Socio-economic Evaluation and Transfer of Technologies: Activities, Achievements and Aspirations

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SUMMARY

The Social Science Division of ICAR-National Rice Research Institute has undertaken several socio-economic studies, impact assessment programmes, capacity building measures and shared advanced technical knowledge with different stakeholders to enrich and update them with advances in agricultural science and bring a visible change in life of farmers engaged in rice farming. The Self–Sufficient Sustainable Seed System for Rice (4S4R) is one of such initiative of the Division. Effective interventions were made with farmers' Farm, Innovation, Resources, Science and Technology (FIRST) Programme, Mera Gaon Mera Gaurav (MGMG) Programme and Front Line Demonstration (FLD) Programme for diversifying the income portfolio of the farmers. During the last five years the division has reached out to 144 villages and benefitted >27000 farm families through various technological interventions; five Farmers' Producer Companies (FPCs) were successfully registered; >60000 visitors had given agro-advisory services and about 5000 participants were trained on different rice based technologies and agri-entrepreneurial aspects. In this Chapter, different activities and achievements of the Division have been compiled and aspirations highlighted.

1. INTRODUCTION

In Indian agricultural canvas, the challenges may vary from increasing population (>1.3 billion) to declining average operational land holding area (1.08 ha), indebted agricultural households (51.9% of agricultural households), sole dependency on agriculture (63.4% of households derive their income from agriculture), highest rate of urban land expansion (Seto et al. 2012), poor market infrastructure (6746 regulated markets out of 26519 total agricultural markets), limited reach of government program and schemes (MSP benefits about 20% of the total farmers) and so on. Underneath these challenges lie opportunities to partner with the locals in the identification of their most pressing needs and devise the sustainable solutions to the problems.

ICAR-National Rice Research Institute, as one of the pioneer research Institutes on rice, which is staple food for more than 60% of its population and provides livelihood to 150 million people of the country has an added

advantage of reaching to the millions of the farmers, share croppers/tenants and landless poor through its high yielding varieties and rice-based technologies to answer the pressing problems. The Institute, through its dedicated Divisions, strives hard to maintain balance with the basic/ fundamental research and science on one hand and transfers the new knowledge and technologies to farmers to augment their well-being on another hand. Over the years, the Division has evolved itself by incorporating knowledge, techniques, methods and approaches from other subjects such as psychology, sociology, communication, entrepreneurship, information technology and so on. The Social Science Division also undertakes fundamental research for developing methodologies, models and approaches for rapid dissemination of institute's technologies to its users and getting feedback on it from the users. The Division also provides platform to evolve and develop the subject based on the objective-oriented research related to identified theme areas and interaction among the Extension professionals and to attain this objective, the Division had organized 1st International Extension Congress in year 2018. In this chapter, the genesis of the Social Science Division, its objectives, activities, achievements and the significant impacts that the Division has made over the years have been discussed and future aspirations of the Division have been highlighted.

2. GENESIS AND OBJECTIVES OF SOCIAL SCIENCE DIVISION

At the beginning, there existed distinct sections like Extension Communication and Training section and Economics and Statistics sections, which were working independently. Later these sections were clubbed under the Extension Communication and Training (ECT) Division in the year 2009 which later evolved into a full-fledged Social Science Division. In the Institute, social science activities got its significance since the Green Revolution period when the institute has released its first rice variety "Padma" in 1968 for farmers. The Division since its beginning is associated with the social scientists that have played a very key role in communicating new and advanced technical knowledge to rice growers of the country and also provided the feedback on the performance of the institute's technologies to the concerned Divisions for its improvement and the evolution of the new technologies. The Division serves the institute with its dedicated team of scientists from Extension, Economics & Statistics and technical officers and skilled manpower. The Division operates with the following objectives:

1. Development of socio-economic approaches, models and strategies for rapid transfer of technologies for sustainable rice production.
2. Characterization of resources, socio-economic and institutional constraint analysis, creation,

3. Demonstration of technologies in the farmers' field and evaluate and validate their performance.
4. Dissemination of rice production technologies through publications, advisory services, exhibition, workshop, interface, special days, etc.
5. Maintain database on rice ecology, ecosystems, farming situations and comprehensive rice statistics for the country as a whole in relation to their potential productivity and profitability.
6. Impart training to rice research workers, trainers and subject matter/ extension specialists on improved rice production and rice-based cropping and farming systems.

3. MAJOR ACTIVITIES OF THE DIVISION

The Division undertakes various activities, which are crucial for the conduct and performance of Institution. These activities can be broadly classified into two categories: research activities and supportive activities.

Research activities include translational research, impact assessment, database maintenance, capacity building for the visitors and trainees, human resource development; ICAR's face lifting activities like transfer of suitable technologies, expansion of the reach of the institute to new regions and providing agro-advisory services which assist the farmers in risk minimization. Albeit its involvement in various activities, it has performed well in the research front and the following section describes its research outputs and outcomes. The Division has undertaken different research projects under broader areas of development of approaches and models for technology dissemination, evaluation and testing, gender sensitivity, impact analysis, database updation, assessment and adoption of various rice production technologies, characterization of resources and innovations to add to rice research in the country and other areas of contemporary importance (Fig. 1).

Fig. 1. Major research projects and activities of the Division in last few years.

4. ACHIEVEMENTS OF THE DIVISION

4.1. Socio-economic approaches and methods for technology transfer

4.1.1. Development of model villages for sustainable and profitable rice farming

Approaches for development of the rice-based model village in the rainfed situation have been undertaken in *Gurujang-Guali* Cluster, *Tangi-Choudwar* Block of Cuttack district with two major interventions viz., varietal substitution of rice in different ecologies and crop diversification for improving the livelihood of the households. Strategies like broad-based participation through the inclusion of scheduled caste and women farmers and cultivation of vegetable under crop diversification after rice using available water were also tried. Assessment of returns from different cropping sequences introduced in the cluster indicated that rice-onion crop sequence was more remunerative than any other type of vegetables like bhindi, cucumber, tomato, pumpkin, bitter gourd in the rice-based cropping systems. Among various socio-economic characteristics; land holding size, non-farm income, labour force participation rate, provision for irrigation etc. were important factors apart from the improved traits of rice varieties like high yielding potential, low disease infestation and better grain quality for their adoption as well as shifting of crop choices by the farmers.

4.1.2. Gender-sensitive extension approaches in rice farming

Under this approach, intense gender sensitization was a pre-requisite which followed the capacity building of women rice growers through training, workshops, demonstrations, group discussions, counselling and exposure programmes. Both men and women got equal opportunity to exchange their experiences and feelings to garner community support to women rice growers in many critical areas of the gender gap.

Various interventions were taken up in *Sankilo* village of Cuttack district in order to design and test gender-sensitive approaches in rice farming. Demonstrations of seven rice varieties with improved technologies by 30 farm-women on 0.5 acre land each were conducted with women perspective. Besides, awareness training on IPM in rice, training-cum demonstrations in paddy-straw mushroom cultivation, NRRI rice parboiling unit and rice-husk stove, etc. was also conducted. It was assessed that almost all of the women farmers have participated in the activities like nursery management, uprooting, transplanting, water management, harvesting, threshing,winnowing, storage and value addition. In case of accessing resources/inputs for rice cultivation, majority of respondents were very successful like training (100%), land (93.33%), family labour (93.33%), threshing floor (93.33%), polythene bag (93.33%), etc. whereas, 30% did not succeed in accessing marketing and market information. It was also observed that majority had full control over rice chaff

(80%) and straw (70%) and the women growers perceived that their recognition in the family (100%), in the community (66.67%) and at the organizational level (60%) had increased.

4.1.3. Strategies for popularization of rice varieties

During the last five years the institute has developed 35 varieties; however, its spread was slow. Therefore, an approach was developed to popularize NRRI varieties and include it in DAC indent. Traditionally, state departments used to get information regarding new varieties from VIC document or institute. This was not enough to place breeder seed demand of newly released varieties in DAC indent. Generally, the demand for breeder seed of newly released varieties is created from block level, therefore, above approach was developed in which result demonstration was conducted at block level in farmers' field and Field day was observed in presence of state-level officials from Department of Agriculture. Based on the result, the state department placed DAC indent of recently released varieties.

4.1.4. A Self–Sufficient Sustainable Seed System for Rice (4S4R)

Water and quality seed are the two most important factors affecting Indian agriculture. The 4S4R model deals with seed. In case of seed, there are five important problems viz. the right quality of seed, right quantity of available seed, right time of supply of seed, right choice of varieties and right cost of production. Self-sufficient Sustainable Seed System for Rice (4S4R) model (Fig. 2) provides solutions to all these problems (Mishra et al. 2018).

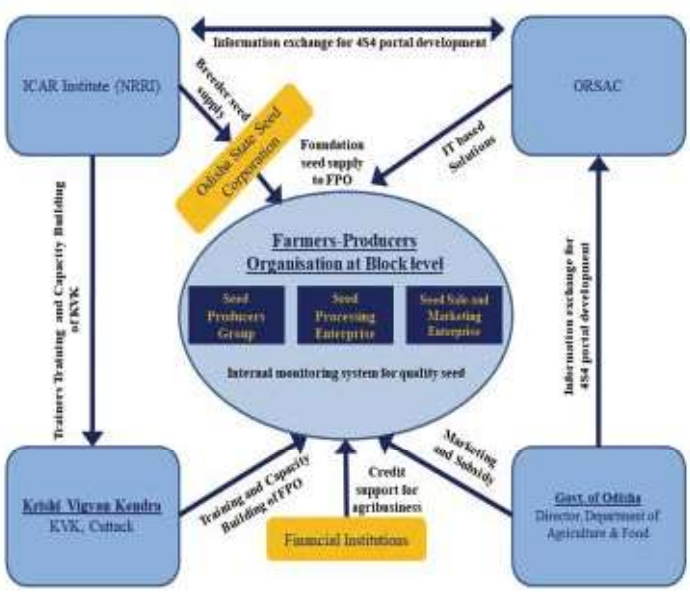

Fig. 2. Conceptual framework of self–sufficient sustainable seed system for rice (4S4R).

4.1.5. Rice Value Chain

The main objective of NRRI developed rice value chain (Fig. 3) was to promote large scale cultivation of high quality and speciality rice varieties of this institute in contiguous patches, and to undertake its processing and trading, so that the consumers have access to premium quality rice and all parties involved in the value chain are benefitted.

4.1.6. Rice-based climate-smart model village through convergence

Approaches for development of the rice-based model village in the rainfed situation have been undertaken in Gurujang-Guali Cluster, Tangi-Choudwar Block of Cuttack district during the last three years through convergence mode. Two major interventions namely, (i) varietal substitution of rice in different ecologies and (ii) crop diversification have been focused besides targeting holistic development of the village for improving the livelihood of the households (Das et al. 2017 and 2018).

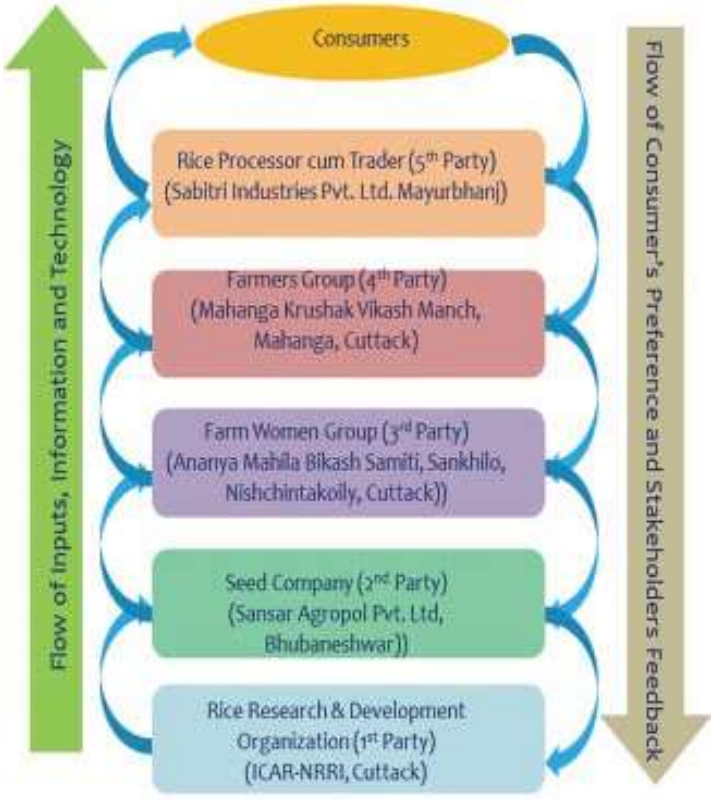

Fig. 3. Conceptual framework of NRRI rice value chain model.

4.2. Dissemination of rice-based technologies

4.2.1. Demonstration of NRRI rice varieties

Varieties like Rajalaxmi (7.3 t ha^{-1}), Ajay, Satyakrishna, Chandan, Sahbhagidhan, Phalguni, CR Dhan 300, Swarna*Sub1*, Naveen, Pyari, Luna Sankhi, Satyabhama, Lalat MAS, Chandrama, Geetanjali, Abhishek, IR 64 *Sub1*, Hazaridhan, Sadabahar, Hue, Kamesh, etc. were demonstrated during dry-season. While Rajalaxmi, Ketekijoha, NuaKalajira and Geetanjali, were demonstrated during the wet season. In the upland situation, the varieties Sahbhagidhan, Abhishek, Kamesh, and Hazaridhan were tested and under the irrigated situation, the varieties Satyakrishna, Phalguni, Chandrama, Chandan, Swarna*Sub1*, Naveen, Pyari, Lalat MAS, Satyabhama, IR 64 *Sub1* and IR 64 MAS, etc. were demonstrated. In the year 2018-19, NRRI rice varieties CR Dhan 305, 202 and IR64 *drt1* were demonstrated in Jharkhand state. The results of the crop cutting experiment indicates that IR 64 *drt 1* has outperformed (>15% yield advantage) Sahbhagi Dhan (Local Check) in the farmers field. In the state of Bihar, CR Dhan 201 has provided yield advantage of 6% over and above the local check Sahbhagi Dhan. In the state of West Bengal, NRRI varieties CR Dhan 307 (Local check- Swarna) and CR Dhan 304 (local check IR 64) have given the yield advantage of 29.46 and 19.39% respectively. In the state of Odisha, CR Dhan 304, CR Dhan 307, CR Dhan 508, CR Dhan 206 and CR Dhan 800 have given yield advantage of more than 15% as compared to the local checks (Fig. 4).

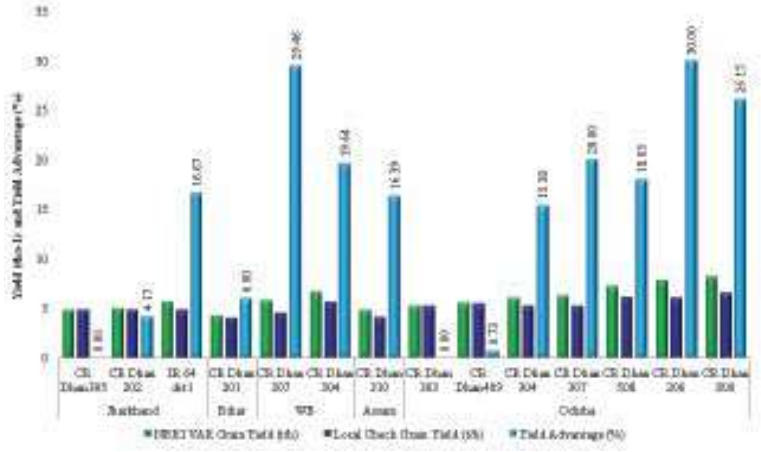

Fig. 4. Performance of NRRI rice varieties in comparison to popular local checks.

4.2.2. Dissemination of rice production technology through KVKs

On-farm trial (OFT) was conducted by KVK Santhapur on "Assessment of Bensulfuron methyl + Pretilachlor (Londex power) in transplanted rice" in an area of 2.5 ha involving 10 farmers. The most popular rice variety "Pooja" was

taken by the farmers which yielded 5.20 t ha^{-1} in treated plot and 5.02 tha^{-1} in farmers' field. The yield increment was only 4.6% but the total savings was Rs. 7000 due to savings of labour cost in hand weeding. Several off-campus training programmes related to rice covering the topics "Scientific nursery raising for healthy seedlings", "Integrated nutrient management in rice", "Integrated weed management in rice and "Integrated pest management in rice" in different villages for 300 farmers, farm women and rural youth were conducted. On-farm trials on suitable weed management for DSR, newly released short duration varieties of rice for DSR and effect of brown manuring on the yield of paddy were conducted by KVK, Koderma. Demonstrations with variety Sahbhagi Dhan and Abhishek were conducted as well as several training courses were organized in integrated nutrient management, water harvesting, seed production technique, vermicompost production, balanced fertilization, System of Rice Intensification and advance agronomical practices for increasing oilseeds and pulses production, contingent crop and resource conservation technologies, etc. were demonstrated.

4.3. Impact evaluation of rice-based technologies

4.3.1. Assessment of adoption of rice production technologies

Adoption of NRRI varieties studied from a representative sample of 100 farmers having rice in the irrigated shallow to semi-deep lowland ecosystem and exposure to NRRI rice varieties were assessed and it was reported that the majority (88%) of the farmers adopted rice variety Gayatri, followed by Pooja (83%), Varsha Dhan (25%) and Sarala (25%). In terms of the area also, most widely grown variety was Gayatri (49%) followed by Pooja (35%).

4.3.2. Estimation of the area under NRRI varieties

The variety wise seed distribution and HYV area information for 5 years (2008-09 to 2012-13) were used to estimate the area under different rice varieties in the Indian states. West Bengal, Odisha, Assam, Chhattisgarh and Uttar Pradesh states have a significant area under NRRIs rice varieties (Pathak et al. 2018). The rice varieties with larger area coverage in Odisha state are Swarna, MTU-1001, Pooja, Lalat, MTU-1010, Pratikshya and Khandagiri and NRRI varieties covered 698,223 ha in the state and accounted for 20.4% of the total HYV area in the state. In Maharashtra state, rice is grown mainly during *Kharif* season and the mega varieties (covering more than 1 lakh ha area) of the state were MTU-1010, Indrayani, PKV-HMT, Ratna and Jaya. The NRRI variety Ratna was grown to the extent of 133,255 ha in the state and mainly confined to the Konkan region. In Madhya Pradesh also rice is grown predominantly during *Kharif* season and it was observed that the mega varieties of the state were IR-64, Kranti, IR-36 and MTU-1010. NRRI varieties were grown to the extent of 22,455 ha in the state. Information with respect to Tripura state revealed that varieties like Swarna, Pooja, Naveen, and NDR-97 covered maximum area under rice. NRRI released varieties were grown to the extent of

73100 ha in the state and accounted for 25% of total *kharif* HYV area and 48% of total *rabi/summer* rice area. Similarly, information for Chhattisgarh state revealed that the coverage of HYV rice in the state was 63%. The *rabi/summer* rice accounts for only 3.2% of the total area under rice. The rice varieties which covered maximum area were MTU-1010, Swarna, MTU-1001, Mahamaya, IR-64 and IR-36 and these varieties covered about 55400 ha in the state.

4.3.3. Evaluation of public-private partnership in adoption of rice transplanter in Odisha

Secondary data regarding the spread of rice transplanter revealed that public-private partnership (PPP) mode of promotion is effective for their adoption in Odisha. The rapid adoption stage is in progress and the number of transplanter purchased by farmers in PPP mode during the year 2013-14 was 634 from a mere three numbers during 2005-06. The transplanters are adopted by large farmers mainly in irrigated areas of Balasore, Cuttack, Kalahandi, Kendrapara, Puri, Sambalpur, Sonepur and Sundergarh districts to overcome labour shortage during the peak period. Among the models approved by the Government, the model promoted by VST Tillers and Tractors i.e., Yanji Shakti 2ZT-238-8 has been adopted by a majority of the farmers followed by the model promoted by Kubota Agriculture Machinery India Pvt. Ltd., i.e., NSP 4W due to aggressive marketing by these two firms. Further, analysis of primary data from 60 transplanter owners covering fifteen districts in Odisha revealed that the cost of transplanting by use of self-propelled transplanter was Rs. 6,750 ha^{-1} in inland Odisha in comparison to Rs. 12,650/- in manual transplanting. The labour-saving due to transplanter use was 53 man-days per ha over manual transplanting. Among the total farmers covered, the distribution of small and marginal farmers were 42% and 92% respectively in the state.

4.4. Entrepreneurship Development

4.4.1. Development of entrepreneurial modules for selected NRRI technologies

A Trainer's Training Module of five-week duration for entrepreneurship development on NRRI Rice Technology (TED-CRiT) on commercial (50 acre), medium (7.5 acre) and small (0.5 acre) rice-fish integrated farming systems models were developed which contained sub-modules such as entrepreneurial motivation, general management, finance management, production management, labour management, marketing management and business plan development etc. These modules were developed to train the potential entrepreneurs to undertake new startups in agricultural sector.

4.4.2. Development of community-based business modules in rice technologies

Under the activity-develop resource-characterization based T-EDP modules of NRRI technologies for community-level adoption, Sakhigopal block of Puri

district was selected based on the reports of the extent of mechanization. The State Government has provided subsidy for the purchase of tractor (97), power tiller (76), reaper (43), power-driven equipment (118), rotavator (56), transplanter (6), combine harvester (1), special power driven equipment (15) and hydraulic trailer (31). Further, as part of developing T-EDP module, the business plan was developed and profitability projections were made.

4.5. Resource characterization, database and information management

4.5.1. Resources characterization to aid rice research

As part of designing resource-characterization based general simulation model of diffusion of rice technologies, adoption data were collected from 19 locales situated at 50 km grids from NRRI. The data were interpolated using the Inverse Distance Weighted (IDW) scheme which resulted in the generation of interpolated rice variety adoption maps and the results revealed that a large area of rice fields was predominantly covered by high yielding varieties of rice (08.35%), while the rest of rice fields (31.65%) were covered with local varieties. Using the grid data of adoption for various HYVs, maps were generated. It was found that Pooja was the most popular variety covering 17.69% of rice area followed by Sarala (6.54%) and Gayatri (6.38%). The diffusion of NRRI varieties was positively correlated with the easiness of labour availability. Further, the diffusion rate was regressed with labour availability, pesticide availability, distance of selling produce, percentage of lowland, percentage of medium deep-water land, percentage of irrigated land, percentage of coastal saline land and acreage of other HYVs and the results showed that 73.6% of variations can be explained by change in independent variables and almost 50% variation was attributed to change in labour availability and percentage of irrigated land.

4.5.2. Development and maintenance of rice knowledge management portal

NRRI developed a digital photo library on rice-related information such as various stages of rice plant growth, insect pests of rice, diseases of rice, implements/machinery used for production and post-harvest of rice, varieties, etc. as consortium partner of the portal. Besides, documents of Government schemes and extension programmes on rice were collected, digitized and uploaded in rice portal. Sixty one-minute spot films and one 17 minute documentary film were produced and made available on the portal. In order to make the portal popular, a capacity building workshop was organized for 60 participants from Odisha, Bihar, Jharkhand and Chhattisgarh at this Institute and they were exposed to the Rice Knowledge Management Portal and its utility in disseminating rice related information to the farming community.

4.6. Developing strategies to double farmers' income

The institute has developed a comprehensive document on strategies to double farmers' income in Odisha state (Pasupalak et al. 2018) and also suggested the strategies to double farmers' income in rice sector for India (Samal et al. 2017).

4.7. Capacity Building

The Division is also engaged in capacity building via different trainings, exposure visits and workshops for the visitors around the years. Figure 5 represents the number of training programmes organized and the participants benefitted out of these trainings in last five years.

The Social Science Division has played a key role in displaying the new technologies to the farmers through its participation in various exhibitions across the country. By its exhibits, the Division has opened a window for dissemination of NRRI technologies and thereby contributing in technology transfer and knowledge sharing in the society. Fig. 6 depicts the year wise participation in exhibition for last few years.

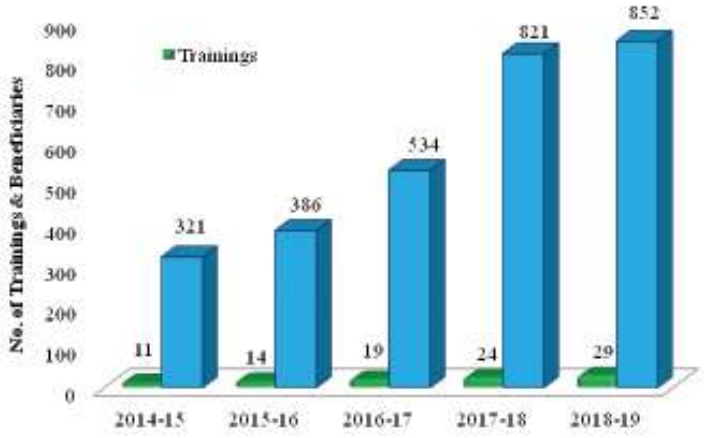

Fig. 5. Number of vocational training organized and the number of beneficiaries in the last five years.

4.8. Exhibition

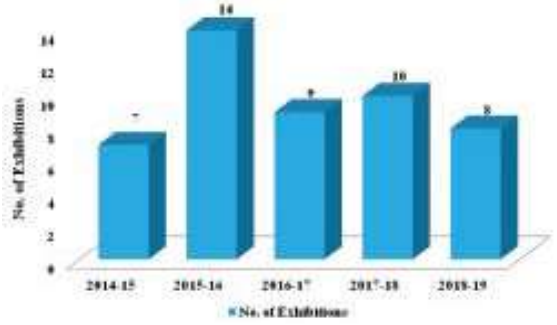

Fig. 6. Year-wise participation in the exhibition.

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4.9 Research publications of the Division

The testament to the research work undertaken by the division is reflected in its publications. The publications from the Social Science Division has a range from research articles to book chapters, popular articles, technical bulletin, training compendium, extension bulletin etc. In last five years (2014-15 to 2018-19) the Division has published 52 research articles out of which 20 (38%) were published in impact factor journals with NAAS score >6. Also, the Division has published 14 book chapters, 12 popular articles, 3 technology bulletins, 24 training compendiums, 13 extension bulletins and presented papers in 20 symposia during the same period.

5. IMPACTS OF THE DIVISION

5.1. Socio-economic approaches and methods for technology transfer

Farmers in the villages where NRRI intervened with improved varieties and other improved production technologies were growing local rice varieties (e.g. Saruchina, Kalamata, Mathura) and harvesting very meagre yield. The improved varieties namely, Sahbhagi Dhan, Swarna-Sub1, Pooja, Ketekijoha, Varshadhan and Naveen were adopted by the farmers which produced almost doubled yield and they cover around 63% of the cultivated rice area. It was also reported that vegetables grown after rice provided better opportunities to the women for employment, family nutrition and income as indicated by the farmers.

Due to embracing of gender-sensitive approaches in rice farming through NRRI intervention, the women growers perceived that their recognition in the family (100%), in the community (66.67%) and at the organizational level (60%) increased. Similarly, there were major changes in the mindset of male members of family/society towards women-managed rice farming (90%) and need for their exposure to rice knowledge (93.33%). Remarkable changes in the behavior of women rice growers were found with regard to knowledge (100%), skill (93.33%), decision-making capacity (86.67%) and group effort (76.67%), respectively.

As a part of action research on empowerment of tribal women engaged in rice-based farming activities in Balasore district of Odisha, about 120 farm-women from three villages were organized into twelve Self Help Groups. Eight income-generating activities in rice-based farming systems were selected for empowering women depending on the capacities and opportunities they had. Extension methods *viz*., group approach, training, demonstration and advisory services were organized for the group on the identified interventions. An index to measure the extent of empowerment was developed by identifying nine relevant indicators and the overall gain in empowerment was found to be 25.6%, which was mainly due to the expansion of income generation activities.

The impact assessment of Swarna-*Sub1* was carried out in the submergence/ flood prone project area to assess the area spread and benefits accrued to farmers. Two surveys were conducted to assess the area spread, one before the introduction of the variety (during 2009) to assess the area under existing varieties and the other, four years after the introduction (during 2013) by interviewing 100 farmers. Until 2007 *Kharif* season, Swarna-*Sub1* was confined to one farmer in the mother trial. Encouraged by its performance, neighbouring 13 farmers have grown the variety in 3.5 ha area in rainfed shallow lowland during 2008 (Mondal et al. 2018). By 2012 *Kharif* season, the variety has covered 35.7% of the shallow lowland in the project area and almost all the farmers have adopted the variety. The varieties which were replaced by Swarna-*Sub1* were Swarna, Jangalajhata, Gayatri and Pooja because of its submergence tolerant ability and comparable grain quality. Further, data analysis revealed that Swarna-*Sub1* has a marginal advantage in yield and income over its competing varieties. The yield advantage was 8.9% and the net return obtained was 4% higher over the competing varieties. The additional return per ha obtained from Swarna-*Sub1*was Rs. 2,883/- and the reduction in the cost of production per quintal was Rs. 39/- in comparison to its competing varieties.

Feedback on the performance of different rice production technologies (RPTs) and government-sponsored programmes and schemes were collected randomly by accidental sampling from 220 rice farmers from various states which revealed that farmers were convinced about the better performance of 'System of Rice Intensification (SRI) method' (with mean weighted score (MWS) of 4.62 out of 5 in a 5-point scale) and 'Line transplanting' (MWS of 4.60) over the traditional random transplanting (MWS of 4.20). About the performance of various government-sponsored programmes and schemes, 'BGREI programme' was highest rated among the beneficiaries (MWS of 4.55) followed by 'procurement of paddy at minimum support price (MSP)' (MWS of 4.23) and training-cum-exposure programme of ATMA'.

5.2. NRRI's footprint across the country

The institute with its mandates on rainfed ecosystem undertakes research activities streamlined at technology development, backstopping and dissemination specific to rainfed rice ecologies in the country. Since its inception the institute has released 129 rice varieties and developed different technologies, which have inscribed its footprints across 20 states and millions of farm families.

5.3. Number of villages and farmers covered

Currently, the institute has covered 144 villages under different extension programmes like Mera Gaon Mera Gaurav (MGMG: 105 Villages), Farmers First Programme (FFP: 4 villages) and Front Line Demonstration Programme (FLD: 35 villages). In terms of farmers' coverage, the institute has covered around

27000 farm families in last five years. Under 4S4R, five Farmers Producer Companies have been registered under Company Registration Act 2013 and 70 FIGs have been created under these FPOs covering 1400 farmers. More than 26,000 farm families are covered by the two major programmes of the institute; under Farmers First Programme more than 1800 (Das et al. 2018) and under Mera Gaon Mera Gaurav Programme more than 25000 farm families are covered by the institute. Out of the total beneficiary, 26% belongs to SC/ST and 66% are small farmers.

5.4. *Effect of trainings on behavior of the participants*

The institute provides a number of training to farmers from all over countries on varies aspect of rice cultivation, ranging from seed production, grain production, nutrient, and disease and pest management to post-harvest processing and marketing of produce. Institute has conducted a survey to assess the impact of the training program conducted by NRRI by taking the trainees who attended the training program during the last three years i.e., 2014-15 to 2016-17. The impact study was conducted for training provided on 11 technologies and response of trainees was elucidated for adoption behaviour and change in behaviour (knowledge, skill and attitude). The results of the study indicate that for most of the training organized by the Division on behalf of institute, have brought >50% positive changes in the behavior of the participants. Trainings on use of improved implements, recommended doses of pesticides and seed rate indicates a <50% change in the behavior of the participants due to other reasons (Fig. 7).

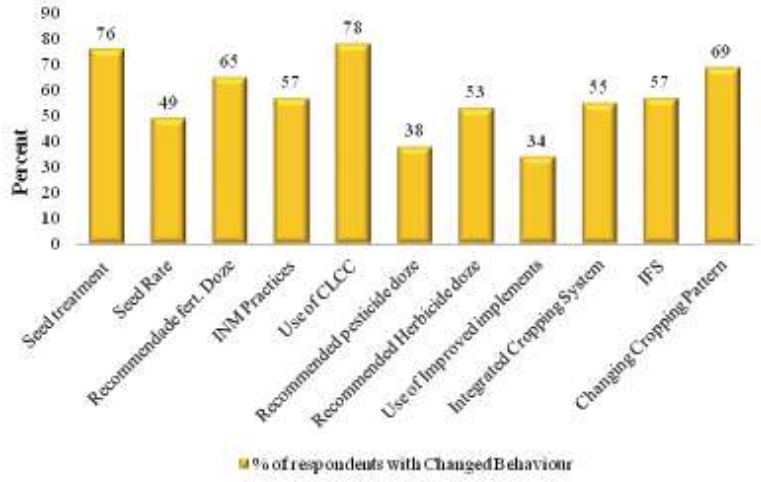

Fig. 7. Impact of training on the behavior of respondents.

The Division also reaches out to different stakeholders for dissemination of new knowledge and improved technologies. In the last decade, the institute has witnessed an increasing trend in the number of visitor's arrival and also the delivery of agro-advisory services to them. This visitor base has continued to increase over the years and multiplied itself more than twice from meagerly 3000 to about 7000 visitors per annum. Also, a sum total of more than 30000 farmers and students have been provided agro-advisory services and basic knowledge of agriculture, respectively (Fig. 8).

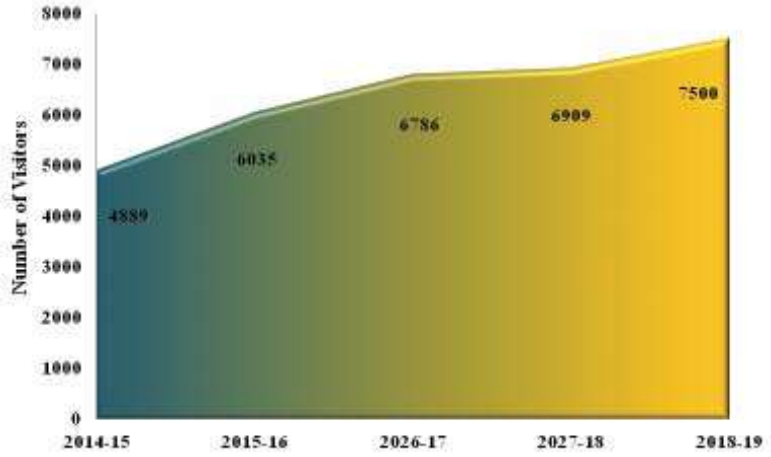

Fig. 8. Visitors in the Institute for the last five years.

6. ASPIRATIONS

Social science Division of institute is an institute's limb to reach out different stakeholders at different platforms for diversified purposes and activities. It is associated with transfer of NRRI technologies from lab to farms across the country, capacity building of different stakeholders on desired aspects of rice cultivation, processing, marketing etc. and showcasing the strength of institute at various local, regional, national and global platforms by participating in different exhibitions. Under this background, the social science Division has set up following aspirations for its futuristic work.

- Promotion of different rice varieties to new areas of the country: As many of the NRRI rice varieties are released by Central Varietal Release Committee (CVRC) and State Varietal Release Committee (SVRC) these varieties should have to be spread to newer paddy cultivation areas (in terms of Institute's reach) of the country. Therefore, it is pursued that the institute's reach has to be expanded to the newer areas by promoting the recent rice varieties to different rice ecologies in other states too.
- Evaluation of mismatch between quality parameters demanded by different stakeholders and quality parameters supplied by the existing varieties and

varieties from the institute so that the mismatch can be bridged up for rapid expansion of NRRI rice varieties to different regions.

- To make Indian farms self-sufficiency in seeds, the 4S4R model would be up-scaled by taken up in the new districts of the existing state and to other states as well.
- Strengthening of value chain of rice in different dimensions like seed chain, grain chain and value chain for processed rice based products.
- Development of a system for real time data collection by using information and communication tools for farmers.
- To undertake the state level study on profitability of rice in different agro-ecological zones of the states.

7. CONCLUSION

Over the years, the Social Science Division has reached to about 90000 of different rice stakeholders spanning from farmers to the consumers including millers, private traders, and government officials from various departments through its diversified activities. As a result, it has contributed to the outreach of the institutions across different zones in the country. The division has a crucial stake in transfer of rice based technologies and knowledge creation via trainings and exhibitions across the country. The division is committed to undertake different socio-economic studies pertaining to rice growing families; resource characterization and mapping; accessing agro input footprints like water and fertilizer footprints, demand forecasting to assist policy makers, product profiling etc.

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