Foliages are integral part in flower arrangement which plays an important role since it can hide the mechanics of an arrangement. Besides this they make an arrangement look complete and form the base and background against which the placement of flower looks elegant. The study has aimed to optimize different drying methods vis-a-vis stage of harvest for quality dry foliages, effectivity of glycerinisation as a drying tool/method and skeletonisation to increase storage life of foliages along with identification of suitable bleaching method and to find out the effectivity of different dyes on some bleached and dried items. Preparation of some value added products from the locally available foliages is an opportunity for small farmers to operate a sustainable alternative enterprise.

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Value Addition of Foliages for Decoration

Scientific Illustration

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Liberalization of EXIM policy in India has paved the way for increased export of floricultural products where contribution of dried flowers is enormous. Being natural, eco-friendly, long lasting and inexpensive decorative items, Dry Flowers have good demand both in Indian and international markets. The industry exports 500 varieties of flowers to 20 countries and are much sought after in USA and UK. India stands as one of the major manufacturers and exporters with around 5% of world trade in dry flowers. The process of drying flowers involves drying, bleaching and colouring after their collection in raw form. The suitable packaging techniques add values to catch niche market. The main methods used for drying are: Air Drying, Glycerine, Desiccants, and Pressing. In India, West Bengal is the major player in Dry Flower trade. The book deals with a case study that reveals entire scenario of Dry Flower trade in West Bengal, India. The book will be useful for prospective entrepreneurs in Dry Flower.

Suhrita Chakrabarty
Sovan Roy
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An Entrepreneur's Guide to Dry Flower

Process and Techniques in Dry Flower

Suhrita Chakrabarty

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System of Rice Intensification (SRI) : An Experiment in Purulia Under NAIP

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Abstract The System of Rice Intensification (SRI) is claimed to be a novel approach to rice cultivation that is both more productive and more sustainable than conventional methods. Proponents of SRI have reported that the average rice yield with SRI is double the current average yield and can be increased to the level of three to four times. Such claims have been challenged or dismissed by many rice scientists ; however despite the lack of clear and unequivocal endorsement by science, SRI seems to have spread widely and rather quickly to many rice-growing regions, including various areas of India. The number of SRI adopters has increased in India in recent years. We evaluated the impact of an innovation of SRI practices on rice yields, the economics of paddy cultivation, the true spread of SRI practices among farmers, the system's impacts on farm livelihoods, rice production resource use and labor inputs based on field research conducted in Purulia District of West Bengal. SRI adoption enabled farmers consistently to enhance paddy yield, increase income, it promises significant tool of livelihood enhancement for starved population.

Keywords SRI, Income, Productivity, Livelihood, Technology.

Introduction

Rice is the staple food for 65% of the population in India and feeds more than half of the world population. The crop accounts for about 22% (42 million ha) of the total cropped area, 34% of the area under food crops, and 42% million ha) of the total cropped area, 34% of the area under food crops, and 42% of the area under cereals. India is the second largest rice-producing country in the world. The rice output of 99 million tons in 2010 amounted to approximately 46% of the country's cereal production and 42% of its total food grains. India needs to increase production by at least 2.5 million tons of milled rice every year to sustain the present level of self-sufficiency. The demand for rice increases with population which is expected to rise by further 38% within 30 years according to the United Nation (1). The Purulia district is predominantly mono cropped. About 60% of the total cultivated land is upland. Out of the total agricultural holding about 73% belongs to small and marginal farmers having scattered and fragmented small holdings. Paddy is the primary crop of the district 50% of the total land is under net-cropped area and only 17% of the net cropped area is under multi crop cultivation 77% of the net-cropped area is under Aman paddy cultivation. In general, one can say that use of SRI methods reduces the agronomic and economic risks that farmers face (2). The crops are grown mostly under rainfed condition ; generally with low fertilizer consumption per unit area. Thus per hectare production is also low as compared to other districts of West Bengal.

What is System of Rice Intensification (SRI)

The System of Rice Intensification (SRI) was developed at Madagascar almost 20 years ago by Er. Henri de Laulanie, S. J. and subsequently popularized them by an NGO, Association Tefy Saina (ATS). It is a "system" rather than a technology because it is not a fixed set of practices. SRI involves a number of specific

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techniques that are always to be tested and adopted accordingly. The package of practices followed is the one in which synergistic interactions can produce much higher grain yields than usually achieved by conventional practices with new varieties/hybrids and external inputs. SRI is being practiced in many states successfully. By adopting this technology the farmers of Andhra Pradesh harvested more from a unit area as compared to the conventional method.

The combination of plant, soil, water, and nutrient management practices that are used in SRI promotes : Measurably greater root growth ; more number of tillers ; greater grain filling ; and higher grain yield.

The main focus in SRI is the water saving potential i.e. more grain yield per drop of water. Little water is used in SRI so that during plant growth, the soil remains well drained and reasonably aerated while still meeting the plant's water requirements. During reproductive phase that follows a thin layer of water (1—3 cm) is kept standing in the field.

There are six main basic principles in which SRI stands they are : Early transplanting ; careful transplanting ; wide Spacing ; weeding and aeration ; water management ; use of organics.

Early transplanting : Transplant young seedlings of 10-12 days in nursery.

Careful transplanting : Life seedling with seed, roots and soils from the nursery and transplant one plant per hill within 15-30 minutes without plunging the plant in the mud ensuring the roots end not turning upwards.

Wide spacing : Give a spacing of 25 × 25 cm or 30 × 30 cm to provide adequate space for roots for facilitating nutrient uptake including micro nutrients from a wider soil area, with more space for the predators to move around facilitating biological control of pests.

By this we can accommodate only 16 plants/m^2 and the seed required is only 5 kg/ha.

Weeding and aeration : Use a hand push weeder (Mandavaweeder or conoweeder) 3-4 times to uproot and incorporate the weeds into soil and to increase soil aeration.

Water management : No standing water during growth period, intermittent wetting and drying until panicle initiation is required. After panicle initiation 1-3 cm of water is kept for about three weeks. About 50% less water is adequate.

Use of organic compost : Use straw, green manure and animal manure to enrich the organic content of the soil for promoting populations of earthworms, microorganisms and to facilitate nutrient availability. Use reduced amounts (<50%) of chemical fertilizer assessing the requirement.

Materials and Methods

Initial evaluation

The first observation trial was conducted with rice local cultivar. The treatments included different modified conventional methods like planting on line with maintaining space on levelled plots. The plots were irrigated in regular manner. Though there were no spectacular yield differences, the study confirmed that flooding was not necessary to maintain yield.

Detailed study

This experiment was conducted during June 2010 to October 2010. Some of the components of SRI cultivation practices were studied in detail. The comparison with conventional practices for transplanted rice was also made. Many factors were evaluated, with treatment combinations.

For the modified SRI practice : Seedling were raised in the dapog manner, and 14 day old seedlings were placed on the surface of a puddle field ; up to the flowering stage, irrigation was given to a depth of 2.5 cm after surface cracks developed in the soil ; after flowering, irrigation was similar to conventional practice ; all weeds were incorporated into the soil during weeding with a conoweeder, and prior to transplanting, green manure at 6.25 t/ha was incorporated into the soil.

For conventional practice : 23-25 day old seedlings were planted ; irrigation was given to a depth of 5 cm one day after the disappearance of surface water ; and weeds were manually removed.

In both practices ; a plant density of 25/m² was used compared to a conventional plant density of 50/m² in order to permit use of the conoweeder. Also single seedlings were planted per hill with both practices. Since these are both essentially SRI practices, the evaluation was really of modified SRI, assessing the effect of three of six practices. The control fertilization treatment was a conventional N, P, K, Plus *Zn* application, with the experimental treatment being this plus incorporation of green manure and additional N application, which is not really an SRI practice.

Location : Purulia, NAIP Component-3 Field, BCKV

Variety : Lal Swarna

Planting Density : 25 × 25 cm

Planting : Conventional : standard nursery, 24 days old seedlings, 2-3 seedlings/hill ; Modified SRI : dapog nursery, 14 days old seedlings, single seedling/hill

Irrigation : Conventional : irrigating to 5 cm depth after disappearance of ponded water ; Modified SRI : irrigating to 2 cm depth after surface cracks develop up to flowering and thereafter as in conventional with a 50—56% saving of water (3).

Weeding : Conventional ; hand weeding at 18, 34 and 38 DAT ; Modified SRI : incorporating weeds and aerating soil with conoweeder at 15, 26, 36, 47 and 57 DAT

Nitrogen : Recommended applications of N, P, K and Zn ; N, P, K and Zn applications+*dhaincha* green manure (6.25 t/ha) prior to planting + 25 kg N/ha at tillering stage.

Soil character : The soil of Purulia is red lateritic and it is said that the soil contain iron. The soil types differ widely from highly acidic to slightly alkaline and from light sandy to stiff clays.

Climate : The experiment was conducted during the northeast monsoon season. Weather condition prevailing during the crop period is 25-32 degree centigrade commonly counting in a draught district rainfall 1100—1500 mm and RH 75—85%.

Accounting for SRI's rise to prominence in Purulia

In just a few years, SRI has become an established part of the rice scene in Purulia through the National Agricultural Innovation Project. A kind of SRI movement has emerged that connects farmers and civil society actors to scientists and policy makers. What has attracted all these actors to coalesce around a cultivation system that is still hotly contested in some scientific circles ? Enthusiastic testimonies by rice farmers are plentiful ; however, few reliable figures exist to show how many farmers are actually practising SRI methods or with what kinds of impacts on rice production, resource efficiency, household economies or rural societies. Rigorous impact studies are in the pipeline but remain to bedone. Moreover, much remains unclear concerning the biophysical mechanisms involved in SRI rice cultivation and the relative costs and benefits in particular contexts. For example, studies reporting improvements in rice yields (4) are balanced by others that found improvements in overall productive efficiency without substantial yield increases (5). Working out which particular SRI components may play what kinds of roles in changing the performance of individual rice plants or improving overall productivity or yields is a complex task, whose results are not yet clear (5, 6). What is really intriguing is that SRI has already momentumin India before these questions are fully answered. Key stake holders in India's SRI scene are satisfied that the results on farmer's fields have demonstrated the system's value, notwithstanding the fact that several detailed questions are yet to be resolved scientifically. SRI is regarded by various actors as a promising to arrange of current technical and policy challenges in Indian agriculture. In Purulia, for example, SRI is seen as a potential solution to shortages of both water and rural labor, which are expected to intensify in the coming years. Purulia is currently facing the depletion of ground water for the irrigation. Meanwhile, SRI is regarded as a main key for boosting the income of the farmers as per mandate of the Project.

Results and Discussion

Grain yields for the sixteen treatments varied from 5059 kg/ha to 7612 kg/ha. The results showed that by adopting the modified SRI irrigation practice, th

Table 1. Adoption of SRI practices in Purulia

SRI Practices	No of farmers following the practice (n=100)
Early Transplanting (Less than 13 days)	40
Single Seedling per hill	98
Spacing (25 × 25 or 30 × 30 cm)	20 (its very hard to convince them to let them follow the technology)
Alternate wetting and drying	10
Weeding and hoeing	42
Mechanical weeding	10

was water saving of 60% under conventional planting and 51% under modified SRI planting without any significant effect on grain yield when compared with conventional practice.

The average yield (9,996 kg/ha) was obtained for the modified SRI practice with younger seedlings, restricted irrigation, addition of green manure, and incorporation of weeds with soil aeration. With green manure application and conventional weeding, water-saving irrigation practices reduced yield compared with conventional irrigation practices, but not significantly. *In situ* incorporation of weeds of the modified SRI practice significantly increased the yield (9,996 kg/ha) when compared to conventional weeding (4,900 kg/ha). With the advent of SRI, many farmers have now begun to adopt all the recommended activities. If so, a key difference between the situation five or six decades ago and current circumstances could be the increasing scarcity of labor, driven by the intensification of urbanization and industrialization processes. However, Purulia farmers still complain about the scarcity of labor for cultural operation, while laborers are shifting towards the city area for their high remunerative job. In the context of the major changes in agriculture and rural society that are to stop the urban labor migration by assuring appropriate wage.

Conclusion

This paper has not sought to judge the relative merits of the scientific claims made by either side in the scientific dispute over SRI. If its advocates are right, SRI could be a productive, more ecologically sustainable, low external-input cultivation system that has the potential to significantly increase rice production and substantially improve poor farmers' livelihoods. To a large degree, however, the physiological and agronomic mechanisms underlying the SRI method remain to be decisively demonstrated, especially if the sceptics are to be convinced that the system is not just smoke and mirrors, based on a measurement error or a misattribution of cause and effect. This essay has sought to show that SRI has become a phenomenon to be taken seriously not as a function of compelling scientific argument but because it has garnered support from farmers, research institutions and extension organizations that believe the system has value, based on their own experiences. Even if the purported biophysical mechanisms at work in SRI are still uncertain and contested, something about the system has evidently been successful in mobilising various stakeholders and changing some farmers' practices. Although it would be simple to attribute the emergence and spread of SRI to a spontaneous bottom-up innovation process (both because the system may not be entirely new and because it has been fostered and encouraged by government agencies and globally linked scientific networks), nevertheless it can perhaps be said to have emerged and spread through distinctive circuits of knowledge, communication and practice that have successfully engaged both farmers and development agencies at grassroots, regional and national levels. A variety of actors possessing different types of material and ideational power re-

Table 2. Estimated labor requirements for cultural practices on SRI conventional plot in hours/ha

Parameter	SRI	Conventional
Seedbed preparation	18	22
Seed treatment	1.5	3
Seed sowing	1.5	2
Fertilizer manure and seedbed	3	4
Ploughing	85	87
Land levelling	20	15
Field bund dressing and drainage channel	15	12
Application of fertilizer as basal dose	2	3
Application of manure	7.5	8
Transplantation	380	450
Hoeing and weeding	97	140
Application of fertilizer	2.5	3
Harvesting	165	190
Threshing	115	120
Total	913	1059