An International Multidisciplinary e-Magazine www.sabujeema.com Volume 2 | Issue 6 | JUNE, 2022

LASER LAND LEVELLING: A PRECURSOR TECHNOLOGY FOR RESOURCE CONSERVATION

Priyanka Priyadarsini & Abhinab Mishra

South Constant of the



Sabujeema Sabujeema editorsabujeema@gmail.com sabujeema-international multidisciplinary-e-magazine





SABUJEEMA

An International Multidisciplinary e-Magazine



LASER LAND LEVELLING: A PRECURSOR TECHNOLOGY FOR RESOURCE CONSERVATION

[Article ID: SIMM0166]

Priyanka Priyadarsini Ph .D Scholar, College of Agril. Engg. & Technology, OUAT, Bhubaneswar, 751003

Abhinab Mishra

Assistant Professor, SoAg, GIET University, Gunupur, 765022

ife in rural India evokes an image of a farmer levelling the land with an oxen-drawn scraper or iron scrappers or levelling boards connected to 4- wheel tractors. Levelling is one of the most basic and integral farm preparations before sowing. Unevenness of fields leads to inefficient use of irrigation water. Proper land levelling in areas irrigated by canals is an essential prerequisite for judicious use of scarce irrigation water because water is precious and scares resource and per capita availability of this resource diminishing day by day. Thus, it is essential to precision land levelling and proper management of irrigation water usage for adequate growth of agriculture.

Laser Land Levelling seeks to explain the benefits of land levelling in fields,

particularly rice fields, and help develop skills of farmers and operators in using laser technology to achieve a level field surface. Laser levelling is a process of smoothening the land surface (\pm 2 cm) from its average elevation using laser equipped drag buckets to achieve precision in land leveling. Laserlevelling in rice fields reduced irrigation time by 47-69 hours per hectare per season and improved yield by approximately 7 percent compared with traditionally levelled fields. In wheat, irrigation time was reduced by 10-12 hours per hectare every season and yield increased by 7-9 percent in laser levelled fields.

BENEFITS OF LASER LEVELLING

- Saves irrigation water up to 35%
- Reduced weed in agriculture field
- Increase in farming area up to 3.5%
- Increase in productivity up to 50%
- Reduced farm operating time by 10%
- Assist top soil management
- Saves fuel/electricity used in irrigation
- Saves labour cost

di

COMPONENTS OF LASER LAND LEVELLING SYSTEM

A laser-controlled land levelling system consists of the following five major components

- a) Laser transmitter
- b) Laser receiver
 - c) Control box
 - d) Hydraulic system
 - e) Drag bucket

Laser transmitter: The laser transmitter mounts on a tripod which allows the laser beam to sweep above the field.

Laser receiver: The laser receiver is a multidirectional receiver that detects the position of the laser reference plane and transmits this



olume 2 - Issue 6 – June, 2022

An International Multidisciplinary e-Magazine



signal to the control box. The receiver is mounted on a mast attached to the drag bucket.

Control box: The control box accepts and processes signals from the machine mounted receiver. It displays these signals to indicate the drag buckets position automatically for providing electrical output for driving the hydraulic valve. The control box mounts on the tractor within easy reach of the operator. The three control box switches are ON/OFF, Auto/Manual and Manual Raise/Lower (which allows the operator to manually raise or lower the drag bucket.)

Hydraulic control system: The hydraulic system of the tractor is used to supply oil to raise and lower the levelling bucket.

Drag bucket: The drag bucket can be either 3-point linkage mounted on or pulled by a tractor. Bucket dimensions and capacity will vary according to the available power source and field conditions.

WORKING

The laser transmitter transmits a laser beam, which is intercepted by the laser receiver mounted on the levelling bucket. The control panel mounted on the tractor interprets the signal from the receiver and opens or closes the hydraulic control valve, which will raise or lower the bucket

STEPS IN LASER LAND LEVELLING A) Ploughing of field:

It is preferable to plough the field when the soil is slightly moist, because if the soil is ploughed dry a significant increase in tractor power is required and large clod sizes may remain. All surface residues need to be cut up or removed to facilitate the transport of soil.

B) Topographic survey:

After ploughing, a topographic survey can be conducted to record the high and low spots in the field. All measurements should be recorded in a field book. The mean height of the field is calculated by taking the sum of all the readings and dividing by the number of readings taken. It is advisable to take the reading at a regular interval of 15 m x 15 m to achieve greater precision in land leveling

C) Laser levelling of field:

Set the average elevation value of the field in the control box. The laser-controlled bucket should be positioned at a point that represents the mean height of the field. The cutting blade should be set slightly above ground level (1.0-2.0 cm). The tractor should then be driven in a circular direction from the high areas to the lower areas in the field. The field should then be re-surveyed to make sure that the desired level of precision has been attained.