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Impact assessment of sowing method of paddy cultivation through traditional method DSR and SRI

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Abstract

Rice cultivation is a major part of Indian agriculture with over half the states cultivating the crop. A huge portion of the agricultural community is dependent on it for their livelihood and a larger portion of the population is dependent on it for food. Hence, there is a pressing need to secure the crop from various issues like water scarcity, labour shortage, etc. Introduction of any new technology into the rice cultivation is to be done with utmost care given the high stakes. The DSR method is an answer to the short-term problems. While the 1950s-60s Green Revolution sought to increase food production, the current times calls for a different kind of 'Green' Revolution with focus on how it would affect the environment and the agricultural community. KVK Auraiya in UP conducted an on Farm Trail to assess the better yield/productivity effect of paddy cultivation. In this area the farmers are growing in traditional method (Puddle Rice) but the productivity is very low and cost of cultivation is similar. By introducing the DSR (Paddy + Dhaincha) the productivity is high (55.59 q./ha.) as compared to traditional (48.90 q./ha) method and cost of cultivation less as compared to traditional method. Through SRI method in paddy cultivation is very effective because in this method the production is very high (69.75 q./ha) the compared to traditional and DSR method.

Keywords: Technology assessed conventional method DSR method, Sri Method, paddy cultivation

Introduction

The Traditional paddy cultivation was oldest method of rice cultivation. The Traditional paddy cultivation practices also had undergone changes due to changing times where, the cumbersome practices were replaced. The interest of the farmers in cultivating rice by using Traditional method has decreased as large numbers of farmers were using fertilizers and pesticides in the method of Traditional paddy cultivation to increase the production of rice. DSR technique is direct seeding of rice. Here the seeds are sown in the field directly rather than transplanting the seedlings. A tractor powered machine is used to drill the seeds in to the soil.

There is no nursery preparation in DSR technique. DSR technology is better than transplanted method of rice cultivation by reducing irrigation and human labour requirement per unit area and found more profitable in terms of net returns per hectare. However, better weed management practices in DSR can decrease the weed management costs with continuous awareness programmes among the farmers. SRI paddy was introduced in Madagascar for the benefit all the farmers. The Traditional method needs extra labour and a lot of fertilizers. Farming with modern methods is also expensive using outside inputs. It was noticed that, farmers adopting conventional methods could increase their production only by using expensive inputs such as chemical fertilizers, pesticides and hybrid seed. It is becoming increasingly difficult for the community to afford these things. It is also known that using chemicals is harmful to the environment. A new method of growing rice is designed for increasing rice production which can use the organic compost, and also the local seed. This method is called "System of Rice Intensification" (SRI). In this context, a study was UTTAR PRADESH in AURAIYA district of UTTAR PRADESH to note the impact of Traditional, DSR as well as SRI method of rice cultivation on the farmers. There is a notion that what has been done in research plots and by scientists is modern and desirable. However, it is farmers who played a key role in designing and developing SRI method of cultivation practices.

Thus every farmer has to be a scientist and an experimenter. Farmer should not blindly follow what is suggested by others. One has to understand the principles behind and decide upon what to do based on local situation and available resources. This is the key aspect in SRI method of cultivation. For the paddy plant to achieve its full potential and give high yield:

- A plant should have more number of tillers
- The number of effective tillers should be higher
- Panicle length and number of grains per panicle should be higher
- The grain weight should be more
- The roots should have extensive and healthy growth Let us explore different methods in achieving the above objectives. Along with various opportunities let us explore the limitations, problems and challenges in each of the aspects. Let farmer's fields be experimenting grounds.

- **Wide planting:** With wide spacing each plant gets more space, air and sunlight. As a result each plant gives more tillers. The roots would grow healthily and extensively and take in more nutrients. As the plant is strong and healthy the number of tillers would be more. The panicle length would be more. The panicle has more number of grains and the grain weight would also be more.

- **Less seed:** As wide spacing is adopted the seed required would be less. This results in the advantages mentioned above. Further it is easy to use and produce quality seed.

- **Transplanting young seedling:** The seedling should be transplanted when it is in 2 leaf stage. When the seedling is transplanted carefully in this stage it grows healthily and generates more number of tillers. It can achieve the potential of giving higher yield.

- **Less water:** When the water is stagnating in the field the roots die due to lack of air. The dead roots are brown/rusty in colour. The soil should have soil particles, air and moisture in equal proportions. The paddy plant can survive even when there is standing water. But, for a healthy paddy plant water should not be in stagnated situation in the field. When irrigation is provided intermittently the roots are aerated and grow healthily

- **Turning back the weeds into the soil:** Instead of weeding and throwing the weeds outside the plot there are several advantages of turning the weeds into the soil by using a 'weeder'. This results in two advantages: firstly, the soil gets aerated and secondly, the weeds get decomposed in the soil and turn into organic matter. Due to this the roots and the plant grow healthily and higher yields can be achieved. Use of organic manures: Organic matter is the food for life forms teeming in the soil. When organic matter is added the microorganisms in the soil multiply manifold. The microorganisms bring nutrients into available form and are made available to them as and when they are needed. SRI is feasible in terms of its less water requirement. SRI does not require farmers to shift towards the high yielding variety of genetically modified rice. It's only the change in cultivation method which enables them to harvest more than double thereby increasing their socio-economic wellbeing. SRI method of paddy cultivation is profitable when compared to traditional method, the techniques of production followed in SRI method contributes to the productivity differences of traditional method. Farmers adopting SRI method are technically efficient it is even claimed that no part of Auraiya need to be short of food anymore if SRI is

promoted nationally. SRI studies done so far by many researchers and scientists are limited to experimental and demonstration activities. Almost no studies have been carried out on the comparative study of Traditional and SRI method of paddy cultivation. Preparation of the main field in SRI is the same as in conventional method. However it is ideal that the field is dry ploughed and puddling by tractor is avoided. Particularly in black soils the field should be ploughed and kept ready during summer itself. The field should be watered and transplanted. This way it would be easy to operate the weeder later. As puddling by tractor is not done the weeder would not get stuck and less energy would be sufficient to run the weeder. The field should be level and there should be no standing water while transplanting. If the plots are small and levelled water management becomes easy. If needed, canals should be prepared for irrigating and draining the SRI plots.

Advantages of SRI

- Saving on seed cost as the seed requirement is less
- Saving on water as Irrigated - Dry method is followed
- Cost of external inputs gets reduced as chemical fertilizers and pesticides are not used
- Incidence of pests and diseases is low as the soil is allowed to dry intermittently.
- More healthy and tasty rice as a result of organic farming practices.
- Higher yields due to profuse tillering, increased panicle length and grain weight
- Seed multiplication with less quantity of parent seed.
- Farmers can produce their own quality seed.

Materials and Methods

Assessment of seed treatment in paddy crop Location of the study: one village were studied namely- Makanpur block Bhagyanagar In through Krishi Vigyan Kendra Auraiya, in village 05 farmers were selected for the SRI Method paddy cultivation from district Auraiya UP India

Results and Discussion

Technology Option	No. of trial	Yield (q./h)	Net return Rs. lakh
T-1 Traditional method Puddle rice	04	48.90	0.44
T-2 DSR	04	55.50	0.49
T-3 SRI	04	69.75	0.62

The study reveals that under the on Farm Trail to assess the better yield/productivity effect of paddy cultivation. In this area the farmers are growing in traditional method (Puddle Rice) but the productivity is very low and cost of cultivation is similar. By introducing the DSR (Paddy + Dhaincha) the productivity is high (55.59 q./ha.) as compared to traditional (48.90 q./ha) method and cost of cultivation less as compared to traditional method. Through SRI method in paddy cultivation is very effective because in this method the production is very high (69.75 q./ha) the compared to traditional and DSR method. Rice (*Oryza sativa* L.) is the staple food of more than half of the world population. The population of the world at present is 7.4 billion. In India the present population (2016) is 1,329 million which will increased to 1,708 million and rank first by 2050 (34 years after) i.e. 11.15 million person per year. India requires increasing rice production by 3 million tonnes every year to ensure food security (Dass, *et al.*, 2015) [4]. Rice-wheat is the

major cropping sequence in India and India is the second largest producer of rice preceded by China. It was the largest exporter of rice in 2015-16 followed by Thailand, Vietnam and Pakistan (Commodity Profile, 2015-16). Basmati rice trade was 2.02 million tonnes in 2009-10 which increased to 4.04 million tonnes in 2015-16 (Commodity Profile, 2016). The area under rice cultivation was 427.54 lakh hectare during 2012-13 which increased up to 438.56 lakh hectare during 2014-15. The production was 105.24 million tonnes in 2012-13 and decreased 104.80 million tones. The yield of rice was 2461 kg/ha during 2012-13 which decreased to 2390 kg/ha during 2014-15 (Annual Report, 2015-16).

Conclusion

SRI is an acronym for System of Rice Intensification. This improved method of rice cultivation was developed in 1983 in Madagascar and has now spread to many parts of the world. Overall, the Yield for SRI method were comparatively higher (69.75 per (q./h) of grain produced) compared to the conventional method (48.90 per (q./h) Despite the reduced material costs of SRI method (i.e., 80% reduction in seed costs and 70% reduction in fertilizers and pesticides costs), the overall production costs were not lowered and were associated with the costs of increased labour coupled with comparatively lower yields. However, net returns increased by about 2.83 for SRI method compared to conventional or DSR methods and were associated with a price premium for rice. However, comparatively better grain yields from conventional methods underscore the need for further investigations in defining what constitutes an optimum set of practices for SRI method specifically addressing the nutrient requirements, grain yields, and weed management. Once farmers learn that they can reduce their seed requirement, water requirement, production costs, and perhaps labour requirements, while maintaining or increasing yields, SRI methods are poised to become more widely adopted.

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