Case Study: Promoting Water Responsible Mint Farming

Context

The Ganga river basin is one of the most densely populated and fertile river basins in the world. It supports about 300 million people over an area of approximately 80000 sq. km of which some 100 million are directly dependent on the river and its tributaries. Electric and diesel operated tube-well / bore well using ground water are the main source of irrigation[1] (app 87 %), besides a large network of irrigation canal, water tank/pond and river as source of surface water irrigation. The region has luxury of water for irrigation, thus mostly water intensive cropping system has evolved and been under practice by farmers from almost four decades. Most prevalent and prominent cropping system includes high water demanding crops like rice, wheat, sugarcane, vegetables and exponentially expanding banana plantations in recent past.

In addition to above, some districts in eastern UP like Barabanki, Shrawasti, Maharajganj and Faizabad have another water demanding crop of Mint or Mentha (*Mentha arvensis*) grown for mentha oil (menthol) production at sizeable and commercial scale in these districts. UP is the leader in menthol production with about 90% share in National production, cultivated in over 2 lakh hectare irrigated land. Barabanki district is major mint producing district in UP and on the global map for menthol production with over 80 thousand hectare irrigated land under mentha.

Mentha arvensis: *A water intensive crop*

Mentha is a highly water intensive crop. It is grown during summer (Feb to June) and needs frequent irrigation. During its crop duration, on an average mentha needs 10-12 times irrigation, totalling about 15000 cubic meter water per acre, yielding 40 kg of menthol, water requirement is estimated at 375 cubic meter per kg of menthol.

Open irrigation channel being main method (over 87% tube-wells use open channel), coupled with flood irrigation practiced by farmers unfortunately adds to the low water productivity. This has been both, a challenge and a concern for all stake holders in view of depleting ground water level and increasing cost of energy required for water draft.

Since mentha is grown by large number of farmers and is considered a cash crop, quite remunerative to support economic situation of farmers, especially small and marginal, it is neither recommendable nor feasible to ask farmers to reduce its cropping in this region. However, the rise in water consumption at an alarming rate demands for an urgent intervention to find alternative means of irrigation and cropping system to meet the high demand for mentha cultivation.

Background information:

A program 'Water for Public good' is under execution by PANI since November'2014 in 10 districts of Eastern UP with funding support from HUF. PANI as project implementing agency (PIA), has involved 10 grass root NGO Sub-partners at various locations for ground implementation of project. Prime objective of this program is to improve overall water management scenario by positively affecting water productivity and alleviate poverty of

[1] U.P. Development Report Volume 2 Planning Commission Government of India; 2007

26500 small and marginal farming household through intervening in water efficient and sustainable agriculture practices amongst farming community. This project has been designed to layer the water component over on-going agro based livelihood program FASAL (Funded by Tata Trusts), under implementation at most of the locations of this program.
All project locations are rich in terms of ground water with over 1400 mm annual rainfall and plain fertile soil of Central Ganga basin.
Therefore, the program designed an intervention to promote 'Water Responsible Mint Farming' for sustainability of this crop and to cope up with emerging preference of International market for environment friendly product, compliance of GAP norms and price competition / volatility by reduced cost of production and enhanced productivity.

Strategies

Program formulated the strategy to intervene in crop management practices of mint at all four project locations where mint is grown at sizeable scale. Following four core strategies were decided to design interventions:

- **Identification and Promotion** *of mint varieties which needs less water and produces more oil yield*
- **Promotion** *of improved and proven water efficient technologies and agronomic practices (Drip irrigation, Ridge & Furrow planting, bio-mulching)*
- **Popularization** *of use of Pusa Hydrogel (A soil mixing input developed by IARI to reduce water application and improve crop yield)*
- **Promotion** *of Early Mint Technology (EMT) developed and recommended by CIMAP-Lucknow for increased yield and reduced water requirement in mint.*

The intervention was designed to address the existing scenario in the most relevant and effective methodology.

Sourcing, multiplication and scaling up of 'Kashi' variety, developed by CIMAP-Lucknow	Pre-planting soil application of Cumijal (A commercial brand of Pusa Hydrogel) @ one kg per acre
Ridge & furrow planting of mint	Irrigation through micro-drip irrigation system
Bio mulching (mainly using farmer's own agro waste or spent biomass of mint plant after distillation)	Early Mint Technology - Complete capsules of package of practices (Nursery multiplication to harvesting and distillation)

Implementation:

Knowledge Building

Research Institutes and SAU were consulted to understand the complexities, limitations and challenges to achieve the objective. Their mint specific scientific observations and recommendations regarding water uses, water conservation practices, changes in yield due to various practices and varietal comparison on water demand and yield parameters were taken into consideration.

Alongside, Mint Growers Association and couple of menthol buyer companies were also consulted to understand issues related to cost of production, yield, quality of menthol, market prices, economics of mint farming etc. and their experience on behaviour of mint farmers to adopt the change.

Community Mobilization

At the Farmers feedback and community response at large were taken to evaluate the ground situation, capture community perception and assess the adoption possibilities of various interventions that were contemplated. Interested, willing and progressive members of farmers groups (which were formed by PIA and sub-partners prior to project) were identified to put-up demonstrations of various practices.

For the purpose of informed and efficient adoption facilitation, capacity building of front line field workers of Project team on various interventions was done through classroom training and field visits.

For appropriate and effective knowledge dissemination, detailed description of each intervention was made and wherever applicable, POPs were drafted and training modules developed for step-by-step processes.

Short videos of different steps of practices were made in local dialect where farmer was the actor to explain and show the actual method of process. These videos were made in real local setting to make it more convincing to community to adopt the same.

Sourcing of Kashi variety was tied-up and requirement was booked with CIMAP on behalf of individual farmers. Sourcing of Cumijal from one of the licensed commercial manufacturer and distributors was also done and material supply for demo was tied-up. Similarly, supply of micro-drip kit was tied-up with one of the reputed manufacturer of drip irrigation system.

Resource Development

Capacity Building

Hands-on training of lead farmers who were selected for demo, barefoot experts and Community Resource Person (CRP) were provided on various POPs.

Several farmers were also taken to CIMAP for exposure visit, interaction with scientists and collecting the planting material of Kashi variety to raise the nursery for further multiplication.

Additionally, with the aim of enhancing first-hand experience and accessibility, demonstrations plots of all the practices were laid in the fields of selected farmers under complete supervision of field team of Sub-partners and agronomic experts of

PIA under most feasible precision. Group members were kept fully engaged in demo process for effective learning and knowledge transfer.

Follow-up of demonstration fields, hand holding support and time to time clarifications, solution to the practical problems at ground were provided by project team on regular basis.

Feedback Mechanism

Videos of processes were shown to group members at high regularity through a mediated and instructional screening by CRPs. Community was encouraged to respond and interact with CRP on video subject to ensure sustained interest and wider learning. CRPs would also prompt community to commit adoption and capture the interest of individual members to provide subsequent support for adoption. Once a practice is adopted by member, CRP will provide hand holding support and capture adoption data for project MIS which will be uploaded on COCO (Connect online- Connect offline software).

All field data, including number of irrigation, hours of irrigation, crop yield etc. was collected by CRP and Supervisor and were submitted for data entry into Project MIS for further analysis and decision.

Crop cutting and yield measurement was done and demonstrated to group members, other farmers in presence of village leaders and local government authorities as third party validation and endorsement of data.

All adoptions of practices done by other group members and other farmers were captured and validated through field verification by project team and counter verification by PIA team.

Agencies or Actors involved:

Figure 1: Actors involved in intervention

Goals or outcomes expected:
The intervention is aimed at bringing about behavioural changes along with measurable yield and water consumption changes.

Social Goals
It is expected that up to 20000 households will adopt the proposed practice in menthe cultivation for a total projected area of 10000. It is also aimed that this increase in income during the 'no crop' season will support empowerment of rural women associated with the project through Nari Sangh.

Economic Goals
With the increase in production quantity by 60 tonnes, the total menthol yield through 'Water Responsible Mint' is expected to grow by 10%. Additionally, with the saving of 16 MCM of water per acre in mint cultivation, it is envisaged that mint farmers will earn a 10% increase in their income.

Challenges and concerns:

In a crop that is so economically viable and dependable by farmers, negotiations and alterations in practice have been a challenge since the risk to cost is high. Several challenges were witnessed during the intervention with Mentha. In terms of the water sensitive techniques suggested, the cost involved was considerably high. Micro-drip and cumijal is not easily affordable by small farmers and was hence a point of resistance. Additionally, the Early Mint Technology, along with techniques like ridge and furrow methods involve extra labour hours and hence account for slow adoption amidst farmers. Limited availability of '*true to the type*' (genetically pure) planting material of recommended variety is causing slower expansion of area under this variety, while on the other hand, buyer's recognition for '***water responsible mint'*** is yet to come to avail premium pricing. In absence of standards and certification for such products, (Like Global GAP), market support to farmers is missing. At the same time, There are limited distillation facilities available in locality who offers quality processing to produce better quality oil. Thus, it can be assumed that for full impact of the intervention to be experienced, there is still some time for a supporting environment as a whole.

Mentha Cultivation- is better, worse?

With improved economics of crop due to reduced watering cost and incremental yield, it may cause further increase in already expanding area under mentha farming, which will mean more and more water drafting.
Due to fast depleting water level, government may put a sanction on this crop, as has been already done by district administration in some of the water scarce districts.

Outcomes:

Peppermint (Mentha) has been chosen as one of the important crop to intervene for improving water management in project, with focus in mentha intensive districts viz Barabanki, Faizabad, Maharajganj and Shrawasti. Project has introduced and promoted following agronomical best practices amongst farmers which are specific to water saving and improve water use efficiency in mentha:

1. Use of Hydrogel in soil at planting
2. Ridge and furrow method of planting
3. Early Mint Technology
4. Varietal replacement

PANI has collaborated with stakeholders like Mint Association to improve value chain efficiency and linking farmers with market players to strengthen efforts to mitigate risks and meet challenges for mutual benefits.

PANI also collaborates with CIMAP to introduce most advance, sustainable and resource conserving technology and practices for farmers.

Initially we focus for techniques to reduce water demand in mentha crop. During our this effort we got Pusa Hydro gel invented by Indian Agriculture Research Institute - IARI, New Delhi. Our farmers using Pusa hydrogel from last two years & their observation is given below -

2015	2016
• Product : Kauvery • Quantity : 52 Kg. • No. of Farmers : 160 • Area Covered : 40 Acre • Apply @ 1.25 Kg. per acre • We observe saving of two irrigation (14-16 Hour /Acre) & about 10 -15% yield enhancement (abouut 4 -6 Kg./acre)	• Product : Cumi gel • Quantity : 275 Kg. • No. of Farmers : 960 • Area Covered : 275 Acre • Apply @ 1Kg. per acre • We have same observation as observe in 2015. • We observe the impact on next crop (Paddy). (about 15% yield enhancement.)

Analysis of post-intervention situation (economical, social)

- Improved crop economics of farmers
- Reduced water drafting from bore-wells
- Reduced diesel consumption in irrigation
- Increased production of menthol (May create over supply situation in market)
- Increased awareness for water use amongst community

Lessons learned

Biomass loss due to leaf fall at crop maturity is prevented by Cumijal due to constant moisture supply to plants, resulting into higher yield. This could be transformational but farmers at large are yet to adopt this.Simple, feasible and low cost practices with high water saving and yield enhancement potential needs to be pursued more for adoption for mass scaling of intervention.

On the whole, the intervention has helped to initiate an alternative method of cultivating a crop that has extensive environmental load. While suggestion for low water usage and endorsement of water management techniques is essential for the intended objectives in revolution of mentha farming, it cannot be ignored that it is primarily improvement in crop economics for farmers that will lead to large scale motivation at this stage.