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Dealing with African Development Deficits: Possible Contributions of Post-Modern Agriculture as Indicated by the System of Rice Intensification (SRI)

Date and Time: Monday, February 25, 2008, From 14:00 to 17:00
Venue: FASID Seminar Room (4F)

Presentation;

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"Dealing With African Development Deficits:
Agroecological Contributions of 'Post-Modern Agriculture' as Suggested by SRI"

Problems of modern agriculture

Modern agriculture has been very successful but it has also been stressful for natural resources – with adverse impacts on soil, water and atmosphere. Modern agriculture is characterized by mechanization, reliance on exogenous inputs, genetic enhancement, and globalization. The epitome of modern agriculture has been the Green Revolution, which stressed genetic improvement in crops and increased external inputs. It was energy-intensive and 'thirsty' for water. Now in the 21st century, we face problems such as reduction of per capita availability of land and water for the agricultural sector, increase of energy costs, diminishing returns to inputs, increasing concern with environmental quality of soil, water, and air because of agrochemical use, and limited access to GR technology still for millions of poor households. Moreover, yield increases from such technology have stagnated over the past decade. Concerning these circumstances, there is necessity to reconsider modern agriculture.

System of Rice Intensification (SRI)

System of Rice Intensification is a new production system that is breaking the rules of the modern agriculture. It capitalizes upon genetic potentials that already exist, mobilizing biological processes in plants and their soil environment that result in much-improved phenotypes. By changing management of plants, soil, water and nutrients, SRI methods are giving better phenotypes from any rice genotype. This agroecological approach reduces chemical inputs with no need to change genes. Features of SRI are transplantation of young seedlings (8-15 days old), wide spacing of single plants in a square pattern (25x25cm or wider), no need for continuous flooding of fields, use of compost and any other biomass or organic matter, and active soil aeration with an implement used to control weeds. These practices taken together result in higher yields by

50-100%; water reductions of 25-50%; no need for capital expenditure nor to rely on agrochemical inputs; pest and disease resistance; drought and lodging tolerance; better grain quality; and lower costs of production by10-20%. Higher yield with lower costs greatly increases profitability.

The key to these changes lies in plant root systems and associated soil organisms. Roots in unflooded soil grow larger and deeper and retain their healthy white coloration, functioning throughout the growth cycle rather than dying back from suffocation. Soil biota provides many valuable services such as improved soil structure and function and nutrient cycling accomplished by worms, microbes and other soil flora and fauna. Other benefits of SRI are a shorter crop cycle by 1-3 weeks, higher milling outturn (about 15%) because of fewer unfilled grains and fewer broken grains.

Agroecological strategy for Africa

In terms of African development needs, it is essential to consider population growth, soil degradation, water shortage, climate change, and rising energy costs. Agroecological strategy tackles with all these problems. Smaller-scale intensive operations achieve greater resource-efficiency; synergies and symbioses engender energy-saving and energy-efficiency; beneficial endogenous biological processes and resistance to biotic and abiotic stresses are fostered; greater use of organic inputs maintains and enhances soil fertility; and there is emphasis on local production and consumption, with enhancement of the health of soil, of plants, and of people. This is not utopian but rather empirically-grounded and already demonstrable in many countries.

Comments;

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The international community as a whole aims to achieve the first goal of the the Millenium Development Goal – to halve hunger and poverty by 2015. In more recent years, there are two methodologies that are available for rice production (1) conventional modern rice technology (seed-fertilizer technology or biotechnology) and (2) System of Rice Intensification (SRI) (Agroecological methodology).

Conventional modern technology is associated with the Green Revolution, which started in the Philippines in 1966 with the release of IRRI of IR8, the first modern variety (MV) of rice. Green revolution is an evolutionary process involving replacement of old MVs with newer ones with better characteristics such as higher yielding, resistant to pests and diseases, and good grain quality. MVs were adopted by Filipino farmers very quickly, which means the seed-fertilizer technology is profitable. However, the farmers face some constraints in the adoption of MVs such as availability of irrigation and farm size.

System of Rice Intensification has been recently advertised as a good replacement of the conventional technology in lieu of the environmental consequences of the conventional technology. The SRI principles are the following: (1) rice seedlings should be transplanted quickly when young; (2) rice plants should be spaced widely apart; (3) rice fields should be kept moist but not flooded (wetting-drying irrigation); (4) organic form of fertilizer; and (5) intensive manual or mechanical weed control without herbicide. Therefore, SRI is a package of methodology that is environmentally friendly, labor-intensive, requiring much knowledge and care. In the future, we need to study the constraints in the adoption of SRI and the consequences of SRI adoption in terms of rice yield, labor use, and profitability using a more representative and bigger household survey data.

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Importance of SRI

From some view point, research of SRI is important. In terms of self sufficiency of rice, that of Indonesia is under 100% so that there is necessity to increase production of rice. In terms of grain consumption, in low GNP countries, grain consumption tends to be high so that grain production is important in low GNP countries. In addition to that, in terms of meat production, grain is also important. To make 31.2 million tones of meat, 192.7million tones of feed is needed and ratio of meat to grain is 6.2 so that grain is also important to make meat and important for high GNP countries which tend to consume much meat.

Necessity to keep researching

There is some data that show increase in yield of SRI. However, there is necessity to know mechanism of SRI to know how SRI increase yield. To evaluate SRI mechanism, there is necessity to know what kind of element can improve rice production. As described before, there are some characteristics in SRI. They are young seeding, sparse seeding, intermittent irrigation, and organic fertilization. Those elements are all seen in traditional Japanese rice production method and by evaluating those elements in Japan, mechanism of SRI could be clarified. In terms of filled rice ratio, young seeding decrease filled rice ratio but the other factors increase. In terms of growth in late stage, young seeding and intermittent irrigation enhanced growth in late stage. In addition, in terms of taste, organic fertilization improved taste. Therefore, SRI seems important in rice production, however, there is necessity to keep researching and should know mechanism.