

# Surface Seeding as a Crop Establishment Option in Problem Areas



**I**n some areas in the eastern part of the Indo-Gangetic Plain, the soils are fine-textured and poorly-drained, impeding normal tillage. These soils take long to come to workable soil moisture conditions before they can be plowed. This delays sowing of wheat after rice harvest. Thus, the traditional tillage practices result in rice-fallows or in uneconomic wheat yields. Farmers have adopted surface seeding for good crop establishment. It is a new option that offers farmers many benefits including less cost and drudgery, timely planting and higher yields.

Surface seeding is a farmer practice for wheat establishment in parts of eastern India, Nepal and Bangladesh. It is particularly relevant to farmers with small landholdings and who have limited or no farm power sources. It is popular with the farmers in Nepal, Bihar (India), and China for its potential of increasing the cropping intensity in many areas where soils remain waterlogged for long or fields are vacated late for winter crops. In the Yangtze River Valley of China, wheat seeds are sown after a pre-seedling herbicide application and then covered with rice straw mulch. Farmers are practicing surface seeding successfully not only in wheat but also other upland crops. High yields have been obtained in wheat, pea and lentil. This technology is commonly used throughout the Indo-Gangetic Plain for establishing winter pulses and oilseeds after rice.

## Surface Seeding: The Practice

Seeds of wheat are broadcast or seeded in rows using drum seeders on the surface without disturbing the soil. The seed is sown before or after rice harvest depending on soil moisture. Surface seeding of wheat onto unplowed, wet soil before rice harvest has worked well in heavy, poorly drained soils.



## Relay Planting

Wheat can be relay planted into the standing rice crop if the soil moisture is suitable (saturated) for surface seeding of wheat before rice harvest. When the crop is ready for harvest, the cut rice bundles are placed evenly on the surface. This allows the rice to dry while the straw acts as mulch. However, relay planting is feasible only if the soil moisture is correct. Mulching can also give similar benefits. A layer of loose rice straw is spread on the ground after surface seeding the wheat.

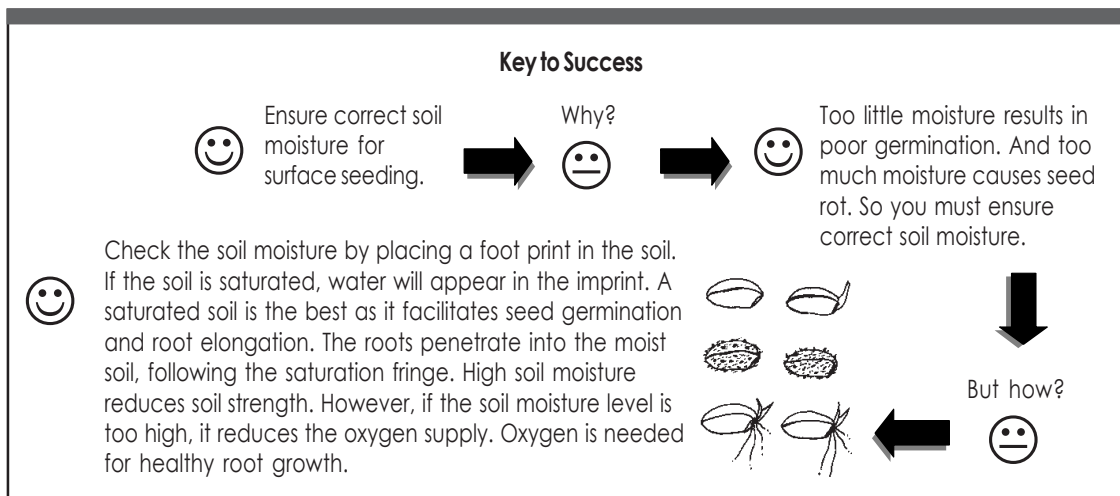
### Advantages of Mulching

- deters weed growth
- protects the seed and young seedlings from birds
- maintains good soil moisture for germination
- keeps the surface soil moist for long
- ensures good root growth

In surface seeded wheat, fertilizer cannot be incorporated into the soil. Hence, it is better to apply phosphorus and potassium fertilizer with the seed at planting and delay the nitrogen fertilizer until the first topdressing, usually best applied after the rice crop is removed and wheat is established. This practice improves the efficiency of applied fertilizers.

## Practice in Coarse Soils

Surface seeding in coarse soils is successful if the soil moisture can be manipulated. Soaking the seed can help as there would be enough surface moisture to germinate the seed. Light irrigation at root penetration stage reduces soil strength and thus facilitates root growth.



**Production of Wheat Following Rice in Nepal, 1993/94**

Parameter	Surface seeding	Chinese drill	Farmer's practice
Grain yield (t /ha)	2.78	2.83	2.31
1000-grain mass (g)	46.11	45.43	40.87
Cost to plow (Rs/ha)	0	600	2300
Net benefit (Rs/ha)	11485	12090	8065
Extra days needed for land preparation before seeding	0	8	15

## Benefits to Farmers


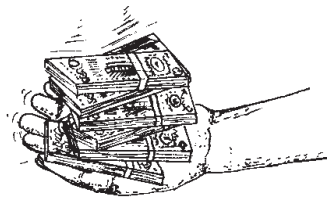
Surface seeding is the simplest of all crop establishment options wherein the seed is placed on the soil surface without any land preparation or tillage. Timely surface seeding of wheat significantly improves yields at relatively less cost. As the cost of land preparation is zero, surface seeding generates high net benefit.

## Wonders in Nepal!

Heavy rains in November 1996 reduced wheat yields which were lower than in 1995. Although surface seeded wheat was damaged, yield was higher than yields from plowed fields. In 1997/98, continuous rain hampered wheat planting. Farmers who used surface seeding planted their crop on time and harvested 3 to 4 tons of grain per ha. But farmers who used the traditional plowing methods could not plant the crop.

**Bonus for the Farmer**

The 1000-grain mass of wheat is high in surface seeded fields as the crop is planted 15 days earlier than the normal practice. Farmers in the Terai region of Nepal receive a premium for bold grain.

### Adapted from:

Hobbs, P.R. 2001. Tillage and Crop Establishment in South Asian Rice-Wheat Systems: Present Practices and Future Options. pages 1-22. In: Kataki, P.K. (ed). The Rice-Wheat Cropping Systems of South Asia: Efficient Production Management. Food Products Press, New York, USA.

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