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ORIGINAL PAPER



Feasibility Study of Mat-Type Paddy Seedlings for Use in Terrace Cultivation

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ABSTRACT

This study was aimed to develop mat-type paddy seedlings for use in hilly areas of paddy cultivation. The soil medium (nursery bed) was prepared thoroughly so that all the seeds sown could germinate. Garden soil, rice husk, and chicken manure in the proportion of 6:3:1 were used for soil media preparation. After 25 days, the height of the plant and its root length were measured. The height of the plant varies from 17 to 22.5 cm and its root length varies from 7.5 to 10.3 cm. In this study, only one soil media with one proportion was used. Thus, it can be suggested to use different types of soil media with varying proportions for nursery bed preparation.

INTRODUCTION

Rice (*Oryza Sativa* L.) is one of the leading food crops in the world. It contributes 40 – 80% of the calories to the Asian diet. Every year, India produces about 116.48 Mt of rice. The rice productivity of India is about 2659 kg.ha⁻¹ (Anon., 2020). With the adoption of high-yielding varieties, rice production in the northeast hilly region of the country has also been increased. However, due to terrain conditions in the northeast part, traditional methods of cultivating rice is still prevalent. From nursery raising techniques to harvesting, conventional methods are still followed. The use of a high-capacity power-operated machine for different farm operations has limitations due to its terrain

conditions (Sebastian *et al.*, 2021). This paper studied the possibility of introducing raising the nursery rice seedling for use in hilly areas.

Generally, there are two types of raising nurseries for paddy transplantation. One is the root-wash seedlings method and the other is mat-type seedlings. In root-wash seedlings, the paddy seeds are broadcasted and allowed to grow freely beyond the ground surface. Whereas in mat-type seedlings, the paddy seeds are broadcasted over the mat which may be made of plastic or banana leaf over which the soil sample is placed. The soil sample may be prepared in different ways in which the thickness of soil may vary from 2 to 3 inches. Thus, the seeds are restricted to grow beyond the underneath but it spreads its root around and forms networks.

In and around the hilly areas of Manipur and other northeastern states, traditional methods of growing root-wash seedlings is prevalent. This method takes longer times to grow and is laborious compared to mat-type seedlings. In this method, a plot of land is selected and is tilled. The tilled dried land is then burnt with a mixture of dry woods in which the soil changes its color into reddish-brown forming a hard crumbly soil particle. It is said that this burning process inhibits the growth of unwanted micro-organisms and also prevents the growth of weeds which competes with paddy seedlings for moisture and other nutrients. The burnt soil is then distributed over the plot areas. The paddy seeds are then broadcasted over the prepared soil surface. The seeds are then covered with soil to prevent them from birds and rodents. It takes about 60 to 70 days for the seed suitable for transplantation.



Plate 1: Photograph showing women uprooting root-wash seedlings

MATERIALS AND METHODS

Methods for preparing mat-type seedlings

1. An area of 2m×1m was chosen for preparing the nursery bed.
2. A mixture of garden soil, rice husk, and chicken manure in the proportion of 5:4:1 was used to prepare the nursery bed.
3. The prepared soil sample was spread over a plastic cover up to a thickness of 2 inches.
4. The seeds to be broadcasted were soaked in water. The chaff that is afloat on the water surface is removed.
5. The soaked seeds were then transferred to a gunny bag and left for 24 hours. When the white root or radicles emerges from the seeds, it is then broadcasted on the prepared nursery bed (Dhananchezhiyan *et al.*, 2013).
6. A sufficient amount of water was given every day so that the germinated seed looks fresh and vigor.

Comparison of root-wash seedlings with mat-type seedlings

Root-wash type	Mat-type seedlings
The seeds are sown directly over the prepared soil surface	The seeds are sown over the soil surface with underneath cover. Banana leaves and plastics are commonly used.
Roots are allowed to grow and penetrate deep into the soil surface	Roots can penetrate only up to the covering layer and spread around forming networks
As the roots penetrate deep into the soil, there are more chances of damage during uprooting for transplantation.	The chances of breakage are less as the roots cannot penetrate further beyond the underneath cover
It takes more time to uproot especially in hardpan and clay soil.	The process of uprooting the seedlings is easy as the soil particles above the underneath cover can be removed easily.
It takes about 60 to 70 days for the seedlings to be suitable for transplantation.	It takes 25 to 30 days for the seedlings to be suitable for transplanting by hand. Thus the duration is reduced by more than half of the time taken by root-wash type seedlings
As the root-wash type seedlings are grown in open hilly regions, proper fencing is	It can be grown in gardens or nearby houses and on the rooftop.

needed to prevent them from stray animals.	
Field preparation includes more processes and is laborious	Consume less time and energy

ASSESSMENT OF PLANT HEIGHT AND ROOT LENGTH

The plant height and root length were measured with a ruler after 25 days. For measurement of root length, the seedlings were removed from the bottom carefully and washed with water thoroughly so that no breakage of roots occurs. The measurement was done in different parts of the seedling areas and average values were considered.



Plate 2: Photograph of typical root-wash type seedlings growing on a hill

FINDINGS

The broadcasted seeds grow up and look green and healthy on the prepared nursery bed. The seedlings were found to be suitable for hand transplanting after 25 days of sowing. The plant height and root length measured vary from 17 to 22.5 cm and 7.5 to 10.3 cm respectively. This variation may be due to unequal distribution of manure and moisture content.



Plate 3: Photograph of the developed mat-type paddy seedlings

CONCLUSIONS

1. The prepared mat-type seedlings were found to be suitable for hand transplantation
2. In this experiment, only a single soil media combination was used. It can be suggested to use different soil samples and combinations for further analysis and experimentation.
3. The growth of seedlings using this method is more rapid as compared to traditional root-wash methods. It takes less time to be suitable for hand transplanting.
4. The yield of the crops (kg/ha) may be compared after harvesting to know that the developed methods are feasible for practice in rural areas.

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