

Performance of zero till seed drill in raising blackgram under rice fallow

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ABSTRACT

Blackgram is one of the predominant pulse crops cultivated in Tiruchirapalli district, Tamil Nadu, India. Maintaining plant population is vital for obtaining high yield. Hence, performance of zero till seed drill for growing blackgram in rice fallow was demonstrated in Tiruchirapalli district. The average plant population of 38.9 m² with an average yield of 423.3 kg ha⁻¹ was recorded for conventional method of sowing. It was recorded that there was 38.96 % yield increase in the demonstration plots when compared with the conventional broadcasting method. There was no effect of stubble on the performance of zero-till seed-drill. The zero tillage sowing was found to be efficient as compared to the conventional method of sowing. The average B:C ratio obtained was 5.2, 3.9 for zero till seed drill and conventional broadcasting method, respectively.

Keywords: Blackgram, pulses, yield and zero till seed drill

Pulses cultivation is under rainfed situation in India. Crops like blackgram, greengram, redgram and cowpea are the major pulse crops grown. New varieties and production technologies are played a vital role in the improvement of yield and production in India. But, area under cultivation of pulses is declining trend nowadays. It is mainly due to cultivation of pulses only under inter or mixed cropping system and also negligible crop among the farming Community (Sumathi, 2012). Blackgram (*Vigna mungo* L.) is a short duration crop which belongs to the Leguminosae family. Blackgram is rich in protein (25-26%) and grown as intercrop, cash crop and also as a sole crop. It is also called as urd bean. In India the area under blackgram cultivation is 3.30 million ha producing 1.60 million tonnes, with the mean productivity of 0.49 kg ha⁻¹ and contributes 11 per cent of total production in the country.

Blackgram is one of the important crops among the pulses. Rice-blackgram cropping system is very common in Tamil Nadu. It contributes to over 70 per cent of total food grain production in the country with an area of 12 M ha under this cropping system. This cropping system is also most predominating in Tamil Nadu, which occupies 65 per cent of total cultivated area. Thus, it is necessary that production of rice and blackgram must keep pace with the growing population of our Country. The traditional practice of broadcasting of seeds in the standing crop of rice does not ensure uniform plant population and moisture which results in poor crop growth and yield. The zero tillage technique also improves the soil environment for crop growth, reduces erosion, conserves the time and energy and decreases the cost of farming (Edminikster and Miller, 1959). Hence, to raise the blackgram crop using zero till seed drill in rice fallow as front line demonstration was chosen.

Zero-till seed drill was used for sowing blackgram seeds in rice fallow at Thiruppaathurai village of Andanallur Taluka of Tiruchirapalli district as a frontline demonstration of technology. This trial was taken in farmer's fields (1 acre of each trial) immediate after harvest of paddy crop. Seed drill was calibrated for blackgram using the metering mechanism provided in the seed drill. Zero-till ferti seed-drill utilizes a different type of furrow opener which makes slit in untilled soil without much disturbing it. The recommended seed rate of 8 kg ac⁻¹ seed was sown according to row to row spacing (30 cm) and before sowing the seed was soaked for 30 minutes to maintain uniform moisture content of the seed. The soil moisture content at the time of sowing was 25 per cent. TNAU pulse wonder at 5.0 kg ha⁻¹ were sprayed on 45 days after sowing. The conventional broadcast method as treated as control. The blackgram variety was ADT 5 and pendimethalin @ 2.5 L ha⁻¹ was used to control weeds and applied with in 48 hrs of sowing of the crop. Average maximum and minimum temperature for respective March, April and May months were 33°C, 34°C and 34°C. The plant growth parameters such as germination, plant population, grain yield, were recorded in ten farmer's fields and net return and benefit cost ratio were calculated.

Germination is a protrusion of radicle or seedling emergence. Germination results in the rupture of the seed coat and emergence of seedling from embryonic axis. Germination was recorded three days after sowing (Tomer *et al.*, 2003).

Good crop establishment is one of the most important features in better crop production. The better crop establishment is in turn expressed as optimum plant population in fields. Number of plants per unit area in the cropped field is called as plant population (Singh *et al.*, 2014).

Short communication

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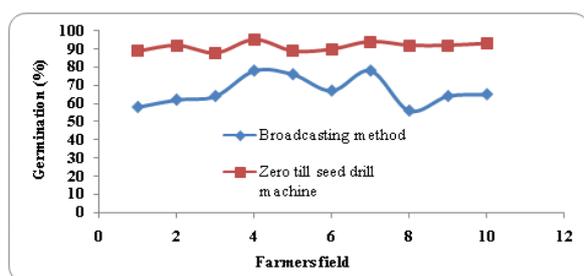


Fig. 1: Germination (%) of different sowing methods

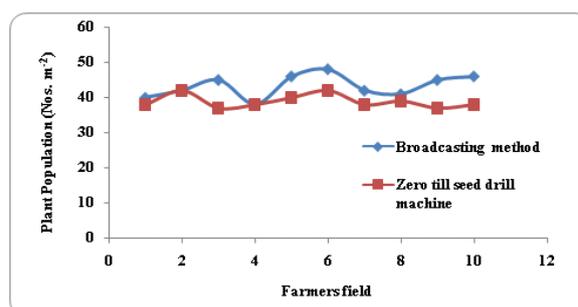


Fig. 2: Plant population of different sowing methods

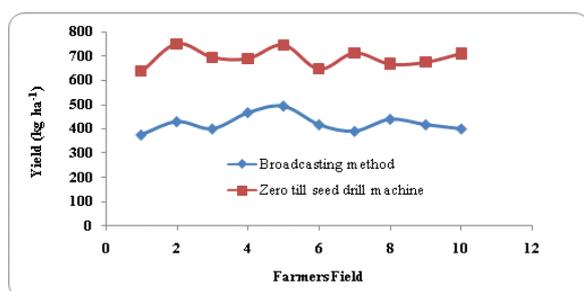


Fig. 3: Yield of different sowing methods

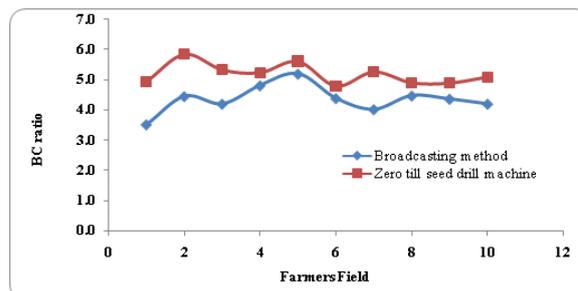


Fig. 4: Benefit cost ratio of different sowing methods

Yield and economics of black gram was calculated after harvest of the crop (Tomer *et al.*, 2003).

The calculation of benefit cost ratio is done by finding the ratio between the gross return and gross cost of production as given below (Marimuthu and Susendiran, 2015).

$$BCR = \frac{\text{Gross Return}}{\text{Gross Cost of production}}$$

The results of zero till seed drill trials carried out in the farmers fields in Thirupparaithurai village of Tiruchirapalli district are as follows. The data were collected during field evaluation studies to determine the germination percentage, plant population and yield were analyzed. The cost of zero till seed drill was computed and compared with that of conventional method *i.e.*, sowing by broadcasting.

Germination

The blackgram germination was recorded after 5th day of sowing and presented in the fig. 1. The result revealed that zero till seed drill sown blackgram has shown higher germination percentage compared to broadcasting. Blackgram seed germinated uniformly in the rows without any gap which was sown using zero-till seed drill. The average germination percentage was 82.8 and 91.4 for broadcasting and zero till seed drill methods, respectively Singh *et al.* (2014) reported similar results in wheat .

Plant population

Plant population is presented in the fig.2. The plant population was higher in broadcasting method compared to seed drill sown. An average plant population was higher as compared to convectional sowing method. An average plant population for machine sowing and broadcasting method was 38.9 and 43.3 numbers m⁻² respectively. In machine sowing method the spacing was calibrated. Number of weeds in general was reported to be lesser in zero-till ferti drill than conventional system. The similar results were reported for wheat crop Singh *et al.* (2014).

Yield

The blackgram yield presented in the fig. 3. The yield of 693 kg ha⁻¹ was higher with seed drill compared to broadcasting because the plant population was optimum and availability of nutrient was more compared to broadcasting method. A possible reason for increased yield is due to increase pod (Ali *et al.*, 2011). With respect to the application of TNAU pulse wonder, the possible reason for improvement in yield might be due to the nature of this crop booster with a combination of nutrients and growth regulators for pulses resulted in decreased flower shedding and improvement in the crop tolerance for abiotic and biotic stress. Average yield of blackgram was 423.2 kg ha⁻¹ for broadcasting method and 693 kg ha⁻¹ for zero till seed drill was recorded.

High yield is due to number of pods and more availability of nutrients. Similar trend was followed for Ramesh *et al.* (2016). Data was analyzed by “t” test and zero till seed drill significant to the control.

Benefit cost ratio (B : C)

The benefit cost ratio was calculated based on cost of cultivation and yield data recorded from the study. Benefit cost ratio is presented in the fig.4. The benefit cost ratio was higher in compared to broadcasting method. The average B:C ratio obtained was 5.2 and 3.9 for zero till seed drill and conventional broadcasting methods respectively. It indicates that blackgram grown with low yield are identified by low knowledge, unfavourable attitude towards higher yielding varieties, low risk bearers with negative perception of pulses production technology. Similar type of investigation has been also carried by Tomar *et al.* (2003) and Samai *et al.* (2000).

From the above findings it can be concluded that use of zero till seed drill method of sowing of black gram cultivation can reduce the technology gap to a considerable extent thus leading to increase the productivity of black gram in Tiruchirappali district of Tamil Nadu.

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