CASE STUDY - 1

Ridiculed for Sowing 'Less' Plants

Madhya Pradesh clears his debts – Sonmau Kalan

"*You have sown so less plants in the farm that even a family of elephants can walk through your field, without damaging even a sapling,*" were jibes that Bhaddi Ahirwar, a young farmer from Sonmua Kalan, a village in Panna district of Madhya Pradesh, often heard.

After a pause, Bhaddi says, "I was convinced that this technique strengthens plant roots and ensure each plant is strong enough to stand upright even during dry spells, heavy rainfall and disease. Just like human body, I was confident that it won't fail."

Bhaddi is talking about System of Rice Intensification, an agronomic technique which he learnt from. The technique was borrowed from Japanese rice cultivation method and popularized throughout the world by Norman Uphoff, an American scientist. The technique strengthens the roots of the crop and increases the number of tillers, thus increasing the yield of each plant. But experimentations have proven that the system is useful for a variety of crops too. Also the system is particularly useful for rainfed regions of the country as it calls for reduced usage of water, particularly in cultivating paddy. Voluntary organizations that are part of the Revitalizing Rainfed Area Network (RRA N) are promoting the technique by providing trainings to rainfed farmers.

Several others in Bhaddi's village also learnt the technique and around 2015 started tinkering with it. But most applied the technique only on patches of farmland as large as 200 square meters. Bhaddi took the risk of using the technique on 1500 square meters of his 2-acre land. The soil fertility of his farm is average. He sows paddy, maize, pigeon pea during Kharif season and wheat, mustard, chick pea in Rabi season. He also owns an open well but its water level was inadequate due to layers of horizontal schist rock. Even in the years of good rainfall, the well dries up by January.

After seeing a whopping enhancement in yield of 56% (from 2.6 Tons/ha to 4.05 Tons/ha), Bhaddi subsequently adopted SCI technique for his other crops over the next two years. In Rabi of 2016, he brought more than half his land (4500 sq mt) under SCI for wheat and chickpea. He is determined that he will eventually bring his whole farmland under SCI, once his family members get used to the technique.

According to him, *"farmers need some time to realize that SCI is not so labour intensive. It is just a matter of changing their old practices. It is time consuming only till the sowing. But once sown, weeding and cutting becomes easier."* With a smile, he says, *"It also makes my wife happy as she got rid of the back pain that weeding gives."* Bhaddi believes that indebtedness is the main reason for the poverty of the farmers in the region. SCI needs less seeds, less investment, yet gives high yields. "It freed me from the clutches of money-lenders. I invited other farmers to visit my farm so that they can also get rid of debts."

CASE STUDY - 2

To Implement SRI effectively

Madhya Pradesh Farmers Development a Three-Pronged Instrument in Panna District

Farmers in Panna district of Madhya Pradesh understand quite well the principles of System of Crop Intensification. Yet they were reluctant to adopt the technique to cultivate their main crops of wheat, chickpea, mustard, as grid sowing is considered too laborious.

After a lot of tinkering, in 2016, the farmers here developed an innovative tool, which they call ***Tifan;*** a three-pronged multiple seeder, designed to be drawn by an ox or other draft animals. *Tifan,* however, is used mainly for line sowing of wheat, mustard (Pbold variety) and chick pea. Using the tool to adopt the practice of SCI has reduced the usage of seed to just one-fourth of what was used in the traditional method.

Mahapat, a 29-year old farmer from village Ghutehi and other farmers from 10 neighbouring villages fabricated another five such seeders with a little support from People's Science Institute. The demand for the instrument is quite high. The farmers invited block level officers to their plots, showed them the new tool and requested the government to support them in making such seeders than subsidizing tools such as the drum-seeder, which does not suit their requirement.

Mahapat used *Tifan* for line sowing of mustard (PBold variety) for the first time in the Rabi season of 2016 in half of his one-acre land. The other half was broadcast in the traditional way. His experiment of SCI transplantation on this variety was not successful in previous years. This year, Mahapat resorted to line sowing (rather than grid sowing). He transplanted mustard saplings, maintaining appropriate distance between the rows. From this patch, he got and an additional 40kg mustard (25% enhancement in the yield), compared to the patch where seeds were broadcast. In Mahapat's opinion, line sowing with optimum seed rate is the essence of SCI, as principally fewer but optimum plants should be maintained in the field, no matter which way they are transplanted. He explains, "*Fewer plants mean weeding is mandatory to curb the competition. I use a wheel driven weeder in one direction. If any extra weeds are left out along the line, my family is ready to take them out by hand. The plot looks beautiful after weeding which is satisfying and ultimately increases the enthusiasm".* Mahapat, too, used just one-fourth of the seed used in traditional method, to transplant the line-sowing patch. Small size of the mustard seeds created a little problem. Here is how he solved it, *"Mustard seeds are too tiny for seed drills. Hence to maintain the lower seed rate, I have mixed the seeds with cow dung compost. Next time I will reduce the seed rate further as it should give more productivity.*"

CASE STUDY - 3

Grows Fish and Paddy Together

Odisha Village

Low soil productivity, dry-spells, undulated land and unavailability of seeds, are some issues which pose threat to adoption of SRI principles. SRI requires timely activities like transplantation of early age seedling, weeding, alternate wetting and drying. These constraints can be dealt with by combining engineering solutions complemented by changes in agronomic practices and soil and water management. On-farm water harvesting is an option to generate otherwise-scarce water resources, by collecting and conserving excess rainwater.

An Indian NGO, PRADAN, has been demonstrating a low-cost, water-harvesting technology that it calls 'the 5% model'. This encourages farmers to convert 5% of their rainfed paddy fields into catchment ponds to trap and store rainwater during the monsoon. This engineering solution and SRI can complement each other as proven here.

This option, referred to as ISRI (Integrated System of Rice Intensification) combines methods of rice cultivation to enhance rice productivity within a diversified farming system that is based on constructing a farm pond in the paddy field. The pond conserves water for fish production while at the same time providing supplemental irrigation for the rice crop and for fruits and vegetables that are

planted on the pond dykes. Such a system was evaluated rigorously at the ICAR-Indian Institute for Water Management (IIWM) in Odisha, over two seasons through replicated trials.

Net economic return was significantly higher from the integrated system (including rice, fish and horticultural crops). The conventional rice system had a net profit of INR 12,429 per hectare, whereas the integrated system produced a net profit of INR 268,600 per hectare over two years. Analyzing the value of benefit costs ratio indicates that in the Integrated SRI system, an investment of Rs.1 returns Rs. 2.97, almost a three-fold return. Conventional upland paddy cultivation on the other hand, was not much more than a break-even operation (B: C ratio - 1.37). The net water productivity (NWP) in the integrated SRI system was calculated to be 18.91 rupee per meter cube of water, while it was only 0.31 rupee per meter cube of water in the conventional rice cultivation system. This indicates a significant economic gain per unit volume of water for the integrated system, and this innovation can be one of the techniques to achieve "more crop per drop" and "doubling farmer's income".