Paddy and the price of water

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Why in News: The southwest monsoon season (June-September) has registered 37.2% deficient rain so far. A weak monsoon can particularly impact paddy (rice with husk)

Role of irrigation in Conventional Paddy Cultivation

Paddy is a highly water-intensive crop, its cultivation entails preparing nurseries, where the seeds are first raised into young plants that are uprooted and re-planted around 30 days later in the main field. During the nursery stage, water equivalent to one round of irrigation is given.

But the real water consumption starts after that: The field in which the seedlings are transplanted is usually irrigated once, before being “puddled” or tilled in standing water. Puddling churns the soil, making it softer for transplanting, and breaks its capillary pores through which water percolates down. This operation alone consumes water equivalent to three irrigations.

For the first two weeks or more after transplanting, farmers have to irrigate every 1-2 days to maintain a water depth of 4-5 cm, necessary to prevent weed growth during the crop’s early stage. In the remaining 110-odd days — out of the total 155-160 days duration (seed to grain) — the irrigation requirement reduces to once a week.

In all, the conventional transplanting route requires some 28 irrigations. It can go up if high temperatures force more frequent watering, and go down if there is enough rain. Each irrigation consumes roughly 5 hectare-cm or 500,000 litres of water (one hectare-cm is one cm of standing water in one hectare area, equal to 100,000 litres).

In traditional rice cultivation methods, 40% of the world’s irrigation water is applied for rice production. Increasing water scarcity due to climate change and competition from urbanization is making this traditional method of rice production unsustainable in the long term.

Combined with other factors like shortage of labor and decreasing arable land, new ideas and innovations in rice cultivation are critically needed to meet rising demand and ensure food security.

One of the potential solutions to address these challenges is direct seeded rice (DSR)

About Direct seeded rice (DSR)

Direct seeding is a crop establishment system wherein rice seeds are sown directly into the field, as opposed to the traditional method of growing seedlings in a nursery, then transplanting into flooded fields.

Direct seeded rice is seen to be one of the most efficient, sustainable, and economically-viable rice production systems used today.

Compared to the conventional puddled transplanted rice (PTR) method prevalent in Asia, DSR delivers faster planting and maturing, conserves scarce resources like water and labor, is more conducive to mechanization, and reduces emissions of greenhouse gases that contribute to climate change.

Mechanized DSR also creates avenues for employment through new service provisions and is less labor intensive and free from drudgery, hence more attractive to youth and women farmers.

Advantages of direct seeding

No significant reduction of yield under optimal conditions

Savings on irrigation water by 12-35% under efficient water management practices

Reduces labor and drudgery by eliminating seedling uprooting and transplanting

Reduces cultivation time, energy, and cost

No plant stress from transplanting

Faster maturation of crops

Lower GHG emissions

Mechanized DSR provides employment opportunities for youth through service provision business model

Increases total income by reducing cost of cultivation

Reason for low attraction of DSR

A key reason is subsidised or even free electricity for irrigation, providing farmers little incentive to deploy water-saving technology. A second reason — highlighted by Pritam Singh, a progressive 120-acre farmer from Urlana Khurd village of Panipat's Madlauda tehsil — is the lack of good machines.

The recommended spacing for paddy is 20 cm row-to-row and 15 cm plant-to-plant, allowing for a plant population of 33 per square meter. "The DSR seed drill machines mostly sow row-to-row and don't get the plant-to-plant distance right

The government has also not been able to tackle the issue of weeds and rodents, which hasbeen a problem in the DSR method.

The Way Ahead

The government should work towards promoting the DSR method to achieve sustainable and climate resilient agricultural practice