



Performance Evaluation of Paddy Seeding Device for Mat Nursery

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ABSTRACT

A pre-germinated paddy seeding device for mat nursery useful in the mechanical rice transplanting was tested for its performance at College of Agricultural Engineering, Bapatla during the year 2010. Two varieties of paddy NLR 145 and BPT 2207 were used in the study at three sprout average lengths obtained at three incubation periods (24, 36 and 48 h). For paddy variety NLR 145, two, three and four number of passes of paddy seeding device over soil filled plastic tray of size 280 X 580 mm were enough at sprout lengths of 1.02, 2.84 and 5.19 mm respectively to get recommended seed density per mat (100 – 120 g/mat) and uniformity (50 – 75 seed/25 cm²). Similarly for paddy variety BPT 2207, two, three and four number of passes of paddy seeding device over tray were enough at sprout lengths of 1.03, 4.19 and 6.28 mm respectively to get recommended seed density per mat and uniformity.

Key words : Paddy, Mat nursery, Seed density, Seed uniformity

The mechanical transplanting of rice using self-propelled transplanter requires mat type of nursery instead of conventionally grown wash root type nursery. The major constraint encountered in the adoption of mechanical rice transplanting is rising of mat type nursery which is labour intensive. Unevenness of plant population in the mat is another problem leading to the more number of missing hills in the field. Earlier report indicates that the transplanter gives better performance with proper mat density (110 g of seed per mat) in terms of less missing hills during transplanting (Behera et al., 2007). A paddy seeding device was developed for uniform spreading of pre-germinated paddy seed (density 100-120 g/mat and uniformity 50 – 75 seed/25cm²) over the soil filled plastic tray of size 280 X 580 mm (Vijay Kumar, 2009). This paddy seeding device not only saves the time, labour and provides good uniformity of seedling on the mat but will also helps in getting desired plant population while transplanting with rice transplanter. Further the device requires to be tested at different incubation periods, so that number of passes can be decided based on the incubation period so as to get recommended density of seed per mat and uniformity.

In view of the above, a paddy seeding device was tested for seed density per mat and uniformity

of seed at three incubation periods 24 h, 36 h and 48 h respectively and performance evaluation has been presented in this paper.

MATERIALS AND METHODS

Design details of paddy seeding device for mat nursery

A pre-germinated paddy seeding device developed in the Dept. of Farm Machinery and Power, College of Agricultural Engineering, Bapatla for mechanizing the unit operations of raising mat type nursery for mechanical rice transplanting was used in the experiments. The detailed description of the device is given below.

The paddy seeding device as shown in Fig. 1 consists of the components frame, ground wheel, hopper, agitator, wooden groove roller, power transmission unit and wooden platform. Fluted roller type seed metering mechanism is provided for dropping of pre-germinated seed over the soil filled plastic tray of size 280 × 580 mm. Its overall dimensions are 487 × 332 × 321 mm. The wooden platform is fixed with wooden tracks to run the developed device and PVC pipes for easy movement of soil filled plastic trays. The power from the ground wheel is transferred to the wooden groove roller and seed agitator in the hopper through the chain and sprocket drive and rope drive respectively, which were

mounted on the shaft. The speed ratio between ground wheel and wooden groove roller is kept as 1:3 and whereas the speed ratio between ground wheel and agitator was 1:1 for easy flow of seed from hopper on to the wooden groove roller. As the device moves forward, the pre-germinated seed in the hopper get spread uniformly over the soil filled tray through wooden groove roller.

Details of experimentation

Two paddy varieties viz NLR 145 and BPT 2207 were selected for experiments. Sufficient quantity of seed initially soaked in water for 24 h and then incubated in a gunny bag for 24 h, 36h and 48 h so as to get sprout. The average sprout length obtained under each incubation per period for both varieties of paddy shown in Table 1.

To study the performance of the device in the laboratory, the following parameters were taken into consideration.

1. Weight of seed per tray

In order to determine the weight of seed per tray or mat, the sprouted seed was filled in the seed hopper and the device was moved on the soil filled plastic tray of size 280 X 580 mm. When the device was moved over the tray, the sprouted seed were dropped. Thereafter, the seed dropped in tray was collected and weighed. The weight of the seed dropped in a tray was taken as the amount of seed dropped per mat.

2. Uniformity of seed

To determine uniformity in seed distribution per 25 cm² in a mat, the device was operated to move over the tray for spreading of seed. The tray was divided into three equal segments along its length. Five square rings of size 50 × 50 mm were placed randomly in each segment along the length of tray. The seed dropped in each ring was collected, averaged for each segment and then counted and weighed.

RESULTS AND DISCUSSION

It was observed from Fig. 2, for paddy variety NLR 145 at sprout length 1.02 mm (24 h incubation period), seed dropped per mat for one pass was

57.6 g and for two passes it was 112.3 g. Recommended quantity of seed per mat used in mechanical rice transplanting is 100 to 120 g. Therefore, two passes of the paddy seeding device over tray are required to get recommended quantity of seed per mat at 24 h incubation period. Similarly at sprout length of 2.84 mm (36 h incubation period), for three passes of device over tray, seed dropped was 110.16 g. At sprout length 5.19 mm (48 h incubation period), for four passes, seed dropped was 108.1 g. The reason may be due to the flow of seed from hopper on to the tray that get obstructed because of increased sprout length with increase in incubation period. Therefore it was concluded that, the number of passes should be increased from 2 to 4 with increase in incubation periods from 24 h to 48h. Similar trend was observed in case of paddy variety BPT 2207 (Fig. 3). Two, three and four number of passes of paddy seeding device over tray were required at sprout lengths of 1.03 (24 h incubation period), 4.19 (36 h incubation period) and 6.28 mm (48 h incubation period) respectively to get recommended seed density per mat.

For seed uniformity per 25 cm² area in a mat, it was observed that (Fig. 4), for paddy variety NLR 145 at sprout length 1.02 mm (24 h incubation period), seed uniformity for two passes was 62.53. Recommended uniformity of seed per 25 cm² area is 50 to 75 no.s in a mat used for mechanical rice transplanting. Therefore, two passes of the paddy seeding device over tray are required to get recommended uniformity of seed per mat at 24 h incubation period. Similarly at sprout length of 2.84 mm (36 h incubation period), for three passes of device over tray, seed uniformity observed was 61.7 no. of seed per 25 cm² area. At sprout length 5.19 mm (48 h incubation period), for four passes, seed uniformity was 61.4 no. of seed per 25 cm² area. Therefore it was concluded that, the number of passes should be increased from 2 to 4 with increase in incubation periods from 24 h to 48h to get recommended uniformity of seed per unit area in a mat. Similar trend was observed in case of paddy variety BPT 2207 also (Fig. 5). Two, three and four number of passes of paddy seeding device over tray were required at sprout lengths of 1.03 (24 h

Table 1. Sprout length obtained at 24 h, 36 h and 48 h incubation periods

S.No.	Paddy variety	Sprout length, (mm)		
		24 h	36 h	48 h
1.	NLR 145	1.02	2.84	5.19
2.	BPT 2207	1.03	4.19	6.28

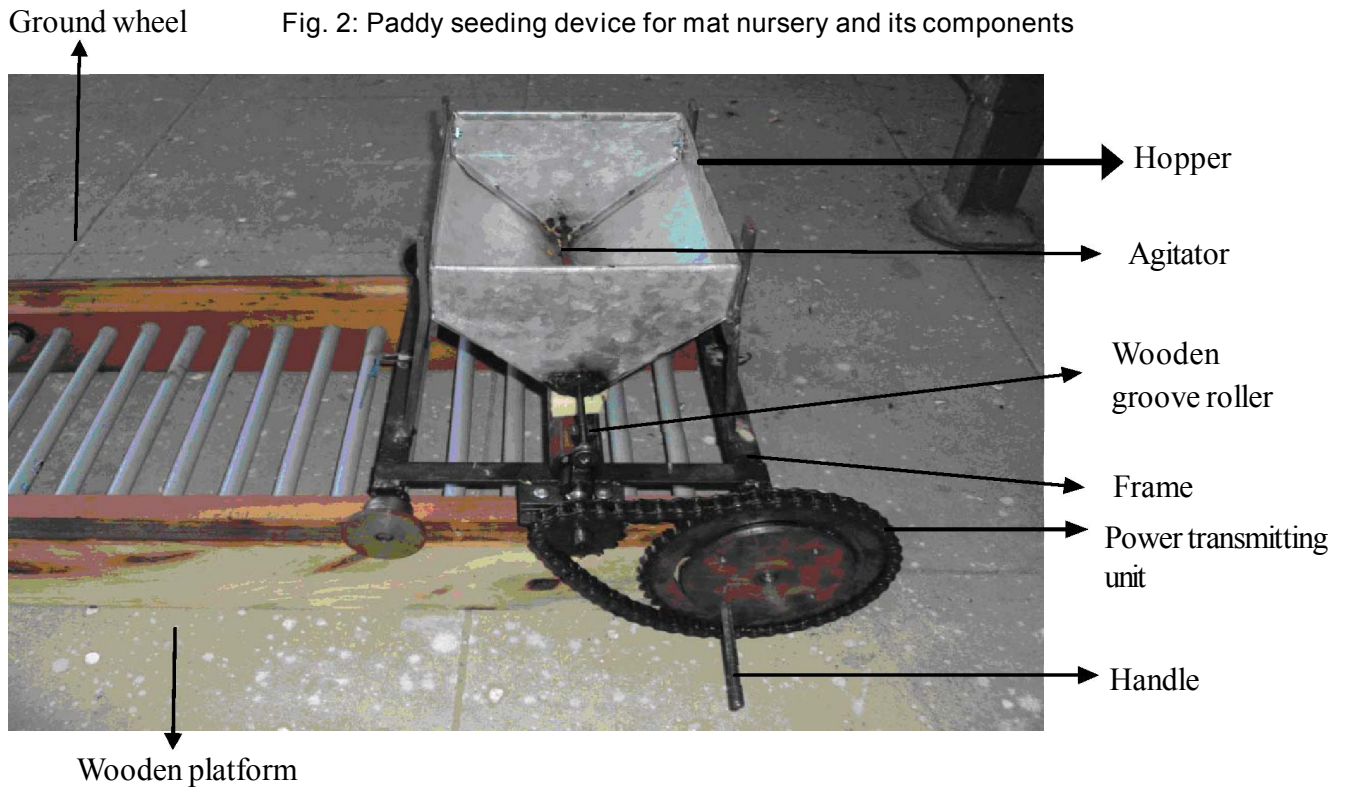


Fig. 2. Seed dropped per mat for paddy variety NLR 145.

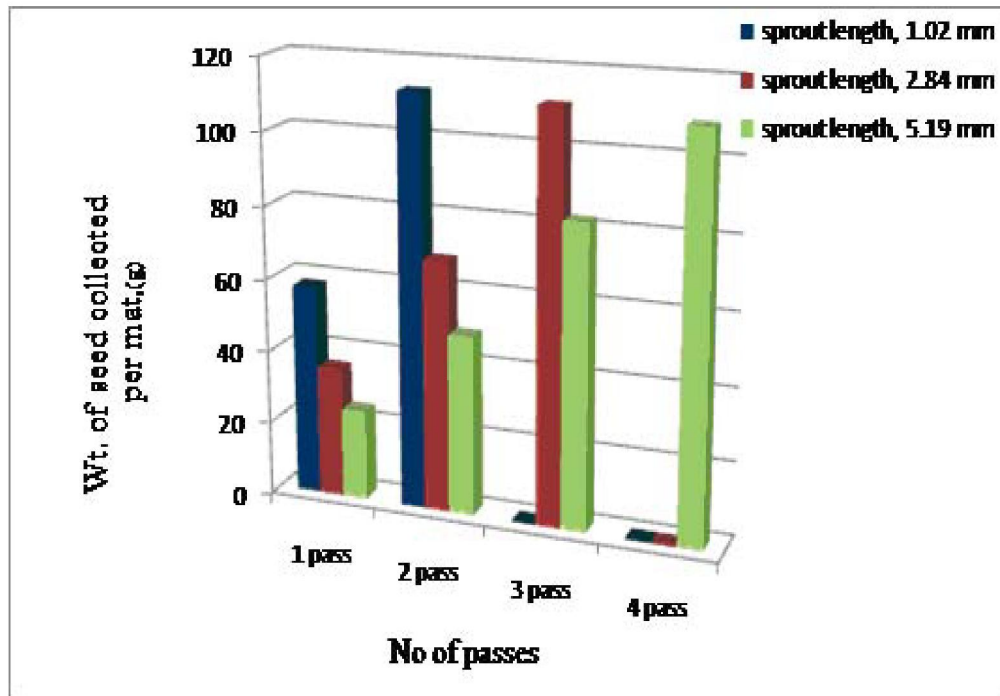


Fig. 4. Seed dropped per mat for paddy variety BPT 2207.

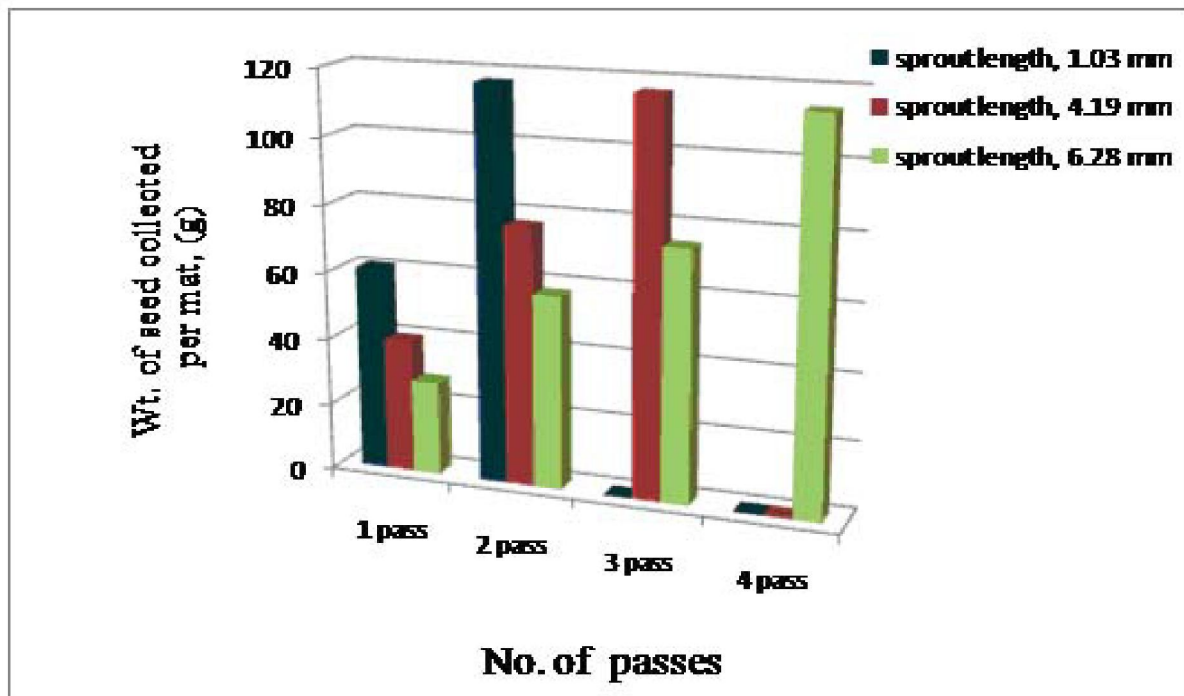
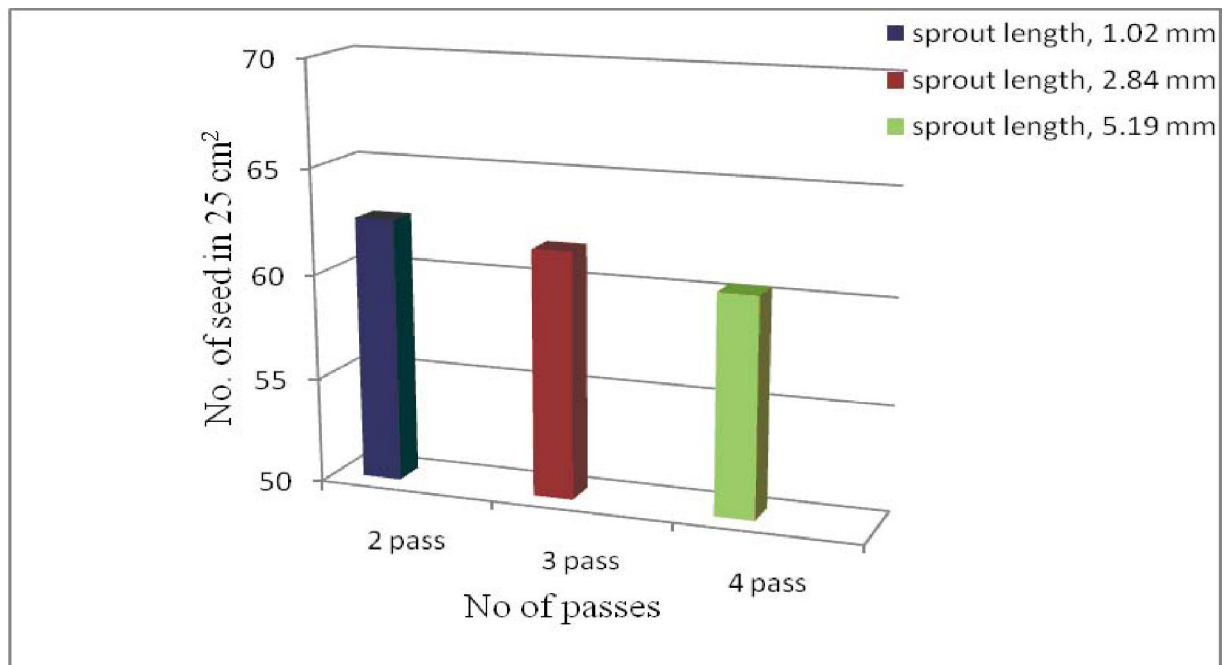
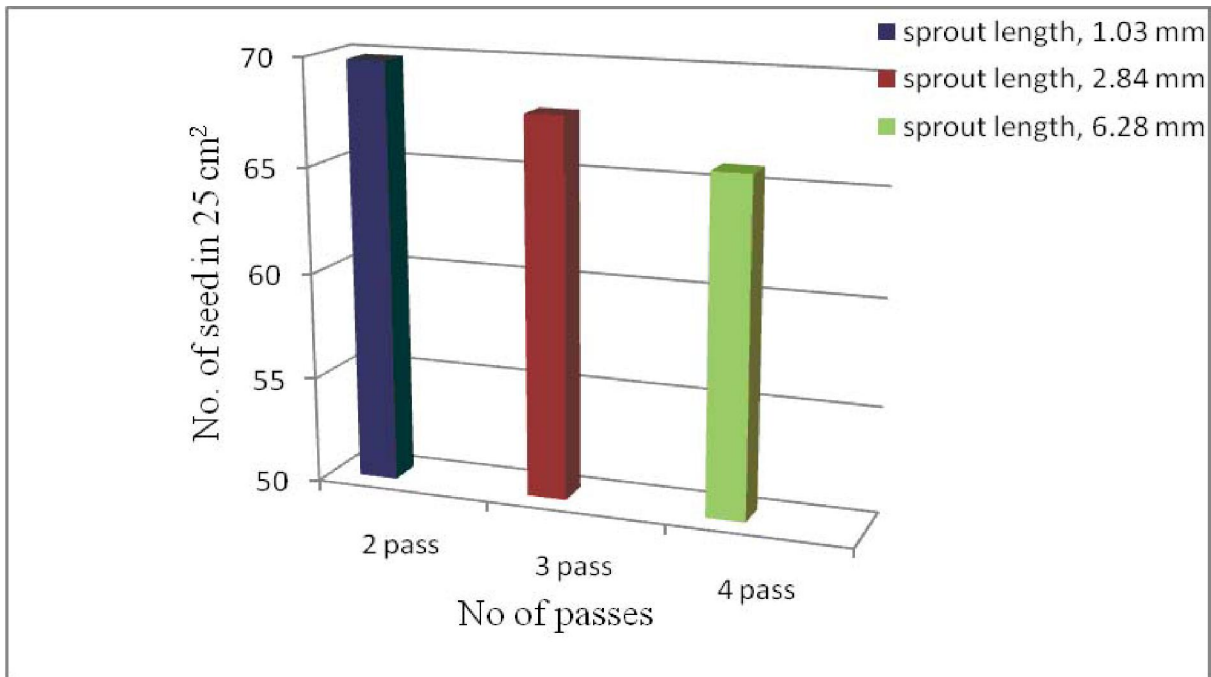
Fig. 5. Uniformity of seed in 25 cm² area in a mat for paddy variety NLR 145

Fig. 4. Uniformity of seed in 25 cm² area in a mat for paddy variety BPT 2207



incubation period), 4.19 (36 h incubation period) and 6.28 mm (48 h incubation period) respectively to get recommended uniformity of seed per unit area in a mat.

Paddy seeding device not only saves the time, labour and provides good uniformity of seedling on the mat but will also helps in getting desired plant population while transplanting with rice transplanter. Further the device requires to be tested at different incubation periods, so that number of passes can be decided based on the incubation period so as to get recommended density of seed per mat and uniformity. For paddy variety NLR 145, two, three and four number of passes of paddy seeding device over a soil filled tray of size 280 × 580 mm were required at sprout lengths of 1.02, 2.84 and 5.19 mm respectively to get recommended seed density per mat (100 to 120 g/mat) and uniformity (2 to 3 seed/cm²) at the corresponding incubation periods of 24 h, 36 h and 48 h respectively. Similarly for paddy variety BPT

2207, two, three and four number of passes of paddy seeding device over tray are required at sprout lengths of 1.03, 4.19 and 6.28 mm respectively to get recommended seed density per mat and uniformity at the corresponding incubation periods of 24 h, 36 h and 48 h respectively.

LITERATURE CITED

- Behera B K, Varshney B P and Swain S 2007** Influence of Seedling Mat Characteristics on Performance of Self-Propelled *Rice Transplanter*. *Agricultural Mechanization in Asia, Africa and Latin America*, 31(1): 01-06.
- Vijay Kumar D 2009** Performance Evaluation of Self-propelled Walking Type Rice Transplanter Compared to Manual Rice Transplanting in Krishna Western Delta Region of Andhra Pradesh. Unpublished M.Tech Thesis. ANGRAU, College of Agricultural Engineering, Bapatla.