Direct Seeded Rice: Prospectus and Challenges

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ABSTRACT
Rice is cultivated in the entire Indian subcontinent and a huge share of Indian agricultural population is dependent on rice cultivation for their livelihood. Rice also constitutes an important part of Indian people’s diet. With the green revolution, there has been a tremendous increase in the productivity of rice but it has led to two major issues of groundwater depletion and stubble burning in NW India. So, an alternative means of rice cultivation is needed with increased water use efficiency and reduced cost of cultivation. Both of these motives are fulfilled with direct seeded rice (DSR). This leads to reduced methane emission and higher water use efficiency.

INTRODUCTION
Rice is one of the most important staple crops and is cultivated in the entire world. It is widely cultivated and consumed in south Asia. India is second largest producer after China. It is cultivated in West Bengal, NW parts of India, Andhra Pradesh, Tamil Nadu, etc. Traditionally, rice seedlings are first grown in a nursery and then are transplanted in the main field. Continuous flooding in puddled soil is required for its transplantation. Puddling of soil, however, disturbs the soil structure, makes hard pan in soil and requires a lot of water. Rice consumes about half of total irrigation water used in Asia (Barker et al, 2020). With on-going climate change, there are projections of increased temperature and altered precipitation which could have detrimental effect on agricultural productivity (Malhi et al, 2021). Cultivation of rice led to two major problems in NW India viz. groundwater depletion and stubble burning which necessitates the other alternative method of rice cultivation. In Direct Seeded Rice, the crop is established by seeds in the field rather than transplantation of seedlings in the field from the nursery. In the states of Punjab and
Haryana, area under DSR increased because of unavailability of migrant labour for transplanting due to COVID-19.

Challenges in rice cultivation:

- Rice is water intensive crop. Traditional method of rice cultivation required around 3000 to 5000 L of water for producing 1 kg of rice.
- Labour intensive crop.
- Contribute to greenhouse gases (methane) emission under anaerobic condition

Advantages of DSR:

- Reduced cost of cultivation
- Reduced emission of methane
- Less labour requirement
- Reduced time taken for maturity leading to timely sowing of succeeding crops and consequent reduction of stubble burning problem
- Increase water use efficiency

Disadvantages of DSR:

- Shift in weed flora to more competitive weeds
- Increased use of herbicides leading to environmental pollution
- Seed required is high as compared to conventional method
- Additional cost for levelling the field
- Not successful under light textured soil

Steps of DSR cultivation:

- For successful DSR cultivation soil should be of medium to heavy textured as in light textured soil there is severe deficiency of iron.
- Land is levelled using laser land leveler for improves water use efficiency.
- Pre-sowing irrigation after levelling the field for development of optimum soil moisture required for proper seed germination.
- After irrigation, field is ploughed once with cultivator after which one planking is done.
- Sow the seed with the help of tractor powered seed drill. Short duration varieties such as PR 115 and PR126 of non-Basmati rice and Pusa Basmati 1121 and Basmati 1509 of Basmati rice are recommended for DSR.
- 8 to 10 kg seed is sufficient for sowing an area of 1 acre with 20 cm row to rowspacing and at the depth of 2-3 cm.
- Before sowing, seed should be treated with recommended fungicides for 12 hours and then dried under shade.

Methods of DSR:

<table>
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<tr>
<th>Dry DSR</th>
<th>Wet DSR</th>
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<tr>
<td>Sowing of seeds by broadcasting on un-</td>
<td>In Wet-DSR, pre-germinated seeds (radicle 1-</td>
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<tr>
<td>puddled soil, or by dibbling method on well</td>
<td>3 mm) are sown in puddled soil.</td>
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<td>prepared soil, or by drilling the ungerminated</td>
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<td>seeds by the help of seed drill.</td>
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Weed management: As we discussed, the weed control is a major challenge in DSR cultivation. With adoption of DSR, the weed flora may shift to more problematic and competitive grasses and sedges which are more difficult to control. Weed can be managed by two types of herbicides; the first one is pre-emergence herbicides e.g., pendimethalin 30 EC @ 1.0 L per acre within two days of sowing with 200 L
of water. If there is need of weed control in later stages, spraying of post emergent herbicides like bispyribac 10 EC @ 100 ml per acre should be done if there is presence of *Echinochloa* sp. and *Cyperus* sp. Application of azimsulfuron 50 DF @ 16 g per acre at 20-25 days after sowing can be done.

Water management: After pre-sowing irrigation, first irrigation should be applied at 5-7 days interval. After that subsequent irrigation should be applied at 5-10 days interval depending upon texture of soil.

**CONCLUSION:**

The intensive cultivation of high yielding varieties of rice along with high amount of fertilizers and pesticides has started with green revolution and cause tremendous increase in the yield of rice mainly in NW India. But it has led to the problem of groundwater depletion and crop residue burning. So, the farmers must adopt an alternative technique of direct seeded rice where the pre germinated seeds are sown directly in the field instead of being transplanted in form of seedlings. It leads to increased water use efficiency, reduced methane emission and reduced labour requirement and consequently reduced cost of cultivation.

**REFERENCE:**
