Crop production technologies for climate resistance in the mid hills of Sikkim

ICAR- Research centre for NEH Region, Sikkim Centre demonstrated different organic crop production technologies along with the implementations and monitoring at farmer’s field at two locations i.e. Timpyem and Thanka Martam, East Sikkim. Farmers and rural youth were monitored to adopt of new technologies through various trainings, meetings with farmers as well as through personal discussions. The major technologies transferred were, i) No till vegetable pea in rice-fallow, ii) Sequential vegetable cultivation under low cost poly tunnel and rain shelter and iii) Low-cost water harvesting structures (Jalkund).

SRI for adaptive climate resilience

ICAR Research Complex for NEH Region, Imphal introduced system of rice intensification (SRI) by substituting traditional rice cultivation. Investigation of SRI cultivation over conventional practice enhances the paddy yield upto 7.8 t/ha, which was 85 % higher than traditional farmers practice. In riverbeds, the broad bed and furrow method assist in controlling rain water and could boost the crop yield over the conventional practice. With the introduction of broad bed and furrow method for groundnut in riverbed areas, the groundnut yielded 2.6 t/ha than 2.2 t/ha under flatbed method.

Organic production in Manipur

An experiment has been conducted at pilot study area (Chandanpokpi village, Chandel, Manipur, India) by ICAR Research Complex for NEH Region, Imphal on organic production package for turmeric. Quality planting material of Megha Turmeric-1 along with biofertilizers and biopesticides were supplied to the participatory farmers. Emphasis was given on rhizome treatment, nutrient management and mulching with paddy straw. The yield (37.58 t/ha) was procured from vermicompost + Pseudomonas + Frateuria. The curcumin and oleoresin content was found to be 6.50% and 8.10%, respectively. The bio-organic management was also found to be beneficial in terms of soil fertility build up. The study showed that bio-organic management of turmeric can be an important strategy for sustaining the soil fertility and improve the farm profitability.

Promoting Quality Protein Maize in Jhum fields

Mizoram Centre (Kolasib and Mamit districts) has taken an initiative to promote high yielding variety (HYV) of maize (HYV RCM 75 and RCM 76) crop in jhum land of 40 mizo farmers. The cost of cultivation of HYV maize was Rs. 10000/ha against Rs. 6000/ha for each farmer and the Yield was about 2600 kg/ha against yield of traditional local landraces 1300 kg/ha. Net income from this crop was Rs. 94000/ha from each farmer against Rs. 50000/ha. Production as well as farm income was enhanced 1.88 times for both HYV and local landraces. The variety matured very early (90-100 days) compare with local traditional variety (150 days). HYV maize variety showed more resistance to aphids and Rhizoctonia sheath blight compared to local land races and also more waterlog tolerant.
Distribution of Mushroom seeds

10 kg mushroom spawn were distributed to a progressive farmer Mr. Skalzang at Thiksey village by RRS-Leh, CAZRI. He was also provided vermi-worm (5 kg) to prepare the vermicompost. Now, the farmer is selling prepared vermicompost and mushroom @ Rs 50 per kg.

Preparation of Vermicompost

NRC-Pig introduced improved breeds of pig, Lumsniang (Hampshire x Meghalaya Local) and deep litter pig shelter for improved housing along with ‘Vanara’ bird for back yard poultry in Mawthei village, Meghalaya. The total annual income of piggery in deep litter pig shelter was Rs. 46,000 and the cost benefit ratio was 1.2 and from the improved housing of Vanara bird rearing, the annual gross income is Rs. 17,200 and cost benefit ratio is 2.42.

Agripreneurship development for higher profitability

A mushroom production unit and one community processing unit have been established in Mawthei village, Meghalaya. The beneficiaries are now engaged for 250 to 400 man days and have got tremendous opportunity to earn at least Rs. 20,000 to 25,000 per month.

Preparation of Jhum field

In Lipu Namchi village, Arunachal Pradesh new hill top was slashed and burned during March to April 2018 in order to open a new Jhum field. As per suggestion given by technical expert from ICAR, Arunachal centre, Basar, rice- maize intercropping was done in the Jhum field of area 5300 m². The yield data was collected just after the harvesting of crops which were given below:

<table>
<thead>
<tr>
<th>Crops</th>
<th>Variety</th>
<th>Area (sq. m)</th>
<th>Yield (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize</td>
<td>DA 61 A</td>
<td>1300</td>
<td>420</td>
</tr>
<tr>
<td>Paddy</td>
<td>Bhalum 1 and 2, CAU R1</td>
<td>4000</td>
<td>1200</td>
</tr>
</tbody>
</table>

Potato as second crop in rice fallow

The improved variety (Kufri Jyoti) of potato which is moderately resistant to early and late blight was introduced as a second crop in rice fallow by and the total number of farmers volunteered were 18. Application of FYM @ 15 t/ha, rock phosphate @ 150 kg/ha and neem cake @ 150kg/ha gives good yield of potato producing an average productivity of 11.3 t/ha.

Jhum fallow after 2 months of harvesting

Field of potato improved variety (Kufri Jyoti)

Production of potato
Backyard poultry farming with ‘Vanaraja’ and ‘Srinidhi’ brings food and nutritional security to tribes of Nagaland

In the year 2016-17, ICAR Nagaland Centre adopted 17 villages throughout the Nagaland after conducting the participatory rural appraisal for their development as poultry model village. A total of 25,319 chicks were supplied to 17 villages comprising of 738 tribal beneficiaries. Therefore the gross income generated after sale of birds was Rs. 1,25,79250/- after deduction of expenses incurred on feed, vaccine and medicines the net income earned was Rs. 7131525/- with a B:C ratio of 2.93.

Economic Empowerment of Tribals of North East Hill Region through Rabbitry

An attempt was made by KVK (NRC on Mithun), Phek, Nagaland, to lessen the deficit of meat (6520 MT/annum) in Phek district by popularizing backyard rabbitry among the tribal communities as a source of quality meat and livelihood option. The aim of the programme was to popularize rabbitry by giving each household of the village, minimum a pair of rabbit. After realizing the initial success and acceptability among the farmers in Porba Upper Khel and Gidemi villages, the programme was extended in another five villages i.e. Sakaraba, Porba Lower Khel, Pfutseromi, Kikruma and Thevopisü. The cumulative gain realized by 210 farm families was about Rs. 27.92 lakhs/year.

Construction of low-cost polyhouse for planting of fruit saplings

The polyhouse was constructed near the pond in Mawthei village, Meghalaya for efficient use of pond water in raising and maintaining the fruit saplings of Khasi mandarin and Assam lemon than 4000 seeds of Khasi mandarin and 1500 seeds of rough lemon were planted and saplings were distributed to the for encouraging agri-horti farming system. Proper spacing of 5m x 5m for Khasi mandarin and 2.5 m x 2.5m for Assam lemon and addition of FYM and plant residue for planting was demonstrated. The total area covered for Khasi mandarin and Assam lemon were 10,060 m² and the total number of saplings distributed were 380 and 890 for Khasi mandarin and Assam lemon, respectively.

Farmers interface

A outreach programme and farmers’ interface was organized in one remote mithun rearing village of Boasimla, Ziro, Arunachal Pradesh in the back drop of mithun Mela jointly organized by ICAR-NRC Mithun and Department of Veterinary and Animal Husbandry, Govt. of Arunachal Pradesh during 22-23 March, 2018. A large number of mithun owners and farmers, NGOs, field veterinarians and officers of both ICAR and State Departments gathered in this Mela and conducted various technology. Technology Injection Programmes including vaccination and micro-chipping of mithuns and scientists-farmers interactions. Awareness about the possible climate change in the NEH Region was also discussed with the farmers and their views were recorded.
**Sustainable Integrated farming system**

The Integrated farming system (IFS) has been established in the field of Mr. Kh. Samuel at Chandanpokpi village, Chandel district in 3.0 ha area. The model included agriculture crops (1.5 ha) + vegetable crops (0.75 ha) + water harvesting (Jalkund stored 150000 litres rain water) + mushroom production (1 unit) + poultry (65 nos.) + bee box (3 units). Altogether from 3 ha land, he earned net returns Rs. 3,96,000 as compared to Rs. 61,000.00 before intervention. On an average, 454 days employment was generated as compared to 110 days in earlier.

**Integrated Farming Systems**

Another agri-fishery-horti-poultry-piggery-secondary agriculture based farming system established at Sekmai Hijam Khunou village, Ukhongshang, Thoubal district, Manipur on Mr. Phijam Thoiba’s field. The model includes agricultural crops (1 ha), fish pond (0.50 ha), horticultural crops (0.5 ha), poultry birds (100 No.), Piggery (6 Nos.). Mr. Phijam Thoiba is earning net returns more than 3.75 lakhs (B: C ratio 3.01) from 2.0 areas. Many farmers have been inspired by his IFS models and fishery farming.

**Research Publications of the Task Force Team**


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**Dr. A. Arunachalam, Task Force Coordinator has been assigned the additional charge of Assistant Director General (International Relations) in the ICAR HQ.**

NMSHE-TF6 Newsletter –September, 2018