



KNOWLEDGE AND PERCEPTION OF FARMERS ABOUT LASER LAND LEVELLING TECHNOLOGY

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ABSTRACT

The present study was conducted purposively in Raichur (Sindhur), Koppal (Gangavathi), Gulbarga and Bellary districts of Karnataka state during 2013-2014. List of farmers who have adopted the laser land levelling technology was obtained from the farm power and machinery department of College of Agricultural Engineering, Raichur and all the farmers who adopted laser land levelling technology were contacted personally. The data was collected from the respondents using structured pretested interview schedule and was analyzed using appropriate statistical tools. The results of the study revealed that, majority (72.88 %) of the farmers belonged medium knowledge category with respect to laser land levelling technology. With regard to individual aspects of laser land levelling technology, majority of the respondents were having full knowledge regarding labour saving in sowing and harvesting and knowledge about various advantages of the technology on crop cultivation followed by preliminary land preparation operations required before using the technology for proper levelling and knowledge regarding reduction in cost of cultivation and suitability of the technology to the dry land farmers for proper rain water use). Majority (86.44 %) of the respondents correctly perceived Laser leveling facilitates various field operations efficiently like use of cone weeder *etc.* Majority of the respondents expressed that, laser land levelling technology helps in saving of 2-3 irrigation water and less water is required for irrigating for more area as the major advantage. High cost of the equipment which cannot be maintained by small farmers and technology is not suitable for small land holdings were the major constraints experienced by the majority of the respondents. Majority (86.44 %) of the respondents expressed that laser land levelling increases cultivable area due to removal of bunds. Hence administrators, policymakers and extension agencies involved in agricultural extension services should take necessary action to provide subsidy on laser land leveller and create awareness among the farming community through intensive extension educational activities for adoption of laser land levelling technology.

KEY WORDS: Knowledge, Laser land leveling technology and Perception.

INTRODUCTION

Uneven soil surface has a major impact on the germination, crop stand and yield of crops due to inhomogeneous water distribution and soil moisture. Therefore, land levelling is a precursor to good agronomic, soil, and crop management practices. Furthermore, resource conservation technologies perform better on well-leveled and laid-out fields. Effective land levelling optimizes water-use, improves crop establishment, reduces the irrigation time and the effort required to manage the crop. It reduces the work in crop establishment and crop management, and increases the yield and product quality. Laser levelling systems are commonly used in agricultural applications. Before the levelling process can start, the fields must be to be plowed and a topographic survey undertaken, in most situations. Depending on the amount of soil that must be cut, it may be necessary to plow during and after the levelling operation, as well. An optimal combination of instruments for laser land levelling exists with Laser Sensor, Control Panel and laser beam projector. Laser beam projector is mounted on a tripod and placed in a central point of the field. This allows the laser beam to sweep unobstructed above the tractor. The laser beam of the projector is detected by the Laser Sensor, which is

mounted on the mast attached to the drag bucket. It transmits the signals to the Control Panel, which controls the level of the machine and operates the hydraulic valves. With the hydraulic valves the levelling bucket can be raised and lowered. The desired rate at which the bucket has to be raised and lowered depends on the operating speed. The faster the ground speed, the faster the bucket will need to be adjusted. Once a field has been leveled, plowing techniques must be changed to keep it level. The important advantages of laser land levelling technology are no waste of water to check the field level, reduced operating time, increased productivity and precisely levelled and smooth soil surface. Even though laser land levelling technology is advantageous knowledge and adoption of the technology by farmers is very low. No studies have been conducted to know the knowledge, adoption and perception of farmers about laser land levelling technology.. Hence the present study was conducted with the following objectives *i.e.* study the knowledge level of the farmers about laser land levelling technology, to know the benefits of the technology as perceived by the farmers, know the perception of the farmers about the technology and to elicit the constraints faced by the farmers in use of the technology

METHODOLOGY

The present study was conducted purposively in Raichur (Sindhur), Koppal (Gangavathi), Gulbarga and Bellary districts of Karnataka state coming under the jurisdiction of University of Agricultural Sciences, Raichur during 2013-2014. List of farmers who have adopted the laser land levelling technology was obtained from the farm power and machinery department of College of Agricultural Engineering, Raichur and all the farmers who adopted laser land levelling technology were contacted personally. The data was collected from the 59 respondents using structured pretested interview schedule.

The collected data was analyzed using appropriate statistical tools like mean, frequency, percentage etc.

RESULTS & DISCUSSION

Knowledge level of farmers about laser land levelling technology

The results presented in table 1 revealed that, majority (72.88 %) of the farmers belonged medium knowledge category with respect to laser land levelling technology followed by low (15.25 %) and high (11.86 %) knowledge categories respectively.

TABLE 1: Overall knowledge level of respondents about laser land levelling technology

Sl. No.	Categories	Frequency	Percentage
1	Low	9	15.25
2	Medium	43	72.88
3	High	7	11.86

With regard to individual aspects of laser land levelling technology, majority (74.58 %) of the respondents were having full knowledge regarding labour saving in sowing and harvesting and Knowledge about various Advantages of the technology on crop cultivation (72.88 %) followed by Preliminary land preparation operations required before using the technology for proper levelling and Knowledge regarding reduction in cost of cultivation (69.49 %), Suitability of the technology to the dry land farmers for proper rain water use (66.10 %), Suitability of the technology to the land holding on custom hiring basis

(59.32 %) and Time required for levelling of one acre of land (Minimum 2hrs per acre) (55.93 %). It might be due better educational status of the respondents, frequent contact of respondents with extension agencies and extension personnel and also during data collection it was revealed that majority of the respondents adopted laser land levelling technology since 2-3 years. The University of Agricultural Sciences Raichur is also promoting the technology through creating awareness among the farming community for better knowledge and adoption of the technology (Table 2).

TABLE 2: Knowledge of the respondents about laser land levelling technology n=59

Sl. No	Particulars	Knowledge					
		Full knowledge		Partial knowledge		No knowledge	
1	Suitability of the technology to the land holding on custom hiring basis	35	59.32	17	28.81	7	11.86
2	Suitability of the technology to the dry land farmers for proper rain water use	39	66.10	11	18.64	9	15.25
3	Preliminary land preparation operations required before using the technology for proper levelling	41	69.49	13	22.03	5	8.47
4	Knowledge about adjustment techniques of the laser land level technology to the suitable land levelling	27	45.76	23	38.98	9	15.25
5	Knowledge about uses of different components of the laser land technology in different land situation	37	62.71	14	23.73	8	13.56
6	Time required for levelling of one acre of land (Minimum 2hrs per acre)	33	55.93	19	32.20	7	11.86
7	Knowledge about various Advantages of the technology on crop cultivation	43	72.88	9	15.25	7	11.86
8	Knowledge regarding reduction in cost of cultivation	41	69.49	13	22.03	5	8.47
9	Labour saving in sowing and harvesting	44	74.58	7	11.86	8	13.56

Well over one third (38.98 %) of them belonged to partial knowledge category with regard to knowledge about adjustment techniques of the laser land level technology to the suitable land levelling followed by time required for levelling of one acre of land (minimum 2hrs per acre) (32.20 %), suitability of the technology to the land holding on custom hiring basis (28.81 %), knowledge about uses of different components of the laser land technology in different land situation (23.73 %) and preliminary land

preparation operations required before using the technology for proper levelling and knowledge regarding reduction in cost of cultivation (22.03 %). Hosseini *et al.*, (2014) also reported that, the respondents were having knowledge regarding appropriate time of laser land levelling and advantages of laser levelling (4.32) followed by knowledge about laser land levelling equipment (4.25) and different methods of farm levelling (4.20).

Perception of farmers about laser land leveling technology

It is clear from the table 3 that, majority (86.44 %) of the respondents correctly perceived Laser leveling facilitates various field operations efficiently like use of cone weeder etc followed by Laser leveling helps for top soil management by incorporating of crop residue in soil and Laser leveling enhances the water holding capacity of the soil (79.66 %), It enriches the marginal return of the produce by reducing injudicious application of nutrients (77.97 %), Laser land leveling helps in uniform transplanting of paddy crop with less labour and time (76.27 %), laser land leveling helps in increase in cultivable area due to removal of bund and boarder cleaning, laser leveling reduces the weed problem due to proper tillage, laser leveling increases the crop yield and laser leveling reduces the soil erosion due to scientific slope provision (72.88 %) and laser leveling increases the infiltration rate of the soil, laser leveling saves manual

energy and laser leveling is suitable for rainfed eco-system for better rain water harvesting and moister conservation (67.80 %).

Two fifth (44.07 %) of the respondents not perceived correctly regarding laser land leveling increase the pest and disease resistance capacity of the crop followed by laser land leveling reduces the cost of cultivation involved in crop production and laser land leveling helps in maintaining uniformity in crop maturity (37.29 %), it is not suitable for small land holdings due to small area operation cost will be more (33.90 %), laser leveling is suitable for rainfed eco-system for better rain water harvesting and moister conservation (32.20 %) and Laser leveling saves manual energy (32.20 %). Hosseini *et al.*, (2014) revealed that, opinion of respondents about role of land levelling technology was highly positive, while decreasing water waste was determined to be relatively positive (mean=3.98).

TABLE 3: Perception of farmers about laser land leveling technology

n=59

Sl. No.	Perception	Response	
		Perceived	Not perceived
1	Laser land leveling helps in uniform transplanting of paddy crop with less labour and time	76.27	23.73
2	Laser leveling enhances the water holding capacity of the soil	79.66	20.34
3	Laser leveling increases the infiltration rate of the soil	67.80	32.20
4	Laser leveling increases the crop yield	72.88	27.12
5	Laser leveling reduces the soil erosion due to scientific slope provision	72.88	27.12
6	Laser leveling facilitates various field operations efficiently like use of cone weeder etc	86.44	13.56
7	It enriches the marginal return of the produce by reducing injudicious application of nutrients	77.97	22.03
8	Laser leveling saves manual energy	67.80	32.20
9	Laser leveling reduces the weed problem due to proper tillage	72.88	27.12
10	It helps in maintaining uniformity in crop maturity	62.71	37.29
11	Laser leveling helps for top soil management by incorporating of crop residue in soil	79.66	20.34
12	Laser leveling is suitable for rainfed eco-system for better rain water harvesting and moister conservation	67.80	32.20
13	Laser land leveling increase the pest and disease resistance capacity of the crop	55.93	44.07
14	Laser land leveling helps in increase in cultivable area due to removal of bund and boarder cleaning	72.88	27.12
15	It reduces the cost of cultivation involved in crop production	62.71	37.29
16	It is not suitable for small land holdings due to small area operation cost will be more	66.10	33.9

TABLE 4: Advantages of laser land levelling technology as expressed by the respondents n=59

Sl. No.	Advantages	Laser land leveling technology	
		Freq.	Per.
1	Helps in Saving of 2-3 irrigation water and less water is required for irrigating for more area	57	96.61
2	Saves labour involved in levelling of the field	43	72.88
3	Increased yield	39	66.10
4	Reduced weed growth	45	76.27
5	Reduced runoff, soil erosion and uniform water availability	33	55.93
6	Increased cultivable area and uniform crop growth	29	49.15

Advantages of laser land levelling technology as expressed by the respondents

It can be observed from table 4 that, majority (96.61 %) of the respondents expressed that, laser land levelling technology helps in saving of 2-3 irrigation water and less water is required for irrigating for more area as the major advantage followed by Reduced weed growth (76.27 %), Saves labour involved in levelling of the field (72.88 %), Increased yield (66.10 %), Reduced runoff, soil erosion and uniform water availability (55.93 %) and Increased cultivable area and uniform crop growth (49.15 %). savings in irrigation water is due to the fact that, land is leveled scientifically in laser land levelling which facilitates in uniform moisture distribution in the field without any stagnation of water and reduces runoff.

Constraints faced by the farmers in using the technology

It is evident from table 5 that, high cost of the equipment which cannot be maintained by small farmers and

technology is not suitable for small land holdings were the major constraints experienced by the majority (62.71 %) of the respondents followed by lack of information and advisory services about the crop production technology among the farmers (61.02 %), Difficulty in preparation of land before using laser land leveling machine (55.93 %) and Training required for operation of laser land leveling machine (49.15 %). The cost of the equipment is high and as a result it is difficult for each and every farmers to maintain it and also parts of the equipments are not locally available in the area. These might be the probable reasons for the above findings. Naresh *et al.*, (2014) reported that, Although, laser land leveling is beneficial, there are certain limitations associated with it such as high cost of the equipment/laser instrument and need for a skilled operator. It may be less efficient in irregular and small sized fields.

TABLE 5: Constraints faced by the farmers in using the technology

Sl. No.	Constraints	n=59	
		Frequency	Percentage
1	High cost of the equipment which cannot be maintained by small farmers	37	62.71
2	Training required for operation of laser land leveling machine	29	49.15
3	Difficulty in preparation of land before using laser land leveling machine	33	55.93
4	Lack of availability of spare parts of the machine in various location	17	28.81
5	Lack of information and advisory services about the crop production technology among the farmers	36	61.02
6	Technology is not suitable for small land holdings	37	62.71

TABLE 6: Comparison between traditional and laser land levelling technology

Sl. No.	Particulars	Laser land levelling technology		Traditional land levelling technology		Reasons
		Freq.	Per.	Freq.	Per.	
1	Increased cultivable land	51	86.44	8	13.56	Due to removal of bunds
2	Increased yield	43	72.88	16	27.12	Due to increased cultivable land and uniform moisture availability
3	Decrease in cost of cultivation	45	76.27	14	23.73	Reduction in the manual labour and reduction in 2-3 irrigations
4	Decrease in number of irrigations required in crop production	33	55.93	26	44.07	Due to scientific slope provided in laser land levelling

Comparison between traditional and laser land levelling technology as expressed by the farmers

It is clear from the results presented in table 6 that, majority (86.44 %) of the respondents expressed that laser land levelling increases cultivable area due to removal of bunds. Majority (72.88 %) of the respondents expressed that laser land levelling increases yield when compared to traditional levelling due to increased cultivable land and uniform moisture availability, slightly more than three fourth (76.27 %) of the respondents expressed decrease in cost of cultivation in laser land levelling technology due to reduction in the manual labour and reduction in 2-3 irrigations and more

than half (55.93 %) of them expressed that laser land levelling decreases number of irrigations required in crop production due to scientific slope provided in laser land levelling. Study conducted by Abdullaev *et al.*, (2007) revealed that, the yield difference between laser leveled and “control” fields was 8 per cent in 2004, increased to 59 per cent in 2005 and 27 per cent in 2006. In all 3 years, the laser field had consistently higher crop yields. Further, it was also revealed that, the net income analysis shows that compared to the control field, there were some cost savings in the laser field related to tillage, labor, and irrigation water, while there were

additional costs due to laser leveling and ripping, pesticides, transportation and taxes on additional output.

CONCLUSION & IMPLICATIONS

It can be concluded from the above results that, Majority of laser land levelling practicing farmers belonged to full knowledge category with respect to Labour saving in sowing and harvesting, Advantages of the technology on crop cultivation and Preliminary land preparation operations required before using the technology for proper levelling. With respect to overall knowledge, majority of them belonged to high knowledge category, followed by low and medium categories. Savings in 2-3 irrigations and less water for more area, Reduced weed growth, increased yield and increased cultivable area are the major advantages of the laser levelling technology. Increased yield, Decrease in number of irrigations required in crop production, less water requirement reduced weed growth and decrease in number of weedings and increase in cultivable area are the major advantages of the laser land levelling as perceived by respondents. Technology is not suitable for small land holdings, High cost of the equipment which cannot be economically affordable for small farmers, Lack of information and advisory services about the crop production technology among the farmers and Difficulty

in preparation of land before using laser land leveling machine were the major constraints experienced by the majority of the respondents. Hence administrators, policymakers and extension agencies involved in agricultural extension services should take necessary action to provide subsidy on laser land leveller and create awareness among the farming community through intensive extension educational activities for adoption of laser land levelling technology.

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