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Laser Land Leveling: A Strategy for Water Resource Management in Agriculture



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Abstract

India is an agrarian country as seventy percent of its population is directly or indirectly dependent on agriculture. With increase in population the demand of food grains also increased manifold making it difficult to sustain such a huge population. Green Revolution, which was introduced to make India self-sufficient in food, led to many new inventions in agriculture sector such as increasing land under irrigation, new seed, machinery etc. Punjab was the state which gave best results from this revolution and soon came to be known as India's 'bread basket'. There is still need to improve productivity which can be achieved through better management of available resources. Laser land leveling is one of the latest techniques which helps in the management of water and soil by reducing the amount and time required for irrigation. Present study sheds light on the advantages of using a laser land leveler and the perceptions of farmers regarding the benefits as well as problems faced by them in its usage. Data was collected through interviews, focused group discussion and schedule.

Keywords : Resource Management, Laser Land Levelling, Laser Land Leveler

Introduction

Agriculture is one of the oldest occupations of human beings. Humans settled near the river banks where agriculture was possible because of fertile soil and accessibility to water. This assured the availability and access to food throughout the year. With increase in population the demand of food grains has also increased worldwide. The pressure to meet the requirement of food grains has increased the pressure on the natural resources such as soil and water. Agriculture is not only limited to feeding the growing population of the world but in the time of globalization and liberalization it is one of the major contributor to the economy of any country.

India is an agrarian country as seventy percent of its population is directly or indirectly dependent on agriculture. Green Revolution was introduced in order to improve the productivity of crops and making India surplus in food grains. Green Revolution led to many new inventions in agriculture sector such as increasing land under irrigation, new seed, machinery etc. All these measures have led to bringing more area under agriculture and increase in productivity.

Punjab was the state which gave best results from this green revolution and became India's 'bread basket'. High yielding varieties of wheat and paddy were introduced in Punjab. The impact was spectacular, between 1965-66 and 1970-71 per hectare yield of wheat doubled from 1104 Kg/ha in 1965-66 to 2238 Kg/ha in 1970-71 (GoP 1997). Agriculture in Punjab was dependent on irrigation facilities, tube wells were dug and canal irrigation was provided to farmers. Paddy cultivation has resulted in the depletion of ground water because paddy being a very high water consuming crop requires large quantities of water. Water for paddy was pumped out from ground. Fields were carved manually with the help of machines so that more area could be brought under paddy. By 2012 sub-surface water in some area dropped by 70 to 90 feet (Singh and Ganeshwari 2014). Water is a precious resource of agriculture for production of crops, so proper emphasis should be taken to properly manage the ground water which is used for crop production.

Unevenness of the agriculture land is one of the major reasons behind degradation of ground water. It also adversely impacts crop

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production and increases the cost of input. Land leveling is one of the latest techniques which help in the management of water and soil. It reduces the amount and time required for irrigation. With the help of this technology land can be leveled with less effort and in a very short time. This 'Laser Land Leveling' is done with the help of Laser Land Leveler.

Objectives of the Study

1. To understand the working and scope of Laser Land Leveler.
2. To know the benefits of using Laser Land Leveler.
3. To know about the problems faced by farmers in using Laser Land Leveler.

Review of Literature

Laser land leveling is a new and advanced technique introduced in the field of agriculture. A few researchers have studied the use and impact of laser leveling in India. Jat and Chandana (2004) have studied how laser land leveling has helped in increasing the land under agriculture. Rajput and Patel (2003) have studied the impact of laser land leveling on the plot size of both wheat and rice. It was found plot size of wheat increased from 50 x 12 m to 50 x 20 m after precision leveling and in rice it increased from 50 x 25 m to 50 x 50 m. Jat et al. (2003) have concluded in their studies that agricultural yield has increased with use of laser land leveler. Studies have also found that there was improvement in application and distribution efficiency of irrigation water (Sattar et al. 2003) and that there is an increase in net return from crops in laser land levelled fields (Choudhary et al. 2002). From the above discussion we can conclude that several scholars have focused on the advantages of laser land levelling technique. The main aspects which are still untouched are perspective of the farmers regarding laser land leveling, obstacles in use of laser land leveling and the role of government to promote this technique for marginal farmers.

Methodology

Present study was conducted through schedules for which a sample of hundred farmers was taken. Sample was taken from agricultural fest held at Ludhiana on March 20 and 21, 2015. This place was chosen to collect sample because farmers from all over the Punjab were present over there, as a result of which it was easier to collect adequate sample for the study. Informal interviews and focused group discussion was also carried out.

What Is Laser Land Leveling?

Laser Land Leveling is the process of leveling the agricultural land with the help of Laser Land Leveler. Laser beam are used for the purpose of leveling. Laser beams are emitted by the transmitter, fixed on the tripod stand which is normally placed in the centre of the field, it emits the rays in 360°. This beam is received by the receiver fitted on pole of Laser Leveler machine. The signals received by receiver helps in adjusting the height of the machine from the ground, which helps in cutting and filling of the land according to the changes required. Height of the machine is adjusted by the hydraulic cylinder at

the rear of machine. Hydraulic valves control the flow of oil to hydraulic cylinder for height adjustments, whereas hydraulic valves act according to the signals received at the receiving station.



Advantages of Land Laser Leveler

There is a wide scope for the use of Land Laser Leveler in agriculture practices. This is because leveled fields are required for the purpose of growing crops. So it can be used to:

Bring new land under cultivation

Bringing new land under agriculture is an uphill task. It is an exhausting work which requires plenty of time and high skill. Mainly high elevated land is left fallow because it is difficult to take water for irrigation to that height. So first height is reduced and then it is leveled. Leveling elevated land with the help of Land Laser Leveler is quite easy, which otherwise would have been very time consuming.

Leveling the Land that is already Under Cultivation

Usage of various agricultural implements such as disk harrow, tillers, rotavator etc. results in undulation of fields. These undulations result in decrease in yield, increase in consumption of water, uneven moisture in field, etc. So to overcome these problems fields are leveled using Laser Land Leveler.

Creating Some Slope in Field or Improvement of Drainage

Some crops require very less water such as guar, cotton, lentil etc. and these crops die with excessive water. So well drained fields are required for the cultivation of these crops which can be easily achieved with the help of this new technology. Laser Land Leveler has the option of creating slope in the field and that too with high accuracy.

Benefits of Using Laser Land Leveler: Farmers' Perception

Laser Land Leveler has been in use from last 5-6 years and is very beneficial. Leveled fields are one of the major requirements for good productivity, less effort and prosperity of the farmers. Data was collected from the farmers through interviews and schedules to know in which ways Laser Land Levelers

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are helpful to them (Table 1). During the field work it was found that that eighty-four percent of the farmers were of the view that laser land leveling helps in efficient use of water and less amount of water is required for irrigation purposes. They added that with the help of laser land leveling water is evenly distributed in the fields which reduces the time required for irrigation. According to the farmers if the field is uneven than its takes longer time to irrigate the field. This is because more water is going to be stored in the low lying pockets and more amount of water is required to ensure that the upper rising parts in the field also receive irrigation.

When asked if laser land leveling has any impact on the crop yield also,seventy-seven percent of farmers responded yes. According to them the land which is leveled with the help of laser leverhad higher crop yield because the nutrients which are added to the crop are evenly distributed all over the crop and the water distribution is also even which helps in increase in production of a crop.Sixty-five percent of the farmers were of the view that crop in the land which is leveled with laser lever matures evenly. They added that even maturity of crop also helps in increase in production of the crop and higher returns to the farmers.

Table 1.1

Benefits of Laser Land Leveling

Response	YES(in%)	NO(in%)
Efficient and less useofwater	84	16
Higher crop yield	77	23
Uniform maturity of crops	65	35
Lesstimerequiredforirrigatin	84	16
Fuel and electricity saving	73	27
Uniform moisture in field	72	28

Source: Fieldwork, 2015

Hurdles in Using Laser Land Levelers

Using Land Laser Leveler is not an easy task. This is one of the advanced technologiesthat are being used in the field of agriculture. So these technologies are expensive to use and are difficult to handle. Following hurdles were mentioned by the respondents:

High cost

Ninety percent of the respondents were of the view that Laser Land Levelers are very costly to buy. It costs about INR 2.5 Lakhs and hence it is not possible for every farmer to buy and use it. Subsidy provided by the government is also very less. For the operation of Laser Leveler one also needs a tractor with 55-60 Hp which further adds to the cost of operation.

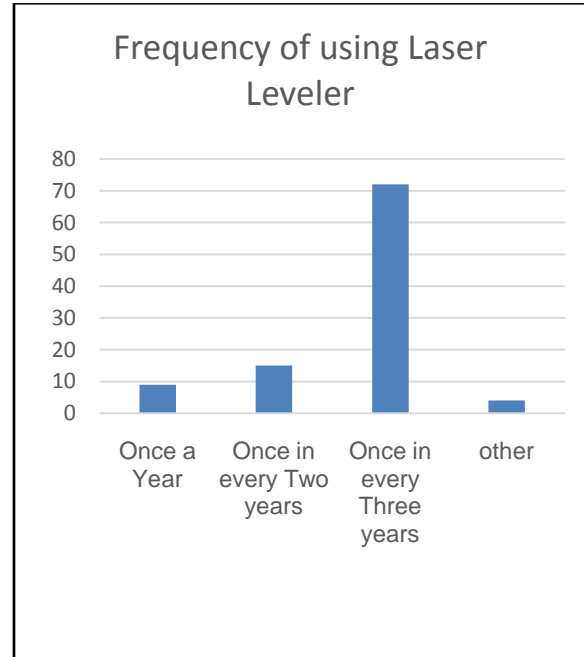


Figure 1.1

Hiring Laser Land Leveler is also a very costly affair as seventy-one percent respondents mentioned inability to afford hiring them at the rate of INR 1200-1500 per hour. As a result, they most of the farmers use laser leveler after every three years (Figure 1.1).

Possibility of Technical Errors

Sixty-five percent respondents said that Laser transmitter and receiver used in Laser Land Leveler are electronic devices which sometimes lead to technical problems. These technical glitches may result in error in leveling of land;as a result, land will not be leveled. Laser transmitters and receivers are not manufactured in India but are imported from abroad. As a result, the repair work is also very costly (Figure 1.2).

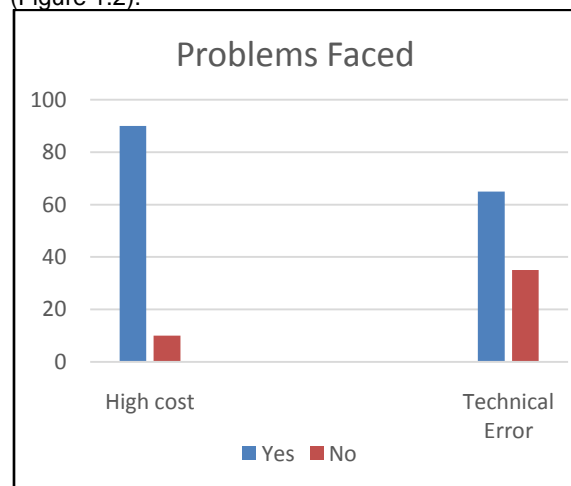


Figure 1.2

Conclusion

Natural resources are of great importance to all the living beings on the earth. Humans with their insatiable greed have exploited the resources in such

a way that now they require conservation. Land leveling is a new technology which can help conserve water. It is extremely beneficial for the farmers as well as it helps to increase crop productivity and reduces the input cost of crops. So government should promote land leveling and should increase the subsidies. Awareness workshops aimed at educating the farmers about the benefits of using this technology also need to be held.

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