CHAPTER 6

‘SAWAH’ BASED RICE FARMING

This Chapter outlines the necessary processes or procedures in order to establish a good and viable ‘Sawah’ rice field that will provide the expected results (good growth, disease/insect free, weed free and higher yields)

CHOOSING A RICE VARIETY

a Good quality seed is a prelude to attaining maximum productivity.

b Planting stock should be from a known source and use a pure variety.

c Do not use seed from fields that were previously sown to a different variety.

d Carry out viability test before planting to know the amount of seed required to plant a given area of land.

e Good seed should give ≥ 80% germination, free from weed seed and other physical impurities

Good and viable seed should give over 80% germination

ESTABLISHING A NURSERY

1. **Select good seed (fully filled seeds) – gives healthier seedlings and results in uniform germination.**

2. **Seed bed should be prepared away from trees and building shades.**

3. **Nursery is done on good soil so fertilizers are not normally applied.**

4. **Water nursery bed evenly and sufficiently insufficient water results in slow seedling growth.**

Rice seed can be pre-germinated before nursing

SIMPLE METHOD OF CALCULATING THE AMOUNT OF SEED REQUIRED TO NURSE

- Assuming a spacing of 20cm x 20cm is to be adopted.
- This gives a total stand of (100cm x 100cm)/ (20cm x 20cm) = 25 stands per square meter.
- To transplant at 2 seedlings per hill gives 50 seeds per square (calculated per ha = 500 000 seeds).
- Assuming average weight of 1000 seeds = 28g
- Then quantity of seed required per ha = (500000/1000) x 28 = 14 kg
- At 80% seed viability, total quantity of seed to nurse is (100/80) x 14 = 17.5 kg

NB:

- For any losses and inefficiencies, this amount could be increased by 10-20%
- When transplanting is to be done at more than two seedlings per stand, seed rate should be adjusted accordingly.

Setting up a nursery bed and nursing.

Nurseries should not be too thick to allow for healthier, vigorous and stronger seedlings growth

Farmers or farmer-groups should be thought the right processes and procedure for establishing a necessary on the field

TRANSPLANTING

- Transplanting is preferred to direct seeding under “Sawah” systems.
- Transplant good seedlings (free from insects, diseases, weeds).
- Seedlings that have vigour and are uniform in height provide good growth.
- Weak seedlings take a longer time to recover.
- Based on the tiller production ability of the rice variety to use, transplanting may be done at 2- 4 seedlings per stand.

Seedlings should be removed only under very moist or wet conditions

Seedlings should be carefully washed off soil material and root volume reduced if necessary for fast crop establishment

Transplanting in rows is best and it is easier and goes faster when done by farmer-groups / family members together

For smaller groups, transplanting in rows should be done by a minimum of 2 persons.

Good and healthy seedlings should stand erect soon after transplanting.

Both farmers and field technical staff should be trained in the art of transplanting. Technical staff from Togo and Benin being trained on transplanting in Ghana.

Micro-surface leveling and smoothing at Sokwae in Ghana during transplanting

Fields that have been prepared (ploughed, puddled and levelled) should be left flooded until ready for transplanting. Removal of water earlier from such field results in soil caking and very difficult to transplant even when water is re-introduced later.

Under advance conditions (in Japan), transplanting is mechanically done using machines which saves labour and time and ensures efficiency. Sub Saharan Africa can get there one day.

WATER MANAGEMENT AFTER TRANSPLANTING

- Water level should be minimum on field during transplanting.
- After transplanting minimum water level should be maintained to allow for faster root establishment until after basic fertilizer application.
- As crop grows, field water level may be raised to help suppress any weed growth.
- However, fields should be periodically drained for short periods to allow for aerobic processes to proceed.
- Fields should be completely drained at least 7 days before harvest.

A freshly transplanted rice field should look like this

Water should be drained sometime after transplanting to allow for aerobic processes

Maintain optimum water levels to suppress weed growth after transplanting

Water management before, during and after transplanting can be done through several means based on field existing conditions

SRI practice needs good leveling and water control based on Sawah system, West Sumatra, Indonesia, August 2010. Farmers in Sub Saharan Africa can get there soon with experience and necessary support.

Nutrient requirements of rice

Nitrogen (N), phosphorus (P) and potassium (K) are well known limiting nutrients (macro-nutrients) to rice production.

Both Sulfur (S) and Zinc (Zn) have become limiting factors to proper rice growth and yield within the West Africa sub-region.

- N enhances growth, development, yield and grain quality.
- P stimulates recovery after stress, root development, tillering, pollination and reduces the period to maturity.
- K plays an important role in the resistance to stress and in the synthesis, ransformation and transport of carbohydrates to the grain
- S plays an important role in plant height, tiller number, panicle number and size, and spikelet number.
- Zn plays an important role in bio-chemical processes such as chlorophyll production.
- Other nutrients (Ca, Mg, Mn, Cu, Fe, B, etc.) are required in very small quantities.

Nutrient Management

- Varying levels of nutrients account for variation in rice growth and final yield of rice.
- Nutrients can be supplied to rice from several sources (organic/mineral fertilizers).
- Required nutrients should be applied in the correct quantities, at the right times and in the correct forms.
- Under transplanted and flooded conditions, mineral fertilizer should be uniformly broad cast on the field during both basal and topdressing.
- Organic matter/fertilizers , however, should be worked into the soil at least 2-3weeks before transplanting.
- Basal mineral fertilizer application should be done about a week after transplanting.
- Top-dressing should be done at panicle initiation stage

Basal fertilizer application using mineral fertilizer (NPK) should be done by uniformly broadcasting onto the field a week after transplanting

After fertilizer application, minimum water levels should be maintained on the field. Field should neither be flooded nor completely drained.

Top dressing (mainly using N based fertilizer eg. Urea and Ammonium Sulphate) should be done at panicle initiation stage.

Weed management and control techniques

Like the human body, all plants including rice need proper protection from pests (insects, diseases and weeds) to attain maximum growth and yield.

Weed management involves the deliberate selection, integration and implementation of effective weed management measures (both preventive and control)

Over-use of one management strategy may allow other major species to become adaptive in the ecological vacuum created by the effective control of the weed species now present.

Weeds commonly found in the lowlands are grasses, sedges and a few broad-leaf plants

There are several methods of clearing weeds.
In order to promote rapid growth, the rice crop should be free of any weeds during 30-40 days after transplanting

- **Hand weeding**:
  Hand pulling or hand hoeing where necessary
- **Mechanical weeding**:
  Use rotary a weeder where appropriate.
- **Herbicide application:**
  Could result in the rapid evolution of new weed populations.
- **Water management**:
  Effective field water management to control weeds is the most economical

Cultural weed control methods are more economical when done at the correct times

When using chemicals to control weeds, seek technical advise, use appropriate equipment, use recommended chemicals in the right quantities and spray at the right times for efficiency and effectiveness

Signs of herbicide injury (too much herbicide / higher rates)

- ❖ Spreading tillers
- ❖ Distinct round brown spots
- ❖ Tube shaped new leaves emerge from plant
- ❖ Dwarfing of the rice plant

Spraying using recommended chemicals can also help to reduce or minimize the destructive effect of some insect pests.

Field discussion with farmers on the importance of maintaining good farm sanitation

Using pure varieties and good seed leads to crop uniformity at heading and ripening stages. Harvesting can be done uniformly

Good farm sanitation is necessary for proper crop growth, disease / pest control and obtaining higher paddy yields

Harvesting should be done at physiological maturity when all grains turn yellowish

Cutting is mostly done a few centimetres from the soil surface using a knife or sickle under small scale farmer conditions.

Harvested rice should be heaped on a tarpaulin or threshing floor to prevent any contamination with any foreign materials (stones, weeds, soil etc) in order to maintain high quality rice.

Manual threshing can be done using sticks, empty barrels or wooden boxes depending on availability and prevailing conditions.

Under manual threshing, use tarpaulin or threshing floors to get quality grain

Winnowing should be done on cemented floors/ tarpaulins to minimize contaminations.

Threshed and winnowed rice should be put in clean bags/containers before being transported to drying or processing centres

Par-boiling paddy rice before milling is a common practice in most parts of Nigeria and northern Ghana and therefore requires the introduction of improved methods to maintain quality of grains.

Some rice cultivation and processing equipment commonly in use across some sites in West Africa particularly Nigeria and Ghana