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Constraints in Adoption of Laser Land Levelling Technology in Haryana

Dinesh Kumar[1], Dalip Kumar Bishnoi[2], Sonia[3]*, Dharmender Singh[4] and Joginder Singh Malik[5]

[1]District Extension Specialist, Krishi Vigyan Kendra, Sadalpur, CCS HAU, Hisar-125052, Haryana, India
[2]Assistant Scientist, [3]Ph.D. Scholar, Department of Agricultural Economics, CCS HAU, Hisar-125004, Haryana, India
[4]Ph.D. Scholar, [5]Professor, Department of Extension Education, CCS HAU, Hisar-125004, Haryana, India
*Corresponding author email id: sonialohchab123@gmail.com

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ABSTRACT

The study analyzed perceptions of farmers about laser land levelling and constraints faced by them in adoption of this resource conservation technology in Sirsa and Karnal district of Haryana. Mean percent score tool of statistics was used to rank perceptions and constraints of farmers. It was noticed that 97.00 per cent respondent farmers believed that there is reduction in irrigation cost. 80.00 per cent believed that laser land levelling adoption helped in better weed management. Also, it was examined that major constraint was non-availability of machines due to shorter window between two consecutive crops. Study of diffusion revealed that fellow farmers and relatives were major source of diffusion. 86.25 per cent of laser land levelling service provided by private players showing dominance of private investment. It was also observed that laser land levelling is a scale neutral technology because it was adopted by all categories of farmers and not biased towards large farmers. It was observed that under scheme Rashtriya Krishi Vikas Yojana (RKVY) laser leveller along with tractor and operator at a custom hiring centre (CHC) was provided at nominal rate Rs. 1075/day while Cooperatives provided laser leveller at rupees 575 per acre.

INTRODUCTION

Water scarcity along with rising temperature pausing a serious threat to agricultural livelihood and food security. Melting of glaciers are accelerated by global warming and ground water table is showing declining trend over last two decades. Declining ground water table will hamper sustainability of agriculture sector. In northern plains of Haryana and Punjab Rice-Wheat is major cropping pattern which includes water thirsty crops. Continuous upliftment of ground water for irrigation caused serious problem of water scarcity in this region. So, it felt imperative need for some resource conservation technology which can in efficient utilization of water resource. Laser land levelling is ultimate technology for climate smart agriculture. But farmers have varying perceptions regarding its potential benefits which leads to constraints in its adoption and various constraints in adoption of laser land levelling in Punjab (Larson et al., 2016).

Social network played a vital role in diffusion of technology (Nain et al., 2019). Lagged adoption of peer group effected farmer's decision to adopt laser levelling very seriously. Also, merely knowledge of technology didn't guarantee its adoption. It was observed that 98.00 per cent of farmers were in contact with at least one other fellow who has adopted laser land levelling. Still, 40.00 per cent of farmers did not adopt the technology at all. Reasons for this might be lack of credit, their land might not be suitable for laser land levelling or they wanted some more convincing results from their fellows. Further, credit constraints for laser land levelling were studied in depth and it was found that two third of farmers borrowed credit more than the cost of laser land levelling (for example- amount borrowed for fertilizer Rs. 10000 could be used to laser level 13 acres of field). Study did not find any significant impact on adoption process by type of relationship a farmer has like a relative or plot neighbourer or a

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knowledgeable farmer who had adopted earlier. But still study concluded that large and knowledgeable farmers created large spill over effect in adoption and most of farmers follow them. Adoption of laser land levelling in Karnal was out of total 621 respondents, 339 (about 55.00%) were found adopters of laser land levelling (LLL) and out of these 339 adopters only 103 (30.00%) respondents had adopted laser land levelling on full-scale while remaining 236 (70.00%) of respondents had adopted laser land levelling on partial scale (Aryal et al., 2018) . Hence, keeping all previous researches in mind study focused on assessing constraints in adoption of this resource conservation technology.

METHODOLOGY

The study was conducted in Karnal and Sirsa districts of Haryana. Purposive and multistage random sampling technique was used for the selection of districts and villages on the basis of highest area under paddy-wheat and cotton-wheat pattern, respectively in Haryana. From each districts, two blocks were selected at random. Further, twenty (20) adopters were taken randomly from each selected block. To work out the constraints, diffusion pattern, perception of farmers regarding technology, different category of farmers, etc. of laser land levelling practices in paddy-wheat and cotton-wheat cropping pattern for crop year 2019-20 were collected by conducting personal interview from selected paddy-wheat and cotton-wheat growers on pretested interview schedule. For analysis, multiple responses of targeted farmers were recorded on three point continuum scale, having three weights i.e., very serious constraint with score 3, serious constraint with score 2, somewhat serious constraint with score 1. Then, these scores for each constraint from all respondent farmers in adoption of laser land levelling technology were added and analyzed through two statistical techniques namely mean score and mean per cent score.

RESULTS AND DISCUSSION

Among sampled farmers 30 per cent of adopters were from small farmer category while 25.00 per cent of farmers belonged to large farmer category. Whereas, 23.75 per cent farmers belonged to marginal farmers and 22.50 per cent of sample farmers belonged to medium category respectively. It showed that adopters were equally from each category of land holding size showing scale neutrality and non-biasedness of laser land levelling towards large farmers. Lybbert et al., (2012) in their study observed similar results. There were different costs of hiring of laser leveller under various agencies. Private individuals charges Rs. 800-950 per hour. While, custom hiring charges from cooperatives society was Rs. 575 per acre. Under Government scheme *i.e.* Rashtriya Krishi Vikas Yojna, Engineering Department provided laser leveller at Rs 1075 per day in the study area.

Constraints in adoption

The perusal of Table 1, more than eighty per cent farmers stated that non- availability of machine due to shorter window between two consecutive crops was major constraints followed by orthodox mind set of farmers because they don't know potential benefits and also reluctant to change (76.70%), high cost of levelling (73.60%), lack of training for operation of machine (52.20%), lack of awareness (44.20%) and last one is small size of holding (40.60%) were identified some of the major constraints which inhibiting the adoption of laser land levelling at more faster rate among the famers of the state. Thakar et al., (2009); Kumar et al., (2017) & Gireesh et al., (2019) found that lack of knowledge and non-availability of machines were some major constraints in adoption of laser land levelling. Gill (2014) & Far et al., (2014) also reported high cost of levelling and small size of holding are the major constraints in their respective study on laser land levelling.

Table 1. Constraints in adoption of laser land levelling

Constraints	Mean Score	Mean Percent
Non–availability of machines due to shorter window between two consecutive crops	2.4	81.10
Orthodox mindset because lack of knowledge of potential benefits	2.3	76.70
High cost of levelling	2.2	73.60
Lack of training for operation of machine	1.6	52.20
Lack of awareness	1.3	44.20
Small size of holding	1.2	40.60

Perceptions of adopters regarding laser land levelling technology (multiple responses)

The results of the Table 2 revealed that 97 per cent of the respondent farmers believed that there was a reduction in irrigation cost due to adoption of laser land leveller followed by 80per cent of farmers believed that it helps in better weed management, 70 per cent of the respondents believed that laser leveller increased the productivity of various crops while 37.50 per cent farmers believed that laser leveller helped in reduction of fertilizer cost. Only 22.50 per cent of respondent farmers stated that due to the adoption of laser leveller there is uniform crop stand resulted better yields with lesser amount of fertilizers. Singh et al., (2020) reported that reduction in various cost like fertilizers, weed management, etc. were the major benefits of laser land technology. Ahmad et al., (2001); Kumar et al., (2010) & Nain et al., (2019) also found productivity enhancement as the main perception of farmers regarding the benefits and use of new technology in their respective studies.

Diffusion pattern of laser land levelling technology in Haryana

It is evident from the Table 3 that 50 per cent of farmers came to know about technology from fellow farmers followed by 27.50 per cent of respondents came to know about the technology from their friends or relatives, 10 per cent of farmers from

Table 2. Perceptions of adopters regarding benefits of laser land levelling in Haryana (Multiple response)

Particulars	Frequency (%)
Reduction in irrigation cost	76 (97.00)
Better weed management	64 (80.00)
Increase in productivity	56 (70.00)
Reduction in fertilizer cost	30 (37.50)
Uniform transplanting in less time and labour	18 (22.50)

Table 3. Diffusion pattern of laser land levelling technology and available providers of technology in Haryana

Particulars	Frequency (%)
Fellow farmer	40 (50.00)
Friends/relatives	22 (27.50)
Co-operative society	08 (10.00)
Kisan mela	07 (08.75)
Others (seminars, campaigns, TV, radio)	03 (03.75)
Types of laser land levelling service providers	
Private (other farmer)	69 (86.25)
Self-owned	08 (10.00)
Government	02 (02.50)
Cooperative	01 (01.25)

cooperative society and 8.75 per cent of farmers in Kisan Mela. Other sources (seminars, campaigns, TV, radio) had least role in the diffusion of this technology with the per cent contribution of 3.75 per cent in the study area. Aggarwal et al., (2010) & Jat et al., (2021) found that diffusion of the technology was mainly through fellow farmers and friends/relatives. Baliwada et al., (2017); Kumari et al., (2019) & Mishra et al., (2022) also reported that fellow farmers, friends and relatives played major role in the diffusion of new technology in their respective research.

Contribution of various sectors/agencies in providing laser land levelling service was evident from the table that 86.25 per cent of laser land levelling service provider were private players showing dominance of private sector. Whereas, only 10.00 per cent of respondent farmers have self-owned laser leveller, while cooperative sector and government agencies have only 2.50 and 1.25 per cent share in laser land levelling service respectively. Hosseini et al., (2014) in their research "The perception of farmers about laser land levelling as an appropriate technology in agricultural sector of Iran" found that self-owned, private, government and cooperative are the types of laser land levelling service providers. Naresh et al., (2014); Das et al., (2014); Kumar & Kumar (2019) supported the results through similar findings in their respective research.

CONCLUSION

The laser land levelling is a scale neutral resource conservation technology adopted by all categories of farmers. Majority of farmers believed that it helped in reduction of irrigation cost and improvement in fertilizer use efficiency. Therefore, agricultural extension workers should disseminate benefits of laser land levelling towards farmers. Also, Government should promote schemes like Rashtriya Krishi Vikas Yojna under which custom hiring centers (CHCs) are made in each district to promote mechanization. There is need to encourage the farmers' cooperatives at block/village level through providing government financial assistance in the form of subsidy (up to 90%) on laser land leveller along with tractor so that accessibility of laser land leveller may be increased during peak hours.

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