Development and adoption of green technologies for sustainable agriculture

IN THE LAST FOUR DECADES, GLOBAL AGRICULTURAL PRODUCTION has been increasing steadily averaging 2.3 percent per year and providing food for the world’s population which has grown at a rate of 1.7 percent (FAO 2007). To meet the increasing global demand for food, the agriculture sector has to rely on advances in production techniques and expansion in production areas over the years. However, rapid population growth and increased human activities have resulted in the overexploitation of the environment, and has threatened the ability of the agriculture sector to provide food and income for the people. There are increasing concerns that the agricultural production system will exceed the environment’s “carrying capacity” or the ability to support human activities.

Clearly, Asian agriculture must continue along the path of sustainable development to support the needs of the present while leaving equal or better opportunities for the future. Hence, further food production increases in the region must be generated by technologies that are ecologically sound, socially equitable, economically viable, and environmentally sustainable.

Green technology forum
Green technologies are innovative technologies with the potential to steer agriculture along a sustainable path, and at the same time contribute to the advancement of economic and efficient production of safe and high-quality food; help small-scale farmers increase their income through high-value marketable farm produce and viable farm enterprises; and promote sustainable production methods to prevent harm to human health and the environment.

FFTC, in cooperation with the Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD); the Council of Agriculture (COA), Executive Yuan, Taiwan ROC; and the National Institute of Fruit Tree Science (NIFTS), NARO, Japan, organized the workshop on the Development and Adoption of Green Technologies for Sustainable Agriculture and Enhancement of Rural Entrepreneurship primarily to deliberate on the development, adoption, and promotion of green technologies in the Asian region. The workshop was held on 28 September - 02 October 2009 in Los Baños, Laguna, Philippines, and was attended by 14 resource speakers (Japan, Korea, Philippines, Taiwan ROC, Thailand, and Vietnam) and about 30 local participants. The activity served as a venue for the sharing and exchange of innovative and promising green technologies, as well as successful lessons and experiences on green technologies for the production of safe and high-quality food, green technologies for high-value commodity production, and development of promising green technologies for the enhancement of rural entrepreneurship.

Production of safe and high-quality food
Sustainability factor is the ability of the agricultural land to maintain acceptable levels of production over a long period of time without degrading the environment, while producing safe and high-quality food.

During the workshop session on Green technologies for the production of safe and high-quality food, the speakers emphasized on technologies that respond to the growing demand among consumers on the quality and safety of what they eat, and whether the food comes from a sustainable source through environment-friendly and sustainable methods. Following are the highlights of paper presentations on the theme:

- Green technology addresses the drawbacks of green revolution while maintaining sustainability and advancing the benefits of modern agriculture.
- Soil Information System (SIS) is a vital tool for efficient and sustainable crop production.
- Grafting compatibility, as a green technology, is very important in controlling systemic plant diseases while minimizing the use of agrochemicals.
- To be socially equitable and economically viable, farmers and consumers should be able to share the benefits from green technologies. In particular, governments must intensify technology transfer and promotion campaigns to enable farmers to have better access to these technologies.
In Korea, vegetable grafting is used to achieve improved yield and safe/high-quality produce, and is highly effective in ameliorating crop loss from harsh environmental conditions, especially under protective cultivation.

An integrated crop-poultry-fish organic farming system in Negros Occidental, Philippines that practices zero-waste management.

**High-value commodity production**
The adoption and diffusion of green technologies very much depend on attaining a balance between economic profitability and environmental sustainability. The workshop session on *Green technologies for high-value commodity production* involved specific technologies for the production of non-staple crops that are highly promising sources of income for poor farming communities. Some of the paper presentation highlights include the following:

- Green technology practices increase the orchid competitiveness of Asian countries such as Thailand and Taiwan in the global market. Some of these practices include mass production via micropropagation, screening for red floral gene linked with RAPD markers, genetic transformation, and development of their own grading system for orchids based on global market demand/preference.

- In Japan, challenges for the market and production of Ume (*Prunus mume* Sieb. et. Zucc.), a promising high-value commodity, include: limited market for the fruit product; production of new Ume products as healthy food; and promotion of eco-friendly processing techniques. Similarly, Shiikuwasha (*Citrus depressa* Hayata) fruit, while limited in terms of production, can be promoted for its health-promoting benefits (functionality).

- As an economically sound solution, organic farming has to satisfy the triangle benefits of producer, consumer, and service.

**Green technologies for the enhancement of rural entrepreneurship**
Green technologies hold great promise in terms of alleviating poverty and rural entrepreneurship, while contributing significantly to health improvement and environmental sustainability in the rural areas. It has the potential to provide livelihood opportunities for the poor in many developing countries in the Asian region.

The workshop session *Development of promising green technologies for the enhancement of rural entrepreneurship* deliberated on success stories and experiences on rural enterprise development initiatives focusing on the promotion and adoption of green technologies.

Some of the challenges identified in promoting green technology for rural entrepreneurship include: mainstreaming of organic agriculture for farmers’ better access; government support and subsidy for certification and marketing; and promoting green technology through the enhancement of on-farm, field demonstrations and interactions between farmers and researchers/scientists.

Other important considerations identified include: improving farmers’ access to sources of technology; dissemination and distribution of benefits from technology adoption; and governments’ political will to provide the right institutional framework and support services for the development and adoption of green technology.

**International Workshop on Development and Adoption of Green Technologies for Sustainable Agriculture and Enhancement of Rural Entrepreneurship**

Held in Los Baños, Laguna, Philippines, 28 September – 02 October 2009

No. of participating countries: 6 (Japan, Korea, Philippines, Taiwan ROC, Thailand, Vietnam)

No. of papers presented: 14
A visit to the *Herbana Farm* in Calamba, Laguna, Philippines, an organic farm promoting urban and rural entrepreneurship and which offers green technology training to public and private entities.

Workshop participants visited the *Folia Tropica Farm* in Los Baños, Laguna, Philippines, a producer of organic fertilizer, soil conditioner and flower booster, mainly from a blend of different plant species and mature compost.

No. of participants: 14 speakers and about 30 local participants/observers
Co-sponsors: Philippine Council for Agriculture, Forestry and Natural Resources Research and Development (PCARRD); National Institute of Fruit Tree Sciences (NIFTS), Japan

**List of papers**

1. Promoting the development and adoption of green technologies for sustainable agricultural development in Asia
   - Sununtar Setboonsarng, Asian Development Bank (ADB), Philippines

2. The paradox of the use of genetic diversity in disease management: experiences in rice and bananas
   - Agustin B. Molina, Commodities for Livelihoods Programme, Biodiversity International

3. Recent progress in vegetable grafting
   - Jung-Myung Lee, Kyung Hee University, Korea

4. Development and application of grafting technologies for soil-borne disease management of Cucurbitaceous plants in Taiwan
   - Yi-Sheng Lin, Asia University, Taichung County, Taiwan ROC

5. Establishment and application of soil information system for a sustainable agriculture in Korea
   - Chan-Won Park, National Academy of Agricultural Science (NAAS), RDA, Korea

6. Organic fertilizer from farm waste adopted by farmers in the Philippines
   - Rodel G. Maghirang, University of the Philippines Los Baños (UPLB)

7. The research, development and commercialization of Phalaenopsis orchid in Taiwan
   - Wen-Huei Chen, National University of Kaohsiung, Taiwan ROC

8. Functionality and processing technologies of Shikuwasa (*Citrus depressa* Hayata)
   - Kazunori Ogawa, National Institute of Fruit Tree Science (NIFTS)/NARO, Japan

9. Development of functionality of Ume (*Prunus mume* Sieb. Et Zucc.) fruit and its industrial application
   - Yoshihiko Ozaki, National Institute of Fruit Tree Science (NIFTS)/NARO, Japan

10. Postharvest handling of orchid cut flowers in Thailand
    - Wachiraya Imsabai, Kasetsart University, Thailand

11. Organic vegetable production in Vietnam: status and outlooks
    - Pham Thi Vuong, Plant Protection Research Institute (PPRI), Vietnam

12. Thailand experiences: technology transfer of orchid production for enhancing rural entrepreneurship
    - Parson Saradhulhat, Kasetsart University, Thailand

13. Sustainable and organic agriculture within the supply and value-added chain
    - Pablo M. Villegas, Villegas Organic and Hobby Farms, and Organic Producers and Trade Association (OPTA), Inc.

14. Building climate resiliency through organic farming and village technologies
    - Joshua B. Guinto, Philippine Rural Reconstruction Movement (PRRM)

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