Direct seeding of wheat using Happy Seeder in paddy residue conditions in Madhya Pradesh

ABSRACT

Trials were conducted on direct sowing of wheat variety GW-322 through happy seeder in combine harvested rice fields in district Narsinghpur, Madhya Pradesh, during two successive year's viz. 2015-16 and 2016-17. The control treatment was conventional field preparation after combine harvesting of rice followed by sowing of wheat by seed cum fertilizer drill. District Narsinghpur lies in Central Narmada valley region of India. The average annual rainfall of the district is 1136 mm [1] (Yadav et.al. 2021). Soils of the district come under the *vertisol* category. Results showed that crop yield and net return under the direct sowing of wheat through happy seeder was higher than that obtained under the conventional method. Direct sowing through happy seeder fetched an average crop yield of 47.45 q/ha whereas under the conventional method it was 43.10 q/ha. The net return under direct sowing through happy seeder was Rs. 59025/- per ha whereas it was only Rs. 48850/- per ha under the conventional method. Happy seeder is an innovative technology and is being widely adopted to reduce stubble problem and conserve soil and environment. The results showed that the direct sowing of wheat through happy seeder performed better than conventional field preparation followed by sowing through conventional seed cum fertilizer drill in combine harvested rice fields.

Key words: happy seeder, wheat, direct sowing.

INTRODUCTION

Combine-harvested rice fields have heavy straw load of the crop residue. Also, there is presence of loose tough straw deposited by the harvester. It is a general practice to burn the rice stubbles in the mechanized rice–wheat systems so as to facilitate sowing of wheat. This practice leads to loss of nutrients and aids in air pollution. To get suitable machinery for direct drilling of wheat seed on such fields is a matter of concern. It is also worth mentioning that sowing wheat directly into combine-harvested rice fields without burning or removing crop residues improves soil health, reduces irrigation need and mitigates climate change effects. Paddy straw management and sowing of wheat in this short time window are challenging for farmers [2, 3 and 4] Happy seeder-a tractor-mounted implement is a promising technology in conservation agriculture. It cuts grooves in the soil, drops seed and fertilizer into the groove and covers the seeded row, all in one pass without any significant soil disturbance. Thus trials were conducted to assess the performance of happy seeder for direct sowing of wheat in combine harvested rice fields.

Trials were conducted on direct sowing of wheat var. GW-322 through happy seeder in combine harvest rice fields in district Narsinghpur, Madhya Pradesh, India in two successive years viz. 2015-16 and 2016-17 during the rabi season (five each year). District Narsinghpur lies in Central Narmada valley region of India. The average annual rainfall of the district is 1136 mm. Soils of the district come under the *vertisol* category.

MATERIAL & METHOD

Happy Seeder consists of a rotor for managing the paddy residues and a zero till drill for sowing of wheat. Flail type straight blades are mounted on the straw management rotor which

cuts (hits/shear) the standing stubbles/ loose straw coming in front of the sowing tine and clean each tine twice in one rotation of rotor for proper placement of seed in the soil. The flails pushes the residues as surface much between the seeded rows [5] The trials were conducted on combine harvested rice fields. The crop residue was left as such after the combine harvesting. No field preparation was done. Wheat variety GW 322 was directly sown on these fields with the help of happy seeder. Seed rate was kept as 100 kg / ha. During 2015-16, five trials (of direct sowing of wheat) of 1 acre each were conducted on farmers fields. Similarly during 2016-17 five trials (of direct sowing of wheat) of one acre each on other farmers fields were conducted. In the control plots conventional field preparation was done and then wheat was sown through seed cum fertilizer drill. Seed rate was maintained as 100 kg / ha.

RESULT AND DISCUSSION

During the year 2015-16 there was an incremental increase in crop yield by 7.2 quintal /ha in direct sowing through happy seeder over the conventional sowing. As the conventional planting involved field preparation hence the cost of cultivation in case of conventional planting was higher by Rs. 3500/-per ha than that in direct sowing through Happy Seeder. The average gross return per hectare was higher by Rs. 10800/- per ha.in direct sowing through happy seeder over the conventional planting. Net return in case of Conventional planting was 46300/- per ha whereas in the case of direct sowing through happy seeder the net return was 60600/- per ha. Benefit cost ratio were calculated. In case of conventional planting it was 3.32 and in direct sowing through happy seeder it was 4.67. Thus the direct sowing of wheat through Happy seeder gave better results over the conventional planting after field preparation.

Table 1: Performance evaluation of direct sowing of wheat var. GW-322 through Happy Seeder (year 2015-16)

Pigeon pea	Yield Q/ha	Average Cost of cultivation (Rs/ha)	Average Gross return (Rs/ha)	Average Net Return (Rs/ha)	Benefit Cost ratio (Average gross return /Average gross cost)
Control **:** Sowing through seed cum fertilizer drill after conventional field preparation	44.2	20000/-	66300/-	46300/-	3.32
Direct sowing through Happy Seeder	51.4	16500/-	77100/-	60600/-	4.67

Results of the trials of the subsequent year 2016-17 are presented in Table 2. The crop yield under conventional planting was 42.0 q/ha and under direct sowing through happy seeder was 43.5 q/ha. Average cost of cultivation under conventional planting was Rs. 20000/- per ha.; in case of direct sowing through happy seeder it was Rs. 16500/- per ha. Higher yield under direct sowing through happy seeder resulted in higher gross return. The Net eturn under the conventional planting was rs. 51400/- per ha. It increase by Rs. 6050/- to Rs. 57450/- per ha.

B:C ratio was 3.57 under conventional planting as compared to 4.48 under direct sown wheat. Thus during the year 2016-17 also the direct sowing of wheat through Happy seeder performed better.

Table 2: Performance evaluation of direct Sowing of wheat var. GW-322 through Happy Seeder (year 2016-17)

Wheat GW-322	Yield Q/ha	Average Cost of cultivation (Rs/ha)	Average Gross return (Rs/ha)	Average Net Return (Rs/ha)	Benefit Cost ratio (Average gross return /Average gross cost)
Control **:** Sowing through seed cum fertilizer drill after conventional field preparation	42.0	20000/-	71400/-	51400/-	3.57
Direct sowing through Happy Seeder	43.5	16500/-	73950/-	57450/-	4.48

Results of the year 2015-16 and 2016-17 were averaged and are presented in Table 3. Under the direct sowing of wheat through happy seeder there was an incremental increase in crop yield, gross return and net return by 4.35 q/ha, Rs. 6675/- per ha. andRs. 10175/- per ha respectively over the conventional sowing. The B:C ratio in case of conventional planting was 3.45 which increased to 4.58 under direct sowing through happy seeder. The average of results of two years shows that the direct sowing of wheat through happy seeder performed better. [6] Gurmeet Singh Dhillon (2016) in his Comparative evaluation of happy seeder technology versus normal sowing in wheat has reported higher yields in direct sowing through happy seeder. In their research on Happy seeder zero tillage equipment for sowing of wheat in standing rice stubbles, [7] also have reported higher yields of wheat over conventional sowing.

Table 3.Average of the 2 years 2015-16 and 2016-17

Wheat GW-322	**Yield Q/ha**	**Average Cost of cultivation (Rs/ha)**	**Average Gross return (Rs/ha)**	**Average Net Return (Rs/ha)**	**Benefit Cost ratio (Average gross return /Average gross cost)**
Control **:** Sowing through seed cum fertilizer drill after conventional field preparation	43.10	20000/-	68850/-	48850/-	3.45
Direct sowing through Happy Seeder	47.45	16500/-	75525/-	59025/-	4.58

CONCLUSION

Timely wheat sowing is a major issue in Rice-Wheat cropping system in Vertisols. Happy seeder ensures timely sowing of wheat without resorting to the convention field preparation in combine harvested rice fields. The rice crop residue remaining in the wheat sown field acts as mulch and thus gave the added benefits of crop mulching, water conservation in the wheat field. This is evident from the results obtained. The average of the two years data shows that the crop yield and net returns were higher in case of direct sowing through happy seeder. Finally the B:C ratio in the conventional planting was 3.45 which was increased to 4.58 in the direct sowing happy seeder. Low-cost informational nudges can play a major role in altering the perception of farmers and enhancing the adoption of Happy Seeder Technology (HST) [8]. Thus it can be well concluded that direct sowing of wheat through happy seeder performed better than the conventional planting in combine harvested rice fields in the Vertisols of central India region.

Disclaimer (Artificial intelligence)

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Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

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~~Details of the AI usage are given below:~~

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