In the 1960's a Japanese agricultural scientist called Masonobu Fukuoka started to ask himself how he could reduce the cost of his farming methods. He saw most costs in ploughing, weeding, fertilizing and transplanting paddy in his rice-wheat system. He spent the next 30 years experimenting to perfect his methods of reducing farming costs in these areas. But now, using his experience, we can develop similar systems in a much shorter time. His methods are also called "farming of the sages", because of the deep spiritual base to his philosophy, and the fact that nature is regarded with godly respect. His methods are based upon natural systems, and farming practiced without harming nature.

Farming with nature can be practiced with any farming system, but the methods described in this chapter are particularly related to the rice and wheat system.
Why do No-Till Farming?

There are 3 main reasons for ploughing:
- to aerate the soil;
- to reduce weeds;
- to mix organic matter in the soil.

If we can achieve these needs without ploughing, then why plough? This was Fukuoka's idea. A plough is never used in the forest, but the soil is always soft and fertile. In fact, the more you plough, the more ploughing is needed, as weed seeds are brought to the surface and germinate. Ploughing leaves the earth bare, leaving microorganisms and nutrients to be dried out by the sun, washed away by the rain, and blown away by the wind. That's why it's difficult for farmers to get good production even after so much hard and expensive work ploughing, weeding, etc.

Farming without tillage does no harm to the environment. Without tillage, the natural soil life will keep the soil loose and fertile by itself, which also greatly lightens the farmer's work, and reduces cost.

How to do No-Till Farming?

There are examples of traditional no-till systems. One example is before cutting rice, lentils are sown and grown without ploughing.

In a good mulching system crops are grown without digging, and by using some green manures such as velvet bean, no-till systems have been developed. More information about these are given in the Mulching and Green Manures chapters.

In this chapter information is given about a no-till method of growing rice and wheat.

Materials Needed for No-Till Farming

- wheat and rice seed
- white clover seed
- wheat straw
- rice straw
- well rotted compost

This is the start of Fukuoka's method:
1. After harvesting summer rice, plough one last time.
2. Sow wheat seed.
3. Thickly sow clover seed.
4. Mulch the wheat and clover with the straw from the rice crop.
In this way, the wheat and clover germinate together. Wheat grows up above the clover, and clover grows on the ground. Below the clover is the straw mulch.

Clover works as a green manure. By covering the soil, it helps to smother weeds and conserve moisture. It also fixes nitrogen in the soil. Nitrogen made naturally like this does the same work as urea fertilizer.

**Let's See how to do No-Till Farming**

![Diagram showing the annual cycle of no-till farming with steps such as sowing wheat, sowing clover, mulching straw, adding compost, weeding (if needed), harvesting rice, and restricting clover.](image)

**Materials needed:** straw, grain and clover seed, compost.
After wheat, sow clover

Cover everything with rice straw

Spread a little compost

Clover germinating in the wheat

This shows the wheat growing with clover underneath

Here the wheat is ripe and underneath the clover is green

After wheat is cut, sow rice and mulch with wheat straw
How to maintain a No-Till System

As the wheat ripens, any weeds should be removed. At first, more weeds will grow, but after the thick ground-cover of clover grows, and without tilling, weeds will reduce.

Sow rice after the wheat is harvested. As the rice grows, there is a danger that it will be smothered and prevented from growing by the thick ground cover of clover. There are 3 ways of preventing this :-

1. Flood the field for 10-12 days. This weakens the clover and the rice can grow through and above it. Then drain the water. The ground cover of clover will recover, and the rice will have grown away from its competition.

In the summer rice is flowering, while underneath clover is doing the weed control.
2. If there is a shortage of water as the rice is germinating, allow livestock to graze the clover. But only allow this once, for a short time, and then remove the livestock. They will eat down the clover, so the rice can grow up and away. The clover will again recover as the ground layer.

3. After sowing the rice, the clover can also be cut. It can be used as a fodder for livestock, or as a mulch. Then add the wheat straw mulch, and weed as necessary.

Another method of coating seed with clay. Here, clay is made into a thick paste, mixed with rice or wheat seed, and pressed through a 5mm sieve.

Try your own research

There are many ways of working with nature to reduce work such as ploughing, weeding, etc. The most important thing is to understand the principles of the methods. Instead of wheat, barley or oats can be used. Timing will be different for different places and climates. It may be better to sow the rice before the wheat is cut, or sow wheat before rice is cut. This method may seem difficult at first, but this is no reason to give up. Try it out first on a small plot, and increase the area as experience grows.

Farmers' Experience

Mrs Sanumaiya Shrestha

Mrs Sanumaiya Shrestha lives at Sunrise Farm in Sita Palla-4, Kathmandu, Nepal. She has experience in no-till farming, so let's hear her story.

I really like the no till method. Wheat and clover are sown together and covered with the rice straw, which also helps to protect them from birds. Then, if there's no rain, we may need to irrigate. Rice is sown in just the same way, without having to raise the seedlings in a nursery. The day before sowing either rice or wheat, I soak the seeds to help them germinate quicker. As soon as rice is cut, I sow the wheat, and as soon as the wheat is cut, I sow the rice. Sometimes a little weeding may be needed, but not often. There's more weeds at the beginning, but much less later on. Now all the work of digging is saved. Before, we did all the digging and the yield was the same, and now we get the same yield without the digging. Doing less work to get the same yield must be a good method, isn't it?
Subjects Related to No-Till Farming

This book provides enough information for you to be able to try your own No-Till Farming. However, this information is also linked to other methods. For extra benefits let's read, learn and practice from other related chapters.

Agroforestry chapter
Only when there's a plentiful supply of fodder from the land can the straw from grain crops be used for mulch in a no-till method. In this chapter, read about how to integrate trees on farms.

Mulching chapter
Mulch keeps the soil covered, keeps weeds down and conserves water. This chapter shows how to mulch the soil while still growing other crops.

Green Manures chapter
By sowing green manures with crops, fertility is increased and with less work there are more benefits. Learn how in this chapter.

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