

SECTION THREE

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1.0 Introduction:

Rural poverty and food insecurity can be partly attributed to degradation of land resources and lack of improved technologies. Throughout the West African sub-region, it is the small-scale farmer that produces the bulk of the food requirements of the people. The over reliance on the small scale farmer to produce the bulk of food required for an ever increasing population is a key factor for food insecurity in most countries. Major constraints to food production include declining soil fertility, poor support to resource poor farmers and lack of clear-cut land use policies. To reverse rural poverty the enabling environment needs to be created to encourage income generation in the rural areas, increase food production and security and protect the environment from degradation (Sanchez et al, 1997). Among the recommendations for achieving increased rice production in West Africa (AICAF, 1995) are improving rice growing technologies (optimum fertilizer usage, effective nutrient and water management options, use of high yielding varieties).

Over the years, although considerable progress has been made in addressing some of the problems confronting the rice growing industry within the sub-region, there is still the need to develop simple, low cost and environmentally friendly systems for managing the inland valley ecosystem that can be adapted by resource-poor farmers. This led to the development of the "Sawah" eco-technology.

2.0 What is "Sawah" Eco-technology

In developing any scientific technology, greater consideration should be given to both increased productivity and environmental friendliness. In other words, current production technologies should not only aim at higher productivity (yields) but also environmentally friendly (sustainability). In order to apply such scientific technologies, farmers' have to develop typically refined rice growing environments referred to as "Sawah" or develop similar alternatives which can conserve soil and control water. The term "sawah" refers to a leveled, bunded and puddled rice field with inlets and outlets for water management. Essential components of such land development are:

- (i) demarcation by bunding based on topography, hydrology and soils,
- (ii) leveling and puddling to control and conserve soil and water, and
- (iii) water inlets and outlets. The above parameters are typical characteristics of "Sawah" fields. The essence for this is to avoid too much water collecting at one side of the field to the disadvantage of other parts of the field. "Sawah" can broadly be classified into several types; (i) spring type, (ii) dyke/weir – canal type, (iii) rain

fed type, (iv) pump type (v) integrated type when two or more of the above types are used in combination. Local materials such as sand bags, bamboo sticks, wood etc are used to construct weirs/dykes to harvest water.

3.0 Why "Sawah" Eco-technology

In Sub-Saharan Africa (SSA), even though there have been research concepts to improve Natural Resource Management (NRM), no clear research concept has been developed on how to improve natural resources such as soil and water conditions at the farmers' field level. The "Sawah" eco-technology is one of such missing concepts to improve natural resources management in majority of African rice farms. It can accelerate improvements in effective natural resources management, minimize environmental degradation and increase soil productivity in majority of African conditions. Of all lowland types available in the sub-region, inland valleys and to some extent flood plains have a comparative advantage because of relatively easy water control. However, African lowlands are quite diverse. Therefore careful site-specific development and management technologies are needed for their effective and sustainable utilization. The development of such technologies and their management by local farmers through self propelled efforts and the use of small-scale equipment such as power tillers are very prudent under African conditions.

4.0 Advantages of "Sawah" Eco-technology

The "Sawah" eco-technology can improve fertilizer and irrigation efficiency. Thus it can minimize the effect of water shortage, poor nutrition especially for nitrogen and phosphorous supply, neutralize acidity as well as alkalinity, and improve micronutrient supply. With this, improved varieties can perform well for the realization of the Green revolution in Africa. Thus the "sawah" eco-technology is the prerequisite condition for the three green revolution technologies to be successful. The "Sawah" system of rice production therefore seeks to improve on lowland rice production by helping to effectively manage land, control water and nutrients to boost local rice production. The lowland "Sawah" can also sustain rice yields ($> 4\text{-}6\text{t/ha}$) through macro scale natural geological fertilization from upland and micro-scale mechanisms to enhance supply of various nutrients. If appropriate lowlands are selected, developed and soil and water managed properly, then the application of improved agronomic practices such as System Rice Intensification (SRI) under the "Sawah" systems, can result in paddy grain yields exceeding 10 t/ha . Use of the technology can increase rice production from about one ton per hectare under the current traditional system to over four tons per hectare. It is also environmentally friendly and it minimizes erosion, reduces land degradation and

increases nutrient-use-efficiency.

5.0 The Way Forward:

After a lengthy discussion involving academics, scientists, farmers, extensionists and policy makers, it was agreed by a general consensus that the introduction, adoption and endogenous evolution of the "sawah" system is appropriate. The introduction and adoption of the "sawah" technology, in some countries, particularly Ghana and Nigeria, has gone deep into the various communities and rice farmers. The general agreement was that, there is the need for a political will and support for the technology to be adopted on a larger scale in order to produce the expected results and make an impact on local rice production. Political will specifically mentioned was effective policy on "sawah" adoption in the lowlands for effective soil, nutrient and water management. Areas mentioned under government support includes acquisition of necessary machinery and parts such as power tillers to promote and encourage mechanization in the rice sector.

- The need for a good evaluation and monitoring system to prevent farmers from diverting donor/ government support to other ventures.
- The need to build the capacity of extension workers and "sawah" farmers by providing them with good "sawah" training and working manuals. This will help MoFA to strengthen its education of farmers on "sawah".
- The need for a comprehensive development strategy for "sawah" expansion through the sensitization of farmers on the technology and the involvement of "sawah" scientists in national rice policy development.
- The need to support farmers in land acquisition. That the farmer be made to contribute to the investment in his/her "sawah" development so as to take ownership.

6.0 Recommendations.

We the participants (farmers, scientists, extensionists, policy makers, academics) at the 1st international workshop held at the Golden Tulip hotel, Kumasi, Ghana from 22nd -24th November 2011:

- Aware of the importance of agriculture to the countries socio-economic development and well-being of the people of Ghana, and beyond.
- Noting the low agricultural production, particularly rice, as a result of continuous soil, land and environmental degradation resulting mainly from soil fertility decline, soil erosion and also a breakdown in the traditional fallow system of maintaining soil fertility,

- Convinced that there is no proper and effective land use policy in the country and that the present land tenure system is inimical to the adoption of improved and appropriate technologies for soil and water management by our resource-poor farmers,
- Convinced that there is lack of public awareness about the soil as the foundation of agriculture,
- Convinced that the demand for rice will continue to rise in the immediate, medium and long term and that large amounts of foreign exchange will continue to be used on rice imports,
- Convinced that Africa, and in particular West Africa including Ghana, has large stretches of lowlands which can be used for rice production across most agro-ecological zones which can significantly reduce imports and create employment,
- Convinced that there is the urgent need for the adoption of improved and sustainable technologies for the rapid expansion of local rice production in the sub-region,

Strongly recommend the following:

(6.1) To Government of Ghana (GoG)

- i. Formulate policies that will enhance agricultural production with minimum damage to soil and environment.
- ii. Review and/or formulate and implement, as a matter of urgency, proper and effective land use policies in accordance with current and future imperatives for land conservation and sustainable agricultural productivity.
- iii. Critically review the current land tenure system, and make it more investor friendly and establish land banks for effective land use planning.
- iv. Support the Soil Research Institute of the Council for Scientific and Industrial Research, to conduct detailed soil investigations and hydrological investigations on lands that are found to be suitable for rice cultivation in particular. Collaboration with other CSIR Institute may be necessary.
- v. Make suitability assessment of any lands earmarked for rice production mandatory and prerequisite to the granting of loans or

any support.

- vi. Ensure that areas earmarked for special rice projects are properly assessed for their suitability. Recommendations from such studies should be judiciously implemented in order to minimize degradation.

(6.2) *To the Ministry of Food and Agriculture (MoFA):*

- i. As a matter of urgency, encourage and promote (out-scale) the adoption of "sawah" eco-technology as an effective and sustainable technology for rice cultivation particularly within the lowlands.
- ii. Liaise with relevant stakeholders to encourage, promote and support mechanization in the rice sector especially small and medium scale farmers.
- iii. Establish a unit with qualified soil scientists within the Ministry to address soil issues effectively.
- iv. Liaise effectively with the CSIR in the execution of rice projects particularly in the fields of soil, nutrient and water management (natural resource management).
- v. Encourage farmers to adopt land conservation and soil fertility enhancement practices for increased productivity particularly rice cultivation.

(6.3) *To Ministry of Environment, Science and Technology (MEST):*

- i. Resource the CSIR-Soil Research Institute (SRI) and CSIR- Crops Research Institute (CRI) to enable them conduct more detailed studies particularly at areas found to be suitable for rice production.
- ii. Help in improving laboratories at the CSIR-SRI to be able to monitor and analyze soil conditions for effective management interventions.
- iii. Ensure that materials imported into the country (e. g. fertilizers and other agro-chemicals), are tested for their efficacy by the CSIR relevant Institutes.
- iv. Ensure that any Environmental Impact Assessment and subsequent evaluation would involve Soil Scientists.

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