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Resource-Saving Technique in Rice Cultivation: Direct Seeded Rice (DSR)

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One way to cope with the lack of workers in India, that produce a lot of grain, is to switch from the traditional way of planting rice to a method called 'Direct Seeding of Rice' (DSR). The Covid-19 outbreak forced many employees to return to their hometowns, creating a labour shortage. Paddy planting involves growing young rice plants in a nursery, where the seeds are sown and nurtured for a few weeks. The nursery covers 5-10% of the area that will be planted with rice. Then, the seedlings are pulled out and moved to a flooded field, where they are planted again.

Fig.1 Direct Seeded Rice crop at PFDC, PAU, Ludhiana

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Direct seeding of rice (DSR) is an alternative way of growing rice that does not involve transplanting seedlings from a nursery to a flooded field. Instead, rice seeds are directly sown into the soil using a machinei.e. seed drill that is pulled by a tractor to sow the pre-germinated seeds directly into the soil. In this procedure, there is no need to establish a nursery or relocate the plants. Farmers only have to make sure their land is flat and water it once before sowing. DSR is not recommended for Soils with a mild sandy texture.

DSR is seen as a more efficient and sustainable way of rice production which saves water, energy and resources, especially in the face of water scarcity, labour shortage, climate change, and increasing demand for rice.DSR has some benefits over the conventional method of puddled transplanted rice (PTR) that is widely used in India. These include:

- No loss of yield under optimal conditions
- Less water use with effective water management practices
- Less labour and drudgery by avoiding seedling uprooting and transplanting
- Less time, energy, and cost of cultivation
- No transplanting stress for plants
- Earlier crop maturity
- Lower greenhouse gas emissions
- More employment opportunities for youth through mechanized DSR and service provision
- Higher income by reducing the cost of production

However, DSR also faces some challenges and limitations that hinder its large-scale adoption in India, where most of the world's rice is produced and consumed. These include:

- Higher seed rates
- Seeds vulnerable to birds and pests
- Weed management
- Higher risk of lodging
- Risk of poor or uneven crop establishment

To overcome these challenges, a holistic and scientific approach is needed to make DSR socially, economically, and environmentally viable. This involves developing suitable varieties, improving seed quality, optimizing sowing methods and timing, applying

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appropriate herbicides and fertilizers, implementing proper water management, and enhancing mechanization and service delivery.

One of the key factors of DSR is the choice of suitable varieties that can cope with different seedbed conditions, weed pressures, and water regimes. Different varieties may have different characteristics that make them more or less adapted to DSR, such as seedling vigour, tillering capacity, lodging resistance, maturity duration, and grain quality

Some of the studies have identified some of the varieties that have performed well under DSR, such as:

- Kala Shah Kaku (KSK-133), a coarse variety that has high tillering, panicle length, grain weight, number of grains per panicle, and yield.
- IR64, a fine variety that has high seedling vigor, weed competitiveness, and yield stability under different water regimes.
- PRH10, a hybrid variety that has high seedling vigor, weed competitiveness, and yield potential under DSR.
- PBW-126 and PBW-127 are short-duration and high-yield varieties.

However, the suitability of varieties may depend on the local conditions, such as soil type, climate, pest and disease incidence, and farmer preferences. Therefore, it is recommended to test different varieties under DSR before adopting them on a large scale.

How to Control Weeds in DSR:

In the paddy transplanting method, the fields have to be watered almost every day for the first three weeks or so, to keep a water level of 4-5 cm. This prevents weeds from growing by depriving them of oxygen underwater, while the rice plants can breathe through their special 'aerenchyma tissues' in their roots. Water acts as a natural weed killer for rice. For weed control in DSR, we need to pre-sowing application of herbicide which eradicates the weeds from the germinating field. For post sowing, in the dry and wet conditions, we can follow similar herbicides and pesticides practices to control the weed and insect attacks which are used for transplanted rice.

Conclusion:

DSR is a promising technology that can address the current and future challenges of rice production in a changing world. It can contribute to food security, water conservation,

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climate mitigation, and rural livelihoods. However, it requires more research, innovation, extension, and policy support to realize its full potential.