RESEARCH PAPER | International Journal of Agricultural Engineering | Volume 10 | Issue 2 | October, 2017 | 643-646
e ISSN–0976–7223 ■ Visit us : *www.researchjournal.co.in* ■ **DOI: 10.15740/HAS/IJAE/10.2/643-646**

Performance evaluation of happy seeder for sowing wheat crop in combined harvested

■ **PRASHANT SINGH, BALVINDRA SINGH GAUTAM AND RAHUL KUMAR YADAV**

Received : 07.08.2017; **Revised :** 12.09.2017; **Accepted :** 28.09.2017

See end of the Paper for authors' affiliation

Correspondence to :

PRASHANT SINGH
Department of Farm Machinery and Power Engineering, Vaugh School of Agricultural Engineering and Technology, Sam Higginbottom Institute of Agriculture, Technology and Science, ALLAHABAD (U.P.) INDIA

■ **ABSTRACT :** The present study was undertaken on happy seeder for wheat crop under rice-wheat the cropping system in Allahabad region. In this study evaluate the performance of the happy seeder with conventional method and show its effectiveness over the sowing technique. The performance evaluation was done from the basis of field capacity, field efficiency, actual field capacity, fuel consumption and cost of operation, the compression of economics of operation of happy seeder with conventional method of sowing wheat in combined harvested paddy field, to prove the effectiveness. The operating speed was varying from 2.5 to 3.5 kmph to evaluate the variables. The field efficiency of happy seeder was 43.4% and 65.04% for seed drill at operating speed of 3.5 kmph. The crop residue is heavy which was collected by sampling. The cost of operating per hectare by happy seeder was Rs. 2098.65 and cost of operation per hectare by seed drill + tillage operations was Rs. 3106.38. Therefore cost of operational with happy economical as compared to seed drill by Rs. 1008.38 per hectare. But happy seeder is unique technique for sowing wheat in combine harvested paddy field. It controls the weeds also.

■ **KEY WORDS :** Happy seeder, Rice, Wheat, Seed drill

■ **HOW TO CITE THIS PAPER :** Singh, Prashant, Gautam, Balvindra Singh and Yadav, Rahul Kumar (2017). Performance evaluation of happy seeder for sowing wheat crop in combined harvested. *Internat. J. Agric. Engg.*, **10**(2) : 643-646, **DOI: 10.15740/HAS/IJAE/10.2/643-646.**

Rice-wheat is a major crop rotation in Indo-Gangticregion. About 26.5 laces ha area is under this rotation in the state of Punjab alone (Anonymous, 2011). Globally no-tillage and minimum tillage technologies are showing their edge over the conventional practices in terms of economics, water saving and eco-friendly. In northwestern India combine harvesting of rice and wheat is a common practice leaving large amount of crop residues in the fields. The area under combine harvested rice and wheat is about 91% and 82% of the total area under the two crops, respectively. Total quantity of paddy straw produced annually under these crops in the state is about 22 mtr. While, at present more than 80% of wheat residue iscollected by the farmers after combine harvesting using straw combine. Rice straw is considered poor feed for animals due to its high silica content and has also no other economicuses and remains unutilized. To vacate fields for the timely sowing of wheat, majority of the rice straw is burnt in situ by the farmers because residues interfere with tillage and seeding operations for the next crop. Burning of rice stubble is rapid and cheap option for farmer which causes a serious atmospheric pollution as well as human health. Besides, it also results in the loss of plant nutrients and organic carbon of the soil and thus deteriorates the soil health and texture.

It is estimated that in Punjab alone, about 2.0 lakh tones of N and S in the paddy residues is lost during burning, costing more than Rs. 200 crores at the prevailing prices. One ton of crop residue on burning release, 1,515 kg CO_2, 92 kg Co, 3.83 kg Nox, 0.4 kg SO_2, 2.7 kg CH_4, and 15.7 kg non-methane volatile organic compounds. The gaseous emissions from burning of paddy straw analyzed 70% CO_2, 7% CO, 0.66% CH_4 and 2.09% N_2O.

The direct drilling of any crop in to combine harvested rice stubbles from a reasonable rice yield has not been possible without prior burning or removal of straw.

The rice-wheat farming system is the most dominant and profitable farming system in the Indo-Genetic Plan region of India. Rice wheat rotation has been heavily supported by both national and provincial governments through a range of input subsidies (machinery, fertilizer, water, electricity and credit and price support mechanisms (USDA, 2004).

The majority of the rice in Uttar Pradesh is mechanically harvested, leaving heavy loads of straw and loose straw in wind rows. With short time frames between the harvesting of rice and sowing the proceeding wheat crop, farmers have managed high stubble loads through the practice of burning. At present more than 90 per cent of rice stubble produced annually in India is burnt each year. Burning is less prevalent in other Indian states where yields are lower and rice crops are harvested manually, leaving lighter loads of 2-4 ton/hectare of stubble in the field. Consequently, farmers can cultivate and sow wheat conventionally, or direct drill wheat into the rice residue, without significant difficulty.

The main production system of NW India is an annual rice/wheat rotation. The wheat straw can be used a animal fodder; the management of rice straw is more problematic. The time between harvesting of rice and sowing of wheat crop is limited and allowing time for the rice residue to breakdown delays the sowing of wheat beyond the optimum sowing date (15-20 November). This delay results in yield losses of 1% per day delay in sowing. To avoid sowing delays and blockage of cultivation implements by rice residue, Farmer burn rice straw in the field. However, this result in nutrient loss and decreases in soil microbial populations. Burning also produces harmful greenhouse gases and particulate emissions, associated with human health problems.

However, one of the major constraints in large scale adoption of this technology as well assub-optimal use efficiency of planter is the lack of skills/knowledge on operation, calibration and maintenance of the machinery. There are different field situation specific adjustments needed before the use of the machine in the field. These adjustments include proper seeding depth, fertilizer rate and the seed rate etc. as per the crop and field conditions to realize the potential benefits of the technology. There are several machinery manufactures who supply these planters but the operational manuals are not available for making adjustments, calibrations under local conditions. In absence of the proper operational guidelines and protocols for efficient use of this machine by the farmers, service providers, extension agents, many a time the desirable results are not achieved and even contradictory results are observed. This results in slow down the adoption rates of the technology. Also, in absence of simple guidelines for maintenance of the machine, the farmers/service providers need to make huge investments on repairing at the start of the season. Therefore, weattempted to develop an operational manual to provide simple guidelines for calibration, operation, maintenance and trouble shooting for efficient use of turbo happy seeder by the range of stakeholders including farmers, service providers, extension agents and researchers.

This view the study is proposed with the following objectives, to evaluate field performance for showing wheat in combine harvested paddy field, to compare with the conventional method of seeding and to compare cost of operation with conventional method.

■ METHODOLOGY

The seed drill and happy seeder were evaluated wheat sown into rice residues grown on the flat in un replicated experiments at farmers field in Allahabad from December 2015 investigated were harvested by combine have straw spreaders. The rice crops in the experimental and farmers fields were harvested by combine. The soil of the experimental field was sandy loam. The soil we're not be saline pH ranging from 7.2 to 7.8. The bulk density is 1.3 kg/cc. The climate is sunshine and the temperature 25^0C.

Evaluation of happy seeder :

Wheat was sown with the happy seeder into

Table 1 : Field performance data of the happy seeder sowing wheat

Speed (km/h)	Area (m^2) (0.29 ha)	TFC (ha/h)	AFC (ha/h)	η (%)	Fuel consumption (L/h)
2.5	A1	0.466	0.215	46.78	4.05
	A2	0.478	0.223	46.65	4.09
	A3	0.532	0.232	43.86	4.12
3.0	B1	0.547	0.241	44.08	4.15
	B2	0.576	0.256	46.80	4.17
	B3	0.597	0.268	44.89	4.22
3.5	C1	0.646	0.267	44.42	4.30
	C2	0.649	0.276	42.52	4.36
	C3	0.667	0.29	43.40	4.40

Table 2 : Field performance data of the seed drill sowing wheat

Speed (km/h)	Area (m^2) (0.29 ha)	TFC (ha/h)	AFC (ha/h)	η (%)	Fuel consumption (L/h)
2.5	A1	0.466	0.316	67	2
	A2	0.478	0.300	62	2
	A3	0.532	0.310	58	2.96
3.0	B1	0.547	0.348	63	3.15
	B2	0.576	0.334	57	3.17
	B3	0.597	0.362	60	3.32
3.5	C1	0.646	0.386	56	3.35
	C2	0.649	0.404	62	3.71
	C3	0.667	0.435	65	3.98

standing rice residue or bare soil on three days in December 2015 with sandy loam soil. The previous rice crop had been harvested with a combine harvester with a cutting height 50 to 60 cm. Average rice dry straw load in each experiment were varied from 5.3 to 6.66 t/ha dry height at the time of rice harvest. In other field the wheat was sown by the conventional seed drill.

RESULTS AND DISCUSSION

The following variables are evaluated for happy seeder and seed drill actual field capacity, field efficiency, fuel consumption and cost of operation. Forward speed taken as independent variable cost for the operation the following data as shown in Table 1 and 2.

Conclusion :

A happy seeder of nine furrow opener was tested for its performance in the month of December 2015 at farmer's field in Allahabad. The performance of the happy seeder with respect to actual field capacity, field efficiency fuel consumption cost of operation and crop residue condition were studied and compared to conventional method on the basis of result obtained as discussed in result, in the following conclusions were drawn.

– The operating speed of happy seeder could be varied from 2.5 to 3.5 kmph, working of happy seeder was found to be optimum at the speed of 3.5 kmph.

– The fuel consumption with happy seeder for sowing wheat varied from 4.12-4.36 l/hr and for seed drill 2.96-3.71 l/hr at different operating speed.

– The field capacity of happy seeder at 3.5 kmph was 0.29 ha/hr and for seed drill 0.435 ha/hr

– The field efficiency for happy seeder 43.4% and for seed drill was 65%

– The cost of operation per hectare by happy seeder was Rs. 2098.65 and cost of operation per hectare by seed drill + tillage operations was Rs. 3106.38. Therefore cost of operational with happy seeder is economical as compared to seed drill by Rs. 1008.38 per hectare.

– The crop residue was 0.830 kg/m^2, 0.832 kg/m^2 and 0.839 kg/m^2 of different plots for happy seeder. The crop residue was found heavy.

Farmer reaction :

The farmer felt that the happy seeder reduce the labour requirement, they appreciated the fact that the use of happy seeder would make the sowing timely and essay, it is water saving and ecofriendly and farmer says it also controls weeds.

Authors' affiliations:
BALVINDRA SINGH GAUTAM AND RAHUL KUMAR YADAV, Department of Farm Machinery and Power Engineering, Vaugh School of Agricultural and Technology, Sam Higginbottom Institute of Agriculture, Technology and Science, ALLAHABAD (U.P.) INDIA

■ REFERENCES

Bmbraw, Avtar Singh, Kang, Jasjit Sing and Kaur, Maninder (2011). Happy Seeder : A Avenue for crop residue management. Research Bulletin, 1/2011. Department of Agronomy, Punjab Agricultural University, Ludhiana

Borresen, T. (1997). The effect of straw management and shallow tillage/drilling on soil properties and crop yields on a loam and a silty loam soil in south-east Norway. Internal report, Department of Soil and Water Sciences, Agricultural University of Norway.

Sidhu, H.S., Singh, M., Humphreys, E., Singh, Y. Singh, B., Dhillon, S.S., Blackwell, J., Bector, V., Singh, M. and Singh, S. (2007). The Happy Seeder enables direct drilling of wheat into rice straw. *Australian J. Experi. Agric.*, **47** : 844-854.

Singh, Y., Singh, B. and Timsina, J. (2005). Crop residue management for nutrient cycling and improving soil productivity in rice-based cropping systems in the tropics. *Adv. Agron.*, **85** : 269-407.

10th Year
★★★★★ of Excellence ★★★★★