No-tillage rice/wheat cultivation

The one straw revolution

Chris Evans

The natural farming rice-wheat no-tillage system was developed over 3 decades by Japanese philosopher and natural farmer Masonobu Fukuoka. His philosophy evolved as he saw the reductionist nature of modern science and the distancing of society from nature as root causes of humanity's many problems. This led him to search for better ways of farming that work more with nature, not against it. He realised that many of our current agricultural needs are met by too much hard work and high inputs. Instead, he reasoned that nature should be allowed to do more work in the farming system, which it has been "designed" to do anyway.

JPP Background

The Jajarkot Permaculture Programme is a grassroots NGO working in 4 districts of Nepal. As its name suggests, it is based on Permaculture, a technique of sustainable systems' design using the direct application of the principles of ecology. Thus its philosophy also embodies observation of and working with nature as the prime model of sustainability.

The JPP gained its first experience of no-till farming during a visit in 1988 by the author and co-founder of the JPP to Japan. After this trip, a trial plot was set up on JPP's Farm #2 Resource Centre (RC) in Jajarkot. The farm is about 1 acre of land consisting of irrigated rice-wheat and dry-land crops. Later a second trial was started at Sita Paila RC in Kathmandu.

The Fukuoka System

The plot was ploughed one last time, sown with wheat and white clover, then mulched with the straw from the previous rice crop. Weeding was necessary until the clover was established.

The wheat sprouts vigorously while the clover forms an undercover, acting as a green manure. This conserves moisture, fixes nitrogen and suppresses weeds - all needs, which the farmer normally tries to fulfil through labour and external inputs. By letting the clover and the straw do this work, inputs are lowered and the soil is not disturbed, allowing it to create its own system of fertility management, as in a natural undisturbed soil.

There is no further work until the wheat harvest the following spring. At this time, the wheat is cut, and rice is sown into the stubble and clover, with the wheat straw mulched on top. There is a risk that the clover smothers the young rice plants. Fukuoka floods his fields which weakens the clover and allows the rice to get away. After 1-2 weeks he drains the field allowing the clover to recover while the rice gains height. At farm #2 there was not enough water to do this; instead we grazed cattle on the clover briefly, a few days after the rice had been planted. At Sita Paila RC in Kathmandu, the clover was cut for rabbit fodder. Either way, the clover is controlled while the rice is given a chance to establish. For both rice and wheat, it is advised to coat the seed in a mixture of powdered clay and water to protect it from birds. When the straw is applied, it is possible to apply small amounts of well rotted compost (Fukuoka uses chicken manure) to help with its decay.

In this way, transplanting is completely eliminated, while weeding is reduced almost to zero. And there is no need for extensive flooding of rice paddies as its purpose in the traditional system is weed control.

Experience and lessons

The no-till system as adapted by the JPP has been extremely successful in that it really takes much less work to produce yields which are equal to and in some cases greater than the conventional/traditional methods. Because of the healthy soil, plants are robust and diseases are almost non-existent. It has worked consistently at Jajarkot's Farm #2 since 1989 and at Kathmandu RC since 1996. But the technique hasn't caught on by itself in the communities surrounding the RCs. This is partly due to the traditional use of straw as livestock fodder, and a lack of clover seed. Therefore, JPP has been reluctant to carry out extension of the method until sufficient alternative fodder can be obtained from agroforestry (AF) systems. Extension of AF thus takes priority over no-till, until the time is right for introducing the latter. The no-till method is so radically different that a major cultural shift is needed to enact it.

There are many ways of adapting the method, as JPP was able to do from the original system of Fukuoka. Timing of sowing is important, and it is possible to sow rice into wheat, and vice versa, when the previous crop is still standing. In Jajarkot we had a problem that the wheat ripened earlier than in surrounding fields, thus increasing its susceptibility to bird predation. The solution was found by either delaying sowing or using a longer rotation variety. Alternatives to clover need to be tried out – plants, which fulfil the same functions but are suitable to different environments, especially hot tropical/sub-tropical, which clover does not like. Perhaps vetches are a possibility. This method emphasises skill in observation of the crop and its environment, and ability to find plants and cropping systems, which mimic relationships and patterns found in nature ■

Ms Man Maya Gaha, JPP technician, with no-till showing wheat with clover under-storey

Photo: Chris Evans

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