

ANNUAL REPORT

(2012-2013)



ICAR RESEARCH COMPLEX FOR NEH REGION

Nagaland Centre, Medziphema-797 106

Nagaland

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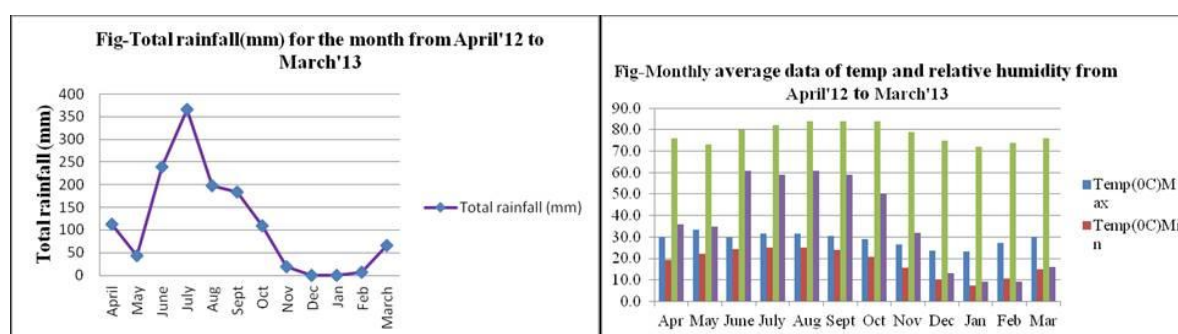
1. WEATHER

1.1 Average weather during April 2012 – March 2013

It was observed that mean monthly maximum and minimum air temperatures were found to vary from 19.3^oC to 36.5 ^oC and 5.1^oC to 26.3^oC, respectively. The highest maximum temperature of 36.5 ^oC was recorded on 25th May while the lowest minimum temperature of 5.1 ^oC was recorded on 25th January. Average monthly maximum and minimum relative humidity varied from 56% (January) to 90% (August) and 3% (February) to 84% (August). Total rainfall received during the period April'12 to March'13 was 1346.70 mm with the total of 79 rainy days. The monthly rainfall was maximum in the month of July (367 mm) followed by June (240 mm). No rainfall occurred during the month of December and January (0.00mm). Except during the months from October'12 to January'13, the sky was clear. The average monthly wind speed varied from 0.20 kmph (January '13) to 3.78 kmph (May '12). Soil temperatures were recorded both in the morning and evening from 5cm, 15cm and 20cm depth. The soil temperature showed an increasing trend along with the depth. Total monthly evaporation was found to vary from 47.0 (December'12) to 143.2 (May'12).

Average monthly weather data of Nagaland (the mean values are given in parentheses with bold letters)

Air temperature (°C)		Relative Humidity (%)		Pan evaporation (mm)	Total rainfall (mm)	Soil temperature (°C) (5cm)		Soil temperature (°C) (15cm)		Soil temperature (°C) (20cm)	
Max	Min	Max	Min			Max	Min	Max	Min	Max	Min
23.3 (Jan'13) – 33.4 (May'12) (28.9)	7.5 (Jan'13) – 25.1 (July'12) (18.3)	72 (Jan'13) – 84 (Sept'12) (78)	9 (Feb'13) – 61 (Aug'12) (37)	47.0 (Dec'12) – 143.2 (May'12) (84)	1346.7	3.0 (Jan'13) – 17.8 (Aug'12) (12.2)	12.4 (Jan'13) – 24.3 (May'12) (20.1)	14.1 (Jan'13) – 28.3 (Aug'12) (22.9)	22.4 (Jan'13) – 33.8 (May'12) (29.6)	15.1 (Jan'13) – 28.9 (Aug'12) (23.6)	20.2 (Jan'13) – 38.8 (Aug'12) (29.8)



1.2 Integrated Agro-met Advisory Services (IAAS):

Bi-weekly (Tuesday and Friday) Medium Range Forecast of weather is being provided in Nagaland through e-mail, FAX, Newspapers and radio. Monsoon press release is being prepared once a week on Wednesday. Mobile SMS on daily weather data is being provided to 1541 progressive farmers across the state (Dimapur=1033, Tuensang=78, Kohima=81, Mon=102, Mokokchung=49, Wokha=15, Phek=109, and Zunheboto= 74).

2. AGRONOMY

2.1 Effect of levels of lime application on growth, yield and quality of rice bean

This field experiment was carried out at Institute Research Farm during the *kharif* season of 2012-13. The soil of the experimental site was slightly clay loam, acidic in reaction ($p^H=5.23$), high in organic carbon (1.14 %), low in available nitrogen (189.40 kg/ha), potash (153.42 kg/ha) and moderate in phosphorous (16.52 kg/ha). The experiment was laid out in split - plot design with three replications. Four levels of lime, *viz.* control (no application), 0.2, 0.4 and 0.6 t/ha- were allotted to the main plot where, four varieties of rice bean such as RBS -16, RBS-53, PRR-2 and RCRB-4 were allotted to the sub-plots. Results showed that the increase in the level of lime increases the yield of the rice bean varieties. Lime application 0.6 t/ha recorded significantly higher yield attributes and yield of the rice bean followed by 0.4 and 0.2 t/ha. In case of the varieties, RBS-53 recorded significantly higher yield attributes and yield of the crop as compared to the other varieties. The rice bean variety PRR-2 recorded significantly lower yield attributes and yield as compared to the other varieties, which might be due to the lower yield potential of this variety.



Varietal and Lime trial in Rice bean

Effect of different levels of lime application on yield attributes and yields of rice bean

Lime application (q ha ⁻¹)	Pod length (cm)	1000-seed weight (g)	Pods/plant (No.)	Seeds/plant (No.)	Grain yield ha ⁻¹ (t)	Straw yield (t ha ⁻¹)
Control	6.32	66.10	23.56	87.00	0.36	0.56
0.2	6.56	66.50	30.26	70.56	0.48	0.53
0.4	6.47	68.38	35.05	100.26	0.85	0.96
0.6	6.90	69.00	32.56	105.53	0.82	0.88
Varieties						
RBS -16	6.52	67.00	54.01	81.86	0.60	0.66
RBS-53	6.83	68.30	57.36	80.96	0.82	0.88
PRR-2	6.78	67.38	49.71	101.96	0.38	0.43
RCRB -4	6.32	67.38	38.55	102.27	0.76	0.82

2.2 Effects of crop establishment methods and fertility levels on growth, yield and quality of rice in rice-lentil cropping system

This field experiment was carried out in the Institute Research Farm during the *kharif* season of 2012-13. The soil of the experimental site was slightly clay loam, acidic in reaction (pH=5.0), high in organic carbon (1.24%), low in available nitrogen (215.18 kg/ha), potash (145.21 kg/ha) and moderate in phosphorous (12.44 kg/ha). The experiment was laid out in split-plot design with three replications. Three crop establishment methods, *viz.* system of rice intensification (SRI), integrated crop management (ICM) and conventional rice culture (CRC) were allotted to the main plot. Five treatments of fertility level, i.e. control, 100% RDF, 100 % RDF + crop residues, 100 % RDF ON and 100 % RDF ON + crop residues were allotted to the sub-plots; where ON represents organic nitrogen (120 kg/ha) through farm yard manure. The results revealed that in crop establishment methods, SRI recorded significantly the highest yield attributes and yield followed by ICM, and CRC recorded significantly the lowest yield attributes and yield of the crop. In case of fertility levels, the treatment 100 % RDF + Crop residues recorded significantly the highest yield attributes and yield of the crop followed by 100 % RDF, 100 % RDF ON + Crop residues as compared to control. It was due to better integrated nutrient management that helped the crop for sound growth and development.

Effect of crop establishment methods and fertility levels on yield attributes yield of rice cropping system

Treatments	Panicle length (cm)	Grains/panicle (No.)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)
Crop establishment methods				
SRI	25.29	473.4	2.86	3.56
ICM	24.40	459.7	2.94	3.69
CRC	23.15	318.6	2.53	3.15
Fertility level				
Control	23.58	386.3	2.15	2.83
100 % RDF	24.91	425.1	3.05	3.56
100 % RDF + Crop residues	25.81	496.7	3.27	3.71
100 % RDF ON	24.09	398.5	2.20	2.80
100 % RDF ON + Crop residues	23.94	394.2	1.98	2.22

2.3 Effect of date of sowing, seeding rate and integrated nutrient management on production potential of summer mungbean (*var. TS-21*):

This field experiment was carried out in the Institute Research Farm during the *kharif* season of 2012-13. The soil of the experimental site was slightly clay loam, acidic in reaction (p^H=5.2), high in organic carbon (1.10 %), low in available nitrogen (207.60 kg/ha), potash (141.50 kg/ha) and moderate in phosphorous (16.63 kg/ha). The experiment was laid out in split-split plot design with three replications. Two dates of sowing *viz.* 10th and 16th April were allotted to the main plot and four seeding rates of 20, 25, 30 and 35 kg/ha was given in the sub-plot. Another treatment, fertility level was allotted in the sub-sub plot to evaluate their best applicability. The results revealed that 10th April date sowing recorded significantly the highest yield attributes and yield of the crop. In case of seeding rate, it showed that the increase in the level of seeding rate increased the yield; but reverse in case of the yield attributes. However, the maximum yield was recorded with the highest seed rate due to a

higher plant population. In case of fertility level, 100% IN + 50 % ON recorded significantly the highest yield attributes and finally highest yield followed by 100 % RDF.

Effect of sowing date, seed rate and integrated nutrient management on yield attributes and yield of summer mungbean (*var. TS-21*)

Treatments	Pod plant	Pod weight /plant (g)	Seed weight /plant (g)	Seeds/pod (No.)	1000-seed weight (g)	Seed yield (t/ha)	Straw yield (t/ha)
Sowing date							
10 th April	31.56	50.00	23.18	10.86	35.37	1.18	1.554
16 th April	29.32	51.26	20.56	8.86	34.24	0.867	0.953
Seed rate (kg/ha)							
20	32.43	56.33	21.63	10.26	34.16	0.783	0.932
25	30.26	55.52	20.53	11.05	34.13	0.82	0.926
30	28.52	53.18	19.13	11.08	35.26	0.982	1.026
35	27.83	51.56	18.86	11.86	35.50	0.996	1.054
Fertility levels							
Control	27.26	53.16	19.83	10.96	33.06	0.763	0.963
100 % IN	30.23	56.53	22.13	11.18	34.28	0.986	1.026
100% IN+ 50% ON	32.17	58.56	23.86	12.02	35.10	1.000	1.061
RDF: 20-40-20 NPK kg/ha ⁻¹ and IN: Inorganic Nitrogen, ON: organic nitrogen through vermicompost							

2.4 Effect of mulching, liming and integrated nutrient management on production potential of *rabi* maize (*var. DA-61-A*) under rainfed condition:

This field experiment was carried out in the Institute Research Farm during the *rabi* season of 2012-13. The soil of the experimental site was slightly clay loam, acidic in reaction ($p^H=5.1$), high in organic carbon (1.06 %), low in available nitrogen (224.42 kg/ha), potash (136.64 kg/ha) and moderate in phosphorous (11.98 kg/ha). The experiment was laid out in split - split plot design with three replications. In this experiment, mulching was allocated in the main plot (*viz.*, control and mulching), and the sub-plot treatment was allocated with farm manure having four levels (control, 4, 8 and 12 t/ha); and in the sub-sub plot, four levels of liming (control, 0.2, 0.4 and 0.6 t/ha) were allocated. The results showed that liming recorded significantly higher yield attributes and yield in the main plot. In the sub-plot treatment, it showed that the increase in the levels of farm yard manure application, increased the yield attributes and finally yield of the crops. In sub-sub plot treatment application, similar trends were observed for farm yard application.



INM trial *Rabi* maize *var. DA-61-A*

Effect of mulching, liming and integrated nutrient management on production potential of *rabi* rainfed maize (var. DA-61-A)

Treatments	Cob/plant (No.)	Grains/row (No.)	Cob length (cm)	Rows/cob (No.)	Grain yield (t ha ⁻¹)
Mulching					
Control	1.02	24.83	10.06	10.86	1.56
Mulch	1.11	30.18	15.36	13.96	2.26
Farm yard manure (t ha⁻¹)					
4	1.04	25.34	10.86	10.68	1.96
8	1.17	28.89	13.82	11.82	2.02
12	1.20	29.00	15.81	13.96	2.18
Liming (t ha⁻¹)					
Control	1.06	23.84	11.63	11.22	1.56
0.2	1.09	25.63	13.56	11.86	2.13
0.4	1.11	28.86	13.92	12.36	2.02
0.6	1.18	30.26	10.56	13.18	2.26





2.5 Seed production program for paddy, maize, soybean and toria:

Under the Tribal Sub-plan (TSP), quality seed production program of paddy, maize, soybean and toria was initiated by the ICAR research Complex for NEH Region, Nagaland Centre, in the Institute Research Farm during 2012-13. A total of 4 quintal of quality seeds of paddy var. Ranjit, 10 quintal of maize (var.RCM-76), and 0.50 quintal of soybean var. JS-335 were produced to partially meet the huge demand of paddy, maize, soybean growing farmers. 1.0 quintal of Quality seeds of toria var. TS-36 and 1.50 quintal of TS-38 were also produced at ICAR Research Farm.



Kharif maize seed production

Winter maize seed production

Drying of maize cobs after harvest	Packaging material developed under TSP
	
Paddy variety Ranjit seed production at Main Scheme farm	Packaging material developed under TSP
	
Soybean (JS-335) seed production at Main Scheme farm	Torina seed production at Main Scheme farm

Glimpses of seed production at ICAR Main Scheme farm

2.6 Performance of maize cultivars during *rabi* season under moisture stress condition:

This field experiment was initiated in the Institute Research Farm under the project 'National Initiative on Climate Resilient Agriculture (NICRA) on the theme "Identification of temperature (drought/ /high temp.) tolerant rice and maize varieties for North-eastern hill ecosystem" during the *rabi* season of 2012-13 under rainfed condition. The allocated treatments were: fertility level with the recommended dose of fertilizer of N, P, and K (80–60–40 kg/ha) through inorganic fertilizers (urea, DAP and MOP). This treatment was undertaken to evaluate the farmers' practices in relation to the natural resources management condition under climate change scenarios. The other treatments were: FYM which was applied as basal application @10 t/ha for improving the physico-chemical and biological properties of the soil. However, lime @5 q/ha was also applied as one of the treatment for reclamation of the soil acidity for better soil-reaction and crop health. Mulching was done to minimize the soil moisture loss from the experimental plot and also to improve the water productivity. Six maize varieties such as Nagaland local, Vijay composite, DA-61-A, DHM-117, RCM-75 and RCM-76 were grown to evaluate their best suitability under moisture stress condition during the *rabi* season (rainfed condition). Average yield of RCM-76 was maximum due to its genetic potential under the given condition of the environment. On the other hand mulching was found to be superior in yielding more maize than the other treatments, which proved the importance of moisture.



Performance of different maize varieties under moisture stress

Yield of the different cultivar at moisture stress condition

Cultivars	RDF	FYM	Lime	Mulch	R+L+F+M	Average
Nagaland local	1.5	2.3	1.2	2.5	4.0	2.3
Vijay Composite	1.75	2.1	2.25	3.5	2.75	2.47
DA-61A	1.7	1.75	2.2	3.5	2.0	2.23
DHM-117	1.25	2.0	2.1	1.5	0.75	1.52
RCM-75	2.4	2.5	2.0	3.5	1.5	2.38
RCM-76	2.5	3.2	2.0	4.5	2.0	2.84
Average	1.85	2.31	1.96	3.17	2.17	

3. NATURAL RESOURCES MANAGEMENT

3.1 Analysis of soil and plant samples from different districts of Nagaland:

579 nos. of soil samples were analyzed in the laboratory covering 7 districts viz., Dimapur, Peren, Kohima, Wokha, Mon, Tuensang and Phek for N, P, K, Organic Carbon (OC), pH, and EC during 2012-13. The ranges of average N, P, K, OC and pH of all these soil samples were 68.99-338.69 kg/ha, 1.04-213.03 kg/ha, 21.50-507.02 kg/ha, 0.51-2.68%, 3.51-7.90, and 0.04-0.330, respectively. Besides, only 20 nos. of plant samples and 96 nos. of vermicompost samples were also analyzed during 2012-13.

3.2 Model farming system for resilient shifting cultivation in Nagaland

Two *jhum* fields were selected in Medziphema and Jharnapani and three systems were compared viz. agri-silvi-livestock, agri-horti-silvi and traditional *jhum*. Contour bunds by using wooden log (locally known as 'Echo') were constructed to prevent soil loss. Pits were made to plant fruit crops and some pits were left to use these as a water recharge trench. All infrastructural facilities like pig shed, plot layout, contour bunding, water harvest structure, piglets, manures etc. were provided to the beneficiaries. Besides, scientists and technical officers visited to the field regularly and gave technical guidance. Through this approach, these beneficiaries harvested good yield of all crops except *Bhalum-4* variety of rice. For instance, in an area of 0.21 ha in each system in Medziphema, the harvest is listed in the following table.

Harvest (kg) in traditional *jhum*, agri-silvi-livestock and agri-horti-silvi systems in a farmer's field in Medziphema

Crop	Harvest (kg)	Crop	Harvest (kg)
Traditional <i>jhum</i> (0.21 ha cropped area)		Agri-horti-silvi (0.21 ha cropped area)	
Rice (<i>Lokhomo</i>)	675.0	Beans	4.0
Sticky Rice	100.0	Chilli	3.5
Maize	53.0	Bitter Gourd	12.5
Colocasia	12.0	Pumpkin	104.0
Local Pumpkin	51.0	Local long bean	147.0
Agri-silvi-livestock (0.21 ha cropped area)		Colocasia	
Colocasia	31.0	Maize	65.0
Maize	76.0	Cucumber	3.0
Rice (<i>Bhalum-4</i>)	Not harvested	Rice (<i>Bhalum-4</i>)	Not harvested

In traditional *jhum*, the traditional paddy varieties like *Lokhomo* and *local* gum rice; maize, colocasia and local pumpkin were planted. Improved paddy variety *Bhalum-4*, maize and colocasia were planted in agri-silvi-livestock model. Pig-shed was constructed along with collecting pit for recharging soil with decomposed pig manure. Fruits plants like *Khasi* mandarin, round lemon, mango, mosambi, litchi, colocasia and vegetables like beans, chilli, brinjal, yard long bean, bitter gourd, pumpkin, colocasia and cucumber were integrated with maize and paddy var. *Bhalum-4* in agri-horti-silvi model. A total of 811 kg, 107 kg and 354 kg of produce were harvested from traditional *jhum*, agri-silvi-livestock and agri-horti-silvi model, respectively. However, the paddy variety var. *Bhalum-4* in agri-silvi-livestock and agri-horti-silvi model was completely failed due to sudden outbreak of *Gundhi* bug. On the contrary, *Lokhomo* and *local* gum rice were unaffected. Another reason could be the time of sowing. All rice cultivars were sown delayed by one month, which might have affected the improved variety, but locals were escaped due to its long acclimatization with the place.

Besides this, alder based *jhum* system were developed at Longleng and Wokha. Model systems were developed at ICAR farm at Jharnapani and Wokha and in farmer's field at Medziphema. All together 53 piglets were distributed for inclusion of animals in *jhum* at Dimapur, Phek, Wokha, Longleng and Kohima districts of Nagaland. Pigshed were also constructed at Jharnapani, Medziphema, K-Basa villages. Three days training were organized at Mission centre, Vankhosung, Wokha district for 45 nos. of participants.



***Jhum* field at Medziphema site**

3.3 Livelihood improvement and empowerment of rural poor through sustainable farming systems in north-east India

Improved and high yielding planting materials of 2 kg of rice (*Bhalum-4*), 5 kg pencil/faba bean (*Annapurna*), 1.4 kg of radish (*B-4432*), 120 g of cabbage (*Samrat*), 60 g of tomato (*Bioseed 56*), 100 g of onion (*Nasik red*), 300g of coriander (*Ramses*), 6 quintal of potato (*K. Jyoti and Megha Jyoti*), 2 kg of bhindi (*Tokita*), 1 kg of bean (*Yard Long*), 800 g of bitter gourd (*Champion*), 1 kg of ridge gourd (*F1 hybrid*) and 600 g of cucumber (*Garima Super*) were distributed. Besides, they also planted maize, colocasia, tapioca and yam from the seeds saved in last year. To create awareness about the fertilizer application as well as to fertilizer HYVs supplied to them, 150 kg of DAP, 200 kg of MOP and 200 kg of Urea were distributed. Guidance was offered to them for application of fertilizer at right dose and at right time. Large cardamom planted with agro-forestry started yielding. Plantation of 0.16 ha large cardamom yielded 60 kg of fresh capsules and after sun-drying yield came to 15.2 kg of dry capsules. Each kg of dry capsules fetched Rs. 500 in the market and thus gross income of Rs. 7600 has been generated.



Different activities at Mon district under NAIP project

In addition to this, a total of 5000 nos. of Titachap (*Michelia champaca*) and Hollock (*Terminalia myriocarpa*) seedlings were planted in a cropped area of 12.5 ha among 6 numbers of beneficiaries. Nine numbers of low cost poultry shed were established and distributed 1700 nos. of *Vanaraja* birds to 9 progressive farmers. About 1500 of fish fingerling were reared in pig-fish integration among 2 farmers. Two nos. of honey extractor have been distributed to 6 nos. of beneficiaries who were already given honey box. Two more villages Phuktong and Tuimei were now under the activity of NAIP in Mon district. In Tuimei village, 20 nos. of terraces were constructed with a net area of 321.34 sqm along with a water harvesting structure to ensure irrigation during winter period for growing high value vegetables. Twenty pairs of rabbit along with cage were distributed among 20 beneficiaries in Tuimei.

3.4 Effect of elevated temperature on soil carbon sequestration, microbial biomass and enzymatic activities under different land use of Nagaland

Soils from variable land use under 3 soil orders (Entisols, Inceptisols and Alfisols) were collected and samples were incubated in BOD incubator at different temperatures for 1 month and analyzed for pH, EC, available nitrogen, available phosphorus, available potassium, microbial biomass carbon *etc.*



Soil collection and experimental set up to study the effect of elevated temperature

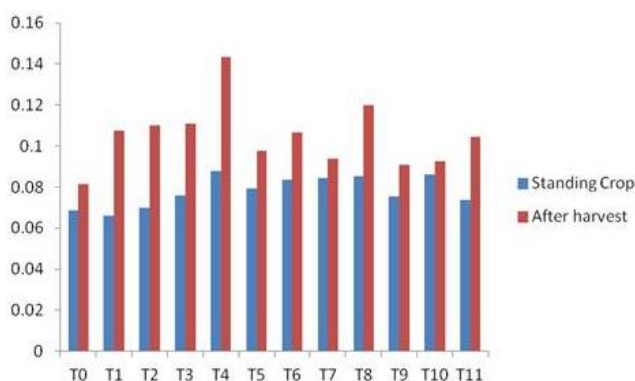
3.5 Resilient shifting cultivation for sustainable soil-water-nutrient-plant continuum in hilly agriculture system of Nagaland

The experimental design are composed of 5 treatments such as T₁ (Control-forest), T₂ (Traditional *jhum*), T₃ (Traditional *jhum* with minor interventions), T₄ (Improved *jhum* 1), and T₅ (Improved *jhum* 2). Field was selected and soil samples for ‘before cutting’ and ‘after burning’ have been collected for analysis in all the treatments. Traditional *jhum* system, which is simply a mixed cropping in a slashed and burnt land with traditional varieties of upland rice, maize and colocasia *etc.* were already established. Traditional *jhum* with minor interventions like improved variety of seeds like SARS-1 and SARS-2; line sowing *etc.* were also established. Pig shed construction was completed for ‘animal intervention’ in *jhum*. Contour bunds had been developed at 10-15 meter interval, on which alternatively colocasia and hedge plant were grown.

3.6 Validation of indigenous techniques knowledge for weed management in sustainable production of *jhum* rice

The field experiment was initiated in the farmers' *jhum* field of Medziphema village with ten different doses of common salt (20, 40, 60, 80, 100, 120, 140, 160, 180, and 200 kg/ha) at 20 and 40 DAS, weedy check and control (weedy) in randomized complete block design with

three replications. Due to scanty of weeds at 20 and 40 DAS, application schedule of common salt was shifted at 45 and 75 DAS, when some weed growth was observed. Even at 45 DAS weed growth was found to be negligible. This might be due to proper burning which resulted in complete destruction of weed seeds. At 75 DAS, no 'grassy' weeds were observed, only broad leaf weeds were observed. Plots applied with 18 per cent common salt produce maximum grain yield, followed by 12 and 20 per cent. Straw yield was highest in 8, 18, 20 per cent salt applied plots. Eighteen per cent common salt application leads to maximum harvest index. However, electrical conductivity has increased by 0.07 - 0.056 dS m⁻¹ with an average of 0.056 dS m⁻¹ after salt application twice during the *jhum* period.



Changes in EC over salt application



Salt application in *jhum* field

3.7 Development of Non-forest Wastelands through Agro-forestry Models in Nagaland State of NEH Region:

A total area of 18.25 ha of degraded land has been rehabilitated. The project sites, confined in six districts of the state *viz.*, Dimapur, Mokokchung, Kohima and Peren were first surveyed and appropriate agroforestry models have been established. The main emphasis is given to horticulture in these areas. The establishment of models at Longleng (1 ha) and Wokha (2 ha) are in progress. Three nurseries to raise tree saplings have been established at Jharnapani, Khaibung and Athibung areas. One training on livelihood security through horticulture based farming system and backyard poultry at Songlguh, Peren district where 60 farmers have been participated.

4. HORTICULTURE

4.1 Technology Mission on Horticulture

4.1.1 Evaluation of *Dendrobium* orchids under shade net condition

The present experiment was carried out at ICAR Research Complex for NEH Region, Jharnapani, Nagaland. Seven *Dendrobium* hybrids namely Snow white, Juwita, Genting Blue, Genting Red, Woonleng, Pink Ruby and Massaco were evaluated for their performance under shade net house. The experiment was laid out in completely randomized block design with three replications. The *Dendrobium* hybrid Snow White recorded the maximum pseudo bulb height of 53.7 cm, followed by Genting Red (49.3 cm) and the minimum pseudo bulb height of 32.1 cm was recorded by Massaco, followed by Pink Ruby (39.8 cm). The maximum no. of pseudo bulbs was recorded by Juwita (6.0) which was closely followed by Snow White (5.7) and the minimum no. of pseudobulbs was recorded by Genting Red (3.0) followed by Massaco (3.7). The no. of leaves per pseudo bulb ranged from 4.8 to 6.5 and it did not vary significantly among the *Dendrobium* hybrids. The maximum internode length was registered by Snow White (5.1 cm) and the minimum internode length was registered by Massaco (3.3). Among the *Dendrobium* orchids evaluated for no. of florets per spike, Snow White recorded

the maximum of 8.4 florets per spike followed by Juwita which recorded 7.5 florets per spike. The minimum of 4.1 florets per spike was recorded by Massaco followed by Wooleng which recorded 4.2 florets per spike. The maximum spike length of 39.7 cm was found in Pink Ruby which was closely followed by Snow White (38.4 cm). The minimum spike length of 28.5 cm was found in Wooleng followed by Massaco which recorded 30.9 cm. This may be due to genetic nature of the plant, growing and environmental conditions. The results of this study concluded that the *Dendrobium* variety Snow white and Juwita were performed better under Nagaland Condition.

Evaluation of *Dendrobium* orchids for vegetative and floral characters

Variety	Pseudo bulb height (cm)	No. of pseudo bulbs/plant	No. of leaves /pseudo bulbs	length of internode (cm)	No florets /spike	No of spike / plant	Spike length (cm)
Snow white	53.7	5.7	6.3	5.1	8.4	2.0	38.4
Juwita	44.6	6.0	6.5	4.9	7.5	1.7	31.0
Genting blue	45.3	5.3	5.6	4.7	6.5	1.3	29.5
Genting Red	49.3	3.0	6.1	4.4	6.0	1.3	31.1
Wooleng	46.9	4.0	5.6	4.7	4.2	1.7	28.5
Pink Ruby	39.8	4.0	4.8	3.9	5.1	1.7	39.7
Massaco	32.1	3.7	5.4	3.3	4.1	1.3	30.9
CD(5%)	7.936	1.480	NS	0.879	0.774	NS	32.747



Genting Blue



Genting Red



Juwita



Juwita



Pink Ruby



Wooleng



Snow White

4.1.2 Evaluation of orchid species under shade net conditions

Orchid species viz., *Dendrobium*, *Aranthera*, *Oncidium*, *Vanda* and *Mokara* were evaluated for their performance under shade net house (50 %) at ICAR Research Complex for NEH Region, Nagaland. The experiment was laid out in CRD with four replications. *Aranthera* recorded the maximum pseudo bulb height of 95.4 cm and *Oncidium* recorded the minimum pseudo bulb height of 29.2 cm. *Dendrobium* recorded 3.9 number of pseudo bulb per plant, whereas *Aranthera*, *Vanda* and *Mokara* recorded only one pseudo bulb per plant. The maximum internode length was recorded by *Oncidium* (5.4 cm) and minimum internode length was recorded by *Mokara* (2.9). *Mokara* registered maximum of 1.7 spikes per plant and *Aranthera* did not produce a single spike during the study. *Oncidium* recorded the maximum number of florets per spike (13) and maximum spike length was recorded by *Dendrobium* (16.9 cm). *Aranthera* did not produce spike which indicated that it had long juvenile phase. The different species varied for the characters studied and it may be due to genetic nature, and growing conditions.

Evaluation of orchid species for vegetative and floral characters

Orchid species	Pseudo bulb height (cm)	No of pseudo bulbs/plant	Internode length (cm)	No of spike /plant	Floret size (cm)	No of floret /spike	Spike length (cm)
Dendrobium	44.5	3.9	4.3	1.5	5.7	6.1	16.9
Aranthera	95.4	1	3.6	-	-	-	
Oncidium	29.2	3.3	5.4	1.0	4.1	13.0	12.8
Vanda	45.4	1	3.0	1	4.9	2.00	3.00
Mokara	53.1	1	2.9	1.7	5.1	8.5	11.2



Evaluation of orchid species

4.1.3 Evaluation of anthurium varieties under shade net conditions

Seven anthurium varieties viz., Violet White, L'Armour, Queen Black, 1st Red, Cynthia, Anastacia and Red were evaluated under Shade net house conditions. The maximum plant height was recorded by L'Armour (36.4 cm) and minimum plant height was recorded by Cynthia (19 cm). The maximum leaf length (25.1 cm) and leaf breadth (14.5 cm) was found in Anastacia and Violet White recorded the minimum leaf length (10 cm) and 1st Red recorded the minimum leaf breadth. Flowering is just initiated. The maximum spadix length (10.6 cm) was recorded by L'Armour and minimum spadix length was recorded by Queen Black (8.3 cm). The maximum spadix breadth of 9.2 cm was recorded by 1st Red and minimum spadix breadth of 5.2 was recorded by Violet White. The maximum spadix length

was recorded by 1st Red (5.4) and minimum spadix length was recorded by Violet White (2.7).

Evaluation of anthurium varieties for vegetative and floral characters

Cultivars name	Plant height	Leaf length	Leaf breadth	No. of flowers / plant	Flower spike length	Spade length	Spade breadth	Spadix length
Violet white	27	19	10	2.0	20.0	5.7	5.2	2.7
L' Amour	36.4	25.1	13.8	1.8	35.4	10.6	7.8	5.3
Queen Black	23.5	19.2	10.9	2.2	23.0	8.3	7.6	3.3
1 st Red	30.8	24.5	13.5	1.6	35.8	10.2	9.2	5.4
Cynthia	19	21.2	10.8	2.8	22.8	9.3	7.9	3.8
Anastacia	25	25.1	14.5	3.0	17	10.4	8.6	3.9
Red	20.5	21.2	11.2	3.0	15	10.3	9	4.1



Evaluation of anthurium varieties

4.1.4 Evaluation of gerbera varieties under polyhouse conditions

Seven gerbera varieties *viz.*, Eiko, Ice Queen, Jaffna, Liekie, P.Intenzz, Stanza and Venice were evaluated in polyhouse for their performance with drip and fertigation. The experiment was laid out in Randomized Block Design with six replications. The maximum plant height was recorded by Liekie (34.2 cm) and the minimum height was recorded by Ice Queen (26.1 cm). The maximum of 10.5 leaves were found in Liekie and minimum of 8.7 leaves were found in Jaffna. The maximum stalk length was recorded by P. Intenzz (48.9 cm) and minimum stalk length was recorded by Venice (37.2 cm). The maximum neck diameter (0.6 cm), stalk diameter (0.8 cm) and ray floret diameter (11.1) was recorded by Liekie. The maximum trans-floret diameter of 6.3 cm was recorded by Stanza and minimum diameter of 4.8 was recorded by Eiko. The Ice Queen variety did not produce any trans-floret. The

maximum disk floret diameter was recorded by P. Intenzz (3.3 cm) and minimum diameter was recorded by Jaffna (2.5). Among the varieties evaluated, the variety Liekie is performing better.

Evaluation of gerbera varieties for their performance under polyhouse

Variety	Plant height (cm)	No of leaves at flowering	Stalk length (cm)	Neck diameter (cm)	Stalk diameter (cm)	Ray floret diameter (cm)	Trans floret diameter (cm)	Disk floret diameter (cm)
Stanza	33.5	8.8	46.3	0.5	0.8	11.1	6.3	2.8
Liekie	34.2	10.5	48.1	0.6	0.8	11.1	5.5	3.1
Venice	30.5	9.5	37.2	0.5	0.7	10.4	5.9	2.7
Ice Queen	26.1	9.6	38.2	0.5	0.7	9.1	0.0	3.2
Jaffna	26.6	8.7	43.7	0.5	0.7	10.8	5.4	2.5
P.Intenzz	30.7	8.8	48.9	0.5	0.7	10.6	5.6	3.3
Eiko	30.3	9.3	43.7	0.5	0.7	10.5	4.8	2.9



Evaluation of gerbera varieties

4.1.5 Fertigation in sequential cropping system

The tomato var. Megha tomato 3 was planted in the polyhouse. The standard package of practices was followed. The water soluble fertilizers were applied through drip irrigation at frequent intervals. The plants were planted at a spacing of 60 x 45 cm (500 plants /140 sq.m area). The plants reached an average height of 1.10 m. The no of branches per plant was 6.5, the average flowers per cluster were 4.2 and the fruit set per cluster was 3.04. Individual fruit was weighing around 47.36 g. A total of 83 kg was obtained from 140 sq.m. However the yield was very less due to high incidence of late blight and bacterial wilt disease.



Fertigation in Megha Tomato 3

4.2 Collection, conservation and characterization of indigenous colocasia germplasm from Northeastern Hills

The experiment was conducted in Research Farm, ICAR Nagaland centre, Jharnapani. The experiment was laid out in Randomized Block Design with three replications. Totally 126 lines were planted with the spacing of 60 x 60 cm were maintained. The standard package of the practices prescribed by the Central Tuber Crop Research Institute, Trivandrum was followed.

Out of 126 germplasm evaluated, 110 different germplasm have been identified based the morphological characterization (IPGRI descriptor). Among the varieties evaluated, 9 lines were dwarf (< 50 cm height), 68 lines were medium (50 – 100 cm) and 33 lines were tall (>100 cm). The 10 lines recorded no suckers, 99 lines had 1 – 5 suckers and one line recorded more than 6 suckers. Out of 110 lines, only 26 lines are having the character of flowering. Remaining lines are non flowering types. Further, it is observed that flowering is strongly influenced by thermogenic phenomenon. Positive significant variation was observed for yield. The yield per plant ranged from 51 g to 1318.25 g. The maximum yield of 1318.25 g per plant was registered by line 60 which was closely followed by line 49 (1314.25 g). The minimum plant yield of 51 g was registered by line 92. The starch content is ranged from 10.9 g/100 g fresh weight to 45 g /100 g fresh weight and total sugar content is ranged from 1.6 g/100 g fresh weight to 8.6 g /100 g fresh weight. Out of 110 germplasm lines, six varieties are having good agronomic characters with high yield potential. All the varieties evaluated for *Phytophthora* are susceptible and few lines are having tolerance to disease.



Few promising lines

4.3 Collection, conservation and characterization of rajma bean germplasm from Nagaland

The experiment was conducted in Research Farm, ICAR Nagaland centre, Jharnapani. The experiment was laid out in Randomized Block Design with three replications. Totally 41 germplasm lines were planted. The standard package of the practices was followed. Out of 41 germplasm, 32 different germplasm had been identified. The morphological characterization was done based on the IPGRI descriptor. Two different type of plant growth was observed. Out of 32 germplasm, 30 were pole types and two were bush types. The data obtained from the study revealed that the positive significant variation was observed for the characters viz., plant height (36 – 178.3 cm), no. of inflorescence per plant (1.5 – 3.6), inflorescence length (2.0 – 6.4 cm), no. of pods per inflorescence (1 – 3.6), pod length (7.6 – 17.3 cm), pod width (0.9 – 1.9 cm), no. of locules per pod (4 – 8.5) and yield per plant (4 – 38.3 pods/plant) and the test weight of seeds was ranged from 29.4 g to 56.1 g.



Germplasm evaluation of rajma bean

4.4 TSP – Fruit based farming system model

Eleven different farming system models were established at Dimapur, Mokokchung, Wokha and Longleng districts and one mushroom unit was also established.



Models developed under TSP-Fruits

The details of the models are furnished below.

S.No	Model	Place
1	Horticulture + Fishery + Poultry	Jharnapani, Dimapur district
2	Agriculture + Horticulture + Fishery + Duckery	Jharnapani, Dimapur district
3	Agriculture + Horticulture + Fishery + Piggery	Jharnapani, Dimapur district
4	Horticulture + Agriculture + Fishery + Poultry	Jharnapani, Dimapur district
5	Horticulture + Poultry + Dairy	Sethikema A, Dimapur district
6	Horticulture + Poultry + Fishery	Videma, Dimapur district
7	Horticulture + Agriculture + Fishery	Bade, Dimapur district
8	Horticulture + Poultry + Piggery + Fishery	Watiyim, Mokokchung district
9	Horticulture + Poultry + Fishery + Dairy	Mokokchung, Mokokchung district
10	Horticulture + Piggery + Fishery	Wokha, Wokha district
11	Horticulture + Poultry	Hukphung, Longleng district

5. Plant Pathology

5.1 Disease development in crops under *Jhum* cultivation of Nagaland – its analysis and management

Survey was conducted at three villages of Mon district to identify the major diseases of *Jhum* crops (paddy, colocasia, beans, ginger and chilli). *Jhum* paddy is infected by blast disease, leaf spot or blight is a major problem of colocasia, anthracnose is common in the beans and wilt disease have become hindrance in ginger production. Germplasm of colocasia (110 nos.) collected from different parts of Nagaland are maintained in the institute on which disease incidence of *Phytophthora* blight was studied during the later part of the crop growth. The results show that almost all the accessions are susceptible to the disease. The results shall be confirmed with the next year data.

5.2 Disease Record

The disease, *Sclerotinia* wilt in sunflower, was observed for the first time in Nagaland, in the experimental farm of ICAR Research Complex for NEHR, Nagaland Centre. The disease was initiated at 50-60 days after sowing with the development of collar rot; leaf blight and head rot symptoms. The pathogen was isolated and cultured on PDA media. Symptoms and mycological studies confirm the identity of the pathogen as *S. sclerotiorum*. Pathogenicity test conducted produced the similar symptoms on sunflower seedlings.



Leaf blight



Head rot



Wilting

5.3 Scientific oyster mushroom cultivation

Mushrooms are accepted as an ideal health food and an efficient tool for recycling of organic wastes as well as a source of subsidiary income. The institute has been organizing on and off campus trainings and demonstrations on various aspects of distinguishing edible and poisonous mushrooms, low cost year round organic production technology, management of mushroom units and processing and preservation technologies. Through these trainings, demonstrations and personal contacts/visits, during the period of report, 200 numbers of beneficiaries comprising of practicing farmers, farm women and rural youths of different districts like Mon, Kohima, Peren, Wokha, Longleng, Zhuneboto are benefitted. Supply of high quality spawns of different species of oyster mushroom which can be grown in summer and winter season are made available to the growers throughout the year. On an average during the peak season, 400 packets of 200gm spawn is supplied to beneficiaries from all the districts, NGOs from the state and neighbouring states. Records show that on an average from a mushroom bed prepared out of 2kg of paddy straw and 200gm spawn produce 800gm-1.25kg of fresh mushroom. ICAR, Nagaland Centre, has revolutionized mushroom production in the state by providing technical guidance to the local budding entrepreneurs and as a result mushroom production is gearing up in the two newly developed low cost mushroom production units for beneficiaries at Medziphema, Kukidolong village under TSP on Horticulture based Farming System and TSP on Mushroom cultivation for subsidiary income and nutritional security in a participatory mode. Each unit has the capacity to hold 150 – 200 beds made by block and polybag method. Evaluation and documentation of these units are in progress.



Spawn Packets

Hands on Training

Mushroom unit at Kukidolong

6. ANIMAL SCIENCE

6.1. Mega Seed Project on Pig:

Parent stock of Large Black and Ghungroo breeds of pigs were maintained under the project. Hampshire and crosses of Ghungroo and Hampshire were introduced during last year. A total of 546 numbers of piglets were born, of which 347 piglets were distributed to 122 beneficiaries of Dimapur, Kohima, Peren, Wokha, Phek, Longleng and Mokokchung district of Nagaland. The feedback from all the corners of the state is very much encouraging and demand of piglets produced under the project is enormous. Artificial insemination in pig is initiated to enhance the production of piglets from superior breeding stock. During the reporting year a sum of Rs. 9,16,815 (Rupees Nine lakh sixteen thousand eight hundred and fifteen only) was generated as revenue under the project by selling the piglets and culled animals for meat purpose.



Artificial Insemination in Pig

6.2. Establishment of Pig breeding unit at farmers' field:

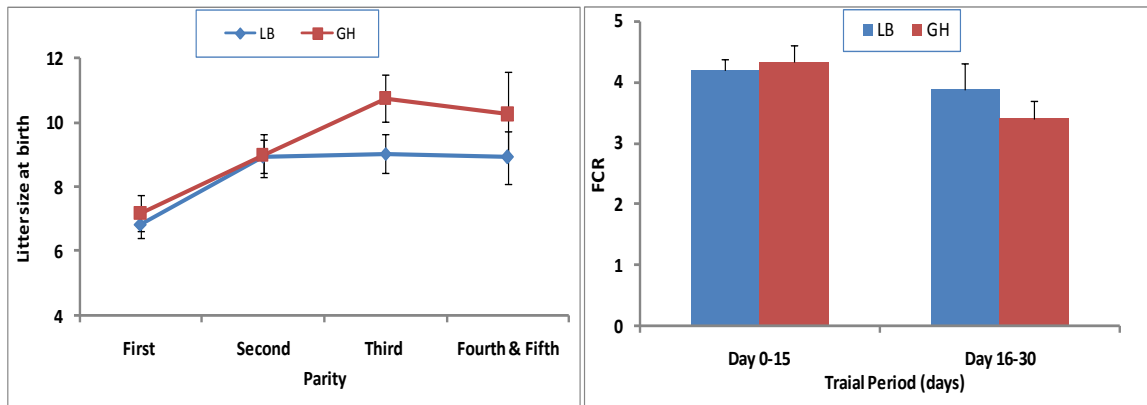
To promote production of piglets, initiative has been taken for establishment of breeding unit at farmers' field in a participatory mode. A total of nine pig breeding units were established at Dimapur, Kohima, Wokha, Mokokchung and Peren districts of Nagaland. Germplasm were supplied from the stock produced under Mega Seed Project on Pig. Out of nine units, production of piglets began in three units. The pig breeding unit at Mesoma village, Kohima has produced 30 piglets from three female in the span of one year. The unit at Bade village, Dimapur is maintaining 8 adult female and 2 male pig for breeding. All the females got conceived and expected to produce at least 50 piglets which could be used for further extension of the herd strength. In rest of the units, performance evaluation is under progress.



Pig breeding unit established under TSP program at Bade village, Dimapur

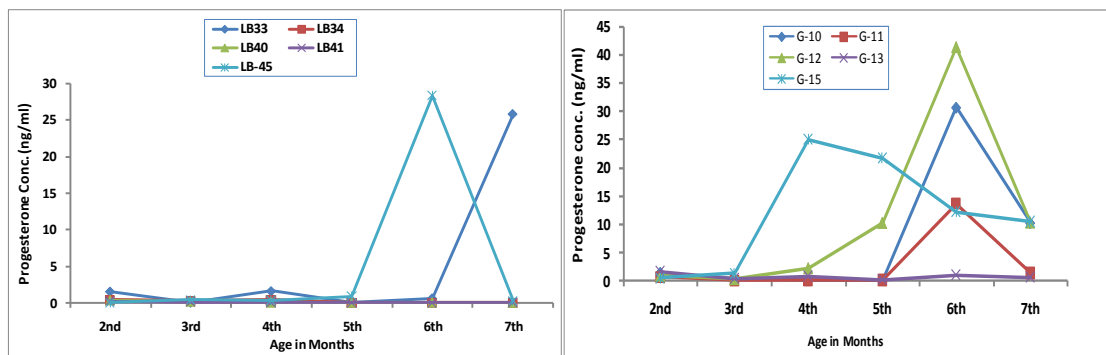
6.3. Comparative studies on productive and reproductive performances of different breeds of pig in Nagaland:

The feed conversion efficiency in Large Black and Ghungroo pigs were compared in 12 gilts for a month with regular feeding. No significant difference was observed in feed conversion efficiency between Large Black cross and Ghungroo gilts (3-4 months age) and it was varied from 3.88 to 4.13 in Large Black and 3.4 to 4.33 in Ghungroo. Retrospective analysis of farrowing (148 cases) record at different parity in Large Black cross (80) and Ghungroo pig (68) was conducted to compare the litter size at first to fifth parity. The litter size was varied from 6.83 ± 0.42 to 8.94 ± 0.81 in Large Black and 7.20 ± 0.55 to 10.27 ± 1.31 in Ghungroo. There was no significant difference in litter size between Large Black and Ghungroo at first and second parity, however, it was tended to be significant ($P < 0.10$) at third parity. Further, within breed comparison of litter size revealed significant higher ($P < 0.05$) litter size at 2nd, 3rd and 4th parity compared to the first parity in Large Black cross and at 3rd and 4th parity compared to first parity in Ghungroo pig.

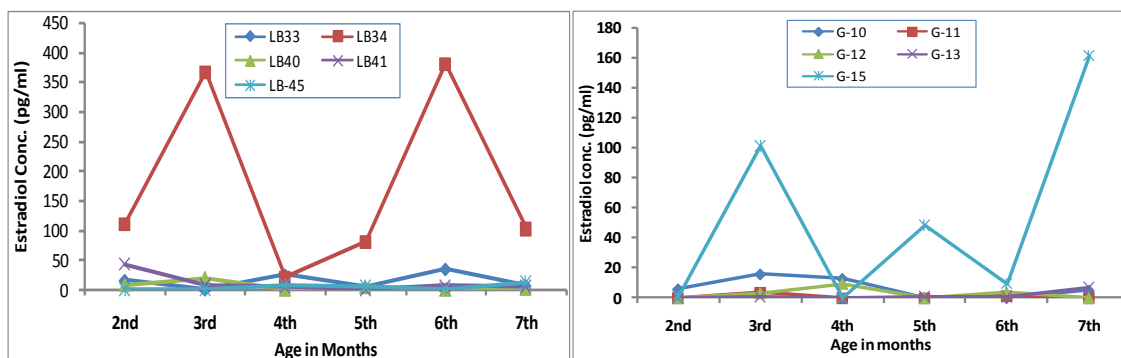


Parity wise comparison of litter size and feed conversion efficiency in Large Black and Ghungroo Pig

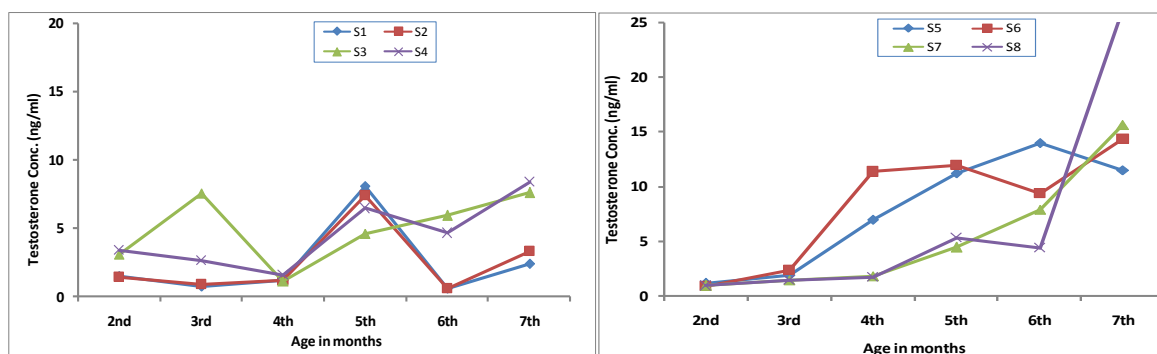
The plasma estradiol, progesterone and testosterone level was estimated in pre-pubertal gilt and boar from second to seven months in representative animals by radio immuno assay kits. In large black cross pig, a rising level of progesterone was observed from the 5th month onwards indicating initiation of cyclical activity. However, in Ghungroo gilts the rising of progesterone was observed at the age of 3rd month, much earlier than Large Black cross. Persistence elevation in Progesterone level was observed from 4th to 7th month onwards in one Ghungroo gilts that subsequently farrowed at seven months indicating early sexual maturity trait in Ghungroo female. The plasma estradiol concentration was increased at 3rd months onwards in some gilt and a typical estradiol profile was observed in one gilt which came into estrous at 3rd month and subsequently conceived and farrowed at seven months of age. The plasma testosterone profile of boar at 2nd to 7th month of age revealed a rising level from 3rd month onwards in majority of the boars of Ghungroo as compared to at 5th month in Large Black cross. The endocrine profile in male and female elicited early maturity trait in Ghungroo pig as compared to Large Black cross.



Plasma Progesterone profile in Large Black and Ghungroo gilts from 2nd to 7th months of age



Plasma Estradiol profile in Large Black and Ghungroo gilts from 2nd to 7th months of age



Plasma Testosterone profile in Large Black and Ghungroo boars from 2nd to 7th months of age

6.4. Poultry Seed Project:

The parent stock of Vanaraja and Gramapriya chicken were maintained in this project. During the reporting year, three new poultry units comprising of hatchery house, brooder - cum- grower house and layer house were acquired under the project. A total of 101,061 numbers of eggs comprised of 82,962 nos. of Vanaraja and 18099 nos. of Gramapriya eggs were produced. Of which, a total 77653 no. of eggs were set and 53776 no. of chicks were produced with 86.34% fertility in Vanaraja 87.46% fertility in Gramapriya. The hatchability on fertile eggs set were 80.52% and 77.78%, respectively in Vanaraja and Gramapriya varieties. The fertility rate was varied from 59.27 to 90.94% in Vanaraja and 80.85 to 93.86% in Gramapriya varieties during last year. Altogether, 45,150 numbers of chicks were distributed to the beneficiaries at subsidized rate in Nagaland, Arunachal, Assam and Meghalaya at day old or after rearing for 3-4 weeks at brooding unit. A total of 21803 no. of chicks were distributed to the farmers directly in different districts of Nagaland and 3300 nos. of chicks were received by farmers in Assam and Manipur. Eight KVKs working in North east has collected 10160 no. of chicks for their on farm trail and demonstration at farmers' filed. Further, 13443 no. of eggs and 3500 kg live birds were sold for table purpose among the staffs and residence in neighboring areas. During the reporting period, a sum of Rs. **18,62,620** (Rupees Eighteen lakh sixty two thousand six hundred and twenty only) was realized as revenue by selling of chicks, eggs and culled birds.

Beneficiaries' details under Poultry Seed project

Particulars of beneficiaries	No. of beneficiaries	Total nos. of chicks collected
Farmers	241	21833
Distribution through KVKs	8	10,160
Farmers from Assam and Manipur	-	3300
Distribution under the project TSP /NAIP/NICRA etc.	180	9857
Total no. of chicks distributed		45150

Under the Tribal Sub - Plan of Poultry Seed Project, Four training programs were organized to provide hands-on training and exposure of scientific rearing practices of poultry under backyard. Altogether 204 participants from Dimapur, Kohima, Mon, Peren, Mokokchung, Wokha and Zunheboto districts were participated and learnt the techniques of scientific poultry farming. Further, a total of 150 farmers were covered under TSP of Poultry Seed Project and given assistance by proving grown up chicks at subsidized rate and 8757 nos. of Vanaraja and Gramapriya chicks were distributed among the beneficiaries. The performance of Vanaraja birds under field condition was appraised from the demonstration unit established in previous year and obtained encouraging results. Out of 11 unit established in previous year, eight farmers has extended the poultry unit and managing a stock of 200 to

200 birds and generating an additional income of Rs. 10,000 to 12,000 per month. The production performances of three different units are presented below.



Vanaraja birds under low input production system



Rearing of layer stock at Watiym village, Mokokchung

Performance and economic evaluation of Vanaraja birds at demonstration units in farmers field under TSP Poultry Seed Project

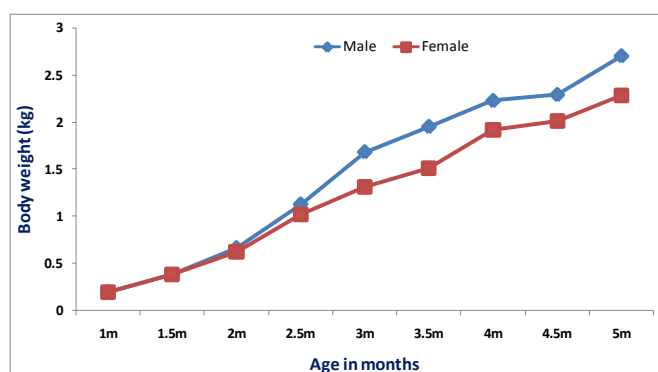
Farmer name	No. of birds procured	Survivability (%) up to 6 months	Production status Body weight gain	Total expenditure (Rs)	Total income (Rs)	Net benefit (Rs)
Smt. Thezano, Sethikema, Dimapur	400	98	8 wks- 1061.11±36.28 g 16 wks - 2544.44±105.86 g	1,18,770	158,588	39,818
Shri Shekhot D. Vadeo, Sakraba, Phek	400	81	12 wks – 1700 g 24 wks - 3008 g	1,16,000	1,79,625	63,625
Shri Supung Jamir, Watiym, Mokokchung	350	82.86	24 wks – 2.5 to 3.25 kg	1,00,000	1,28,625	28,625

6.5. Understanding the unique traits in indigenous pig and poultry which make them resilient to climate change and development of database under the project ‘National Initiative on Climate Resilient Agriculture’

An experiment was initiated to understand the impact of climatic stress on growth and physiology of Vanaraja birds and its amelioration through dietary supplementation. A total of 400 no. of Vanaraja birds were allocated at day old in four groups with two replicates each and maintained for 16 weeks. Recommended doses of pre-biotic + probiotic, Ascorbic acid, Selenium and Vitamin E were applied in group I, II and III respectively, and group IV was maintained as control. The weekly body weight, feed intake, mortality and blood biochemical parameters (Blood glucose, total protein, albumin, cholesterol, triglyceride) at fortnight interval was measured in all the group. Further, the carcass quality was studied in representative no. of birds at the end of experiment. The data analysis is under progress.

6.6. Livelihood improvement and empowerment of rural poor through sustainable farming systems in Mon district of Nagaland (NAIP- III)

The scientific rearing practice of Vanaraja birds at backyard was demonstrated at farmers’ field. Four progressive farmers namely Tayang, Yuao, Tamok, Chingngam established small semi-intensive poultry unit with the technical guidance obtained from ICAR Research Complex for NEH Region. They established small poultry house with locally available bamboo, thatch grass and wood with floor space of 500 sq ft for rearing 150-200 birds. The birds were maintained under semi –intensive system with minimum supplementation of poultry ration or home-made concentrate mixture comprising of broken rice, maize, and grain residues. The prophylactic measures to the birds against prevalent diseases of Ranikhet, Gumboro and fowl pox were taken care by the ICAR. The average body weight attained about 2.0 – 2.5 kg at five months of age.



Performances of Vanaraja birds at Lampong Shenghah village of Mon districts

The survival rate of the Vanaraja birds was recorded as 80-85 per cent. All four farmers have used a sizable portion of total birds for home consumption at family function or during festival. The remaining birds were sold at local market on an average of Rs. 300 – 400 per bird and earned additional income. The expenditure and income for each unit is presented below. The total expenditure included the cost of chicks, transportation, feed and medicines. However, the labour cost and cost of construction of poultry house was not included as because the family labour and locally available materials were utilized. The total income included the amount generated out of sale of birds and the estimated value of birds used for home consumption.



Grown up Vanaraja birds at farmers' field and farmers carrying birds to local market

Economic evaluation of backyard poultry demonstration units at Lampong Shenghah village, Mon

Farmer name	No. of birds procured	Survival (%)	Total expenditure (Rs)	Total income (Rs)	Net benefit (Rs)	Home consumption (live weight)
Shri Yuao	400	85	60,000	1,05,000	45,000	120 kg
Shri Chingngam	175	84	26,600	34,720	8,120	90 kg
Shri Tayang Konyak	175	83	24,730	39,980	15,250	25 kg
Shri Tamok	100	80	15,470	25,000	9,530	30 kg

All these four progressive farmers learned the scientific knowledge of rearing backyard poultry from ICAR and not only met the requirement of animal protein for their families but also generate additional income. All four farmers have now extended their poultry unit. They are maintaining a stock of 200-400 birds regularly and earning Rs. 10,000 to 11,000 per month. The performance of Vanaraja birds at low input production system created a positive impact on the fellow farmers.

6.7. Establishment of vaccine bank under TSP

The non- availability of vaccine for livestock and poultry in North East region is considered to be major constrain for success in animal husbandry. An initiative was taken under Tribal Sub Plan to set up a vaccine bank for maintaining cold chain and supply of different vaccines for livestock and poultry at free of cost to the beneficiaries directly or through the KVKs and state department. During the reporting year a total of 810 doses of swine fever, 4000 doses of FDRD (F strain), 2600 doses of FDRD (R2B strain), 3600 doses of fowl pox and 200 doses of duck cholera vaccines were distributed in Dimapur, Kohima, Wokha, Peren and Phek districts of Nagaland. Further, two animal health camp cum vaccination program was conducted at Dimapur and Peren districts covering about 121 beneficiaries. Besides distribution of feed supplements, deworming and acaricides for cattle, pig and poultry, vaccination was done against rabies in dog, swine fever in pig and FMD in cattle.

7. TRAINING AND FLD



FLD on rejuvenation of Khasi mandarin



FLD on Assam lemon



Training on horti-based farming system



Training on scientific cultivation of tuber crops



Hands on training on scientific mushroom cultivation (HTM)



Scientific mushroom production and processing (HTM)



IDM in maize and rice (NICRA)



Oyster mushroom cultivation



Encouraging Local Food Production (NEEPSCO)



Mushroom cultivation training at Shorupathar



Mushroom cultivation at Ahthibung (TSP)



Agri-clinic and soil health camp at Bade



Agri-Expo 2012



Honey box making (NAIP)



Weaving cum sewing (NAIP)



Mushroom cultivation (NAIP)



Establishment of weaving unit at L/S



Animal Health cum Vaccination Program conducted at Bade village, Dimapur and Inbung village, Peren



Training Program organized under TSP of Poultry Seed Project at ICAR-Research Complex, Nagaland Centre, Jharnapani on September 18-20, 2012.



Honourable Director NRC on Pig, addressing the participants in training program on December 13-14, 2012 organized under Mega Seed Project on pig



Training Program organized at ICAR-Research Complex, Nagaland Centre, Jharnapani on March 25-26, 2013

7. LIST OF PUBLICATIONS

Research Papers

- Deka, Bidyut C.; Thirugnanavel, A.; Patel, R.K.; Nath, Amit and Deshmukh, Nishant (2012). Horticultural Diversity in North East India and its improvement in value addition. *Indian J. Genet.*, 72(2): 157 – 167.
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- Kalita, H.; Borah, Tasvina R; Gopi, R.; Helim, R. and Das, B. (2012). A new record of Patchouli wilt from Sikkim, Himalayas. *J Mycol Plant Pathol*, 42(2) 254-255.
- Kumar, A.; Avasthe, R.K.; Borah, Tasvina R.; Lepcha, B. and Pandey, B. (2012) Organic mulches affecting yield, quality and diseases of ginger (*Zingiber officinale*) in mid hills of North Eastern Himalayas. *Indian J. Horticulture* 69 (3) 439-442.
- Kumar, A.; Mohanty, A. K.; Borah, Tasvina R. and Singh, Awani Kumar. (2012) Evaluation of indigenous forest plant leaves for bio-mulching in organic ginger production and income generation under rain-fed conditions of NEH region. *Indian J. Traditional Knowledge* Vol. 11(3), 487-492
- Loyi T., Kumar, H., Nandi, S., Mathapati, B.S., Patra, M.K., Pattnaik, B. (2012). Differential expression of pro-inflammatory cytokines in endometrial tissue of buffaloes with clinical and sub-clinical endometritis. *Research in Veterinary Science*. 2012 Oct 4. pii: S0034-5288(12)00258-5. doi: 10.1016/j.rvsc.2012.09.008.
- Patra, M.K., Ravi, S.K., Islam, R., Loyi Tumnyak and Kumar H. (2012). Bilateral Hydrosalpinx in buffalo: A case report. *Buffalo Bulletin* 31(3): 99-102.

Poster presentation/Abstracts

- Begum Sonuwara, Patra, M.K., Ngullie Ebibeni, Ngullie Lily, Das, R.K. and Sangtam, H.M. (2013). Scenario of indigenous rearing practices of pig in Nagaland. National Seminar on climate change and climate resilient agriculture organized by Agromet advisory services, Sonitpur, B.N. College of agriculture, Bswath Chariali during March 18-19, 2013.
- Kuotsu, R.; Chatterjee, Dibyendu; Krose, M.; Sahoo, B.; Kumar, R; Patra, M. K.; Thirugnanavel, A. and Deka, B. C. (2012). Farmers First: Transformation of a *jhumia* to a progressive farmer. Poster presented at North East Agri Expo, 15th November, 2012.
- Patra, M. K., Begum,S., Ngullie, E., Ngullie, L., Das, R.K. and Sangtam. H. M (2012). Backyard Poultry Production in Nagaland: Present Scenario and future Scope. XXIX Annual conference and national symposium of Indian Poultry Science Association at Project Directorate on Poultry, Hyderabad during December 5-7, 2012.
- Patra, M. K., Thirugnanavel, A., Ngullie, E., Das, R.K., Begum, S., Ngullie, L. and Deka, B.C. (2012). Women Empowerment through Backyard Poultry Farming: A Success Story. *National seminar on progressive agriculture, Farmers – Scientist interactions in the poster session of “Success stories on Agricultural technologies and ITKs” during North East Region Agri Expo* at Dimapur during November 15-17, 2012.
- Patra, M.K., Kumar, H., Nandi, S. Loyi, Tumnyak, Krishnan, B. B. and Islam, R. (2012). Up-regulation of certain pro-inflammatory cytokines transcripts as diagnostic indicator of

endometritis in buffaloes. *National Symposium on “Addressing animal reproductive stresses through biotechnological tools” and XXVIII Annual Convention of ISSAR* at College of Veterinary Science, Khanapara, AAU, Guwahati during November 21-23, 2012.

Patra, M.K., Ngullie, E., Das, R. K., Begum S. and Ngullie L. (2012). Entrepreneurship development through backyard poultry farming: A success story. XXIX Annual conference and national symposium of Indian Poultry Science Association at Project Directorate on Poultry, Hyderabad during December 5-7, 2012.

Patra, M.K., Ngullie, L., Ngullie, E., Das, R. K. and Begum S. (2012). Comparative evaluation of certain production and reproduction traits of Large Black and Ghungroo pig in Nagaland condition. *National Symposium on “Addressing animal reproductive stresses through biotechnological tools” and XXVIII Annual Convention of ISSAR* at College of Veterinary Science, Khanapara, AAU, Guwahati during November 21-23, 2012.

Patra, M.K., Sanchu, V., Ngullie, E., Ngullie, L., Begum S. and Das, R.K. (2012). Effect of egg weight on fertility and hatchability in Vanaraja and Gramapriya chicken. XXIX Annual conference and national symposium of Indian Poultry Science Association at Project Directorate on Poultry, Hyderabad during December 5-7, 2012.

Patra, M. K., Thirugnanavel, A., Chatterjee, D., Krose, M., Kumar, R., Deka, B. C. and Ngachan, S.V. (2012). Enhancing Nutritional Security in Rural Livelihood through Backyard Poultry Production: Way to Success. *National seminar on progressive agriculture, Farmers – Scientist interactions in the poster session of “Success stories on Agricultural technologies and ITKs” during North East Region Agri Expo* at Dimapur during November 15-17, 2012.

Sangtam, H. M., Patra, M. K., Deka, B. C., Ezung, N.K. and Meyase, M. (2012). Women entrepreneurship development through integrated farming system: A success story. *National seminar on progressive agriculture, Farmers – Scientist interactions in the poster session of “Success stories on Agricultural technologies and ITKs” during North East Region Agri Expo* at Dimapur during November 15-17, 2012.

Book / Book Chapters

Borah, T. R., Deka, B. C., Chatterjee, Dibyendu and Ngachan, S. V. (2012). *Jhum* park – A new vista in eco-tourism. *In: Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee, Dibyendu, Borah, T. R. and Ngachan, S. V. (Eds.) Resilient Shifting Cultivation: Challenges and Opportunities*, Published by: Director, ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya, pp. 118-125.

Borah, Tasvina R. (2012). Crop diseases in *jhum* and their organic management *In: Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee Dibyendu, Borah, Tasvina R. and Ngachan, S. V. (Eds.) Resilient Shifting Cultivation: Challenges and Opportunities*, Published by: Director, ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya, pp.74 -77.

Chatterjee, Dibyendu (2012). Impact of *jhum* cultivation on soil and environment: strategic way out. *In: Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee, Dibyendu, Borah, T. R. and Ngachan, S. V. (Eds.) Resilient Shifting Cultivation: Challenges and Opportunities*, Published by: Director, ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya, pp. 27-34.

- Chatterjee, Dibyendu, Deka, B.C., Patra, M. K., Thirugnanavel, A., Sahoo, B., Kumar, Rakesh, Bhatt, B. P. and Krose, Mhiesikedo (2012). Livelihood improvement of Konyaks through integrated farming system at Lampong Sheanghah village of Mon District, Nagaland. *In: Book of extended summeries of the national seminar on "Livelihood options in agriculture for small and marginal farmers' in fragile ecosystems"* 9-10th August, 2012, supported by NAIP III, organized by ICAR Research Complex for NEH Region, Umroi Road, Umiam, Meghalaya, pp. 12-17.
- Chatterjee, Dibyendu, Deka, B.C., Patra, M.K., Thirugnanavel, A., Borah, Tasvina R. Kuotsu, Rukuosietuo and Ngachan, S. V. (2012). Resilient shifting cultivation for sustainable soil-water-nutrient-plant continuum in hilly agriculture system of North Eastern India. *In: Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee, Dibyendu, Borah, Tasvina R. and Ngachan, S. V. (Eds.) Resilient Shifting Cultivation: Challenges and Opportunities*, Published by: Director, ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya, pp. 104-109.
- Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee, Dibyendu, Borah, Tasvina R. and Ngachan, S. V. (Eds.) 2012. *Resilient Shifting Cultivation: Challenges and Opportunities*, Published by: Director, ICAR Research Complex for NEH Region, Umiam 793103, Meghalaya
- Gopi, R. and Borah, Tasvina R. (2012). Disease management in cereals. *In: Biotechnological and Bio rational Approaches for Pest and Disease Management*.Eds. H. Kalita, K. Kishore, H. Rahman and L. R. Chatlod. Published by Agrobiotech. pp.148-158
- Patra, M.K., Begum, S., Nnullie, L. and Das, R.K. (2012). Livestock based integrated farming system: An approach for sustainable development in Nagaland. *In: Resilient Shifting cultivation: Challenges and Opportunities*. (Eds.) Deka, B.C., Patra, M. K., Thirugnanavel, A., Chatterjee, D., Borah, T.R. and Ngachan, S.V. Published by ICAR Research Complex for NEH Region, Umiam, Meghalaya. PP: 78-85.

Training Manual/ Folder/Technical Bulletin

- Borah, Tasvina R. 2013. Organic management of crop diseases in *sukhakhetti*. *In: Chatterjee, Dibyendu, and Ezung, N. K. (Eds.) 2013. Resilient *jhum* cultivation through integrated farming system*. ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema-797 106, Nagaland (*In Press*).
- Chatterjee, Dibyendu, and Ezung, N. K. (Eds.) 2013. *Resilient *jhum* cultivation through integrated farming system*. ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema-797 106, Nagaland (*In Press*).
- Chatterjee, Dibyendu, Patra, M. K., Thirugnanavel, A., Deka, B.C. 2013. *In: Chatterjee, Dibyendu, and Ezung, N. K. (Eds.) 2013. Resilient *jhum* cultivation through integrated farming system*. ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema-797 106, Nagaland (*In Press*).
- Chatterjee, Dibyendu. 2013. Model Farming System for Resilient Shifting Cultivation in Nagaland *In: Chatterjee, Dibyendu, and Ezung, N. K. (Eds.) 2013. Resilient *jhum* cultivation through integrated farming system*. ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema-797 106, Nagaland (*In Press*).
- Deka, B.C., Chatterjee, Dibyendu, Sahoo, B., Patra, M. K., Thirugnanavel, A., Kumar, R., Krose, M., Bhatt, B. P. and Ngachan, S.V. (Eds.) 2013. *Soil-Water-Plant-Animal-Society continuum approach for livelihood improvement of *Konyak* tribe of Mon in Nagaland*. Published in

March 2013, ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema-797 106, Nagaland.

Khriedinuo Pfukrei, Tasvina R. Borah and Bidyut C. Deka (2013) Seed production in Nagaland. Published by Joint Director, ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani, Medziphema, Nagaland – 797 106.

7. TRAINING, SEMINAR, SYMPOSIA, WORKSHOP, MEETING ETC. ATTENDED BY THE SCIENTIST/ JOINT DIRECTOR

- Dr. A. Thirugnanavel attended CTCRI NEH Project planning and Inception workshop held at ICAR RC NEH, Barapani, Meghalaya during 24-25th July 2012.
- Dr. A. Thirugnanavel attended five days training programme on improved tuber crops production technologies for NEH Region under CTCRI North East Programme held at CTCRI, Thiruvananthapuram, Kerala during 3-7th December 2012.
- Dr. A. Thirugnanavel attended Monitoring and Evaluation workshop and farmer's seminar organized by CTCRI under CTCRI North East Programme held at KVK, Mokokchung during 20-21.3.13.
- Dr. A. Thirugnanavel attended the 7th DUS review meeting held at IIVR, Varanasi during 28th February to 1st March 2013.
- Dr. A. Thirugnanavel attended the national dialogue on orchid conservation and sustainable development for community livelihood held at Gangtok, Sikkim during 8-9.3.13.
- Dr. A. Thirugnanavel attended three days training workshop on Sustainable livelihood assessment and value chain analysis under CTCRI North East Programme held at ICAR Nagaland Centre during 22-24th September 2012.
- Dr. B. C. Deka, Dr. A. Thirugnanavel, Dr. Dibyendu Chatterjee attended a meeting on 'Protection of Plant Varieties and Farmers' Rights Act' to protect the indigenous varieties of Nagaland at ICAR Nagaland Centre on 29th June, 2012.
- Dr. B. C. Deka, Dr. A. Thirugnanavel, Dr. Dibyendu Chatterjee, Dr. T. R. Borah attended the inaugural function on "training on new technologies in maize production under Tribal Sub Plan (TSP)" on 10th July, 2012 at KVK, Dimapur.
- Dr. B. C. Deka, Dr. B. Sahoo, Dr. M. K. Patra, Dr. A. Thirugnanavel, Dr. Dibyendu Chatterjee, Dr. Tasvina R. Borah attended the inaugural function on Institute Industry Day celebration programme on "Scope of entrepreneurship in Mithun farming" at NRC on Mithun on 27th July, 2012.
- Dr. B. C. Deka, Dr. M. K. Patra, Dr. A. Thirugnanavel, Dr. Dibyendu Chatterjee, Dr. Tasvina R. Borah participated 'Technology week' celebration programme of ICAR Nagaland Centre on September 17-22, 2012 at KVK Dimapur.
- Dr. B. C. Deka, Dr. M. K. Patra, Dr. Dibyendu Chatterjee, Dr. Tasvina R. Borah attended an inaugural ceremony of hands on training programme on "Basic principles of PCR and its application in molecular biotechnology research" and an awareness programme on the "Scope of Biotechnology for career development" at NRC Mithun in presence of Honorable Governor of Nagaland Shri Nikhil Kumar on 31.05.2012.

- Dr. Dibyendu Chatterjee attended and presented a seminar on “Combating soil degradation through conservation agriculture” at ICAR Research Complex for NEH Region, Nagaland Centre, Jharnapani on February 2, 2013 (RCN/G-8 /Vol. IV/06/464 dated 28th January, 2013).
- Dr. Dibyendu Chatterjee attended and presented at national seminar on “*Livelihood options in agriculture for small and marginal farmers’ in fragile ecosystems*” sub theme: *Innovations in integrated farming system options for livelihood improvement*, 9-10th August, 2012, ICAR Research Complex for NEH Region, Umiam, Meghalaya under NAIP Comp III.
- Dr. Dibyendu Chatterjee attended and presented on “Soils and Crops of Nagaland state and the best varieties released” at *Fertilizer Orientation Programme* organized by The Fertilizer Association of India (FAI) on 16th March, 2013 at School of Agricultural Sciences and Rural Development (SASRD), Medziphema Campus, Nagaland.
- Dr. Dibyendu Chatterjee participated and presented in national seminar on “Livelihood options in agriculture for small and marginal farmers’ in fragile ecosystems” sub theme: *Innovations in integrated farming system options for livelihood improvement*, scheduled during 9-10th August, 2012 at ICAR Research Complex for NEH Region, Umiam, Meghalaya under NAIP Comp III.
- Dr. Dibyendu Chatterjee participated and presented in regional seminar cum workshop on NAIP component III SLRS entitled “Site specific farming system options for disadvantaged areas” from 5th – 6th July, 2012 at ICAR Manipur centre, Lamphelat, Imphal.
- Dr. M. K. Patra attended a training program on ‘Advances in Functional Genomic concepts and Techniques for quality Ruminant and Poultry Production’ at National Institute of Animal Nutrition and of Physiology, Adugodi, Bangalore, September 26 to October 16, 2012.
- Dr. M. K. Patra attended National Symposium on ‘Addressing Animal reproductive stresses through biotechnological tools’ held at college of veterinary science, Assam Agricultural University, Khanapara, Guwahati from November 21-23, 2012.
- Dr. M. K. Patra attended the QRT meeting of AICRP/Poultry Seed Project at Project Directorate on Poultry, Hyderabad on September 24-25, 2012.
- Dr. M. K. Patra attended the review meeting of Poultry Seed Project at Project Directorate on Poultry, Hyderabad on June 20, 2012.
- Dr. M. K. Patra, Dr. A. Thirugnanavel, Dr. Dibyendu Chatterjee delivered lectures in a training programme at “Resilient *jhum* cultivation through integrated farming system” at Mission Centre, Vankhosung, Wokha on February 5, 2013.
- Dr. M. K. Patra, Dr. Dibyendu Chatterjee attended the programme on “Vetting of District contingency plan for KVKs of Arunachal Pradesh, Manipur and Nagaland” on 21st January, 2013 at KVK Dimapur, Jharnapani.
- Mrs. Tasvina R. Borah attended and delivered a lecture on “Disease management in large cardamom” on 10th October to participants of a training organized by ATMA.

8. IMPORTANT VISITORS

- Dr. A.B. Das, Director NRC on Pig visited on 13-14th December, 2012.
- Dr B.C. Konwar, Vice Chancellor, SASRD visited on 15th May, 2012.
- Dr. K.M. Bujarbaruah, Vice Chancellor, AAU, Jorhat visited on November 16, 2012.

9. LIST OF ON-GOING PROJECTS

1. List of ongoing projects (Institute based)

Resilient shifting cultivation for sustainable soil-water-nutrient-plant continuum in hilly agriculture system of Nagaland	Institute Plan Project
Disease development in crops under <i>jhum</i> cultivation of Nagaland – Its analysis and management	Institute Plan Project
Physiological and genomic regulation of early sexual maturity in Ghungroo, Local and Crossbred pig of North East India	Institute Plan Project
Comparative studies on productive and reproductive performances of different breeds of pigs in Nagaland	Institute Plan Project
Collection, characterization and documentation of Rajma beans in Nagaland	Institute Plan Project
Validation of ITK in weed management of <i>jhum</i> rice	Institute Plan Project
Seed production plan in rice, maize, linseed, and toria under TSP	Institute Plan Project (TSP)
Model farming systems for resilient shifting cultivation in Nagaland	Institute Plan Project (TSP)
Fruit based farming system model	Institute plan project (TSP)

2. List of externally funded projects

Project Title	Project Category / Funding Sources
Livelihood Improvement and Empowerment of Rural Poor through Sustainable Farming Systems in Mon District of Nagaland (NAIP-III)	Others/ NAIP-World Bank
National Initiative on Climate Change Agriculture	Others/ CRIDA & ICAR
Technology mission for integrated development of horticulture in North-Eastern states including Sikkim	Others/ Ministry of Agriculture, GOI
Integrated Agro-met Advisory Services (IAAS)	Others / Ministry of Earth Science, GOI
Mega Seed Project on Pig	Others / NRC on Pig, ICAR
Poultry Seed Project	Others / PDP, Hyderabad, ICAR
Implementation of tribal sub plan under the PD_ADMAS in Nagaland	Others / PD_ADMAS, ICAR
Collection, conservation and characterization of colocasia germplasm from North-Eastern hills	Others/ PPV&FRA
Development of Non-forest Wastelands through Agro-forestry Models in Nagaland State of NEH Region	Others / Ministry of Rural Dev., GOI
Value chain development in Citrus for North East India	DBT

10. LIBRARY

1. Total no. of books at present = 1821

- Genetics and Plant breeding=119
- Veterinary Science = 191
- Chemistry = 73
- Soil Science = 169
- Home science = 06
- Nagaland = 08
- Statistics = 50
- Forestry = 123
- Agronomy = 204
- Swamy's Hand Book = 22
- Horticulture = 134
- Entomology =1 82
- Plant Pathology = 188
- Extension literature = 257
- Microbiology = 51
- Soil and water conservation = 44

2. Total no. of Hindi books = 497

3. Received Annual Reports from

- ICAR-RC for NEH region Shillong, Meghalaaaya
- Directorate of Agriculture, Kohima, Nagaland
- Sugarcane Breeding Institute, Caimbatote
- Indian Lac Research Institute, ICAR, Ranchi, India
- Central Potato Research Institute, ICAR, Shimla
- Jute Technology Research Laboratory, ICAR, Calcutta
- National Bureau of Soil Survey and Land Use Planning, ICAR, Nagpur
- Sri Ramakrishna seva Kendra
- National Research Centre for Agroforestry, Jhansi
- Department of Agriculture Research and education, Ministry of Agriculture, Govt. of India
- Nagaland
- Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora
- AICRP on Linseed, Kanpur

- ICAR- RC for NEH Region, Sikkim Centre
- NRC on Mithun, ICAR, Nagaland centre
- ICAR, Research Complex for NEH Region, Basar, Arunachal Pradesh
- NABARD
- NRC on Pig, ICAR, Raani, Guwahati
- NRC for Orchids, ICAR, Pakyong, Sikkim, India
- ICAR- RC for NEH Region, Tripura Centre
- CIH, Medziphema, Nagaland
- Project Directorate on Animal Disease Monitoring and Surveillance

4. **Received Journals from**

- Allelopathy Journal
- Indian Journal of Animal Reproduction
- Indian Journal of Animal Research
- The Royal Veterinary Journal of India
- Indian Journal of Animal Sciences
- Indian Veterinary Medical Journal
- Veterinary World
- Asian Journal of Bio-Science
- Asian Journal of Experimental Chemistry
- Indian Journal of Agriculture Science
- Indian Horticulture
- Indian Journal of Ecology and Environmental Sciences
- Indian Journal of Forestry
- International Journal of Ecology and Environmental Sciences
- Indian Journal of Agronomy
- Indian Journal of Horticulture

5. **Received Newsletters from**

- Monthly Newsletter on the North East India, Ministry of Home Affairs, Govt. of India
- Agricomplex, ICAR, RC for NEH Region, Umiam, Meghalaya
- Cadalmin, CMFRI Newsletter (Central Marine Fishery Research Institute)
- Agrobios
- KVK Newsletters
- Tamil Nadu Veterinary and Animal Science University

- Vivekanada parvatiya Krishi Anusandhan Sansthan, Almora
- IARI News
- ICAR, A Science and technology Newsletter
- Agrinews, Department of Agriculture and Co-operation, Ministry of Agriculture, Govt. of India
- IMMA News (Indian Micro Fertilizers Manufactures Association)
- Central Potato Research Institute

5. Received Technical and Extension Series from

- ICAR Reporter
- Mithun Digest, NRC on Mithun
- Nutrition News, National Institute of nutrition
- Marine Fisheries Information service
- Rashtriya Krishi (Hind Agricultural Research and training Institute)
- Agri Export Advantage, Export-Import Bank of India
- Agricultural Extension Review
- Poultry Planner
- MGIRI (Mahatma Gandhi Institute for Rural Industrialization)

6. Daily Newspapers

- The Telegraph
- The Times of india
- Purvanchal Prahari
- Nagaland Post

7. Weekly Magazine

- India Today

8. List of materials/furniture's in the library

- Book Shelves=27
- Chairs= 13
- Reading Table=02
- Small table=01
- Almirah=01
- Fans=05
- Calculator=01
- Stamp pad=01
- Library seal=07

- Book shelves key=27
- Working Table Key=01
- Register/files
 - a) ACC stock = 01
 - b) Library book = 02
 - c) Hindi issue = 01
 - d) Sale record of old newspapers = 01
 - e) Daily newspaper and weekly magazine entry register = 01
 - f) Library file RCN/Lib./Pt-IV/2005 = 01