

## **Puddling level and sedimentation period affecting rice seedling withdrawal force**

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### **ABSTRACT**

A laboratory experiment was conducted in silty-clay loam soil to determine the seedling withdrawal force after transplanting at different depths and sedimentation periods of puddled soil as produced by various puddlers and level of puddling. Instron Universal Testing Machine was used to measure the seedling withdrawal force. Seedling withdrawal force increased with depth of transplanting. Least seedling withdrawal force of 0.93 N was found in case of rotary puddler with three passes ( $R_3$ ) at 3 cm depth of transplanting and 24 hours of sedimentation period ( $S_{24}$ ) and increased with sedimentation period. In case of rotary puddler with three passes ( $R_3$ ), two passes ( $R_2$ ) and peg type puddler ( $P_3$ ), the increase in seedling withdrawal force was faster between sedimentation period of 48 ( $S_{48}$ ) to 72 hours ( $S_{72}$ ) but in case of peg type puddler with two passes ( $P_2$ ), cultivator with two passes ( $C_2$ ) and three passes ( $C_3$ ), the increase in seedling withdrawal force was faster between  $S_{24}$  and  $S_{48}$ . However, at 5 and 7 cm depth of transplanting, a decrease of seedling withdrawal force was observed between  $S_{48}$  and  $S_{72}$ . Since, higher seedling withdrawal force indicates better anchorage of seedling and reduction of buried and floating seedlings, it could be said that ideal time of transplanting for treatments  $R_3$ ,  $R_2$  and  $P_3$  was 72 hours of sedimentation period after puddling whereas it was 48 hours of sedimentation period in case of  $P_2$ ,  $C_2$  and  $C_3$ .

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**Key words :** Puddled soil, Sedimentation, Seedling, Force, Time of transplanting, Rice seedling.

**R**ice crop requires a good puddled field condition to create favourable physico-chemical and microbiological environment for normal growth of rice plant (Dutta, 1948). However, it has also been reported that excessive puddling is detrimental to subsequent crop in a wetland and dry land crop rotation (Bolton and De Datta, 1979; Kar, 1995). Hence, ideal puddling is considered very important for rice crop. Self-propelled rice translators are gaining popularity because of higher area coverage per unit time and reduction of drudgery involved in manual transplanting, which is very labour intensive. But for proper maneuverability and proper seedling anchorage, ideal puddle soil condition is required. Since, seedling withdrawal force is an index of seedling anchorage, it could be used as basis to decide a time gap between puddling and transplanting by a mechanical transplanter. The present study was taken up in the laboratory to study the seedling withdrawal force in puddled soil at different levels of puddling, sedimentation period and depth of transplanting to assess the ideal time of transplanting.

### **METHODOLOGY**

The experiment was conducted in a silty clay loam soil (Sand: 32.82 %; Silt: 42 % and clay: 25.18 %). Three tractor drawn puddling equipment namely rotary puddler (R); peg type puddler (P) and nine tyne cultivator (C) were used for puddling the experimental field with two levels of puddling *i.e.* two and three passes. Peg type

puddler and cultivator were included in the experiment because of their wide use by local farmers as puddling equipment. The details of the experimental variables are given below:

#### **Independent variables:**

##### *Puddling equipment:*

- Rotary blade puddler with two passes ( $R_2$ )
- Rotary blade puddler with three passes ( $R_3$ )
- Peg type puddler with two passes ( $P_2$ )
- Peg type puddler with three passes ( $P_3$ )
- Cultivator with two passes ( $C_2$ )
- Cultivator with three passes ( $C_3$ )

##### *Sedimentation period:*

- 24 ( $S_{24}$ ), 48 ( $S_{48}$ ) and 72 ( $S_{72}$ ) hours

##### *Depth of transplanting:*

- 3, 5 and 7 cm

#### **Dependent variables:**

- Seedling withdrawal force.

#### **Statistical design:**

- Three factor CRD with two replications.

The puddled soil collected from the field with the help of 12 cm diameter and 15 cm length cylinder. The cylinder containing puddled soil was lifted out of the field by keeping a mild steel plate at the bottom. The plate was released over a tin container of 12 cm diameter and