Effect of Different Types of Tillage and Sowing Methods on Growing and Yield of Chickpea Crop

Yogesh Ku. Kosariya¹*, A.K. Verma², Shubham² and Sangeeta³

¹Department of Farm Machinery and Power Engineering, Raipur (C.G.), 492012, India
²Faculty of Agricultural Engineering, Raipur (C.G.), 492012, India
³GKV, Raipur (C.G.), 492012, India

*Corresponding author

A B S T R A C T

Introduction

Chickpea (Cicer arietinum L.) is an important winter season pulse crop of India and a key source of protein. In Chhattisgarh, chickpea is grown over an area of 393.78 thousand ha with an annual production of 433.15 thousand tones and an average productivity of 1100 kg/ha (Anonymous, 2016-2017). It is an important winter season pulse crop of India with drought condition as single most important abiotic constraints of higher productivity (Kumar et al., 2006). Potential solutions to address these issues include a shift from intensive tillage based practices to conservation agriculture (CA) based crop management systems. Direct drilling (seeding/planting with zero tillage technology) is one such practice that potentially addresses the issues of labor, energy, water, soil health etc. and adaptations to climatic variability (Jat et al., 2009). The major problem in wheat as well as chickpea sowing under no tillage is the frequent choking of the furrow opener of no-till drill due to long loose straw of paddy lying in the...
windrows, after harvesting by combines. However, the loose straw residue not burnt/spread on the ground resulted in frequent choking of drill in between furrow openers and frame of the drill. Keeping above points in view, farmer participatory trials were conducted to evaluate the performance of different farm machines for direct drilling of wheat in harvested paddy fields viz., happy seeder, national seed cum fertilizer drill, raised bed seed cum fertilizer drill and conventional seed drill in the research farm of IGKV, Raipur (C.G.) during 2017-18.

**Materials and Methods**

In this experiment, three different tillage treatments were studied. The details of tillage treatments are as follows: F₁ (Zero tillage), F₂ (Cultivator with two pass + Rotavator with two pass), F₃ (Mould Board Plough with one pass + Cultivator with two pass + Rotavator with two passes). To evaluate the performance of happy seeder and to study on different sowing machines (Fig. 1) for chickpea cultivation, the following sowing machines were used in the experiment for sowing of chickpea; S₁ (Happy seeder); S₂ (Zero till seed cum fertilizer drill); S₃ (Conventional seed cum fertilizer drill) and S₄ (Raised bed seed cum fertilizer drill). The three number of replications were performed on field. In each replication, the sequence of all treatments was different. The following treatments were used in the experiment for sowing of chickpea: T₁ - (F₁S₁), T₂ - (F₁S₂), T₃ - (F₂S₃) and T₄ - (F₃S₄). Table 1 shows condition of land, crop and machinery related parameters.

**Results and Discussion**

The maximum number of branches/plant after 20, 40 and 80 days of sowing was counted in treatment T₁ (happy seeder, 3.15, 8.45 and 15.92, respectively) whereas it was found to be minimum for the treatment T₂ (zero till seed cum fertilizer drill, 2.27, 7.78 and 14.43, respectively). There was more number of branches/plant in treatments T₃ and T₄ than treatment T₂. The maximum number of pods per plant was counted in treatment T₁ (72.2) followed by treatment T₄ (69.3) whereas it was found to be minimum for the treatment T₂ (62.2) followed by treatment T₃ (52.7).

**Table 1 Land related parameters**

| S. No. | Particulars            | Specification         |
|--------|------------------------|-----------------------|
| 1.     | Experimental field     | IGKV research farm    |
| 2.     | Number of treatment    | 4                     |
| 3.     | Number of tillage practices | 3                 |
| 4.     | Number of sowing method| 4                     |
| 5.     | Replications           | 3                     |
| 6.     | Field size             | 0.4043 ha             |
| 7.     | Plot size              | 30 x 10 m             |
| 8.     | Distance between replications | 1.0 m              |
| 9.     | Distance between plots | 0.5 m                 |
| 10.    | Total number of plots  | 12                    |
| 11.    | Season of Experiment   | Rabi                  |
| 12.    | Crop                   | Chickpea              |
| 13.    | Variety                | JG -130               |
| 14.    | Date of sowing         | 9 Nov, 2017           |
Table 2 Measurement of yield attributing characters

| S. No. | Treatments | Pods/plant | Grain Yield kg/ha | Straw Yield kg/ha | 100 Grain Weight, g |
|--------|------------|------------|-------------------|-------------------|-------------------|
| 1.     | T₁         | 72.60      | 1137.80           | 3674.50           | 28.43             |
| 2.     | T₂         | 62.20      | 1008.50           | 3129.96           | 26.96             |
| 3.     | T₃         | 67.70      | 1067.29           | 3314.54           | 27.20             |
| 4.     | T₄         | 69.30      | 1092.89           | 3631.44           | 27.80             |

Table 3 Measurement of crop parameters

| S. No. | Treatments | Depth of Sowing cm | Seed Emergence % | Plant Population/m² | Plant Height, cm | Depth of Root, cm | Number of Branches/Plant |
|--------|------------|--------------------|------------------|--------------------|-----------------|------------------|--------------------------|
|        |            |                    |                  | 20 DAS 40 DAS 80 DAS | 20 DAS 40 DAS 80 DAS | 20 DAS 40 DAS 80 DAS | 20 DAS 40 DAS 80 DAS |
| 1.     | T₁         | 3.22               | 87.10            | 55.68 53.52 48.91 | 8.67 24.72 54.34 | 2.17 7.97 14.58 | 3.15 8.45 15.92 |
| 2.     | T₂         | 3.45               | 86.00            | 52.78 49.13 43.23 | 7.12 23.01 52.09 | 2.06 7.80 14.28 | 2.27 7.78 14.43 |
| 3.     | T₃         | 3.82               | 86.70            | 54.31 51.23 45.43 | 7.92 23.78 52.72 | 3.52 9.01 15.72 | 2.83 8.02 15.03 |
| 4.     | T₄         | 4.41               | 86.90            | 53.92 50.42 44.41 | 8.19 24.17 53.11 | 3.68 9.12 15.91 | 2.98 8.21 15.19 |
Fig.1 Sowing of chickpea with happy seeder and other implements

The maximum total yield of chickpea grain was obtained in treatment T1 (1137.8 kg/ha) followed by treatment T4 (1092.83 kg/ha) where as it was found to be minimum for the treatment T2 (1008.5 kg/ha) followed by treatment T3 (1067.29 kg/ha). The maximum weight of 100 grain was obtained in treatment T1 (28.43 g) followed by treatment T4 (27.8 g) where as it was found to be minimum for the treatment T2 (26.96 g) followed by treatment T3 (27.2 g). The yield and crop parameters are shown in table 2 and 3 respectively.

From the above data we have been concluded that the parameters pertaining to happy seeder shows maximum profits than other used machinery. Through this study we have also pointed out that at some places due to the jumping of ground wheel certain amount of seed cannot be placed at desired depth. But overall yield attributes show that the farmer should adopt this technology for maximum productivity in rice-chickpea cropping system of Chhattisgarh.

References

Chauhan, A., Jha, G., Chourasiya, A., Jha, A., and Joshi, J. K. 2017. Effect of tillage and weed management practices and growth productivity and energy analysis of late -sown chickpea. International Journal of Agriculture Sciences., 9(5): 3779-3781.

Jat, M. L., Kamboj, B. R., Sidhu, H. S., Singh, M., Bana, A., Bishnoi, D. K., and Jat, H. S. (2013). Operational manual for Turbo Happy Seeder- Technology for managing crop residues with environmental stewardship.

Kumar, R., Arya, R.L. and Mishra, J.P. 2006. Effect of seed priming and tillage
management on productivity of chickpea genotype under rain fed conditions. Indian J. Agronomy, 51 (1): 54-56.

Sahay, K. M., and Singh, K. K. 1994. A Textbook of Unit Operation of Agricultural Processing. Vikas Publication House PVT LTD., pp. 103-161.

Singh, Y., and Singh, S. 2007. The happy seeder enables direct drilling of wheat into rice stubble. Aus. J. Exp., 4(7): 844-854.

Singh, A., Kang, J. S., and Kaur, M. 2013. Planting of wheat with happy seeder and rotavator in rice stubbles. Indo-Am. J. Agric. and Vet. Sci., 1(8):372-379.

How to cite this article:
Yogesh Ku. Kosariya, A.K. Verma, Shubham and Sangeeta. 2019. Effect of Different Types of Tillage and Sowing Methods on Growing and Yield of Chickpea Crop. Int.J.Curr.Microbiol.App.Sci. 8(02): 2623-2627. doi: https://doi.org/10.20546/ijcmas.2019.802.306