Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.7212

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **7 (1):** 78-82 (2019)

Research Article

Evaluation of Comparative Performance between Happy Seed Drill, Inclined Plate Planter and Conventional Drill Technology for Chickpea Production

Yogesh Ku. Kosariya[1*] and R. K. Naik[2]

[1]Ph.D. Scholar and [2]Associate Professor (FMPE)

Department of Farm Machinery and Power Engineering, FAE, IGKV, Raipur, Chhattisgarh

*Corresponding Author E-mail: 12345yogeshkk@gmail.com

Received: 23.12.2018 | Revised: 20.01.2019 | Accepted: 26.01.2019

ABSTRACT

The research work was carried out at the instructional farm of IGKV, Raipur and the study was conducted to evaluate comparative performance between inclined plate planter, happy seed drill and conventional drill technology for sowing of chickpea crop in harvested rice stubbles during 2017-18 in the several fields of farm. The data showed that happy seed drill produced maximum germination count (32; 42/m^2) followed by inclined plate planter (28; 30/m^2) and conventional drill (27; 28 /m^2). Significantly highest number of fertile tillers were recorded by happy seed drill (12; 14/m length) compared to conventional drill (8; 7/m length). Highest thousand grain weight (g) were recorded by happy seed drill (249; 254) followed by inclined plate planter (228; 232) and conventional drill (227; 230). Maximum yield was recorded by happy seed drill (2220; 2020 kg/ha) compared to inclined plate planter (1674; 1875 kg/ha) and conventional drill (1653; 1760 kg/ha). This were happened due to shredded rice stubbles was distributed thoroughly as a layer above the crop which retain moisture. On other hand, crop sown by happy seed drill is also less affected by irrigation and labour. Happy seed drill not only ensures maximum yield but also save fuel, energy, hence it is a most economical machine.

Key words: *Happy seed drill (HSD), Conventional drill, Inclined plate planter, Save energy; Economics*

INTRODUCTION

Chickpea (*Cicer arietinum* L.) is the largest produced food legume in South Asia and the third largest produced food legume globally. Chickpea is grown in more than 50 countries. Asia accounts 89.7% of the area in chickpea production, followed by 4.3% in Africa, 2.6% in Oceania, 2.9% in Americas and 0.4% in Europe[3]. India ranked first in terms of chickpea production and consumption in the world. About 65% of global area with 68 % of global production of chickpea is contributed by India[2].

Cite this article: Kosariya, Y. K., and Naik, R. K., Evaluation of Comparative Performance between Happy Seed Drill, Inclined Plate Planter and Conventional Drill Technology for Chickpea Production, *Int. J. Pure App. Biosci.* **7(1):** 78-82 (2019). doi: http://dx.doi.org/10.18782/2320-7051.7212

Chickpea production has grown from 3.65 to 5.63 million tonnes between 1950-51 and 2004-05, registering a growth of 0.58% annually. Combine harvester is widely used in Chhattisgarh due to labour scarcity and to reduce cost of harvesting, threshing as well as cleaning of paddy at same time. The straw left in the field became problem for the farmers. Residue burning is a part of the 'rice-wheat cropping system' (RWCS) as well as rice chickpea cropping system, those are the dominant cropping system in Chhattisgarh plain. In Chhattisgarh Presently, crop residues in combine-harvested rice fields are being burnt for cleaning fields before planting of wheat causing a serious atmospheric pollution. Burning of straw causes environmental pollution leading to many diseases[5]. Burning also produces CO_2, which creates greenhouse effect. The direct drilling of wheat as well as chickpea into harvested rice stubbles from a reasonable chickpea yield has not been possible without prior burning or removal of straw. The Happy seed drill is a tractor-mounted machine that cuts and lifts rice straw, sows seed into the bare soil, and deposits the straw over the sown area as mulch. It therefore allows farmers to sow wheat as well as chickpea immediately after their rice harvest without the need to burn any rice residue for land preparation.

MATERIAL AND METHODS

The present study was conducted to evaluate happy seed drill technology compared to conventional drills for sowing of chickpea crop during 2017-18 in agro-ecological zone of Chhattisgarh. The study was carried out in several fields of instructional farm of IGKV. At the research farm of IGKV, Raipur the rice variety R-1 was sown on the field in the month of July. After the harvesting of paddy, chickpea crop was sown with different farm machines in paddy residue conditions. The previous rice crop had been harvested with a reaper at a cutting height of approximately 10-30 cm. After rice harvest, the windrows of loose residues ("Header tailings") were manually spread evenly across the areas to be sown with residues retained, and removed chickpea was sown with help of happy seeder in the residual moisture of paddy crop. In happy seed drill the tines chopped the residues of harvested rice crop increased the productivity of the soil. The experiments were laid out in a strip plot design having total area of 3742 m^2 and the field was divided into three equal main plots and replicated in different sub plots with a net plot size of an acre for each treatment. Plot size of 1247.03 m^2 was selected for T_1: Happy seeder, similarly same area for T_2: Inclined plate planter and T_3: Conventional seed drill for sowing of chickpea as shown in figure 1. Moisture content, bulk density of soil, field capacity, fuel consumption and mean emergence time (met) and percentage of emergence, agronomical parameters was measured by standard procedure.

Figure. 1 Sowing of chickpea with T_1, T_2 and T_3 machine under heavy stubbles of rice

Table 1. Condition of land and other used parameter

(a) Shape of test field	Rectangular
(b) Length and width of field	65.83 ×56.83 meter
(b) Area of the main plot	3742 meter square
(c) Area of sub main plot	1247 square meter
(d) Moisture content, db	15.65%
(e) Design of sowing pattern	Strip plot design
(f) Remaining straw (stubble) height	10-30 cm
(g) Crop	Chickpea
(h) Fertilizer	DAP
(i) Happy seeder	T_1
(j) Inclined Plate Planter	T_2
(k) Conventional seed drill	T_3

RESULTS AND DISCUSSION

Physical parameters of soil

The moisture content, bulk density and porosity of the soil before sowing operation was the average moisture content at 15 cm depth was found to be 15.26% (db). Other researcher evaluates the machine at moisture content of 20.2% (db) Singh[9]. Average bulk density was observed 1.47 g/cm3 and porosity was measured 50.62% before sowing of chickpea by sowing machines. The mean germination percentage was recorded as 84.61% which is highest in case of T_1: happy seeder followed by T_2: zero till SCFD and T_3: conventional seed drill with 82.08% and 80% respectively.

Germination Count (m^2)

It was recorded during the initial growth stage and before harvesting with the help of measuring scale. Meter scale was placed in three rows of each plot randomly and then plants were counted in running meter row length. From table.2, it is clear that happy seed drill showed fields has significantly higher germination count (42) followed by inclined plate planter (28) and conventional drill (29) in the years 2017-18.

Figure. 2 Effective tillers and germination count

Effective tillers (per m length)

Number of effective tillers per was calculated by the counting of tillers generated at the root of each plant in meter length. Happy seed drill produced significantly more fertile tillers (12) compared to conventional (9). Targeted soil preparation was better with happy seeder zero tillage compared to broadcasting resulted in best nutrient uptake and finally higher number of fertile tillers Abbas *et. al.*[1], Lupton *et. al.*[7], reported that better development of root gave

better genetic makeup and ultimately produced maximum number of productive tillers.

1000 grain weight (g)

During the year 2017-18 maximum 1000 grain weight was recorded (250 g) with happy seed drill which differ significantly from inclined plate planter (228 g) and conventional drill (226 g). This increase in 1000 grain weight was attributed due to better targeted soil preparation, root development and maximum uptake of nutrients. These results are in accordance to Zamir *et. al.*[11], and Nasrullah *et. al.*[8],

Grain yield (kg/ha)

The data showed that grain yield differ significantly from each other during both the years of study. The highest grain yield 2220 kg/ha were obtained in happy seed drill followed by inclined plate planter (1675 kg/ha) and conventional drill (1653 kg/ha). This increase in yield may be attributed due to good soil tilth and better resource utilization in better uptake of nutrients. These results are in accordance to the Sidhu *et. al.*[10], who reported that sowing of chickpea with happy seeder without burning of previous crop residues, eliminating air pollution and loss of nutrients and organic carbon due to burning, at the same as maintaining or increasing yield up to 10% compared to conventional method.

Table.2 Overall post-harvest crop yield parameters under different used machine

Treatments	Plant population per square-m	Plant height, cm	No. of branches per plant	No. of pods per plant	1000 grain weight, g	Seed yield per plant, g	Seed yield kg/ha
T_1	32.00	38.90	27.10	33.11	249.28	7.40	2020.00
T_2	28.00	38.21	25.80	30.32	228.22	6.44	1675.40
T_3	29.00	37.50	22.80	28.55	227.96	6.36	1653.60
Mean	29.66	38.20	25.23	30.66	235.15	6.73	1783.00

The economic analysis showed that happy seed drill is most economical technique compared to other drills. Happy seed drill time and energy saving that ensure timely sowing of rabi seeds like chickpea and produced better yield. Input cost of operation of happy seeder was 700(₹/h), while 585.09 (₹/h) for Inclined plate planter and 637.56(₹/h) conventional seed drill.

CONCLUSION

In field study it was also observed that the depth of seed was placed at a uniform depth of 3.94 cm, fertilizer at a depth of 4.39 cm in happy seed drill. The variation was also very negligible and was near to the agronomical condition. It was also observed that the vertical placing of seed and fertilizer was nearly 5 cm which was very good indication of suitably designed seed drill. The highest germination count in treatment T_1 might be due to the reason that after chopping the paddy straw, the accumulation of paddy straw in front of furrow openers was minimum and subsequent seeding operation by happy seeder, the seed coverage was better.

REFERENCES

1. Abbas, G., Ali, M. A., Abbas, G., Azam, G., and Hussain, I., Impact of planting methods on wheat grain yield and yield contributing parameters. *J. Anim. Plant Sci.*, **19(1):** 30-33 (2009).
2. Amarender Reddy and Devraj Mishra, Growth and Instability in chickpea production in India. (2010).
3. Gaur, P.M., Tripathi, S., Gowda, CLL., Ranga Rao, G.V, Sharma, H.C., Pande, S. and Sharma, M., Chickpea Seed Production Manual. Patancheru 502 324, Andhra Pradesh, India: *International*

Crops Research Institute for the Semi-Arid Tropics.28 pp. (2010).

4. Iqbal, M. F., Hussain, M., Faisal, N., Iqbal, J., Rehman, A., Ahmad, M. and Padyar, J. A., Happy seeder zero tillage equipment for sowing of wheat in standing rice stubbles. *Int. J. Adv. Res. Biol. Sci*. **4(4):** 101-105 (2017).
5. I.N.C.C.A. Indian Network for Climate Change Assessment. Assessment of the greenhouse gas emission: 2007, The Ministry of Environment and Forests, Govt. of India, New Delhi. (2010).
6. Karayel, D., and Ozmerzi, A., Effect of tillage methods on sowing uniformity of maize. Canadian Bio-systems Engineering., **44:** 2.23-2.26 (2002).
7. Lupton, F. G. H., Oliver, R. H., Ellis, F. B., Barnes, B. T., Howse, K. R., Welbank, P. J., and Taylor, P. J., Root and Shoot growth of semi-dwarf and taller winter wheat. Ann. Appl. Bio. **(77):** 129-144 (1974).
8. Nasrullah, M. H., Cheema, M. S., and Akhtar, M., Efficacy of different dry sowing methods to enhance wheat yield under Cotton-Wheat cropping system. *Crop and Env.* **1(1):** 27-30 (2010).
9. Singh, A., Evaluation of wheat sowing technologies under paddy residue conditions. *International Journal of Forestry and Crop Improvement*, **6(1):** 49-54 (2015).
10. Sidhu, H. S., Singh, M., Humphreys, E., Singh, Y., and Singh, S., The happy seeder enables direct drilling of wheat into rice stubble. *Aus. J. Exp*., **4(7):** 844-854 (2007).
11. Zamir, M. S. I., Ahmad, A. H., and Nadeem, M. A., Behavior of various wheat cultivars at tillage in Sub-tropical conditions. Cerc. *Agron. Moldov*. **4(144):** 13-19 (2010).