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Sustainable Farming –

A Giant Leap Towards Achieving Sustainable Development Goals: Case Study of Direct Seeded Rice

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India has a decade to meet the sustainable development goals set by the United Nations (UN) for the year 2030. Interventions in the agriculture sector have a massive role to play in achieving these goals. Along these global targets, India has set its own priorities and targets for the farmers and the agriculture sector. Right incentives and intercessions are likely to yield both global and national objectives, simultaneously.

While most of the UN's sustainable development goals have some relevance to the farming and agriculture sector, zero hunger and responsible consumption and production have a direct bearing on the agriculture sector. These goals have been conceived to eradicate hunger, ensure food security and promote sustainable production and consumption. There is synergy between the global agenda and India's own priorities to increase farmer incomes and promote sustainable agricultural practices. This can be achieved by deploying a mechanism that focuses on resource efficiency at the farm level. Water conservation is one such technique.

Water Consumption in Agriculture Sector

India is one of the largest producers of many agricultural commodities and, thus, a large consumer of agricultural inputs, including water. Agriculture accounts for 70 percent of global freshwater withdrawals. Considering that about one billion people in the world do not have access to fresh water, it makes water-intensive agricultural practices unsustainable in the long run. Unsustainable water use is a challenge faced globally. Water for irrigation and food production constitutes one of the greatest pressures on freshwater resources. According to the UN's Food and Agricultural Organization (FAO), farmers will need an additional 19 percent of water by 2050 to meet the demands for food, much of it in regions already experiencing water scarcity.

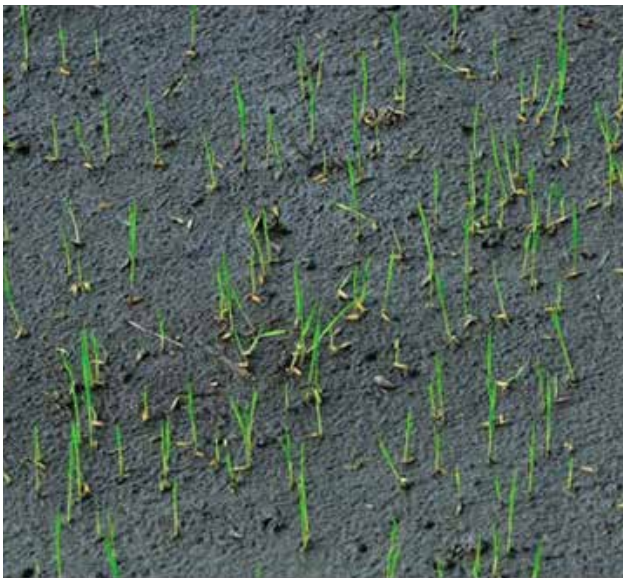
Promoting efficiency in water-use has been a policy priority for India, particularly under the current government. In the year 2015, Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) was launched with the motto, 'Har Khet Ko Pani' (water for every farm). An important component of this scheme was 'per drop more crop', implying efficient deployment of water as an input. In addition, the government is promoting

micro-irrigation techniques such as drip and sprinkler irrigation. However, some crops such as rice are traditionally water-intensive and require flooded soil for better yield. According to the International Rice Research Institute(IRRI), about 3,000 litres of water is used to produce one kilogram of rice in India[1]. In addition to this, a 2018 study on Water Productivity Mapping of Major Indian Crops[2] found a misalignment of rice cropping patterns in the country with respect to the available irrigation facilities. The study found that states such as Punjab, which have the highest land productivity of rice, have relatively low irrigation water productivity, indicating inefficient irrigation water use. Compared to this, Chhattisgarh and Jharkhand have high irrigation water productivity but low irrigation coverage. Due to the unique characteristics of the crop and farming methods adopted in India, the sustainable farming objective has to be met by deploying technology dedicated to the production of rice, which enables low water usage technology in rice production.

Use of Direct Seeded Rice (DSR)

Technological development and interventions such as 'direct seeding of rice' provide long lasting solutions to the challenge of global water scarcity. The use of direct seeding of rice technique is popular in China – world's largest producer of rice. DSR, one of the oldest methods of rice production, refers to the process of establishing a rice crop from seeds sown in the field rather than by transplanting seedlings from the nursery.

Existing studies highlight that traditional methods of rice farming lead to higher losses of water through puddling, surface evaporation and percolation[3] as compared to direct seeding of rice. Due to the elevating shortages of water, the incentive to develop and adopt dry-DSR has increased today[4]. Direct seeding helps reduce water consumption by about 30 per cent (which is about 0.9 million litres of water per acre), has less methane emissions[5] and is, therefore, more sustainable.



According to a study conducted by Punjab Agriculture University (PAU) in 2015–16, the net returns from direct seeded rice were higher by ₹9,403 per hectare than transplanted rice. Other studies have also shown that the application of the DSR technique increased the farm income by Rs 2250–3750 per hectare[6] and also resulted in higher grain yield[7]. In addition to high economic returns, DSR crops are faster and easier to plant, have shorter duration, are less labour intensive and consume less water[8]. It was observed by PAU that DSR provides higher benefit cost ratio of 2.55 as compared to 1.86 in the case of transplanted rice, One of the major reasons for this being lower overall cost of cultivation in DSR due to saving of labour cost. The PAU Study also found that farmers reported 15–20 percent saving of irrigation water.

Despite the perceived benefits, the current deployment of this technique is sparse. Like all new methods, this technique also has a few drawbacks that need to be addressed both by building capacity and by closing informational gaps. Weed management is one of the biggest challenges faced. Direct seeded rice is more prone to weed infestation and, thus, in most countries, prior to deployment on a large scale, smaller, demo-farms are created as pilot projects. There is a need to create awareness among farmers and, subsequently, train them so that they are able to use this technique effectively.

Experience from India shows that regional responses to the adoption of DSR have been varied. In this regard, private companies, farmer-producer organizations and non-governmental organizations are undertaking programmes to create awareness and ensure that technology is percolated at the farm level. There is a need for the right impetus from the government to facilitate and leverage these measures and initiatives by collaborating through joint awareness programmes, demonstrations through government machinery (such as Krishi Vigyan Kendras) and accurately targeting input subsidies. Combined efforts through public-private partnership in this direction will ensure that the country moves closer to achieving the sustainable development goals.

End Notes

[1]*See http://www.knowledgebank.irri.org/ericeproduction/III.1_Water_usage_in_rice.htm*

[2]*accessible at https://www.nabard.org/auth/writereaddata/tender/1806181128Water%20Productivity%20Mapping%20of%20Major%20Indian%20Crops,%20Web%20Version%20(Low%20Resolution%20PDF).pdf*

[3]*Rehman, H.U., S.M.A. Basra and M. Farooq (2011), 'Field appraisal of seed priming to improve the growth, yield, and quality of direct seeded rice', Turkish Journal of Agriculture andForestry, Vol. 35, pp. 357–65.*

[4]*Joshi, E., D. Kumar, B. Lal, V. Nepalia, P. Gautam and A.K. Vyas (2013), 'Management of direct seeded rice for enhanced resource - use efficiency', Plant Knowledge Journal, Vol. 2, No. 3, pp.119–34.*

[5]*Wassmann R., Neue H.U., Ladha J.K., Aulakh M.S. (2004), 'Mitigating Greenhouse Gas Emissions from Rice-Wheat Cropping Systems in Asia', in: Wassmann R., Vlek P.L.G. (eds), Tropical Agriculture in Transition — Opportunities for Mitigating Greenhouse Gas Emissions?, Springer, 2004.*

[6]*Kumar V, Jat H.S., Sharma P.C., et al.(2018), 'Can productivity and profitability be enhanced in intensively managed cereal systems while reducing the environmental footprint of production? Assessing sustainable intensification options in the breadbasket of India', Agriculture, Ecosystem & Environment, Vol. 252, pp. 132–47.*

[7]*Sarkar RK, Sanjukta D, Das S (2003), 'Yield of rainfed lowland rice with medium water depth under anaerobic direct seeding and transplanting', Tropical Science, Vol. 43, pp. 192–98.*

[8]*Bhushan L, Ladha JK, Gupta RK, Singh S, Tirol-Padre A, Saharawat YS, Gathala M, Pathak H (2007), 'Saving of water and labor in a rice–wheat system with no-tillage and direct seeding technologies', Agronomy Journal, Vol. 99, pp. 1288–96.*

3rd Floor, Building No. 115, Sector 44,
Institutional Area, Gurugram 122 002,
National Capital Region, India.

ritwik@wazir.in

Wazir Advisors

www.wazir.in