simulating Agronomic Traits and Yield of Maize (*Zea mays* L.) at Different Planting Dates and Nitrogen Levels

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MS Agronomy, University of the Philippines Los Baños

Co-authored by: Dr. Pompe C. Sta. Cruz, College of Agriculture, UPLB

An open field experiment will be undertaken during the dry season, from February to July, 2016 to assess the ability of CERES-maize model in simulating the effect of planting dates and nitrogen rates on agronomic traits and yield of maize (*Zea mays* L.) at Central Experiment Station, University of the Philippines Los Baños, Laguna, Philippines (14.167748°N and 121.252681°E). Split plot design will be used with three replicates, during four planting dates (February 25, March 26, April 27, and May 28) and two nitrogen levels (120 kg ha⁻¹ and 180 kg ha⁻¹). Planting dates and nitrogen application rates will be main plots and subplots, respectively. For model evaluation, the aboveground biomass and phenological stages will be used and these will be observed at vegetative and reproductive stages. The Generalized Livelihood Uncertainty Estimation (GLUE) programme will be used to predict the genetic coefficients for the Decision Support System for Agrotechnology Transfer (DSSAT) CERES-maize model. The ultimate goal of the study is to accurately determine the optimum planting time, biomass yield, and nitrogen fertilizer rates with reasonable accuracy using DSSAT CERES-maize model.

Keywords: DSSAT CERES-maize model, planting time, biomass yield, phenological stage

Irrigation Water Use Efficiency for Robusta Coffee Production in Lam Dong Province, Vietnam

Ms. Tran Nhat Lam Duyen

Straight PhD Agricultural Economics, University of the Philippines Los Baños

Co-authored by: Dr. Roberto F. Rañola, Jr., College of Economics and Management, UPLB

Lam Dong province is the second largest area in Vietnam with 23 percent of the national coffee acreage. However, the prolonged dry period and lack of water for irrigation in recent years have severely affected thousands hectares of coffee in Lam Dong and therefore needs some feasible solutions. In this study, data was collected from 194 coffee farms of Kinh and ethnic minority people in Lam Dong between June and July 2015. Descriptive statistics was used to analyze coffee production and socio-economic household characteristics in study area. The multivariate regression analysis with Cobb-Douglas production function was also used to determine response of amount of irrigation water and other production factors to coffee production in Lam Dong. Data Envelopment Analysis (DEA) model was applied to compute the technical efficiency (TE) and the irrigation water use efficiency (IWUE) of surveyed farms, and then Tobit model was applied to quantify the correlation of factors to IWUE. The regression analysis indicated the amount of water, working capital, labor, and farm size significantly affecting coffee production. Analyzed results of DEA revealed that the average TE across the surveyed farms were around 72 percent and 66 percent under variable return to scale (VRS) and constant return to scale (CRS) assumptions, respectively. In addition, the efficiency of coffee production carried out by aboriginal farmers was higher than those of Kinh farmers. There is a requirement for improving the water use efficiency of farms indicated by IWUE of 52 percent under VRS while it was only 39 percent under CRS. Further comparative analysis showed that the irrigation efficiency practiced by Kinh farmers was lesser than by aboriginal farmers. Further analysis of Tobit model indicated the influence of some variables (i.e., farmers' experience, education level, distance from the water source to farms, ownership of water source, extension contact and credit access) on IWUE. It contributed to decision making in policy directions to ensure the sustainable coffee production at Lam Dong.

Keywords: technical efficiency, irrigation water use efficiency, data envelopment analysis, Tobit model, Robusta coffee farms, Lam Dong

FIELD TOUR & SPECIAL SESSION

The second day of the Conference featured a visit to the Chambok CBET in Kampong Speu Province in Southwest Cambodia. The community was developed in 2002 by Mlup Baitong, a local non-governmental organization (NGO) in Cambodia engaged in the conservation and sustainable use and management of natural resources through education, training, and advocacy.

Chambok CBET is an internationally-recognized project noted for achieving balance between natural resource management and community and livelihood improvement. Its wide range of ecotourism services include homestays, restaurants, handicraft markets, and guided tours. Managed by the villagers themselves, profits from these activities are used to support the needs of the community such as the establishment of water supply facilities, maintenance of community infrastructure, remuneration for forest patrol guards, and foreign languages training among others.

This participatory approach to the sustainable management of natural resources led the Chambok CBET to win the 19th International TO DO! Contest for Socially Responsible Tourism in Berlin in 2014. The award is given to “projects, measures or products characterized by the active participation of the local population and fairness in the way the projects interact with its stakeholders.”

Meanwhile, a one-day special session was held solely for the IDRC-SEARCA scholars who were not able to present during the Conference. The special session was conducted with the expertise of the project’s Advisory Committee members, namely: Dr. Oscar Zamora and Dr. Percy Sajise of the Philippines, Dr. Mom Seng of Cambodia, Dr. Silinthone Sacklokhham of Lao PDR, and Dr. Prasit Wangpakapattanawong of Thailand. Dr. Annie Wesley of IDRC was also present to give comments to the scholars’ research proposals. Serving as resource person for the session is Dr. Somsak Srisontisuk who heads the Master of Rural Development Management program at Khon Kaen University in Thailand.

Twenty scholars presented their research proposals where they discussed their research objectives, the significance of their study, and research methodology. The Advisory Committee members in turn gave recommendations for the development of the scholars' thesis researches, which include, among others, the following:

1. Using updated related literature;
2. Keeping their objects specific, measurable, achievable, relevant, and time-bound (SMART);
3. Identifying the beneficiaries of the results of their research;
4. Finding the right combination of experience and science; and
5. Recognizing farmers as more than just a source of information.

As a representative of his fellow scholars and recent alumni, Mr. Biachampah encouraged his fellow scholars to consult with their advisers regularly and to know when to work hard and when to have a break. He also reminded his colleagues to ask themselves how they can use their knowledge in helping the agriculture in the uplands. Finally, he expressed his sincere gratitude for the opportunity given by IDRC and SEARCA.

In closing, Dr Wesley thanked the Advisory Committee members and Dr. Somsak for their commitment in helping the scholars. She also reminded the scholars to regard themselves as “leaders for today and tomorrow” and to continuously look for ways on how they can be of service to their home countries.

PHOTOS

Oral and Poster Sessions





Field Tour



Special Session



ANNEXES

ANNEX A. CONFERENCE FLYER



Organized by
International Society of Environmental and Rural Development
Royal University of Agriculture, Cambodia
Institute of Environmental Rehabilitation and Conservation, Japan

Co-organized by
United Nations University, Institute for the Advanced Study of Sustainability

Collaborated with
Tokyo University of Agriculture, Japan
Bohol Island State University, Philippines
Khon Kaen University, Thailand
Association of Environmental and Rural Development, Thailand



It is a great pleasure of the International Society of Environmental and Rural Development (ISERD) to welcome you all to Phnom Penh, Cambodia for the upcoming event of the *7th International Conference on Environmental and Rural Development (7th ICERD)*. Royal University of Agriculture (RUA) is very delighted to host this significant event to be held during 16 - 17 January 2016. *Environmentally-friendly Agricultural and Rural Development* is the theme of the 7th ICERD. The main objective of this conference is to discuss and develop the suitable and effective processes and strategies for sustainable rural development taking into account of agricultural and environmental aspects in developing countries. Scientists and facilitators of all disciplines belonging to international, governmental or non-governmental organizations are invited to participate and submit contributions. Also, the 7th ICERD will be held in the conjunction with the *3rd and last IDRC-SEARCA Annual Fellowship Plus Conference-Workshop*.

VENUE: Royal University of Agriculture, Phnom Penh, Cambodia

THEME: Environmentally-friendly Agricultural and Rural Development

Education for Sustainable Development (Environmental education, Food and agricultural education, Participatory approach, Capacity building, Community empowerment, Agricultural extension, In-formal/Non-formal Education, etc.)
Rural Development (Marketing, Partnership, Value added product, Community development, Access to technology, Cultural preservation, etc.)

Environmental Management (Bio-diversity, Soil degradation and land conservation, Water quality conservation, Deforestation and sustainable forest management, Environmental management, etc.)

Agricultural Systems (Organic farming, Conservation tillage, Mechanization, Irrigation and drainage, Nutrient and pest management, Agro-forestry, Indigenous technology, Animal management, Tropical feed resource, etc.)

Infrastructural Systems (Water resource development, Land reclamation, Road construction, etc.)

LANGUAGE: English

PUBLICATIONS: All participants are invited to submit an abstract through e-mail to the Conference Secretariat at 7thicerd@rua.edu.kh. Full manuscript presented at the conference will be published in the International Journal of Environmental and Rural Development (IJERD) after a peer-reviewing process. Please submit the full manuscript to ISERD Secretariat at iserd.secretariat@gmail.com.

IMPORTANT DATES:

- | | |
|--|--------------------|
| • Deadline for abstract submission (7thicerd@rua.edu.kh) | 30 September, 2015 |
| • Notification of abstract acceptance | 15 October, 2015 |
| • Deadline for full manuscript submission (iserd.secretariat@gmail.com) | 15 November, 2015 |
| • Notification of oral and poster presentation | 15 December, 2015 |
| • Conference | 16 January, 2016 |
| • Excursion | 17 January, 2016 |

Please see Instruction for Author in International Journal for guideline for writing manuscript. (<http://www.iserd.net>)

Contact: For more information, please visit <http://www.iserd.net> or contact conference secretariat at 7thicerd@rua.edu.kh



ANNEX B. CONFERENCE PROGRAM

The 7th ICERD-International Conference on Environmental and Rural Development, 16th-17th January, 2016, Phnom Penh, Cambodia

Managing Committee

President of ISERD

Deputy President of ISERD

Chair of Organizing Committee

Chair of Steering Committee

Chair of Scientific Committee

Awarding Committee

Prof. Dr. Mario T. Tabucanon

Prof. Dr. Bunthan Ngo

Prof. Dr. Anan Polthancee

Prof. Dr. Eiji Yamaji

Prof. Dr. Bunthan Ngo

Prof. Dr. Mom Seng

Prof. Dr. Machito Mihara

Prof. Dr. Eiji Yamaji

Prof. Dr. Regucivilla A. Pobar

Chair of Excellent Paper Award

Chair of Poster Presentation and Excellent Poster Award

Chairmanship

Oral Presentation

Room 1

1st session, 10:30-12:00

Rural Development (Ru)

Chair **Dr. Sinisa Berjan**

Co-chair **Dr. Lalita Siri Wattananon**

2nd session, 13:30-15:00

Rural Development (Ru)

Chair **Dr. Robert J. Farquharson**

Co-chair **Dr. Serge Morand**

3rd session, 15:30-17:00

Education for Sustainable Rural Development (Ed)

Chair **Dr. Machito Mihara**

Co-chair **Dr. Maria Cristeta N. Cuaresma**

Room 4

1st session, 10:30-12:00

Rural Development (Ru)

Chair **Dr. Marcelino T. Razalan Jr.**

Co-chair **Dr. Hok Lyda**

2nd session, 13:30-15:00

Rural Development (Ru)

Chair **Dr. Merites M. Buot**

Co-chair **Dr. Huon Thavrak**

3rd session, 15:30-17:00

Environmental Management (En)

Chair **Dr. Percy E. Sajise**

Co-chair **Dr. Neang Maline**

Room 2

1st session, 10:30-12:00

Agricultural systems (Ag)

Chair **Dr. Buntong Borarin**

Co-chair **Dr. Nina-Nocon-Shimokuchi**

2nd session, 13:30-15:00

Agricultural systems (Ag)

Chair **Dr. Chuleemas Boonthai Iwai**

Co-chair **Dr. Noel T. Lomosbog**

3rd session, 15:30-17:00

Agricultural systems (Ag)

Chair **Dr. Peter Stamp**

Co-chair **Dr. Shigeoki Moritani**

Room 5

1st session, 10:30-12:00

Agricultural Systems (Ag)

Chair **Dr. Seng Mom**

Co-chair **Dr. Pen Miranda**

2nd session, 13:30-15:00

Agricultural systems (Ag)

Chair **Dr. Dieter Trautz**

Co-chair **Dr. Phruksa Lawongsa**

Room 3

1st session, 10:30-12:00

Environmental Management (En)

Chair **Dr. Hiromu Okazawa**

Co-chair **Dr. Hor Sanara**

2nd session, 13:30-15:00

Environmental Management (En)

Chair **Dr. Prasit Wangpakattanawong**

Co-chair **Dr. Jeeranuch Sakhamduang**

3rd session, 15:30-17:00

Environmental Management (En)

Chair **Dr. Oscar B. Zamora**

Co-chair **Dr. Tomas D. Reyes Jr.**

Poster Presentation

Chair Prof. Dr. Regucivilla A. Pobar

Education for Sustainable Rural Development (Ed)

Co-chair

Dr. Dawroong Watcharinrat

Dr. Katsuyuki Shimizu

Dr. Shella C. Olaguir

Dr. Vijaya Kumar Thirukkoveala

Rural Development (Ru)

Co-chair

Dr. Anucha Wittayakorn Puripunpinyoo

Dr. Aya Kaneko Ikawa

Dr. Chay Chim

Dr. Kumiko Kawabe

Dr. Mongkon Ta-Oun

Dr. Takashi Ueno

Agricultural Systems (Ag)

Co-chair

Dr. Anchalee Sawatthum

Dr. Cheat Sophal

Dr. Kanita Thanacharoenchanaphas

Dr. Kang Kroesna

Dr. Keo Sath

Dr. Nguyen Thi Kim Dong

Dr. Nguyen Van Thu

Dr. Pheng Vutha

Dr. Patcharin Krutmuang

Dr. Ratchata Tonwitawat

Dr. Rungkan Klahan

Dr. Sawat Pimsuwan

Dr. Shinobu Yamada Terauchi

Dr. Vo Quang Minh

Dr. Vo Tong Xuan

Dr. Yolina T. Castaneto

Environmental Management (En)

Co-chair

Dr. Alan Paul D. Sandigan

Dr. Cheang Hong

Dr. Chihiro Kato

Dr. Duangrat Thongphak

Dr. Kiichiro Hayashi

Dr. Kubashi Satoru

Dr. Makoto Ooba

Dr. Narumol Kaewjampa

Dr. Ngo Thi Thanh Truc

Dr. Takahiko Kubodera

Dr. Somporn Pleanjai

Program of the 7th International Conference on Environmental and Rural Development

January 15, 2016 (Friday)

15:00-16:00	ISERD Council meeting
16:00-17:00	Steering Committee meeting
17:30-20:00	Registration and welcome dinner at Khmer Surin Restaurant

January 16, 2016 (Saturday)

Part I: Opening Program

07:00-08:30	Registration
08:30-10:00	Announcement of program by MC/addressing delegates
	National anthem
	Welcome address and Recognition of Participants by Prof. Dr. Mom Seng Chair of 7 th ICERD Steering Committee Vice Rector, Royal University of Agriculture
	Message from ISERD, Prof. Dr. Mario T. Tabucanon President of ISERD
	Introduction of Excellent paper Awards by Prof. Dr. Eiji Yamaji Chair of Excellent paper Award, 7 th ICERD
	Introduction of Excellent poster Awards by Prof. Dr. Regucivilla A. Pobar Chair of Excellent poster Award, 7 th ICERD
	Outcomes from ISERD Council Meeting by Prof. Dr. Machito Mihara Executive Secretary of ISERD
	Remark from USAID Representative
	Remark from IDRC-SEARCA by Dr. Gil C. Saguiguit, Jr., Director, SEARCA
	Opening remark by Prof. Dr. Bunthan Ngo Chair of Organizing Committee, 7 th ICERD Rector, Royal University of Agriculture
	Keynote Address 'Sustainable Agriculture: Progress and Future' Dr. Makara Ouk, Director, Cambodian Agricultural Research and Development Institute

Part II: Poster Presentation and Parallel Sessions

10:00-10:30	Poster presentation & coffee break
10:30-12:00	Session 1 of oral presentation (6 presentations: Room 1,2,3,4,5)
12:00-13:30	Lunch
13:30-15:00	Session 2 of oral presentation (6 presentations: Room 1,2,3,4,5)
15:00-15:30	Poster presentation & coffee break
15:30-17:00	Session 3 of oral presentation (6 presentations: Room 1,2,3,4)

Part III: Banquet & Awarding Ceremony

January 17, 2016 (Sunday)

7:00-15:30	Excursion
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Presentation Program

Room 1: Rural Development Education for Sustainable Rural Development

Session 1	Chair	Co-chair	Page
10:30-10:45	Dr. Sinisa Berjan	Dr. Lalita Siritwattananon	1
	A Deconstruction of a Social Environment in a Cebu City, Philippines Community Gathering <i>Merites M. Buot, Gilda L. Uy</i>		
10:45-11:00			2
	Impact Assessment of Land Use Change on Ecosystem Services and Livelihood Security of Rural Highland Communities in Lao PDR <i>Bouravanh Biachampah</i>		
11:00-11:15			3
	Impact of Modernization on Disaster-Prone Regions as Factor of Increasing Vulnerability: Case of Ishinomaki and Kesennuma, Miyagi, Japan <i>Koji Miwa</i>		
11:15-11:30			4
	Globalization and Urbanization of Rural Areas: The Case of the City of Dasmariñas, Cavite Province, Philippines <i>Christopher C. Mantillas</i>		
11:30-11:45			5
	Biodiversity and Health in Southeast Asia: the project BiodivHealthSEA <i>Serge Morand, Claire Lajantie, BiodivHealthSEA team</i>		
11:45-12:00			6
	Assessment of Credit-Market Linkage Arrangement of Rice Farmers in Selected Town of Laguna, Philippines 2014 <i>Cesar B. Quicoy</i>		

Room 2: Agricultural Systems

Session 1	Chair	Co-chair	Page
	Dr. Buntong Borarin	Dr. Nina-Noon-Shimokuchi	7
	Characterization of Banana Production in Comer, Apayao <i>Jonah B. Hapal, Hamie T. Martin</i>		
			8
	Diversity of Plant Growth Promoting Rhizobacteria Communities Associated with Thiamethoxam in Cassava Production Systems <i>Phruksa Lawongsa, Pimporn Panomkhum</i>		
			9
	Response of Kalingas Litan (<i>Cinnamomum microphallum</i>) Stem Cutting Treated with Various Level of Indole Butyric acid (IBA) <i>Noel T. Lomoshog</i>		
			10
	Improving Upland Rice Production for Sustainability of Rice Self-Sufficiency Ratanakiri Province, Cambodia <i>Sophal Var, Edna A. Aguilan, Pompe C. Sta Cruz, and Rico C. Arcog</i>		
			11
	Improving Waxy Maize, the Heritage of South East Asia <i>Peter Stamp, Somsen Jampatong, Ham Le-Huy, Choosak Jomputk</i>		
			12
	Comparison of Rice Plant Development with Different Transplanting Density under SRI Practices in the Lysimeter <i>Ishwar Pun, Eiji Yanagi</i>		

Room 3: Environmental Management

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	Dr. Hiromu Okazawa	Dr. Hor Sanara	13
	Coupling of SWAT and HEC-RAS for Flood Damage and Flood Risk Analysis, Nam Phong River Basin, Thailand <i>Nareth Nut, Vichian Plernkamon, Machito Mihara</i>		
			14
	Effects of Survey Methods between GNSS and Direct-Leveling on Elevation Values over Long Routes in Mountainous Area <i>Takahiko Kubodera, Hiromu Okazawa, Yoshiharu Hosokawa</i>		
			15
	Predicting Soil Temperature Condition in Agricultural Land under Climate Change in Japan <i>Chihito Kato, Taku Nishimura</i>		
			16
	Differences in Benthic Cover, Fish Assemblage, and Macro-Benthic Invertebrates inside and outside Marine Protected Area <i>Jesrelliane Aaron-Amper, Samuel J. Gulayan</i>		
			17
	Application of Soil and Water Assessment Tool (SWAT) Model to Predict Streamflow and Sediment Yield in Waig-inabanga Watershed, Bohol, Philippines <i>Tomas D. Reyes, Jr.</i>		
			18
	Proposed the Model for Estimation of Nitrogen Load in the Agro-Forestry Watershed <i>Yuri Yamazaki, Hiromu Okazawa, Toshimi Muneoka</i>		

	Session 2 Chair Dr. Robert J. Farquharson Co-chair Dr. Serge Morand	Page	Session 2 Chair Dr. Chulemas Boonthai Iwai Co-chair Dr. Noel T. Lomsoog	Page	Session 2 Chair Dr. Prasit Wangpakattanawong Co-chair Dr. Jeeranuch Sakhamduang	Page
13:30-13:45	The Economic Contribution of Fuel Wood to Livelihood in Suol Commune, Kratie Province, Cambodia <i>Masahiro Saiga, Theara Nam, Machito Mihara</i>	19	Effect of Growing Media on Growth of <i>Platyedum ridleyi</i> at the Seedling Stage <i>Sawat Pimsriwan, Nuthapol Chuenarom, Intukarn Kongchana</i>	25	Influence of Meteorological Variable Combinations on Reference Evapotranspiration Estimated by the FAO56 Penman-Monteith Method <i>Hiromu Okazawa, Andrew J. Wade, Yasushi Takeuchi</i>	31
13:45-14:00	Appropriate Extension Approaches in Disseminating Livestock Production Technology in Cambodia <i>Pudheany Ung, Rommel C. Sulabo, Amado A. Angeles, Myra E. David</i>	20	Vermicomposting Using Waste Papers as Substrates for African Night Crawler (<i>Eudrilus Eugeniae</i>) <i>Yolina T. Castañeto, Elmer T. Castañeto, Jayson Q. Caranza</i>	26	Assessing Climate Change Vulnerability to Increase Adaptation Capacity in Rural Areas: Cases of Apple Farming in 4 Different Municipalities in Gyeonggi Province, Korea <i>Seong Yoon Choi, Eiji Yamaji</i>	32
14:00-14:15	Roles and Factors Effecting to the Rural Development Activities by University- Case in Pathum Thani Province, Thailand <i>Lalita Sirivattananon, Pornthip Puengkaew</i>	21	An Attempt to Use High Salinity Water for Irrigating a Green-Roof Garden <i>Shigeoki Moritani, Tahet Yamamoto, Hentimsoa Andry, Choichi Sasaki, Chhiro Kato, Hiroaka Saito</i>	27	Soil as a Biofilter Medium for Air Pollution Control <i>Daisy B. Badilla, Peter A. Gostomski</i>	33
14:15-14:30	Comparison of Indigenous Knowledge and Scientific Knowledge of Land Use Selection of Ikalahan Farmers in Sta. Fe, Nueva Vizcaya, Philippines <i>Hannie T. Martin, Rex Victor O. Cruz, Rodrigo B. Badayos, Elsa P. Santos</i>	22	Earthworm Communities and Activities in Rice Ecosystem under Different Soil Salinity Levels in Northeast Thailand <i>Ajcharawadee Kruapukee, Chuleemas Boonthai Iwai, Narumol Kaewjampa</i>	28	Local Community Participation in Biodiversity Monitoring and Its Implication for REDD+: A Case Study of Chankran Roy Community Forestry in Cambodia <i>Donal Yeang, Sam Un Eam, Kiriranan Sherehan, Louisa Mckerrow</i>	34
14:30-14:45	Current Agricultural Condition and Constraint in Paktya Province of Afghanistan <i>Abdul Malik Dawlatzai, Machito Mihara</i>	23	Drought Tolerance and Nitrogen Use Efficiency of Upland Rice (<i>Oryza sativa</i> L.) Genotypes Grown under Varying Water and Nitrogen Regimes <i>Raby NGET and Pompe C. Sia. CRUZ, Contancio D. Decusman, Pearl B. Sanchez</i>	29	Payment for Watershed Services (PWS): Its Potential as a Scheme for the Sustainable Management of Barobob Watershed in Nueva Vizcaya, Philippines <i>Elizabeth T. Carig, Joel G. Carig, Arvin P. Vallesteros</i>	35
14:45-15:00	Interrelationships of Governance, Empowerment and Sustainability in the Ancestral Domain of the Ayangan in Nueva Vizcaya, Philippines <i>Marcelino T. Razalan Jr.</i>	24	Grown Soybeans (<i>Glycine Max</i> (L.) Merr.) <i>Insa Kuhlring, Nina Bome, Dieter Trautz</i>	30	Policy Analysis for Biodiversity Conservation in Cambodia: The Protected Areas System <i>Somaly Chan</i>	36

Session 3		Session 3		Session 3	
Chair Dr. Machito Mihara		Chair Dr. Pertter Stamp		Chair Dr. Oscar B. Zamora	
Co-chair Dr. Maria Cristeta N. Cuaresma		Co-chair Dr. Shigeoki Moritani		Co-chair Dr. Tomas D. Reyes Jr.	
	Page		Page		Page
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Room 4 : Rural Development and Environmental Management

Session 1
Chair Dr. Marcelino T. Razalan Jr.
Co-chair Dr. Hok Lyda

Room 5: Agricultural System

Session 1
Chair Dr. Seng Mom
Co-chair Dr. Pen Miranda

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10:30-10:45	55	Economic Analysis of Small-Scale Pumping Machines Operated in Rice Production in Chum Kiri District, Kampot, Cambodia <i>Lyhour Hn, Sarith Moeuk, Chamnan Suos</i>	Carbon Dioxide Evolution as an Index of N Mineralization Rates of Organic Substrates <i>Sambo Pheap, Gina V. Pongga, Jocelyn D. Labios, Evalour T. Aspuria</i>
10:45-11:00	56	The Cassava Marketing in Pailin Province, Cambodia, 2014 <i>Sreyneang Chheun</i>	Agronomic Performance and Weed Infestation in Bitter Gourd (<i>Momordica charantia</i> Linn.) with Mulches under Open Field and Protected Cultivation Systems <i>Marina A. Labonite, Dennis D. Jomoc, Jose G. Labonite, Imelda G. Torrefranca, Julie Carne G. Estillore, Zenaida Gonzaga, Sandra Mcdaugall, Gordon Rogers</i>
11:00-11:15	57	Economic Opportunities for Off-Season Chilli and Tomato Production and Marketing in Kampot Province, Cambodia <i>Sinath Srey</i>	Utilization of Corn cob as Feedstuff on Growth Performance, Feed Utilization and Carcass Composition of Nile Tilapia (<i>Oreochromis Niloticus</i>) <i>Rungkan Klahan, Punphong Yotha, Benjamas Jitnasmith, Khanchai Danmek, Montri Punyathong</i>
11:15-11:30	58	Are There Potential Economic Benefits from Adoption of New Rice Varieties in the Ayeyarwady Delta of Myanmar? <i>Stephen Rodger</i>	Improving Diet Quality, Nutrient Digestibility and Growth Performance of Cattle by Supplementing Water Hyacinth (<i>Eichhornia Crassipes</i>) to Rice Straw <i>Nguyen Van Thu, Nguyen Thi Kim Dong</i>
11:30-11:45	59	Assessing the Economic Benefits from the Adoption of New Rice Varieties in the Ayeyarwady Delta of Myanmar	Effect of Levels of Dietary Crude Protein on Nutrient Intakes, Growth and Economic Return of Guinea Fowls in the Mekong Delta of Vietnam <i>Nguyen Thi Kim Dong, Nguyen Van Thu</i>
11:45-12:00	60	Supply Chain Management of Organic Rice in Northern Thailand <i>Pattana Jierviriyapant, Yiwadee Sipomat, Ong-Art Liangphansakul</i>	A Response of Dietary Nutrient Utilization, Growth Rate and Economic Return of Rabbits Supplemented Coconut Cake in Mekong Delta of Vietnam <i>Truong Thanh Trung, Nguyen Thi Kim Dong, Nguyen Van Thu</i>

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Env 20	Greenhouse Gas Emissions of Organic Car Wax Processing from Rice Bran Oil <i>Somporn Pleanjai , Unchalee Saguanpong</i>	195
Env 21	Ecotoxicology of Leachate from Sewage Sludge, Spent Wash Liquor and Wastewater from Cassava Industry on Nile Tilapia and Water Fern <i>Wilaiwan Duangcharoen, Chuleemas Boonthai Iwai</i>	196
Env 22	The Study on the Impact of Drought on Household Economy in Kbal Tuek Commune, Tuek Phos District, Kampong Chhnang Province <i>Lang Dy Leng, Kroesna Kang , Sokcheng Sim, Chamroeun Heng</i>	197
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ANNEX C. SPECIAL SESSION PROGRAM



3rd IDRC-SEARCA Annual
Fellowship Plus Conference-Workshop
18 January 2016



Frangipani Living Arts Hotel, Phnom Penh, Cambodia

8:00 - 8:30	REGISTRATION	
8:30 - 8:40	OPENING PROGRAM Opening Remarks Rationale and Mechanics of the Activity	Dr. Maria Cristeta N. Cuaresma Program Head, SEARCA Graduate Education and Institutional Development
8:40 - 10:00	PRESENTATION OF SCHOLARS' RESEARCH PROPOSALS Effects of Concentrate Supplementation Using Paper Mulberry Leaves as a Basal Diet on Growth Performance of Local Goat in Laos	Mr. Bounthiem Bouasavanh MS Animal Science, CMU
	Development of a Low-Cost Sorting Machine for Mandarin (<i>Citrus Reticulata</i> Blanco) Using Vision	Mr. Zaw Zaw Htet MS Agricultural Engineering, UPLB
	Performance Evaluation of Single Cylinder Engine Using Different Blends of Ethanol as Fuel	Ms. Khine Myat Swe MS Agricultural Engineering, UPLB
	Ecotourism as a Sustainable Development Strategy for Natural Resource Management in Dong Na Tard Protected Area, Savannakhet Province, Lao PDR	Mr. Yoth Vanhnasin MS Natural Resource Conservation, UPLB
10:00 - 10:20	REFRESHMENTS Group Photo	
10:20 - 12:20	Continuation of Presentation of Research Proposals Improving Upland Rice Production Management Systems Among Rural Households in Southern Shan State, Myanmar	Ms. Wai Mar Lynn MS Rural Development Management, KKU
	Credit System of Rice Farmers in Rakhine State, Myanmar	Ms. Cho Zin Thet MS Rural Development Management, KKU
	Decision Making Related to Agroforestry Practice Among Ethnic Households in Northern Upland Area of Lao, PDR: A Case Study of Kachet Village	Ms. Chanhthavy Bounmithanh MS Rural Development Management, KKU
	The Correlation Between Upland Agriculture and Food Security in Paletwa Township, Chin State, Myanmar	Mr. San Lwin MS Rural Development Management, KKU
	Assessment of Local Knowledge and Practices on Soil Conservation of Farmers in Taungtha Township, Myingyan District, Mandalay Division, Myanmar	Mr. Zin Wai Aung MS Rural Development Management, KKU
	Household and Community Level Practices Towards Sustainability of Community-Based Irrigation System in Sekong Province, Lao PDR	Mr. Saengdavanh Inthavong MS Rural Development Management, KKU
12:20 - 1:20	LUNCH	
1:20 - 3:20	Continuation of Presentation of Research Proposals Agroforestry System and Household Socio-Economic Development of Upland Farming in Nakai Resettlement Villages, Khammouan Province, Laos	Mr. Khampasith Sengsouvanh MPAf in Extension Education, UPLB
	Social and Cultural Effects Associated with the Maize Farming in Phin District, Savannakhet Province, Laos	Ms. Sengsavang Sisouraj MS Rural Sociology, UPLB

	Continuation of Presentation of Research Proposals Quality Evaluation of Hydrolytic Products from Cassava (<i>Manihot esculenta</i> Crantz) Starch Using Malted Rice (<i>Oryza sativa</i> L.) and <i>Rhizopus oryzae</i> Isolated from Cambodia's Dried Starter Culture (<i>Dambae</i>)	Ms. Theavy Srey MS Food Science, UPLB
	Disease Survey of Rice in Lao PDR and Study on Control of Sheath Blight Disease	Ms. Pinkham Vongphachanh MS Plant Pathology, KCU
	Changes in Soil Chemical Properties After 20 Years of Application of Contrasting Quality Organic Residues	Mr. Sisavanh Xayavong MS Agriculture, KCU
	Impact of Vegetables Production on Food Security and Livelihood of Farmers in Shan State, Myanmar	Ms. Cho Cho Myint MS Horticulture, UPLB
3:20 - 3:30	REFRESHMENTS	
3:30 - 4:50	Continuation of Presentation of Research Proposals Energy Utilization Analysis of Rice Production in Selected Municipals of Laguna, Philippines	Mr. Gyaw Shine Oo MS Agronomy, UPLB
	Analyzing the Yield Components of Soybean (Glycine max. L) in Different Planting Times and Row Spacing with CROPGRO-soybean model in Los Baños, Laguna	Ms. Khin Hnin Yu MS Agronomy, UPLB
	Assessment of CERES-maize Model's Performance in Simulating Agronomic Traits and Yield of Maize at Different Planting Dates and Nitrogen Levels	Mr. Naing Moe MS Agronomy, UPLB
	Irrigation Water Use Efficiency for Robusta Coffee Production in Lamdong Province, Vietnam	Ms. Tran Nhat Lam Duyen MS Agricultural Economics
4:50 - 5:20	CLOSING PROGRAM Messages from the Advisory Committee	
	Dr. Vo-Tong Xuan Rector Emeritus, An Giang University Rector, Nam Can Tho University	Dr. Prasit Wangpakapattanawong Assistant Professor, Faculty of Science, CMU Country Representative, World Agroforestry Centre
	Dr. Oscar B. Zamora Professor Emeritus, UPLB	Dr. Silinthone Sacklokham Vice Dean, National University of Laos
	Dr. Percy E. Sajise Honorary Research Fellow, Bioversity International Adjunct Professor, School of Environmental Science and Management, UPLB	Dr. Mom Seng Vice Rector for International Relation, Royal University of Agriculture
	Resource Person	Dr. Somsak Srisontisuk Program Director, Master of Rural Development Management, Graduate School, KCU
	Message and Closing Remarks	Dr. Annie S. Wesley Senior Program Specialist IDRC of Canada

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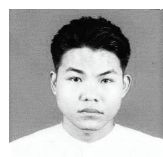
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