

## Laser land leveling: A Water Saving Technology

**Rajkumar R. Halidoddi<sup>1\*</sup>,  
Anilkumar T. Dandekar<sup>2</sup>,  
J. Vishwanatha<sup>3</sup> and  
A.V.Karegoudar<sup>3</sup>**

<sup>1</sup>Directorate of Research office,  
UAS, Raichur, Karnataka

<sup>2</sup>Agricultural College, Mandya,  
UAS, Bengaluru, Karnataka

<sup>3</sup>AICRP on Management of Salt  
Affected Soils, A.R.S.  
Gangavathi, UAS, Raichur



\*Corresponding Author

**Rajkumar R. Halidoddi\***

E-mail: halidoddiraju@gmail.com

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### INTRODUCTION

India has invested heavily in the development of irrigation water resources from a mere 26 million hectares in 1952 to more than 92.7 million hectares during 2004-05. However, there is a wide gap (10 mha) between the created (92.7mha) and utilized (82.7 mha) irrigation potential in the country. This gap is mainly due to inefficient water management. It is estimated that only by bridging the gap; an additional area of about 10 million hectares can be brought under assured irrigation - leading to an additional food grain production of about 60 million tonnes per annum. Most of the area in the country is irrigated by surface application methods such as flood irrigation, check basin, border strip and furrow irrigation. The application efficiency of these methods has been found to be only 30 to 50 percent as compared to attainable level of 60 to 80 percent. This is due to the mismatch in water application methods with the stream size, soil type, field size, and slope etc. In surface irrigation, land leveling is essential for high application efficiency that ensures high water-use efficiency and crop yield. Conventional methods of land leveling are good enough to meet only the partial requirement of land leveling. It still leaves the scope of improvement in land leveling in the field. The use of laser technology in the precision land leveling is of recent origin in India. It not only minimizes the cost of leveling but also ensures the desired degree of precision. Modern laser guided land levelers have proved to be better equipment for precision land leveling.

Furrow irrigation systems need a slight but uniform slope to use water most efficiently. Laser leveling can reduce water use by 20-30% and increase crop yields by 10-20%. Zero-slope fields can be flushed or drained more quickly. Level fields allow for a more uniform flood depth, using less water and reducing pumping costs.

Benefits from precision leveling of land extend for many years, although some minor land smoothing may be required from time to time due to field operations and weather conditions. Laser-controlled precision land leveling helps to:

- Save irrigation water
- Increase cultivable area by 3 to 5% approximately
- Improve crop establishment
- Improve uniformity of crop maturity
- Increase water application efficiency up to 50%
- Increase cropping intensity by about 40%.
- Increase crop yields (wheat 15%, sugarcane 42%, rice 61% and cotton 66%)
- Facilitate management of saline environments
- Reduce weed problems and improve weed control efficiency
- Maintain salinity levels

In laser land leveler, the hydraulic operation is controlled automatically by a laser beam receiver mounted on leveler that receives signals from laser transmitter for a pre-designated slope in longitudinal/ transverse or in both the directions. As a result, operator's skills do not matter in achieving the quality of land leveling. Declining water table, non availability of canal water to tail end farmers of the command and deteriorating soil health are the major concern for sustainable agriculture in Tungabhadra command area. Thus, proper emphasis should be given on the management of irrigation water resources. Laser land leveling is one of the available options that promote efficient application of water and is a prerequisite to the reclamation of saline soils.

With the target of completing 50 acres of laser land leveling during this season at Agricultural research station, Gangavati, one laser leveling machine from UAS, Raichur has been procured and the laser leveling work has been initiated. As on now, 5 acres salinity blocks and 10 acres normal soils blocks of Agricultural research station, Gangavati was made ready to take up the research work.

Keeping in view the advantages of laser leveling in TBP area, the extension work has been initiated at farmers field during 2012-13 by All India Co-ordinated Research Project (AICRP) on Management of salt affected soils and use of saline water in Agriculture scheme, Agricultural research station (A.R.S), Gangavati. Many training programmes and hands on training were conducted on laser leveling and its benefit in the command area for the young farmers and students at A.R.S Gangavathi. In initial years, the demonstrations works were carried in six farmer's field in an area of twenty two hectares in command area. With the effect of extensive field demonstrations and training programmes conducted during the years, at present 105 farmers have adopted laser leveling technology in their 348 hectares of land. As per the feedback from these farmers, the following points were noted.

- Water saving will be more
- Uniform crop growth
- Equal distribution of water
- Water logging can be avoided
- Laser leveling should be included under the state government subsidy scheme

Laser land leveling is one such important technology for using water efficiently as it reduces irrigation time and enhances productivity not only of water but also of other non-water farm inputs. It does not only minimize the cost of leveling but also ensures the desired degree of precision. It enables efficient utilization of scarce water resources through elimination of unnecessary depression and elevated contours (Naresh et al., 2011). It has been noted that poor farm design and uneven fields are responsible for 30% water losses (Asif et al., 2003). Precision land leveling (PLL) facilitates application efficiency through even distribution of water and increases water use efficiency that results in uniform seed germination, better crop growth and higher crop yield (Jat et al., 2006). Under these circumstances, PLL can help the farmers to utilize the scarce land and water resource more effectively and efficiently

towards increased crop production (Abdullaev et al., 2007). It was estimated that around 25 to 30% of irrigation water could be saved through this technique without having any adverse effect on the crop yield (Bhatt & Sharma, 2009).

During Early Kharif 2017-18, live demonstration of the laser leveling technology have been taken at farmer field Sri Ramakrishna S/o N. Suri Narayana R/o Devicamp, Karatagi, Gangavathi, District Koppal of Karnataka state during summer month in an area of 4 ha. In this training programme, around fifty farmers from different villages near to Devicamp were present. The farmer was also cultivated paddy in transplanted rice in normal leveled land during same season. At the time of harvest of the paddy crop in laser leveled land and transplanted rice field, one field day programme was organized at Devicamp village. The Farmer expressed that, he has harvested paddy yield of 35.5 q/ha in laser leveled land as compared to 31.5 q/ha in transplanted rice in normal leveled land. As per the farmers view, he has saved around 20-25 % water in laser leveled land as compared to transplanted rice. In the field day programme he has expressed his experiences and benefit from the technology to the gathering from beginning of the crop to harvesting stage. He also expressed that in laser leveled land he could able to see uniform growth of the crop and less weed infestation.

### CONCLUSIONS

Laser land leveling is one of the important technology which can be used as water saving technology in the command areas, as it reduces irrigation time and enhances productivity. It also reduces the farm inputs like fertilizer. Laser leveling minimizes the cost of leveling and also ensures the desired degree of precision. It enables efficient utilization of scarce water resources through elimination of unnecessary depression and elevated contours. It also helps in attaining uniform seeding depth

and smooth operation of the seed drill. With laser leveling around 20-25% water can be saved mainly due to smooth and level land which in turn helps in reducing of irrigation application time. This technology will help the farmers by reducing the land to become waterlogged and ensure in-time availability of canal water for the tail end farmers of command area.

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