Laser leveling: a practical, low-cost solution to saving water in agriculture

Fifteen hundred acres of laser leveling done in Alwar, Rajasthan, and Nuh, Haryana, is expected to save 525 to 675 million litres of groundwater in 2018. This is a significant achievement in semiarid areas where the majority of agriculture is still dependent on flood irrigation. But what exactly is laser leveling? This was the question farmers asked the Sehgal Foundation team when this low-cost technological solution to save water in agriculture was introduced.

According to Pawan Kumar, program leader, Adaptive Technologies-Agriculture, "Sehgal Foundation is working on improving water-usage efficiency in agriculture in Haryana and Rajasthan—both semiarid districts with limited groundwater. A majority of farmers in these regions practice flood irrigation without proper field leveling. Water usage is high due to the cultivation of water-intensive crops such as wheat, onion, cotton, tomato, eggplant, etc. To improve water security in the district, we started a pilot project in 2016 that focused on the use of laser levelers to assess the impact on water saving and other benefits."

Need for laser leveling

After the Green Revolution, water availability changed drastically in India. Since 1960, the area irrigated with groundwater increased by 500 per cent, which is a critical factor in the fast depletion of groundwater reserves. Approximately 91 per cent of groundwater is withdrawn for use in irrigation and livestock, and the gap between consumption and supply of groundwater will continue to widen in the future. Overall irrigation efficiency is quite low in India compared to global standards due to the use of conventional flood irrigation techniques (Narayanamoorthy, 2006). Providing technology-based solutions to farmers that can supplement water-saving in flood irrigation is a pressing need.

Why laser leveling?

Traditionally, farmers leveled their land by using wooden planks drawn by draft animals or using tractor-operated soil scrapers. These leveling practices are crude and keep a 4–5 per cent staggered slope in the field (Lybbert et al., 2013). The laser leveler maintains 1–2 per cent slopes. A precise slope allows water to spread uniformly. The significant advantages are the saving of 22–33 per cent of water in irrigation and a 9–12 per cent increase in crop productivity (Pawan Kumar, 2017). Further, if 50 per cent of the area under the rice-wheat cropping system in the states of Haryana and Punjab were laser leveled, the additional production of 699 million kilograms of rice and 987 million kilograms of wheat would amount to USD385 million/year. Thus, precise leveling of farms supports food productivity and water security in these regions (Aryal, Mehrotra, Jat and Sidhu, 2015).

Laser leveling: Low cost, high potential

The potential of using laser leveling is very high in regions where the majority of the agricultural land is currently leveled using traditional methods and requires a medium-to-high level of correction. Laser leveling will save a considerable amount of water. The table below shows the water requirements and savings potential with different crops after leveling.

Crop	Average water requirement [1] (cm/acre)	Water quantity ('000 litres/acre)	Water saving potential by laser leveler ('000 litres/acre)
Rice	75	3,000	750–900
Cotton	28	1,120	280–336
Wheat	35	1,400	350–420
Mustard	15	600	150–180
Onion	75	3,000	750–900
Tomato	70	2,800	700–840

An average of 1.98 million litres of water is required to grow a one-acre crop (Aryal and Jat, 2015). Precise land leveling can save 0.35 to 0.45 million litres of water for the same crop. The large-scale adoption of this technology in villages can create water security. Along with water saving, crop yields will increase by at least 7 percent for rice and 7–9 per cent for wheat (Aryal and Jat, 2015) and these figures can rise to 12 per cent. Other advantages that farmers observed included reductions in irrigation time, labor costs, reduces drudgery, uniform seed germination, reduced weed germination, etc. The pilot of laser leveling has shown promising results and increased adoption by farmers who share many benefits derived from using the technology.

(Compiled by Sarah Berry, communications and media consultant, with inputs from Pawan Kumar, program leader, Adaptive Technologies-Agriculture, S M Sehgal Foundation)

[1] *Handbook of Agriculture*, An ICAR publication, Edition 2000.

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