

# Integrating local innovations and multiplying their benefits within an agroecological farming system: Learning from farmer innovator, Chandra Prasad



Azola harvested from the rice paddies being grown in a pond.

*Credit: Basanta Rana Bhat*



Rainwater harvested off a roof being captured in a fish pond.

*Credit: Basanta Rana Bhat*

Chandra Prasad Adhikari, a farmer from Fulbari, Chitwan, in Nepal, is a born innovator. For over twenty years, he has been working towards creating a totally integrated organic farm. In addition to 2.5 ha where he produces sunflower and maize – both integrated with beans

– he has 1 ha of land where he has created a true agroecological small farming system, with linkages between all aspects of the system. His farm shows how different technologies and farming systems promoted by extension programmes can be modified and

enhanced through farmers’ own innovativeness.

Chandra has a farm that integrates rice, fish, dairy cows and vegetables. He continuously refines the system, adding new elements. The fish-rice system is a form of integrated farming that has been widely promoted by various formal extension programmes. However, Chandra has built on the concept in a number of ways. Within the rice paddies, he has introduced V-shaped gates into the outlets that control the drainage of the paddies while also preventing the fish (carp) from escaping. He has also modified the harvesting system. When he drains the paddy and catches the fish to be sold at the market, he separates out the smaller fish and transfers them to ponds that he has built adjoining the paddies. These are ponds that are raised above ground level and are filled with water that is harvested off his roof and used to irrigate vegetables. By raising fish in the ponds, he has nutrient-laden water to apply to his vegetables.

Chandra constructed the cattle shed on his farm using the improved design promoted by livestock extension services, which allows for the separation of manure and urine. He currently has one cow and calf in the shed. He uses the manure to make compost and adds some of the urine to accelerate the composting process. He then added a roof over the area where he makes compost, preventing direct sunlight which reduces the loss of nitrogen from the compost, while also making an additional area on which to grow bottle gourds. Chandra has found that half-decomposed compost is a very good substrate for worm farming (vermiculture).

He has an interesting own design for his worm farm. The worms are grown in a structure with a pond surrounding it so that the worms are protected from

predators and other worms. The Tilapia he grows in this pond is an additional source of protein for the household. Besides feeding the worms on the half-decomposed manure compost, he also feeds them on compost from his 'herbal ring composter'. This is an innovation that Chandra developed over 20 years ago, which has now been widely adopted by other farmers. Prolinnova Nepal published this innovation in one of its early innovation catalogues. The structure is made from 3 concrete rings and is continuously fed with fresh plant material, including selected herbs, at the top, which breaks down and drops through the netting at the bottom of the rings, which stand off the ground, on some bricks. Once all these inputs are completely broken down by the worms, the substrate is used to fertilise his vegetable beds.

More recently, Chandra has made more modifications to his farming system. He found that he could harvest azola – an aquatic fern that naturally grows in the rice fields – and use it as a feed for the fish that he grows in the ponds. He also harvests azola to feed his black soldier fly larvae. He heard about the benefits of black soldier fly larvae from his grandson, who had done some research on the insect during his studies at the Agriculture and Forestry University and decided to integrate it into his system – adding his own innovation with the azola.

Besides being a farmer innovator, Chandra has recently set up a training centre on his farm, which allows him to share his knowledge with other farmers and train students from various universities and agricultural colleges. He also has a rice processing facility on his farm. Rice is processed and bagged in this facility for fellow farmers in the organic farmers' cooperative for transport to the market.

The innovation process highlights how an output of one part of the system becomes an input for another part of the system. The composted manure produced by the innovator, for example, is used to fertilise the vegetable plots. Water in the fish ponds are used as nutrient-rich irrigation for the paddies. The azola from the paddies is grown in



**Farmer innovator, Chandra Prasad, with the ring compost maker he developed.**

*Credit: Basanta Rana Bhat*



**The protected worm farm (vermiculture) surrounded by a pond containing Tilapia.**

*Credit: Basanta Rana Bhat*

ponds and then used as feed for the black soldier flies. Thus, Chandra ensures circularity in the farming system. Chandra's farm shows us how his own innovations as well as those adapted from elsewhere can be integrated into a system that multiplies the benefits of the individual components – this is an innovation in itself. His farm also illustrates the value of recognising farmers' innovativeness and encouraging them not to simply adopt farming practices provided by extension services exactly as they are demonstrated, but to modify and adapt them to suit a farmer's own environment.

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