



Sustainable social enterprise approach for Non-Pesticidal Management (NPM)

A case study of NPM initiative of JSMBT & SAMUHA in Karnataka¹

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I. Background



Figure 1: SAMUHA Admin office at Devadurga

This case study shares the experiences emerging from Non-Pesticidal Management (NPM) paddy interventions undertaken in the Upper Krishna Project (UKP) and the Tungabhadra Left Bank Canal (TLBC) command areas in Raichur and Koppal districts by Janara Samuha Mutual Benefit Trust (JSMBT) and SAMUHA. SAMUHA is a development organisation working with vulnerable people in Northern Karnataka to improve their quality of life within defined periods of time on various development themes including water, social justice, disabilities, micro-credit, NPM Paddy and climate change. SAMUHA has promoted JSMBT, which is a joint venture between the Devadurga and Koppal district level mutually aided cooperative societies.

NPM paddy interventions were taken up in the UKP command area at Deodurg taluk of Raichur district and in the TLBC command area at Sindhanur taluk of Raichur district and Karatagi taluk of Koppal district. These taluks originally come under the semi-arid region of the Hyderabad Karnataka of Northern Karnataka and fall under North Eastern Dry (2) and Northern Dry (3) Agroclimatic Zones of the state of Karnataka. While Deodurg is characterized by a mix of undulating black and red soils with random granitic patches, Sindhanur and Karatagi have deep black soils. Average annual rainfall were 590 mm and 687 mm and groundwater development percentage were 43% and 31% for

Koppal and Raichur, respectively. Major crops grown in the region were paddy and jowar during Kharif and groundnut and Bengalgram during Rabi. Paddy is the ruling crop in both command areas. Most of the farmers in the region come under marginal (37%) and small (31%) categories while medium and larger size farmers constitute about 30% and 1 %, respectively. Landless labourers account for 3% in the region. The following sections share the important issues faced by paddy farmers in the UKP and TLBC command areas, how the NPM Paddy Programme was evolved to address these issues, the benefits realized by the farmers and the key learnings that emerge from this experience.

II. The need for NPM intervention in canal irrigated paddy cropping system

Chemical intensive high input paddy cultivation system is very prevalent in the UKP and TLBC command areas. The emergence of this kind of input intensive paddy cultivation regime can be traced to the influx and settlement of farming communities from Andhra Pradesh a few generations ago. They brought with them modern crop cultivation practices. Being risk taking progressive farmers, they believed that higher returns in farming could be realized only by input intensive technologies. This attitude has led them to the practice of irrational use of chemical fertilizers along with higher water-use intensity in canal irrigated paddy cultivation system. Influenced by this, the local Kannadiga communities also adopted similar intensive agricultural practices. Over time, application of 4 to 5 quintals of fertilizers per acre and 4 to 6 standing inches of water at every irrigation have become quite common in the canal command areas. This situation was further reinforced by the upward pressure on rents exerted by landowners on the tenant farmers in the command area. Easier access to farm inputs on credit by input dealers and farm credit from financial institutions also abetted this development. Irrational use of chemical fertilizers and water, created an environment conducive for Brown Plant Hopper (BPH), leading to significant



Figure 2: Line planting of paddy at Hale Baraguru, Karatagi

crop damage across the UKP and TLBC command areas in Deodurg, Sindhanur and Karatagi. Over the years, BPH has become an endemic pest in these areas. Farmers had responded to this development through indiscriminate usage of synthetic chemical pesticides, which is reflected in 4 to 6 six sprays/applications in a crop cycle. This had increased the cost of cultivation at least by 20% besides polluting the soil and environment. Paddy farmers were caught in this treadmill of chemical intensive agriculture and this necessitated systematic intervention and support to lead them out of the same.

III. Rolling out of NPM interventions

It is in this context that SAMUHA started its NPM interventions with the following objectives in mind:

- To educate farmers on growing healthy crops
- To avoid usage of synthetic chemical pesticides and protect the environment
- To reduce cost of cultivation and increase the net income realised by the farmers

- To facilitate better market access for NPM produce

NPM interventions in paddy were first initiated in Deodurg located in the young UKP command area (15 years old) by 2008. The first phase of NPM intervention of SAMUHA was supported by Ford Foundation through the Self Help Plus project. After this phase, SAMUHA continued with the NPM initiative on its own for another three years. Then the NPM program was integrated with other funded agricultural initiatives like the Water Management Project from Hindustan Unilever Foundation.

1. Mobilization of farmers for NPM initiative

In a new project village, the process of mobilization of farmers began with a 'village entry process', which involved

1. Opinion leaders mapping and
2. discussion on NPM concept with the villagers in Grama Sabha.

This was followed up with a street-house-kitchen survey. Male and female representatives of the streets of the village were mobilized to form Grama Samestha, an informal institution with the mandate to discuss and approve any new

programme / project in the village.



Figure 3: NPM Farmers Club meeting at Mundaragi, Deodurg

NPM initiative in Deodurg was rolled out by leveraging the social capital built over the years by SAMUHA and the women SHG network. The choice of adopting NPM paddy cultivation implied challenging the dominant knowledge system of chemical intensive farming while believing in an unknown alternative. Credibility and trust earned through previous interventions aided in bringing that belief. NPM activity begins with a village level pre-season workshop. Successful experiences in NPM cultivation were shared in this workshop. Interested and committed farmers were identified and enrolled in the NPM Programme in this workshop through an application prescribed by Internal Control System (ICS). Both owners of the land and the tenant farmers were considered as the eligible members and special preference was accorded to small farmers. As the ownership and tenancy mostly rested with male members of the farming family, most of the mobilized farmers were men. But, most of them belonged to households which were associated with women SHGs. These enrolled farmers were then organized to form 'NPM Farmers Club' at the village level.

These clubs were informally federated under JSMBT, which was essentially playing the role of an NPM Farmer Producer Organization (FPO). Women SHG members enrolled in the NPM Programme were the direct members of JSMBT, while men were only the nominal members. The NPM Programme offered a package of services to participating farmers that comprised of –

- Farmers Field School (FFS) trainings/ Workshops/Field days to build their capacity

- Input supply
- Credit linkage
- Field monitoring and handholding during the crop season
- Internal Control System (ICS) meetings and documentation, and
- Market linkage

2. Capacity building of NPM farmers



Figure 4: FFS session in progress at B.R.Gunda, Deodurg

The enrolled farmers take a pledge to cultivate without using any synthetic chemical pesticides. Their capacity is built mainly through pre-season workshops and Modified Farmers Field Schools (FFS). Pre season workshops were conducted with the objective of understanding existing cultivation practices and problems in paddy cultivation. While two to three pre-season training sessions were organized at a common place, after sowing, subsequent FFS training sessions were conducted directly in the fields on a fortnightly basis during different stages of crop cultivation.

The NPM Programme team consisted of Programme Head – Agriculture, team leaders and field officers. The Programme Head built the capacity of team leaders and field officers through Training of Trainers (ToT) and Modified FFS. In turn, the team leaders and field officers trained the enrolled farmers. Farmers undergo an experiential learning process in the FFS sessions along with the facilitators. Depending on the needs of the NPM Farmers Club and the NPM Programme, a farmer sahayak/master

farmer is groomed in every Club. They support their fellow farmers by providing guidance and help in a timely manner.



Figure 5: FFS field observation, B.R.Gunda, Deodurg

Over a period of time, say in three to five years, these Farmers Clubs were strengthened, thus eliminating the need for the sahayaks. Need-based sessions were conducted for better understanding of problems in the perspective of paddy ecosystem analysis. Facilitation was done to undertake crop management decisions through a group process. Topics covered in the training sessions include-

1. Orientation on NPM (concept and objectives)
2. Agro-EcoSystem Analysis (AESA)
3. Plant nutrients and their importance
4. Different growth stages of paddy and the pertinent management practices
5. Seed selection
6. Seed treatment
7. Nursery preparation and management
8. Preparation and usage of herbal leaf extracts and growth promoters
9. Management of major pests such as the BPH and diseases like Blast and Bacterial Leaf Blight, and
10. Harvest management

Videos on management of BPH, preparation of biopesticides, Direct Seeded Rice (DSR) and line transplanting were disseminated across villages, some of which can be accessed at

<https://samuha.org/index.php/s-npm-paddy>.

Weekly and monthly reviews were conducted to track the progress of the NPM Programme. These meetings also served as a platform for capacity building of farmers and helped the staff in understanding the situation on ground better. Farm visits were also made for offering handholding support to individual farmers as and when required.

3. Package of NPM practices adopted for paddy

NPM package of practices promoted by SAMUHA involves integrated crop management measures aimed at enhancing the resilience of canal irrigated paddy ecosystem to pest attacks. Some of these measures include -

- Crop geometry
- Water management
- Nutrient management and
- Need based application of bio-pesticides

Farmers were motivated to make a conscious choice to move away from 'high inputs high returns' approach to focus on 'growing healthy crops to get optimal yield and returns'. Farmers learned to cultivate NPM paddy crop with application of 25 kgs of neem cake and 2 to 3 quintals of artificial fertilizers and irrigating 1 to 3 inches of water. Since farmers adopted a holistic crop management approach, insect pests and diseases were normally under control. In case, extreme weather conditions brought in pests and diseases, NPM farmers applied bio-pesticides such as herbal leaf extract and chilli-ginger-garlic extract as per the guidance of the Programme. With these measures, farmers were able to significantly reduce the cost of cultivation while at the same time realizing yields that were on par with that of conventional canal irrigated paddy cultivation. In the command area where farmers used to cultivate two paddy crops per year, they are finding it difficult to grow more than one crop owing to water shortages.

Given the reduced availability of canal water for crop cultivation and the susceptibility of the

prevalent paddy variety Sona Masuri (BPT 5204) to BPH, farmers were advised to adopt pest resistant short and medium duration fine rice varieties like RNR 15048. Gaining confidence from the successful adoption of NPM approach in canal irrigated paddy cultivation, SAMUHA innovatively integrated NPM package with its larger initiatives on promoting line planting³ and Direct Seeded Rice (DSR) methods. Reduction in irrigation which is an integral part of these methods have also aided in reducing pest incidence. The NPM package-of-practices has also been improvised and evolved based on the context and changing conditions. For instance, 5 to 10 kgs of nitrogen have been increased in the package based on the response of the soil. Similarly, owing to labour and quality issues, the panchagavya has been gradually replaced with ready-made growth promoters and

asked us to try NPM practices in one acre on a trial basis. These practices included limiting standing water in the field to one to two inches, applying fertilizers in measured and split doses, and avoiding chemical pesticides. We also got to know of farmers who had successfully implemented these practices. In my first attempt, the yield that I got was similar to the level realized in the previous years but I was able to save around Rs.4000. Happy with this result, I extended NPM practices to two acres. Realizing a saving of Rs.4000 per acre was a very significant benefit for a farmer like me.

Moreover, we were also able to eat poison-free food and feed chemical free fodder to our cattle. Having availed the Farm Gate Procurement service from JSMBT, I received payment for my produce on time without any stress and uncertainty. In the third year, I got a yield of 90 bags from two acres and a net income of Rs 82,900.

We, farmers, do not keep track of the expenses incurred in agriculture; many of us do not have much knowledge on quantity and usage of fertilizers and manure. Hence, we blindly buy whatever the dealer gives to us. During the last five years, we have learnt how to keep an account of every expenditure. We now record them in a note book. We are now well aware of proper use of fertilizers and neem cake, and well versed with preparation of bio formulations. I am happy about NPM cultivation and I intend to continue the same method in the time to come.”

supplements. Various externally sourced bio-inputs were also explored for their suitability as part of NPM package. Inputs such as neem powder and growth supplements were supplied to the farmers as part of the NPM support package.

4. Quality assurance system

The NPM Programme adopted Participatory Guarantee System (PGS) based Internal Control System (ICS) for ensuring quality of NPM practices by the practicing farmers. Regular fortnightly ICS meetings were conducted by the field officers in each village. In these meetings,

Box 1

Experience of farmer Siddappa, Govindapalli village, Deodurg



Govindapalli is a small village of 180 residents situated 35 kilometers from Deodurg. Fifty two farmers from this village were organized into Shri Anajaniah Raitha Koota under the Water Management Programme. Of these 52 farmers, 10 have been practicing NPM agriculture in 20 acres. Siddappa is one among them. He has been following NPM practices on his two acre land and here is his account.

“In the beginning, the JSMBT project team members motivated farmers to grow paddy with less water under NPM approach. When we raised questions about the feasibility of this suggestion, the team

farmers share details of progress in their respective fields. These meetings also focused on addressing the issues faced by NPM farmers at the field level. Any non-compliance with respect to the NPM protocols is brought to the attention of the Farmers Club and necessary action was taken by the Club for addressing them. The final list of farmers who have practiced NPM agriculture without any non-compliance is submitted by the Farmers Club to the ICS unit. In addition to this, NPM fields were periodically monitored by the field officers with the support of local sahayaks.

Documents such as i) individual application, ii) farm diary, iii) field maps, iv) approved farmers list from Farmers Club and v) non-compliance reports were maintained meticulously as part of the ICS system. Besides ensuring adherence to NPM practices during production and harvest, the team takes the following measures to ensure the integrity of the produce in the chain-of-custody until the product reaches the buyer:

- arrangement and supply of bags to farmers,
- collection of grain samples for testing pesticide residues and for grading,
- fixing offer price for the paddy lot as per the quality, and
- farm gate procurement and transportation of

paddy safely to the destinations.

5. Organisational structure

The NPM Programme in each location is handled by a team consisting of one team leader and 5-6 field officers, depending on the number of farmers per village and operational efficiency. Each Field officer monitors and supports about 4 to 6 villages and each village has about 20 to 40 NPM farmers. Each NPM Farmers Club also have one helper called farmer sahayak or master farmer. Management and domain support to the location team is provided by the Agriculture Head of SAMUHA.

6. Facilitating marketing of NPM paddy with Safe Harvest Private Limited (SHPL)

JSMBT has been facilitating marketing linkage between NPM paddy farmers and Safe Harvest Private Limited through its Farm Gate Procurement (FGP) services. Based on the approved farmers list received from NPM Farmers Clubs and the demand from SHPL, paddy is procured from NPM farmers by JSMBT and aggregated in its godown. Leaves of neem and Vitex negundo are used to prevent pest infestation during storage.



Figure 6: ICS meeting in progress at B.R.Gunda, Deodurg

Offer price is fixed based on the grade of the paddy procured (A, B & C), which in turn is based on the moisture content (12 –14%), grain colour and broken percentage of the grain. The prices prevailing in APMC market yards and local markets were also considered for fixing the offer price. The offer price is usually more than the APMC market price, considering that the farmer need not pay transport cost and commission in FGP and the payment is received in time. Over 7800 MT of NPM paddy worth Rs.14.5 crore have been sold to Safe Harvest Private Limited since 2008.

7. Extension of learning from UKP command area to TLBC command area

Unlike the young UKP command area, TLBC is a matured command area (about 50 years old) characterized by higher landholding size and comparatively higher literacy rate. BPH incidence was more severe in the TLBC command area, which has become an endemic pest. This was mainly due to mismanagement of water and nutrients. Farmers resorted to repeated spray of pesticides to manage BPH and other important pests.

Sindhaur in TLBC command area was considered as the pesticide capital of Karnataka. It was in this context that the NPM Programme, based on the experience gained in Deodurg, was extended to Sindhaur and Karatagi locations in the TLBC command area by 2015. The NPM Programme explored integration of NPM methods with Direct Seeded Rice (DSR) and line planting (modified SRI) methods in Sindhaur and Karatagi. Based on the positive experience, DSR and line planting have become part of NPM package-of-practices in these regions. Starting with 39 farmers from 28 villages in 2015, the NPM Programme has widened its coverage to 161 farmers from 50 villages in 2019-20. Farmers in the TLBC region were informally federated and supported by JSMBT for procurement of NPM produce. For the first time, 69 tons of NPM paddy was procured by JSMBT in these regions during 2019-20.

8. Exploration to adopt NPM methods to other crops



Figure 7: NPM paddy stored in godown at Raichur

An attempt on adopting NPM approach for groundnut was made with the participation of 105 farmers in 216 acres during 2009-10. Farmers realized a reduction in the cost of cultivation to the tune of Rs.3000/acre. But they could not get additional price as the NPM groundnut was sold in the regular markets.

In Kharif 2011, another attempt to adopt NPM methods for the vegetables such as gourds, okra and beans was taken up in acres with the involvement of 15 farmers from Gangavathi taluk of Koppal district. From these farmers about 40 tons of NPM vegetables were procured and marketed directly by JSMBT; but it could not succeed in ensuring better prices to the farmers. These attempts made it clear that while applying NPM approach to these crops is quite feasible at the production level and can result in considerable reduction in cost of cultivation, a viable marketing strategy is needed for making it attractive to farmers and for increasing scale.9. Initiatives towards cost coverage in the NPM programme

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Once the NPM model was consolidated in the first phase, SAMUHA started focusing on making it financially sustainable to limit dependence of the NPM Programme on external support. It built its model of service charge system mainly based on the incremental benefits realized by the farmers in NPM cultivation over prevalent chemical intensive paddy cultivation, which was

Box 2

Experience of farmer Yankereaddappa, Hulikhal village, Karatagi



Hulikhal village is located at a distance of 12 kilometers from Karatagi Taluk of Koppal district and forms a part of the pesticide dominated TLBC command area. It has 400 families residing in the village. SAMUHA has been implementing Water Management Programme with 175 farmers and motivating farmers to adopt NPM practices in paddy cultivation through FFSs. Yankereaddappa is one of the participating farmers and here is his account.

“For the last three years, I have been cultivating paddy in my 1.38 acres by adopting improved water management practices and NPM. In the beginning, I had many doubts about the effectiveness of these approaches since it was a struggle to get good yield despite using five quintals of fertilizers and 5-6 applications of chemical pesticides. We were apprehensive of falling deeper into debt.

The NPM Programme team told us to try in part of our land. So, in the first year I adopted NPM in 1.38 acres and I realized a yield of 35 bags. During the second year, it increased to 40 bags and in the third year I have reaped 50 bags. In all these years, I have been applying the same recommended measure of fertilizer and neem cake; I have also been maintaining irrigation depth of one inch in the panicle stage and one and a half inches in other stages. As a result, water use for irrigation has significantly come down, which would have benefitted the farmers in the tail region of the command. Cost of production also has come down. We found that the NPM rice tastes good and even my relatives liked the taste of rice. We were able

to eat poison free food, which is good for our health. The fodder is also good for the livestock. I am confident about practicing NPM approach in paddy cultivation in the coming years. It is my hope that all farmers will eventually adopt this method of cultivation.

around Rs. 4000 per acre. As per this system, the farmers pay an agricultural extension service fee of Rs.1000 per acre for the first two acres and Rs.250 for every additional acre that is brought under NPM. This also involves 50% of the payment up front every season in order to confirm their participation. Apart from this, a service charge of 1% of the value of paddy procured is collected from SHPL and a small margin is recovered from the sale of inputs.

Parallely, manpower rationalization was taken up to optimize cost of implementation. By design, each field officer covers about 150 - 200 farmers with 150- 200 acre from 4 to 5 villages located at an average distance of 15 kms. With all these efforts NPM Programme could succeed in covering about half of its implementation costs. But more importantly, the introduction of service charge system has resulted in participation of farmers with better understanding and commitment and also reinforced the mutual accountability of farmers and the team members. NPM Programme is exploring other options of revenue generation for increasing the cost coverage.

IV. Benefits realized

- ▶ NPM paddy farmers have gained a wider understanding of major pests and diseases, role of beneficial insects in paddy ecosystem, nutrient management and decision making processes in crop management.
- ▶ The intensity of crop protection issues has come down over the years with the adoption of NPM approach and has become manageable.
- ▶ While most of the farmers started with adoption of NPM approach in one acre, almost all of them have extended it to their

Table 1: NPM Paddy Programme in Deodurg - At a glance

S.No	Particulars	2008	2017	2018	2019
1	Total number of NPM paddy farmers	18	626	614	432
2	Total area under NPM paddy (acres)	25	1,189	1,413	840
3	Average yield during the year (qtl/ac)	19	26	27	29
4	Total NPM paddy production (qtl)	474	31,211	38,151	24,360
5	Share of NPM farmers marketed through Farm Gate Procurement (FGP)	61	76	55	97
6	NPM paddy procured through FGP (qtl)	149	21,256	17,440	21,900
7	Average price offered in FGP (Rs/qtl)	1,339	1,998	1,911	1,821
8	Value of NPM paddy procured (Rs in Cr)	0.02	4.25	3.33	3.99
9	Total savings in cost of cultivation (Rs in Lakhs)	0.4	40.7	43.9	23.5
10	Additional income realised from participating in FGP compared to marketing in APMC at District point (Rs in Lakhs)	0.20	28.34	23.25	29.20
11	Total additional income realized by farmers from the NPM Programme (Rs in Lakhs)	0.57	69.08	67.17	52.72

entire paddy cultivation.

- ▶ Use of 6–8 kg or liters of synthetic chemical pesticide formulations per acre was prevented by adopting NPM practices, thereby avoiding potential adverse effects on health and environment.
- ▶ Farmers have realized a saving of Rs.2800-5000 per acre due to reduction in cost of cultivation arising from adoption of NPM methods and improved crop management practices (see Table 1).
- ▶ Farmers have realized an additional income to the tune of Rs. 1600-3500 per acre by marketing their produce through FGP, as the offer price at the farm gate was more than the APMC prices by 8 to 10% considering that there are no transport and commission

costs (see Table 1). Furthermore, farmers benefited from transparency in procurement process and guaranteed and timely payment in FGP.

- ▶ NPM practices have resulted in reducing water use significantly, which would benefit farmers in the tail region of the command.
- ▶ Participating farmers have acquired the habit of discussing their agriculture related issues in their Farmers Club.
- ▶ Increased awareness about harmful effects of pesticides.
- ▶ Women laborers working in NPM fields have not experienced skin and other health related issues that they had while working in conventional fields.
- ▶ Consumption of pesticide-free paddy has

increased in the location, mainly among the producer families. NPM farmers have expressed improvement in health conditions and reduced medical expenses of their family members.

V. Key Learning

NPM interventions in paddy were first started in 2008 in Deodurg in 24 acres with the participation of 18 farmers from 5 villages. Since then, it has grown into an NPM Programme that provides various crop management services to paddy farmers in the region. It now covers 781 farming households and 1519 acres across three locations. The important milestones in this journey include, i) initiation of credit linkage with scheduled banks in 2011 to ease timely purchase of inputs by farmers, ii) introduction of extension service fee in 2012, iii) initiation of NPM paddy procurement on a small scale by SHPL during 2009, which picked up 2017 onwards and iv) expansion of the NPM activities to Sindhanur and Karatagi by 2015.

The key learnings are,

- > The major pest and diseases of paddy can be addressed effectively by creating an environment less conducive for their incidence through contextually relevant preventive and need based curative measures.
- > NPM methods can be effectively combined with line planting and DSR methods in canal irrigated paddy ecosystems, though challenges like high weed infestation in DSR remains.
- > Based on the context and emerging situations, the NPM package of practices needs to be continually improvised to improve its effectiveness.
- > The better farm gate prices realised serve as an incentive to farmers to continue their participation in the NPM Programme.
- > Contamination is a critical issue in the open

canal irrigated system of the command area, especially since NPM farmers are scattered through the Field Irrigation Channels.

- > Fee based agriculture extension service is a feasible option for implementing NPM with systematic approach and management strategies.
- > Social capital built by women SHGs and farmers' organisations aided in establishing and scaling up the NPM Programme. So, strengthening village level organisations and sustaining the interest of the participating

Box 3

Experience of farmer Veerabhadra, Basapura E J, Sindhanur



In 2019, during the kharif season, I had sown rice using the DSR method in over 10 acres as per the guidance from the SAMUHA team. I followed the advice of the team on application of fertilizers, neem cake and irrigation water. In fact, I never retained water and carried out alternate wetting and drying of the field. Initially, I was worried as the germination was patchy and the crop was not looking good. However, after a few weeks the crop began to look good. I did weeding thrice, applied fertilizers in split doses and irrigated the paddy field once in 15 days. I have not used any chemical pesticides on my field and sprayed the suggested organic formulations and chilli- ginger- garlic extract. I realized an average yield of 41 bags per acre, three bags more than the yield I used to get earlier.

I understood that by growing paddy in DSR method there is no need for nursery, transplantation or

puddling and so there is considerable savings in labour. In the transplantation method, water is retained in the field. But for this method, there is no need for water retention, resulting considerable reduction in water use. In the DSR method, pest infestation was very less and the numbers of panicles were more. I have saved around Rs.3500 per acre. My fellow farmers were surprised at my crop and felt that they should have followed this method. I am going to continue growing paddy following DSR and NPM methods.

farmers are very important for the stability and sustainability of the NPM Programme.

- > Factors that positively influenced enrollment of farmers and their compliance in the NPM Programme included i) capacity building events, ii) field monitoring support, iii) quality input supply and iv) attractive marketing linkage.
- > Master farmers were helpful in building the capacity of fellow farmers in the initial stage and establishment of the NPM Programme. Since members become experts of their own fields over time and, procurement and input supply were taken care by the group representatives, the role of master farmer will depend on the scaling up and sustainability plan of the NPM Farmers Club in a particular season.
- > Facilitating 'experiential learning process' among farmers through FFS was more effective in developing confidence of the farmers than 'suggestion based approach'. This is reflected in continuous engagement of most of the enrolled farmers in NPM since 2009-10.
- > Process-based Internal Control System (ICS) served as the backbone of the NPM Programme.
- > There is a need to organize market linkages for short and medium duration pest resistant paddy varieties which are promoted as a

better alternative to long duration BPH susceptible Sona Masuri variety.

VI. Future plan

JSMBT - SAMUHA plans to work on the following leads to strengthen the NPM Programme:

- A. Bringing more farmers under NPM to reach 1000 farmers with 2000 acres.
- B. Exploring a pilot project on Field Irrigation Channel (FIC) based adoption of NPM to address pesticide contamination issues and better water management in the command area in collaboration with key state departments.
- C. Establishing NPM community nursery to ensure healthy seedlings and timely planting in the main field.
- D. Organizing and/or strengthening NPM women labour groups on line planting of paddy for wider adoption of this technology.
- E. Exploring local value addition of NPM produce to realize larger share of consumer prices.
- F. Establishing community owned seed production units

It can be seen from the experience of JSMBT and SAMUHA on NPM paddy that it is quite feasible to promote NPM approach among small and marginal farmers even in a chemical intensive cultivation system entrenched by an influential pesticide dealer network. There is a large scope for scaling up NPM approach in the canal irrigation ecosystem if orchestrated engagement of multi-stakeholders with effective participation of farmers and strong facilitation by relevant state government bodies like the irrigation department is adopted. Similarly, there is a lot of scope for wider adoption of process based NPM with Modified Farmers Field School (FFS) and Internal Control System (ICS) attempted by SAMUHA in other crop ecosystems across the country.

The **NPM (Non-Pesticidal Management) Network**, is an informal network initiated by a group of CSOs to promote 'pesticide-free' sustainable agriculture at the grassroots and to establish pesticide-free foods as a 'category' in the local, regional, and national markets. Its main objectives are, (i) Facilitate exchange of learning among the members, (ii) Develop and promote NPM standards and protocols for labelling and certification, (iii) Build the capacities of farmers' organisations, CSOs and other value chain actors, and (iv) Build the knowledge base, serve as a resource organisation, and create an enabling environment for NPM.

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