HORTICULTURE NOTE NO: 29

RICE SEEDLING PREPARATION USING NURSERY BOXES

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ABSTRACT

A practical method of rice seedling preparation using a nursery box is described. The advanatages of the method are outlined. The management of the nursery is discussed.

INTRODUCTION

Paddy rice usually cultivated by transplanting seedlings grown in the rice nursery results in healthy and better growing seedlings which have a great effect on the rice yield. Thus a well prepared nursery is very important for paddy rice cultivation. Growing rice seedlings by the nursery box method is not only capable of meeting the needs of the farmers but also has the following good results:

1. Saves the land used for field nursery preparation.
2. Allows for ease of management.
3. Gives uniform seeds for germination.
4. Seedling growth is more vigorous.
5. Seedlings can be easily taken out.
6. Fewer injuries are caused to the seedlings during transplanting.

While this article mainly advocates the nursery box method, the traditional method is still being used widely. The latter requires growing seedlings directly in the field nursery bed in the farms. The following article outlines the highlights of a practical method of rice seedling preparation using a nursery box.

2. PRETREATMENT OF SEEDS

This first stage describes the specific processes involved prior to seed germination in nursery boxes. The three processes are as follows:-

2.1. Seed selection

As in any crop production practice, selection and planting of healthy seeds results in strong and healthy plants returning high yields. Rice crop is no exception, whereby the emphasis in this process is to select plump and healthy seeds which germinate well and seedlings start to grow well, resulting in high yields.

It is also evident from reports that the larger the seeds and endosperm, the better the growth of seedlings, and it is clear that there is a close relationship between the size of seeds and the growth of seedlings.

Also that the seed of greater specific gravity is superior in germination and subsequent growth of seedling to a seed of smaller specific gravity. Experimental results indicate that the larger seeds with greater specific gravity show higher productivity. It is further established that there is a very high correlation between the specific gravity of seeds and rice yields. Therefore, the size of seeds has a close bearing on the growth of seedlings and greater effect on the rice yield.

Given the above considerations for seed selection, a combination of two methods are widely used for seed selection. Seed selection by wind and specific gravity are found to be most effective. Each of these methods are briefly described below:

(1) Wind selection method

Seed selection by an implement called winnower is widely used. Alternatively, selection by wind can be effected by the manoeuvre of tossing the seeds up to two to three meters into the natural wind and letting them drop to the collection area. The plump and heavy seeds would naturally fall straight down while the thin and lighter seeds will be blown slightly away from the collection area.

(2) Specific gravity selection method

This method employs the use of a liquid solution made up of a mixture of either salt (sodium chloride) or ammonium sulphate dissolved in fresh water. The mixture of salt and water, for example, is pre-determined at 2.5 kilograms of salt to ten litres of water and well stirred. The solution is then adjusted to the proper specific gravity such that; when a hen's egg begins to float on the water, the specific gravity of the liquid solution is about 1.08 to 1.09. As salt is being added and stirred to dilution, the specific gravity of the solution

Figure 1. **Seeds directly sown in the nursery bed in the field.**

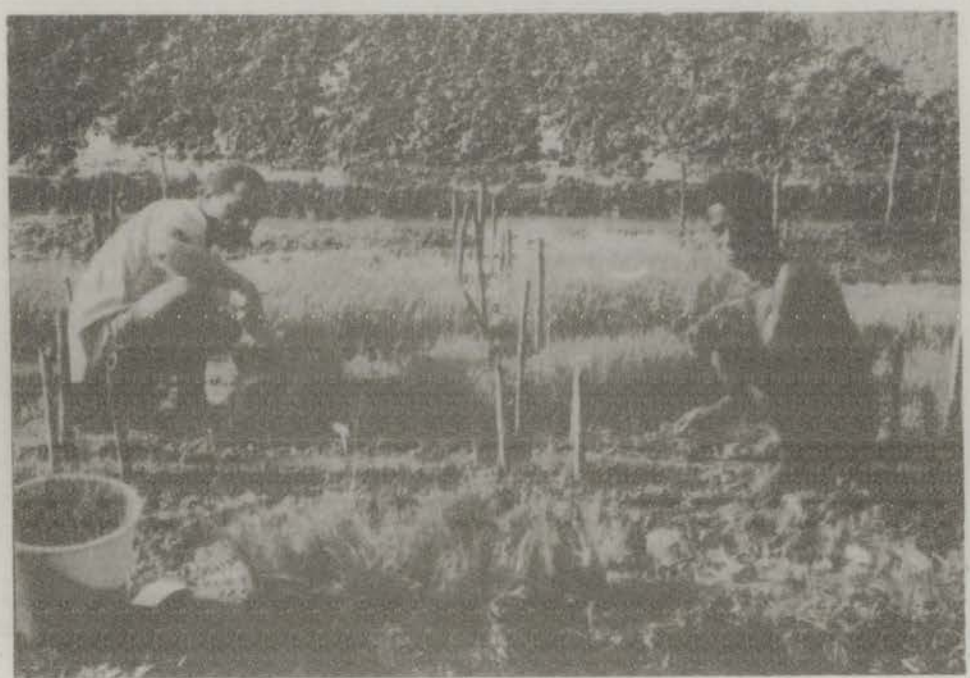

Figure 2. **Pull out of the seedlings for transplanting by traditional method.**

is increased so that at about a specific gravity of 1.13, the egg will surface at about two centimeters out of the water surface. This specific gravity of 1.13 is ideal for most Japanese paddy rice varieties of awnless non-glutinous type. The awned non-glutinous type requires a specific gravity of 1.10, while the awned glutinous rice type has a specific gravity of 1.08.

Seeds are then soaked into the liquid solution and mixed well by stirring. After soaking them for some time, those floating to the surface are removed. The settled seeds (those that sink to the bottom) are the ones considered to be well filled up. The selected seeds should be rinsed well with fresh water to wash out the salinity completely.

2.2 Disinfection of seeds

Seeds are disinfected to control seed-borne diseases. A solution made up of a mixture comprising; 1/1000 mercury compound (as uspulum or mercuron) solution, 1/1000 formalin solution, 1/1000 40% Benlate or 1/1000 30% Busan are widely used. After the disinfection the seeds are rinsed and then soaked in fresh water.

2.3 Soaking of seeds

The paddy rice seeds are then soaked in fresh water for absorbing sufficient moisture before sowing in the nursery boxes to facilitate germination and uniformity of growth. Rice seeds are usually placed in a bag and soaked in river water or tank. The number of days for soaking process depends largely on water temperature. When the seeds have absorbed the moisture up to 25% of their weight, they are saturated. The soaking process depends largely on water temperature. When the seeds have absorbed the moisture up to 25% of their weight, they are saturated. The soaking of seeds is usually stopped when a few seeds begin to germinate. According to our experiences, it takes from 1 to 2 days in PNG.

3. NURSERY BOX PREPARATION AND SEEDING

3.1 Preparing the nursery box

Nursery boxes are normally made of wood or plastics with standard dimensions of: 28 centimeters wide, 58 centimeters in length and 3 centimeters in height. Given this size of boxes, it takes 220 rice nursery boxes to plant one hectare of rice field.

3.2 Mix fertilizer with soil

Young seedlings on emergence from the seeds, need to continue their growth under a crowded nursery environment. For this reason, the medium for sustaining strong and healthy seedling growth must be balanced with adequate plant nutrients. To allow for this, ammonium sulphate, calcium phosphate and potassium chloride are normally used at the rate 4:4:2 grams respectively per nursery box. The fertilizer is mixed well with fine soil that had been ground and sieved. The mixture is then filled into nursery boxes to about one centimeter from the box's height.

3.3 Sow the seeds (Seedling)

Sow the above pretreated seeds at the rate of 220 - 240 grams of wet seeds per nursery box. The seeds must be spread evenly over the prepared layer of soil in the nursery box. Then cover the seeds with another layer of fine soil up to the top of box surface.

3.4 Irrigation

After seeding, the nursery boxes are watered or irrigated using fine sprinkler from a nozzle attached to a watering device. This should be done slowly and with care until the soils in the nursery boxes are fully saturated.

3.5 Chemical application

Pre-seedling stage chemical spraying is usually done to prevent the occurrence of stunting diseases of rice seedlings. Normally an application comprising 0.5 milliliters of 30% Tachigalen are sprayed on the soil surfaces in the nursery boxes.

4. MANAGEMENT OF NURSERY

Management of rice box nursery is critical and important in ensuring that strong and healthy rice seedlings are raised prior to transplanting out into the rice fields. There are stages of the rice seedling growth that must be observed and appropriate corrective measures taken to prevent undesirable growth effects, which may have adverse effects on the consequent rice yield. Aspects of the rice nursery box management are as follows:-

4.1 Germinating stage

It is firstly important to consider and prepare a suitable site to store and look after the nursery boxes. The ideal nursery site must meet basic management requirements in a way that:

(a) The nursery boxes are under cover, free from rain.
(b) The nursery boxes are well protected from strong winds.
(c) The nursery is conveniently sited with easy access to watering sources and allows for good drainage.
(d) The nursery caretaker or farmer must live close to the nursery so as to maintain close watch and care of the seedlings.

After seeding, nursery boxes are stacked up making a column of up to 20 boxes, and in case of many boxes, the columns can make up several rows.

The boxes are stacked as such up to when the first leaf (without leaf blade) elongates to 1.0 - 1.5 centimeter in height (Fig. 3). From this stage the newly emerged seedlings should be covered with plastic sheet or rice straw if the temperatures are too low (the optimum

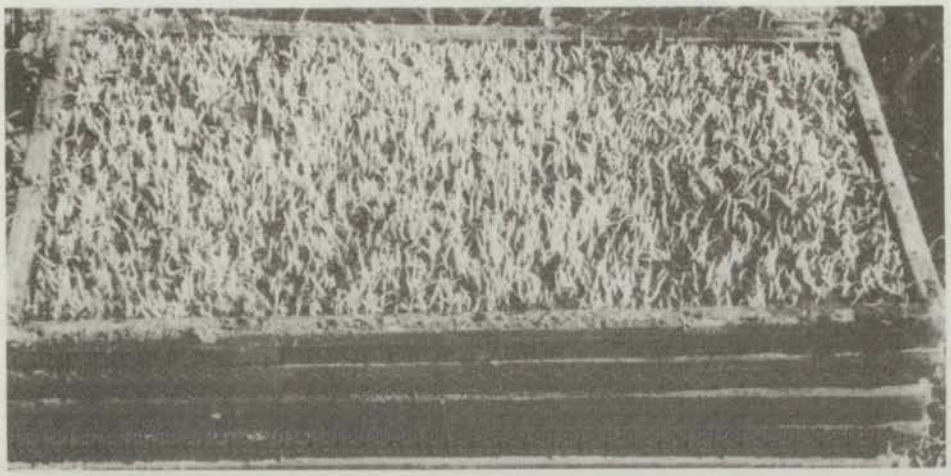

Figure 3. **Seeds sown in a nursery box and filled up to 1st leaf germination, about 15 cm under controlled environment.**

Figure 4. **Nursery boxes transferred to the seed bed of the farm for greening prior to transplanting.**

temperature is between 30° and 35°C). On the other hand the covering can be removed where the temperatures are too high, but should still be prevented from rain.

4.2 Greening stage

The nursery boxes should be moved out for greening when the first leaf elongates to and about 1.5 centimeter in height. Prior to the shifting of nursery boxes to the rice field site, some pre-requisite arrangements should be made. Firstly, a flat ridge about 15 cm high and 140 cm wide be prepared at the paddy field. The nursery boxes are then moved from the top of columns and placed in two rows in a prepared field nursery bed for greening (Fig. 4). The required atmospheric temperature of 25° and 30°C is ideal for the first elongated leaf of the seedlings to turn green. Even at this stage the seedlings should be protected from heavy rain, and hence covered with either plastic or small sieve netting (left side of Fig. 4).

4.3 Irrigation

Nursery beds are brought under submerged irrigation, whereby the water surface should be kept lower than

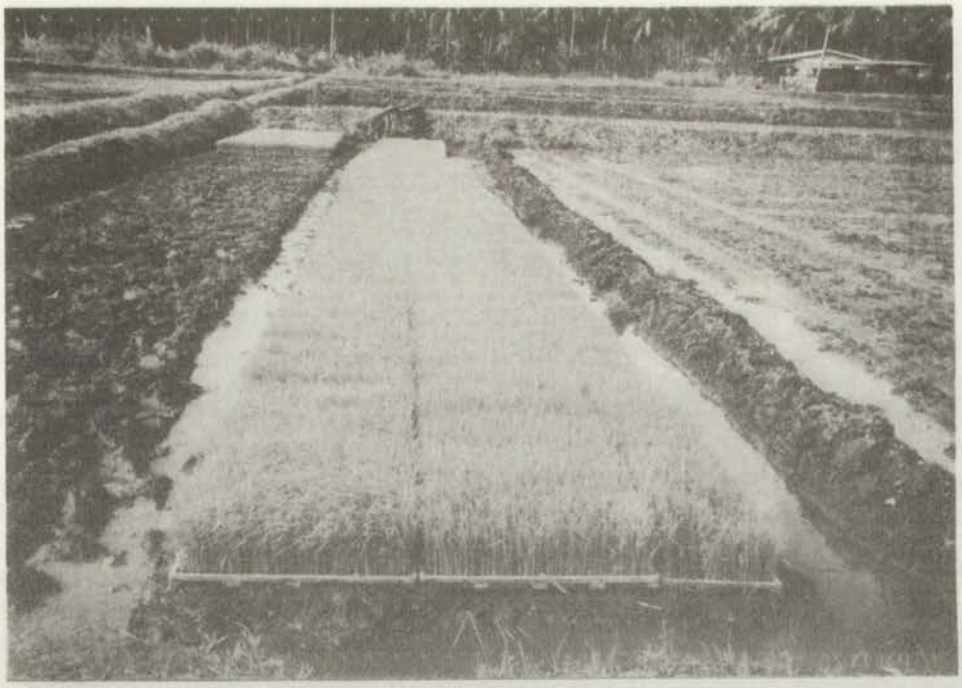

Figure 5. **Note the uniform and strong seedlings in the nursery boxes after greening in the paddy field.**

Figure 6: **Removal of the uniform and strong seedlings out of nursery boxes after greening in the paddy field.**

the soil surface of the nursery box at 1.5 centimeters during the greening stage. The water remains in the field until the moisture is absorbed fully by the nursery box soils, then drained from the field (Fig. 5).

4.4 Pest Control

The pests not only cause hinderance to the growth of rice seedlings, but also cause infection to the rice crop later in the farm. To prevent this occurring, we normally use 3% Furadan, 30% Tachigaren or 1% Malathion to the seedlings at the nursery. This prevents the seedlings from insect attacks.

5. TRANSPLANTING OF SEEDLINGS

Once the seedlings are fully greened and have by this

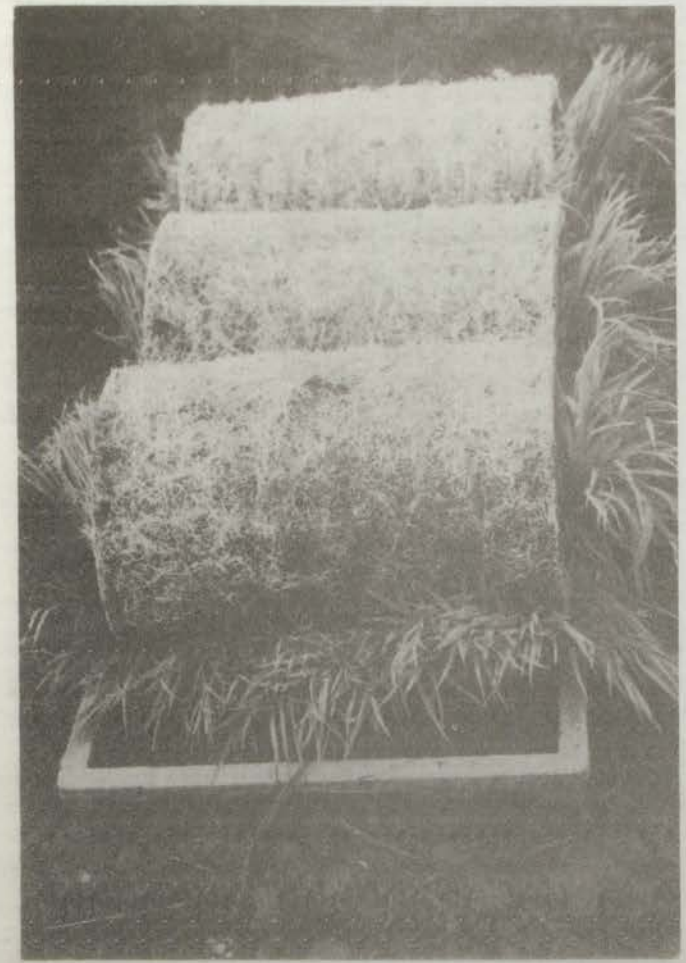

Figure 7. **Seedlings in the nursery boxes rolled to move for transplanting in the paddy field.**

stage developed up to four or five leaves, the seedlings are ready for transplanting out into the rice paddy fields (Figs 6 and 7). The seedlings would have by this stage developed massive root system forming a thick mat at the base of the nursery box (Fig. 6). The inter-weaving of the seedling roots makes it convenient for packing and transport of rice seedlings to locations for transplanting (Fig. 7). Transplanting can be done either manually or mechanically. A paddy field rice planter mounted with seedlings prepared in nursery boxes is shown in Fig. 8.

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(Note:- the author was unavailable to read the proofs. The material from the text is however, faithfully reporduced above. - Editor).

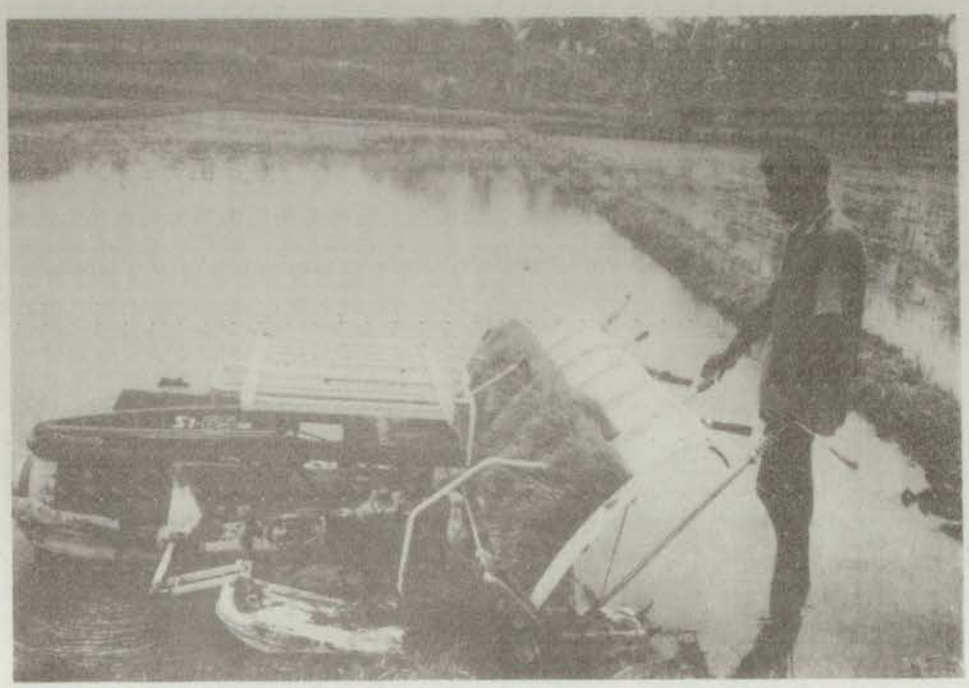

Figure 8. **Seedlings from the nursery boxes can be mounted onto a mechanised transplanter for transplanting in the paddy field.**