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*Report of the Task Force*  
*on*  
*Agricultural Development of Assam*



*Submitted to*  
The Hon'ble Vice Chairman, NITI Aayog  
Government of India  
New Delhi

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*By*  
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Assam

## Report of the Task Force on Agricultural Development in Assam

### Agriculture in Assam

The economy of Assam is mainly agrarian with agriculture and allied activities contributing about 20 per cent to the state's net domestic product and providing livelihood support to about 75 per cent of the population of the region. However, the productivity of the major crops like rice, pulses, and oilseeds is still much lower in Assam compared to the national average.

Agriculture in Assam in macro sense is characterized by monocropping, largely small holders' low input-low output, subsistence farming systems practised primarily under rainfed condition. These weaknesses, however, could now be converted into opportunities by capitalizing on the hidden strengths in the form of maximizing production through input optimization, specially when green revolution belt has experienced fatigue. From the existing and anticipated R & D support, the state has to gear up itself to double its food grain production in the next decade.

At present, the net and gross cropped areas in the state are 28.11 (35.1 per cent of geographical area) and 40.99 lakh hectares, respectively with a cropping intensity of 144 per cent. Rice is the dominating crop of the state occupying around 91% of the gross cropped area. Pulses and oilseeds are yet to make desired headway. Among cash crops, sugarcane and jute occupy a substantial area. In horticulture, banana, pineapple and citrus are the major fruit crops while potato, various cole crops, cucurbits, okra and diverse leafy vegetables are the major vegetable crops. The state also has potential for spice crops, notable among them being ginger, turmeric, chilli and black pepper. The recent years have witnessed gradual rise in area devoted to flowers.

The overall achievement of agriculture and allied sector during the 10<sup>th</sup> Plan was just 1.16 per cent. Against this, the annual growth during the 11<sup>th</sup> Plan had been 4<sup>+</sup> per cent which was quite encouraging against the target of just 2 per cent for the Plan period. This has opened up food processing as an emerging area with off farm employment potentiality.

The state has also tremendous potential for the growth of livestock including poultry and fishery sub-sectors. However, poor production potential of the indigenous strains of livestock and poultry leads to dependance of the population on other states for meeting its animal protein requirements. Similar is the case with fish production. Realising the potential of this sector in addressing the very basic issue of inclusive growth in agriculture, several new programs are to be initiated to increase the production and productivity of the animals and fishes with greater emphasis on Integrated Farming System mode of food production.

Assam can be broadly divided into three distinct physiographic units - the plains, the plateau and the hills with the plains of Brahmaputra and Barak valleys being the main area for agricultural development. The typical characteristic feature of Assam soils is its acidity ( $p^H$  ranging from 4.2 to 5.8). High humidity and seasonal pattern of rainfall and temperature are important features of Assam climate with rainfall being the most important determinant factor for the climate. Rainfall distribution follows a typical monsoon pattern with peak precipitation during monsoon (June - September) and scanty rainfall in winter (December - February). Based on variation in rainfall, physiography and soil characteristics, the state has been divided into following six agroclimatic zones:

## Taskforce

1. The Minister of Agriculture, Assam - Chairman
2. The Vice-Chancellor, Assam Agricultural University, Jorhat-13
3. The Vice-Chancellor, Rajib Gandhi Univ. for Corporative Management, Sivasagar
4. The Addl. Chief Secretary & Agriculture Production Commissioner, Agriculture Deptt., Dispur
5. The Addl. Chief Secretary to the Govt. of Assam, P&D Department, Dispur
6. The Principal Secretary to the Govt. of Assam, Finance Department, Dispur
7. The Principal Secretary to the Govt. of Assam, Soil Conservation Department, Dispur
8. The Principal Secretary to the Govt. of Assam, Veterinary & A.H. Department, Dispur
9. The Principal Secretary to the Govt. of Assam, Fishery Department, Dispur
10. The Commissioner to the Govt. of Assam, P&RD Department, Dispur
11. The Secretary to the Govt. of Assam, Agriculture Deptt., Dispur - Convenor
12. The Secretary to the Govt. of Assam, P&RD Department, Dispur
13. The Chief General Manager, NABARD, Dispur
14. The Chief General Manager, State Bank of India, Guwahati
15. The Chief Managing Director, Assam Gramin Vikash Bank, Bhangagar
16. The Director of Agriculture, Assam, Khanapara, Guwahati-22
17. The Director of Horticulture & FP, Assam, Khanapara, Guwahati -22
18. The Mission Director, State Food Processing Mission, Udyug Bhavan, Bamunimaidam

## Target

- ❑ Doubling food production in Assam over a period of 5 years adopting green revolution related technologies
- ❑ Promoting secondary agriculture to facilitate agriculture centric trade, business and commerce and thus promote employment avenues
- ❑ Enhancing producers-growers competitiveness on newer science and technology methods including precision farming, stress mitigation.
- ❑ Adoption of natural resource conservation (NRC) modules with their enhanced use efficiency to promote the concept of more production from lesser resources
- ❑ Embracing peri-urban crop, animal and fish husbandry program to bridge food production, processing and marketing gaps with optimisation of waste management
- ❑ Convergence building for resource, ideas and man power strength pulling for a common cause of food self sufficiency and corporatization of agriculture

## Way forward

### 1. Leveraging the benefit from BGREI in a planned manner

#### Strategies

##### A. Rice

- ❑ To concentrate on relatively risk free 14 lakh ha area during *sali* season under BGREI for rice targeting per ha productivity of 6.00 tonne in 12 lakh ha (with modern mega varieties and hybrids) and 4 tonne in 2 lakh ha (with improved *joha* and *boro* rice varieties) with adoption of recommended packages of practices thus producing 80 lakh MT in *kharif* season.
- ❑ Increase area under summer paddy (*boro*) from 4 lakh ha to 6 lakh ha in *rabi* season with expansion of irrigation facility to obtain a yield of 7 t/ha and thereby to produce 42 lakh MT of paddy.

- ❑ Thus, more than 120 (80 + 42) lakh MT paddy production is targeted from relatively risk free rice area of 20 lakh ha.
- ❑ Research for development of rice varieties with yield potential of more than 10 t/ha coupled with resistance to multiple biotic and abiotic stresses and preferred grain quality and associated agronomic packages for realization of yield potential in farmers' fields
- ❑ Introgress biotic and abiotic stress resistance genes into mega rice varieties for their better and wider adaptation to stress prone situations
- ❑ Development of rice hybrids fitted to specific situations and uses
- ❑ Explore the commercial prospect of deep water paddy (*bao*) specially for export of red kernelled rice.

### **Input requirement to achieve the above**

#### **Seed**

- ❑ Of 14 lakh ha sali rice, 10 lakh ha shall be covered with high yielding mega varieties (like Ranjit, Bahadur, Gitesh, Swarna Sub 1 etc.), 2 lakh ha with hybrids and 2 lakh ha will be covered with speciality rice like *joha*, *bora* etc.
- ❑ Of the 6 lakh ha *boro* rice area, at least 2 lakh ha will be under Hybrids with other 4 lakh ha under HYV.

As of now, the entire seeds for hybrid rice will have to be procured from outside while the seeds of improved high yielding varieties shall be produced locally adopting participatory seed production programme and strengthening the seed farms of the Govt. of Assam. Seed and other inputs requirement for the proposed area will be as given below:

#### **Seed requirement with 30 % replacement rate**

Certified seed of HYV for 16 lakh ha =	19,200 MT (@ 40 kg/ha)
Foundation Seed	= 250 MT (with seed multiplication ratio to be 80)
Breeder Seed	= 3 MT (with seed multiplication ratio to be 80)
Hybrid seed for 4 lakh ha	= 6,000 MT (@15kg/ha) (100% seed replacement)
<b>Estimated fund requirement</b>	<b>= (67.20 + 0.88 + 0.02 + 90.00) = Rs 157.90 crores</b>

#### **Fertilizer under INM package**

Chemical	= 3,23,000 MT
Organic (Bio-fertilizer)	= 6,000 MT
<b>Estimated fund requirement</b>	<b>= (387.60 + 120.00) = Rs 507.60 crores</b>

#### **Pesticides under IPM package:**

Chemical	= 20 lakh litre
Bio-pesticide	= 16,000 MT
<b>Estimated fund requirement</b>	<b>= (40.00 + 160.00) crores = Rs 200.00 crores</b>

**Total fund requirement for essential farm inputs = Rs (157.90 + 507.60 + 200.00) crores = Rs 866.50 crores**

#### **Water**

- i. **For summer paddy (*boro* rice)** – Of 6 lakh ha summer paddy area, 4 lakh ha has irrigation facility. This facility has to be extended to additional 2 lakh ha for which provisioning/installation of 50,000 Shallow tube wells (diesel or electric operated) is proposed.  
(Estimated fund requirement = Rs 250 crores (@Rs 50,000/unit))

- ii. **For kharif paddy (*sali* rice)** - To develop measures for rainwater harvesting by way of -
- Increasing water holding capacity of Brahmaputra and Barak rivers and their tributaries by digging them further by 10 ft.  
**(Estimated fund requirement = Rs 20,000 crores that includes surface irrigation facility)**
  - Cleaning up natural springs/streams/wetland areas, *beels* and reservoirs to ensure free water flow and increasing water retention capacity  
**(Estimated fund requirement = Rs 1,000 crores)**
  - Implementing *jalkund* concept of water harvesting in the small holder producers' fields **(with support for 1 lakh jalkunds)**  
**(Estimated fund requirement = Rs 10 crore @ Rs 1000 per jalkund)**
  - Promotion of low cost low lift manual pumps.  
**(Estimated fund requirement = Rs 500 crores for 5 lakh ha @ Rs 10,000/ha)**

**Total fund requirement for water = Rs(250+20000+1000+10+500) = Rs 21,860 crores**

#### **Farm implements and others**

In order to pursue machine driven push to productivity growth, following will be needed.

- Establishment of custom hiring centres for farm implements at the rate of 1 each per 10000 ha area *ie.*, 200 centres for 20 lakh ha rice area with all the required farm implements.  
**(Estimated fund requirement = Rs 60 crores with Rs 30 lakh/centre).**
- Subsidised supply of small farm implements like sprayer, weeders, pump sets etc.  
**(Estimated fund requirement = Rs 100 crores with Rs 5,000 per farmer for 2 lakh farmers)**
- Establishment of grain storage structures @ 1 in each block [**@ Rs. 25 lakh each**]  
**(219 × 25 = Rs. 55 crores)**  
**(Estimated fund requirement = Rs 55 crores with Rs. 25 lakh each for 219 blocks)**

**Total fund requirement for farm implements = Rs (60 + 100 + 55) = Rs 215 crores**

**Total fund requirement for rice program = Rs (866.50 + 21,860 + 215) = Rs 22941 crores**

#### **B. Pulse and Oilseed**

- Increase area coverage under pulses from 1.3 lakh ha to a minimum of 4 lakh ha under NFSM-pulse like programmes targeting a production of 4 lakh MT (with per ha productivity of 1.0 t from 0.58 t/ha), 3.2 lakh MT up from the present level of 0.8 lakh MT.
- Similarly, oilseed area shall be increased from 2.8 lakh ha to 5 lakh ha in the line of pulses to produce 5 lakh MT (with per ha productivity of 1.0 t from 0.57 t/ha), 3.4 lakh MT up from the present level of 1.6 lakh MT.
- Breed/introduce high yielding varieties of various *rabi* pulses and oilseeds (particularly, rape & mustard) with better adaptation to acidic soil, moisture stress and suitability for late sowing.
- Develop and promote situation specific agronomic practices with emphasis on moisture stress management and INM, IPM and cropping systems.
- Expand area under *kharif* pulse, particularly, pigeon pea and non-traditional oilseed crops like ground nut and sunflower etc.

- ❑ Improve farmers' access to irrigation for rapid increase in productivity.

## Input requirement to achieve the above

### I. Pulse

#### Seed

##### With 20 % seed replacement rate

Certified seed of HYV for 4 lakh ha = 2000 MT (@ 25 kg/ha)

Foundation Seed = 100 MT (with seed multiplication ratio to be 20)

Breeder Seed = 5 MT (with seed multiplication ratio to be 20)

**Estimated fund requirement = Rs (16.00 + 9.00 + 0.48) crores = Rs 25.48 crores**

#### Fertilizer

Chemical = 1,93,600 MT

Organic (Bio-fertilizer) = 3,200 MT

Lime = 1,96,000 MT

**Estimated fund requirement = Rs (232.32+24.00+196.00) crores = Rs 452.32 crores**

**Total fund requirement for pulse program = Rs (25.48 + 452.32) crores  
= Rs 477.80 crores**

### II. Oilseed

#### Seed

##### With 30 % seed replacement rate

Certified seed of HYV for 5 lakh ha = 1500 MT (@ 10 kg/ha)

Foundation Seed = 30 MT (with seed multiplication ratio to be 50)

Breeder Seed = 0.06 MT (with seed multiplication ratio to be 50)

**Estimated fund requirement = Rs (90.00 + 1.95 + 0.0004) crores = Rs 91.95 crores**

#### Fertilizer

Chemical = 1,66,000 MT

Organic (Bio-fertilizer) = 4,000 MT

Lime = 2,45,000 MT

**Estimated fund requirement = Rs (199.20 + 30.00 + 245.0) crores = Rs 474.20 crores**

**Total fund requirement for oilseed program = 91.95 + 474.20 = 566.15 crores**

In order to systematize pulse and oilseed production (in *rabi* season), following steps shall be taken:

- Advancing *sali* planting
- Selective mechanization for enhancing harvest and post-harvest operations of *sali* rice and quick tillage operations for *rabi* crops and
- Development/promotion of varieties of *rabi* crops suitable for delayed sowing.

**Total fund requirement for the programme to leverage benefit of BGREI = Rs (22941 + 477.80 + 566.15) crores = Rs 23,984 crores (If river digging is**

**compromised up to a level of 25 per cent, the total fund involvement will be Rs (23984 - 15000) crores = Rs 8985 crores.**

## **2. Diversification into horticulture, animal husbandry and fisheries**

As mentioned already, only 14 lakh ha area out of 17 lakh ha under kharif rice shall be used for paddy saving thereby 3 lakh ha area for diversification. Similarly, around 6 lakh ha area shall be available for crop diversification during rabi season. Following diversification is planned:

### **I. Diversification into fisheries**

Digging up of 1 lakh ha flood prone area creating water harvesting structure for pursuing pisciculture along with other ventures (horticulture in the raised land).

### **II. Diversification into animal husbandry and poultry**

Resorting to peri-urban concept of dairy, animal husbandry and poultry farming. For this, a separate programme is attached (ANNEXURE). Areas where paddy productivity is around 1.5 t/ha shall be diversified into fodder production for livestock. Similarly, QPM maize is planned in around 1 lakh ha area during rabi and 0.5 lakh ha area during kharif.

### **III. Diversification into horticulture and floriculture:**

- a. First attempt shall be to utilize 0.80 lakh ha of fallow lands for increasing vegetable production area.
- b. Introduction of dominant fruit and plantation crops viz., citrus - orange and arecanut in the tea gardens of the state in consultation with commerce ministry to increase production of these crops. Expansion of fruit crops area from 1,36,000 ha to 1,50,000 with primary emphasis on banana, citrus, pineapple, papaya, litchi, guava, coconut with emphasis on garden approach.
- c. Increase productivity of potato and other vegetable crops and diversification of low vegetable yielding areas into floriculture covering also the foothills and mid-hill areas of the state.
- d. Utilization of foot hill areas/tilla lands and the bunds around the wastelands, beels etc. for MAP

## **Input and fund requirement to achieve the above**

### **A. For fisheries**

- i. Cost for excavation, embankment and land development costing **Rs 1000 crore** (@ Rs 1 lakh/ha)
- ii. 80 crores fingerlings/lakh ha (@ 8000/ha) costing **Rs 320 crores** (@ Re 4/fingerling )
- iii. 0.5 lakh ton lime (@ 500 kg/ha) costing **Rs 50 crore** (@ Rs 10000/ton)
- iv. 22500 ton Urea costing **Rs 2.50 crore** (@ Rs 10000/ton)
- v. 21000 ton SSP costing **Rs 3.50 crore**
- vi. 3 lakh ton feed costing **Rs 36 crore**
- vii. 40,000 Km nets for bio-security purposes for 1 lakh ha (assuming each pond is of 1 ha) (**Rs 50 crores**)

**Estimated fund requirement = Rs(1000+320+50+2.5+3.5+36+50) crores  
= Rs 1462 crores**

### **B. For animal husbandry**

#### **For growing fodder crops in 2 lakh ha**

- i. Maize seed requirement = 6,000 MT (for 1 lakh ha) (Rs 84 crores)
- ii. Other fodder seed requirement = 8,000 MT (oat+cowpea for 1 lakh ha) (Rs 84 crores)

- iii. Fertilizer requirement = 70,000 MT (Rs 500 crores)
- iv. Other requirements like improved breeds of livestock, housing, feeds = **Rs 150 crores**

**Estimated fund requirement = Rs (84 + 84 + 500 + 150) = Rs 818 crores**

### C. For horticulture

For seed and planting materials – (need of planting materials have been estimated)

- i. 10 V type nurseries costing **Rs 80 crores**
- i. Green houses for floriculture and high value crops (Rs 5 lakh × 500 No. = **Rs 25 crores**)
- ii. Tissue culture facility - at least 6 for citrus, banana and other crops (with approx. fund involvement of **Rs 6 crores**)
- iii. Protected cultivation of vegetables covering 0.1 lakh ha (with approx. fund involvement of **Rs. 1225 crores\***)
- iv. Creation of facilities for conservation, maintenance and production of indigenous fruits (4 orchards with fund involvement of **Rs 0.5 crores**)
- v. Integrated potato seed production programme for totally replacing the farmers' non-descript varieties with improved varieties (Estimated fund involvement = **Rs 200 crores\*\***)

**\*Total estimated fund requirement for protected cultivation of vegetables in 10,000 ha = Rs. 1225 crores**

- i. Bamboo based poly house in 3,000 ha (@ 15.00 lakh /ha) = Rs 450 crores
- ii. Bamboo based rain shelter in 3,000 ha (@ 10.00 lakh /ha) = Rs 300 crores
- iii. Bamboo based shade net house in 3,000 ha (@ 15.00 lakh /ha) = Rs 450 crores
- iv. Bamboo based poly tunnel in 1,000 ha (@ 2.50 lakh /ha) = Rs 25 crores

(With per ha productivity of 20 ton, total realizable quantity of vegetables per batch will be 2 lakh MT × 3 batches per annum i.e., 6 lakh MT. Sold @ Rs 10/kg, approximate return will be Rs 600 crore against an investment of Rs 1225 reaching breakeven point in two years)

**\*\*Total estimated fund involvement for potato seed production programme = Rs 200 crore**

- i. Estimated fund requirement for seed production (excluding post harvest and storage cost) = Rs 50 crores
- ii. Estimated fund requirement for cold storage = Rs 100 crores
- iii. Estimated fund requirement for mechanization and pack houses = Rs 50 crores

**Estimated fund requirement for horticulture = Rs (80 + 25 + 6 + 1225 + 0.5 + 200) crores = Rs 1536.50 crores.**

**Total fund requirement for diversification = Rs (Rs 1462 + 818 + 1536.50) crores = Rs 3816.50 crores**

### 3. Promoting agriculture centric employment avenues

Agriculture provides both on- and off-farm employment. Off-farm employment in this part of the country, however, has not been attempted much in business mode. The targeted production output could be achieved only when support service mechanism to optimize



production is strengthened. This strengthening shall, besides delivering services, open up self employment avenues. Following could be targeted to achieve the twin objectives.

- ❑ Facilitating agri-service centers for custom-hiring of farm implements and micro-irrigation facilities together with maintenance and repairing facilities. One such centre in each district initially with a funding support of Rs 20 lakh per centre = **Rs 5.6 crores** for 28 districts
- ❑ Agri-service centres for seed, fertilizers, pesticides and farm operation packages. One such centre in each district with a funding support of Rs 20 lakh each ie. **Rs 5.6 crores** for 28 districts
- ❑ Facilitating establishment of agri-clinics – one in each district initially with a funding support of Rs 10 lakh each ie. **Rs 2.8 crores** for 28 districts.
- ❑ Facilitating establishment of fruit/vegetable processing facilities like pineapple, orange, tomato, potato and some spices like chilli, ginger etc. - details given under agro-processing head.
- ❑ Apiary (bee keeping) and processing units for honey and other bee products - **Rs 1.5 crores** for 28 districts.
- ❑ Facilitation agency for Agricultural Insurance Services
- ❑ Consultancy services
- ❑ Hatcheries for production of fish-fingerlings - Covered under diversification.
- ❑ Livestock health service centres including AI facilitation - Similar to agri-clinic, but @ Rs 20 lakh per centre ie. **Rs 5.6 crores**.
- ❑ Information technology kiosks in rural areas for access to various agriculture related information - @ Rs 10 lakh per centre X 28 centres = **Rs 2.8 crores**
- ❑ Setting up of metallic/non-metallic storage structure - Rs 5 lakh X 50 = **Rs 2.5 crores**
- ❑ Vegetable/fruit *mandis* - @ Rs 1.0 crore X 28 = **Rs 28 crores**

**Total fund requirement for agri-centric employment = Rs 54.40 crores**

#### **4. Agro-processing and Packaging Industry to develop Secondary Agriculture**

With justified emphasis during the 11<sup>th</sup> Five Year Plan period for raising crop productivity through use of better technology, management and improved planting materials, Assam witnessed in the recent years significant rise in production of most of the crops. However, about 25-30% of the agricultural produces gets lost annually due to improper post-harvest handling, lack of sufficient storage facilities, insufficient market infrastructure warranting due importance on various postharvest aspects like pre-harvest treatment, proper harvest, setting up of collection centres with grading facilities and transport facilities, marketing, processing etc. The post-harvest loss is alarmingly high in horticultural crops like banana, pineapple, Khasi mandarins and vegetables. On the other hand, value addition to agriculture produce can easily be promoted and established at village level which will prepare products of local importance for sale in the local markets. It can increase farm income up to 40 per cent and will create additional job opportunities and will also improve nutritional status of the people.

#### **Work plan**

Following work plan has been formulated to initiate activities in value addition and value chain management in major agricultural and horticultural crops in Assam:

1. **Pack-house facilities in production sites:** These facilities will be equipped with facilities for commodity-wise cleaning, washing, grading, packing, cold-storage and refrigerated vans for transportation
  - a) For *Khasi* mandarin: One unit each in Tinsukia, Nagajanka (Jorhat district) and Sonapur
  - b) For Banana: One unit each in Dudhnoi, Nalbari, Nagaon, Jorhat, Sivasagar, Dibrugarh and Silchar areas
  - c) For pineapple: One unit each in Golaghat, Karbi-Anglong, Jorhat and Silchar areas
  - d) For ginger and turmeric: One unit each in Tinsukia, Golaghat, Karbi-Anglong, Dima Hasao, Sivasagar areas
  - e) For vegetables: One unit each in Dibrugarh, Sivasagar, Jorhat, Golaghat. Nagaon, Borpeta, Nalbari, Goalpara, Silchar areas
  - f) For cut-flowers: Jorhat, Hajo, Kamrup areas
2. **Cereal processing units:** For production of rice flakes, puffed rice etc. at Dibrugarh, Jorhat, Golaghat, Borpeta, Nalbari and Silchar areas
3. **Processing units for fruits and vegetables:** These units will be established in the following areas to process fruits and vegetables into products like jam, jelly, beverages, pickles, dehydrated vegetables etc.: Dibrugarh, Diphu, Nagaon, Borpeta, Silchar
4. **Marketing unit:** To sale the produce manufactured in the above produce at domestic and national markets, equipped with refrigerated warehouses..... Dibrugarh, Jorhat and Guwahati
5. **Retail chain:** Retail shops to be constructed at urban places

### Mode of operation

The units will be established by the Govt. of Assam and subsequently leased out to local entrepreneurs. Products from packhouses and processing units will move to the marketing units and will be finally sold through the retail outlets.

### Budget

*Rs in crores*

Facilities	Nos.	Cost/unit	Total cost
Packhouse for Khasi mandarin	3	250.00	7.50
Packhouse for banana	7	250.00	17.50
Packhouse for pineapple	4	200.00	8.00
Packhouse for ginger/turmeric	5	200.00	10.00
Packhouse for vegetables	9	200.00	18.00
Packhouse for flowers	3	100.00	3.00
Cereal processing unit	6	200.00	12.00
Processing units for fruits and vegetables	5	300.00	15.00
Marketing unit	3	150.00	4.00
Retail outlets	50	10.00	5.00
<b>Total fund requirement</b>			<b>100.50</b>

## 5. Enhancing use-efficiency of natural resource including water

- ❑ This is planned to be achieved through the implementations of precision farming approaches encompassing GPS/RS data as well as grid analysis of soil samples.
- ❑ Together with the above, research on scaling up water productivity in the concept of crop per drop shall be undertaken while validating the current findings on this concept.
- ❑ As has been already indicated, the wetland areas of the state shall be used for watershed concept of water harvesting and integrated farming.
- ❑ Other concepts of water harvesting like digging of river, *Jalkund* concepts are highlighted above.

**Estimated fund requirement = Rs 100 crores**

## 6. Recharging of Ground Water

- ❑ According to the Central Ground Water Board, the total annual replenishable water recharge from rainfall and other sources in state is estimated to be 27.23BCM ,while the annual ground water availability is 24.89 BCM. The annual ground water draft is 5.44 BCM out of which 4.85 BCM is for irrigation. The overall stage of ground water development in Assam is 22 per cent.
- ❑ The source of irrigation in the state is mostly ground water minor. At present though the ground water potential in safe limit, growing demands of water for irrigation and other sectors necessitate thinking about the recharging of ground water. Recharging of ground water is normally to address the following 3 issues-
  - ❑ To enhance the sustainable yield in areas where over-development has depleted the aquifer,
  - ❑ Conservation and storage of excess surface water for future requirement and
  - ❑ To improve the quality of existing ground water through dilution.
- ❑ The artificial recharge of ground water is normally taken in following areas
  - ❑ Area where ground water levels are declining on regular basis,
  - ❑ Area where substantial amount of aquifer has already been de-saturated,
  - ❑ Area where availability of ground water is inadequate in lean months ,
  - ❑ Area where water quality is poor.
- ❑ A wide spectrum of techniques could be employed to recharge the ground water reservoirs. Some of the techniques that could be suitably employed in our area along with financial involvement are given in the following table-

### List of techniques to be adopted with estimated financial involvement

Name of techniques	Descriptions	Location suitability	Fund requirement (crores)
Checkdam- 100 nos @ Rs. 15 lakh/ checkdam	Constructed across small streams having gentle slope	Plain and Hills	15
Development of Spring, 100 nos @ Rs. 10 lakh/ spring	Upstream management for recharging of water	Hill	10
Small field Pond	Earlier there was traditional practice to excavate soil in paddy field at the depressed point	Plain preferably rainfed low land rice area	Covered under <i>jalkund</i> concept
Summer ploughing with Disc plough for 3 lakh ha @ Rs. 3585/ha	-	Plain	1
Construction of recharge pits, 10 Pits/ha with volume 1.2 m <sup>3</sup> @ Rs. 1200/ha for 1 lakh ha	Excavated into a permeable formation mostly employed in undulating topography	Hill	12
Suitable crop (eg. Agro-forestry system) for water conservation promoting ground water recharge	-	-	12
<b>Estimated fund requirement</b>			<b>Rs 50 crores</b>

### 7. Delivering the production, processing, storage inputs deliverables - an ongoing program

- a. Achieve fertilizer use efficiency and improve soil health. For fertilizer use efficiency, precision farming as indicated above is one of the best option and hence proposed.
  - ❑ This mode of increasing the efficiency of fertilizer will have to be done initially by agricultural experts for which their capacity building programme will be taken up (Estimated cost involved = **Rs 16 crores**).
  - ❑ Under precision farming itself, 17 soil quality parameters are tested based on which soil health card could be issued.
  - ❑ Pending, however, the adoption of precision farming model, soil testing stations under the agricultural departments as well as all the KVKs and research stations of AAU shall be strengthened with needed manpower, in a mission mode so as to issue a minimum 1 lakh 'Soil Health Cards' per annum. Issuance of soil health cards will facilitate promotion of site specific nutrient management practices with higher fertilizer use efficiency (Estimated cost involved = Rs 12 crore (running expenditure) + 2 crores (establishment of labs) = **Rs 14.5 crores**).
  - ❑ Considering lower nitrogen use efficiency and fixation of applied phosphorus that leads to only 30% - 40% use efficiency of fertilizer, organic mode of agriculture both under INM and complete organic (bio-fertilizer based) use shall be pursued.

**Estimated fund requirement = Rs (16 + 14.5) = 30 crores**

### 8. Re-orienting research and extension in the above directions Research

- Breeding for stress tolerant crop varieties

- Development of rice hybrids fitted to specific situations and uses
- Development of crop varieties with better water, soil and nutrient use efficiency
- Use of bio-technology and bioinformatics for development of crop varieties for specific situations and uses
- Package of practices for organic farming for different crops and animals together with bio-inputs
- Development of effective natural resource management modules
- Soil acidity, nutrition and crop care management module development
- Harvest and post-harvest value chain tightening module development
- Development of climate neutral/smart agricultural practices
- Plant/animal/fish health package development
- Validation and adoption of hydroponic/aeroponic including controlled environment technological packages for different crops, fodder and floriculture

**Estimated fund requirement = Rs 50 crores for 5 years**

### **Extension**

- ❑ Capacity building of community based groups and organizations for socio-economic-technological empowerment of farmers.
- ❑ Developing e-extension services for ready access to technology information and market trend through use of mobile solution, SMS services and establishing KIOSK, at KVKs.
- ❑ Showcasing of latest cost-effective production technologies in farmers' field in a hand holding manner.
- ❑ Field testing and validation of disaster management technologies for flood, drought, and erosion etc. in the context of climate change.
- ❑ Facilitation of convergence building among various technology percolating agencies to promote appropriate location specific technology.
- ❑ Creating awareness on Intellectual Property Rights (IPR), PPV & FRA and Biodiversity issues amongst the farmers.
- ❑ Enhancing farmers - scientist interface for enriching knowledge and integrating technologies in the farmer's conditions.
- ❑ Organizing the youth on the basis of their farm activities and promotion of integrated farming.
- ❑ Positioning KVKs as one-stop information and technology hub for the stakeholders

**Estimated fund requirement = Rs 25 crores for 5 years**

## **9. Plan for making credit availability to small and marginal farmers**

- ❑ The entire system of issuance of KCC shall be made transparent, easy and accessible only to the genuine agricultural farmers (bank-state government-university-farmers organization interface and decision).
- ❑ Tightening credit-repayment structure for ensuring bank health and farmers' involvement in benefitting from the system.
- ❑ Embracing PPP mode of food production with the support from NABARD.
- ❑ Promoting programmes for international funding support.
- ❑ Entering into pre-harvest payment mode agreement with the farmers and ensuring produce procurement

## 10. Market Intelligence

- Establishing at least one hub in each of 6 agroclimatic zones with needed ICT support and related facility including contractual manpower to gather and analyze market information and provide timely guidance to the farmer-producers on what to produce, when to produce, how much to produce, how, where and when to sell. One of the KVKs in each of the zones shall be identified to locate the market intelligence hub.

**Estimated fund requirement = Rs 8 lakh per anum per centre × 6 centres = Rs 48 lakh × 5 years = Rs 2.4 Crores**

## 11. Power

- Convergence building with Rural Electrification and MNREGA programme
- Putting in place solar pump device with related ancillary support initially @ 1 such unit in each of 206 blocks @ Rs 7.5 lakh each (for 4 HP) = Rs 15.45 crore.
- Installation of biogas plant with the per-urban dairy clusters in partnership with non-conventional energy resource department

**Total fund proposed = Rs (8985 + 3816.50 + 54.40 + 100.50 + 100 + 50 + 30 + 50 + 25 + 2.4 + 15.45) = Rs 13,198.50 crores + Rs 288.54 (for peri-urban project) = Rs 13,487 crores**

## 12. Expected output

- Two folds production enhancement in different crops, animal and fish commodities.
- Development department – University – Financing - Industry - farmers participatory model of achieving sustainable food production.
- Technology – policy integration for enhanced food production and employment scope there from in food production to consumption value chain.
- A highly competent and skilled agricultural work force to leverage the benefit from upcoming agri-related trade and business.
- Technology capsule for water harvesting, ground water recharging, soil health cards, quality seed and planting materials, food processing units, farm implements centres, channelized markets etc.

## 13. Expected Outcome

- Agriculture in business mode in Assam thus alluring the younger generation to this avocation for improved livelihood opportunity.
- Doing away with dependence for food on outside the region thus making the state self sufficient in food and also opening up within the region food trade first followed by national and trans- boundary food trade.
- Reducing poverty and hunger through agriculture centric avocation.
- Creating agri-related job opportunities thus addressing rural-urban migration.

**ANNEXURE**

**PERI-URBAN AGRICULTURE**

**PROJECT SUMMARY**

With the implementation of BGREI ( Bringing Green revolution to Eastern india), NFSM, technology Mission on Horticulture and RKVY etc, programs of Govt, Of India in the state of Assam and the hitherto untapped agricultural opportunities of the state in a mission mode manner addressing the production, processing, input provisioning etc. vulnerabilities as well as to preposition the state and its agrarian society to leverage the benefit from South East Asian Agri-trade and business, it is high time that competitiveness and capacities for enhanced and quality food production in the state is increased by way of facilitating the small holder producers of the state to have access to the farm production deliverables, putting in place in close proximity the processing, value addition and market facilities. One of the options to attempt this is to embrace peri-urban concept of farming so that the food produced have an easily accessible market, so that the youths are allured to this avocation and so that agriculture is pursued in a business mode for better livelihood opportunities. It is in this context that the present project has been prepared targeting initially two major cities of the state i.e Guwahati and Jorhat. Little about the two cities :

### **Targeted city 1: Guwahati**

#### **Introduction**

Guwahati, the capital city of Assam, is situated in the Kamrup (Metro) district of the state. It is one of the most densely populated cities in the state. The population of Guwahati city is 1,022,606, as per the 2011 census report. The city requires a huge amount of agricultural commodities in order to feed its million plus population. Most of the commodities are sourced from adjoining districts and from the adjoining state of Meghalaya, mostly for off season vegetables. A significant quantity of cereals and edible oils are also sourced from outside the region. The city is currently deficient in respect of all the food commodities considered in the present project. In addition, the demand for quality agricultural produce with little/no chemical residues is fast increasing. The present scenario further reveals the lack of proper regulatory measures and other infrastructure facilities for handling of commodities. The prices of agricultural commodities are often beyond the reach of the common people. Hence, implementation of this programme will ease out the problem to a great extent and ensure regular supply of fresh and quality food produces at affordable prices for the city consumers.

#### **Geography and climate**

Guwahati is located at latitude  $26^{\circ} 11' 0''$  N and longitude  $91^{\circ} 44' 0''$  E with an elevation of 55 m above mean sea level. The area is mostly plain with small hills here and there and in the boundary with Meghalaya. The river Brahmaputra flows through the city. The average annual rainfall (2001-2011) of the city is 1710.82 mm per year. The area around the city and in the peripheral districts which are to be included in the project have suitable land with loamy to sandy loam soil, rich in humus and organic matter.

#### **Land availability**

Abundant land in the peripheral districts of Kamrup (Rural), Nalbari, Darrang and Morigaon is available which waiting for a planned agricultural intervention. In fact Assam Agricultural University is already rendering advisory services to the farmers of these districts and is also involving them in participatory seed production program and hence utilizing their land for their purpose shall be an welcome gesture.

## **Activities, Strategy and Roadmap**

1. Continuous and uninterrupted supply of quality rice, edible oil, fruits, vegetables, milk, egg and fish for the growing urban population in order to meet the RDA.
2. Solve the fragmented land holding problem with formation of farmers' group for organised cultivation in compact clusters.
3. Encourage group activity in cultivation/production and marketing of identified commodities.
4. Production of quality agricultural produce with permitted residual levels.
5. Streamlining the marketing channel for creating a win-win situation for both producers and consumers.
6. Minimise handling and transportation losses, thereby increasing food availability.
7. Stabilise the prices of commodities.
8. Generation of employment avenues especially for the rural youth.

## **Strategy and Roadmap**

1. Survey of different agricultural commodities arriving in the city, their quality, price, types and places of production etc.
2. Survey of markets (vegetables, fruits, fish, cereals and edible oil) within the city.
3. Survey of potential areas of cultivation/production.
4. Promoting cluster approach in the identified areas.
5. Capacity building of farmers/farmer groups in different aspects of agricultural production and group management systems.
6. Formation of associations of vendors/retailers for regulation of supply chain.
7. Assist farmers for open/protected cultivation of high value crops.
8. Promoting the concept and practice of organic production.
9. Setting up handling and collection centres in identified locations wherever feasible/necessary.
10. Provisioning adequate infrastructure support for commodity transportation.
11. Ensuring market price uniformity.

## **Baseline survey**

Baseline survey will be taken up to identify the cultivating/producing clusters, both existing as well as potential. The extent of commodity supply chain to the identified city centres and to pinpoint constraints, if any, would also be assessed. It will also be undertaken to estimate the quantity of commodities coming from different places to the city. Tools and techniques proposed to be utilized during the baseline survey include PRA, RRA, Focus Group Discussions, Market survey, Questionnaires etc.

## **Capacity building and training of farmers**

Capacity building and training of farmers will be an integral part of the chain of activities to be undertaken. Farmers will be trained on the important aspects of quality commodity cultivation/production. Moreover, farmer groups involved in cultivation/production under the project would be exposed to different successful ventures in the region. Besides training farmers on technical aspects of commodity cultivation/production, they would also be trained on areas such as post harvest management, commodity marketing, FIG/CIG formation and management, project management etc.



## Area expansion (open and protected conditions)

Area expansion in open condition will be one of the major components in the whole chain of activities. Potential areas nearby and within 100 km from the city will be identified through the involvement of farmer groups identified under the project. Various locations in four districts, viz., Kamrup (rural), Nalbari, Darrang and Morigaon have been proposed under the project as per the Table below.

Protected cultivation is essential for production of various types of quality vegetables round the year. For the purpose, green house structure including medium to low cost poly houses, shade nets etc. will be provided to farmers for cultivation of high value and off season vegetables under protected condition.

Area expansion is proposed to be taken up in a phased manner over the project period of three years with an incremental expansion of 33% area per year.

### *Area selected from different districts around Guwahati city for the proposed project*

<b>Kamrup</b>	<b>Morigaon</b>	<b>Nalbari</b>	<b>Darrang</b>
<b>AGRICULTURE</b>			
Changsari	Gossarguri	Jagra	Pub Rongamati
Khetri	Bhurbandha	Tihu	Dumuni Chowki
Sualkuchi	RojaMayang	Bori	
Rongia	Jagi Bhagat Gaon	Adabari	
Rani	Jaluguti	Chatama	
Sonapur			
Goreswar			
Hajo			
<b>HORTICULTURE</b>			
Boko	Moirabari	Jagara	Kharupetia
Jajikona	Jagiroad	Tihu	Kopati
Tulsibari	Bhorigaon	Belsor	Bhokotpara
Bongsar	Gossarguri	Pokowa	
Singimari	Bhurbandha	Banekuchi	
Dharapur	Jagi Bhokot Gaon		
Sonapur	Jaluguti		
Khetri	Mikirbheta		
<b>LIVESTOCK &amp; POULTRY</b>			
Khanapara	Jaluguti	Dhamdhama	Dumunichowki
Chandrapur	Bhurbandha	Tihu	Pub Rongamati
Jharubari	Roja Mayang	Adabari	
Satpakhali	Jagiroad		
Rangamati			
Jiyakur No. 1			
<b>FISHERIES</b>			
Kukumara	Roja Mayang	Barbhag	Kopati
Bortari	Lahorighat	Mukalmua	Bhokotpara
Hajo	Gerua	Chamota	
Amranga	Bhurbandha	Kaithalkuchi	

## Post-harvest infrastructure and management

Post harvest management currently is one of the most neglected aspects in the marketing chain, resulting in heavy loss to the tune of 35-40% in respect of the highly perishable commodities.

Hence, proper collection, grading, sorting and storage facilities is proposed to be provided through the initiative project in identified locations to minimize post-harvest losses. Proper management practices will also be encouraged till it reaches the ultimate consumers. Hence, it is proposed to assist the farmers for construction of low cost zero energy cool chambers to store their produce at farm level, together with creating various ways and means for maintaining the cold chain activity till the produce reaches the consumers.

## Marketing infrastructure

The whole project will be a failure if the marketing aspect is not taken care of, as only good returns will motivate farmers to continue commodity cultivation/production on a large and sustainable scale. Hence, marketing infrastructure like improvement of existing market sheds construction of new market sheds, provision of ice-cooled vegetable trolleys, refrigerated vans and plastic crates for proper packing and transportation of vegetables from farmers' field to retail shops have been proposed as integral components under the project.

## Project management

For smooth implementation of the project and to meet the different expenditures like administrative expenses, field consultancy, project preparation, institutional strengthening, hiring of vehicles, purchase of computer hardware/software, hiring of experts/staff, action studies, monitoring and evaluating, publicity, mass media, video recording, seminars, conferences, meetings, workshops, exhibitions, *Kisan Melas*, contingencies, payment of TA/DA etc., fund has been earmarked under the project.

## Targeted city 2: Jorhat

### Introduction

**Jorhat** is the second largest city in the state of Assam. Jorhat today has grown into a thriving city with a strong sense of character and identity. It is the best laid out city in upper Assam with broad roads, cutting each other at right angles. Recent development of Jorhat has seen the rise of several high cost apartments and flats with people flocking in from all parts of the state. The total population of Jorhat district was 9.99 Lakh and Jorhat town was 1.7 lakh (2001 Census). Considering a 1.5% growth, the present population of Jorhat town stands at 2.2 Lakh. The food item requirement of Jorhat town is fulfilled by local production as well as supply from outside the districts. Table 1 shows the production and requirement of food items in the Jorhat district and the production of cereals, vegetables and fruits are in surplus. The same trend is also assumed for the Jorhat town. In case of cereals which is mainly rice, though the production is surplus, the current project will concentrate on quality rice like scented rice and glutinous rice which have a niche market in the town. In case of fruits, though the overall production is surplus, there is not enough production of fruits like, pineapple, Assam lemon etc which can be used for production of processed products. Similarly, in case of vegetables, emphasis will be given only in the production of high value crops.

**Table 1: Production and requirement of food items in Jorhat district.**

Item	Production	Requirement	Surplus/Deficit
1. Cereals (t)	271140	168079	(+)103061
2. Pulses (t)	3920	19542.03	(-)15622.03
3. Fruits (t)	136055	34179.50	(+)101875.50
4. Vegetables (t)	74020	54320.9	(+)19699.1
5. Meat (t)	1325.72	12,229	(-)10903.28
6. Milk ('000 l)	57700	73369	(-)15669
7. Egg (nos)	5100000	221120340	(-)216020340
8. Fish (t)	10468.68	12071.69	(-)1603.01

## Source: CDAP, Jorhat

The table reveals that the city is currently deficient in respect of most of the major food commodities. While the demand for quality agricultural produce with little/no chemical residues is fast increasing but there is definitely lack of proper regulatory measures and other infrastructure facilities for handling commodities in to the city.

## Geography and climate

Jorhat is located at latitude 26.75°N and longitude 94.22°E. It has an average elevation of 116 metres (381 ft). Jorhat city occupies around 69.64 sq KM and the area is mostly plain. The river Brahmaputra flows through the northern side of the city. Nestled amid the Brahmaputra is the world's largest river island Majuli. The island is famous for its crops like toria, pulses and vegetables Jorhat experiences moderate climate. The temperature varies between 9°C to 39°C. It receives rainfall on an average at 2244 mm with north-west monsoon contributing a major share.

## Land availability

Lot of suitable land for agriculture is available in and around the city. Peripheral areas like Majuli, Allengmora, Garumora, Teok, Boloma, Titabor etc. are the main hubs of agricultural production and the agricultural produces finds it way to the markets in the Jorhat city. Since the farmers are eager to join hands with the University for agricultural development initiatives, land availability for the proposed program shall not be a problem and the University shall take full responsibility to have the land for the purpose of this project..

## Strategy and Roadmap

### Activities

1. Continuous and uninterrupted supply of quality rice, edible oil, fruits, vegetables, milk, egg and fish for the growing urban population in order to meet the RDA.
2. Solve the fragmented land holding problem with formation of farmers' group for organised cultivation in compact clusters.
3. Encourage group activity in cultivation/production and marketing of identified commodities.
4. Production of quality agricultural produce with permitted residual levels.
5. Streamlining the marketing channel for creating a win-win situation for both producers and consumers.
6. Minimise handling and transportation losses, thereby increasing food availability.
7. Stabilise the prices of commodities.
8. Generation of employment avenues especially for the rural youth.

## Strategy and Roadmap

1. Survey of different agricultural commodities arriving in the city, their quality, price, types and places of production etc.
2. Survey of markets (vegetables, fruits, fish, cereals and edible oil) within the city.
3. Survey of potential areas of cultivation/production.
4. Promoting cluster approach in the identified areas.
5. Capacity building of farmers/farmer groups in different aspects of agricultural production and group management systems.

6. Formation of associations of vendors/retailers for regulation of supply chain.
7. Assist farmers for open/protected cultivation of high value crops.
8. Promoting the concept and practice of organic production.
9. Setting up handling and collection centres in identified locations wherever feasible/necessary.
10. Provisioning adequate infrastructure support for commodity transportation.
11. Ensuring market price uniformity.

## **Baseline survey**

Baseline survey will be taken up to identify the cultivating/producing clusters, both existing as well as potential. The extent of commodity supply chain to the identified city centres and to pinpoint constraints, if any, would also be assessed. It will also be undertaken to estimate the quantity of commodities coming from different places to the city. Tools and techniques proposed to be utilized during the baseline survey include PRA, RRA, Focus Group Discussions, Market survey, Questionnaires etc.

## **Capacity building and training of farmers**

Capacity building and training of farmers will be an integral part of the chain of activities to be undertaken. Farmers will be trained on the important aspects of quality commodity cultivation/production. Moreover, farmer groups involved in cultivation/production under the project would be exposed to different successful ventures in the region. Besides training farmers on technical aspects of commodity cultivation/production, they would also be trained on areas such as post harvest management, commodity marketing, FIG/CIG formation and management, project management etc.

## **Area expansion (open and protected conditions)**

Area expansion in open condition will be one of the major components in the whole chain of activities. Potential areas nearby and within 20-30 km from the city will be identified through the involvement of farmer groups identified under the project. Various locations in the districts, viz., Majuli, Titabor, Teok, Morioni etc have been proposed under the project as per the Table below.

### *Area selected from different areas around Jorhat city for the proposed programme*

<b>Sl. No</b>	<b>Crop/enterprise</b>	<b>Area selected</b>
1	Rice	Titabar Borhola
2	Oilseed	Majuli
3	Pulse	Majuli
4	Horticulture ( Fruit)	Mariany, Teok
5	Vegetables	Alengmora, Majuli , Teok
6	Fish	Garumora, Tilikiaam Janji
7	layers	Teok, Hatigarh, Hatichungi
8	Goat	Kaliapani, Hanchara, Majuli, Teok
9	Duck	Titabar, Mariani

Protected cultivation is essential for production of various types of quality vegetables round the year. For the purpose, green house structure including medium to low cost poly houses, shade nets etc. will be provided to farmers for cultivation of high value and off season vegetables under protected condition.

Area expansion is proposed to be taken up in a phased manner over the project period of five years with an incremental expansion of 20% area per year.

### **Post-harvest infrastructure and management**

Post harvest management currently is one of the most neglected aspects in the marketing chain, resulting in heavy loss to the tune of 35-40% in respect of the highly perishable commodities. Hence, proper collection, grading, sorting and storage facilities are proposed to be provided through the project in identified locations to minimize post-harvest losses. Proper management practices will also be encouraged till it reaches the ultimate consumers. Hence, it is proposed to assist the farmers for construction of low cost zero energy cool chambers to store their produce at farm level, together with creating various ways and means for maintaining the cold chain activity till the produce reaches the consumers.

### **Marketing infrastructure**

The whole project will be a failure if the marketing aspect is not taken care of, as only good returns will motivate farmers to continue commodity cultivation/production on a large and sustainable scale. Hence, marketing infrastructure like improvement of existing market sheds, construction of new market sheds, provision of ice-cooled vegetable trolleys, refrigerated vans, goods van and plastic crates for proper packing and transportation of vegetables, fish, eggs etc from farmers' field to retail shops have been proposed as integral components under the project.

### **Project management**

For smooth implementation of the project and to meet the different expenditures like administrative expenses, field consultancy, project preparation, institutional strengthening, hiring of vehicles, purchase of computer hardware/software, hiring of experts/staff, action studies, monitoring and evaluating, publicity, mass media, video recording, seminars, conferences, meetings, workshops, exhibitions, *Kisan Melas*, contingencies, payment of TA/DA etc., a fund outlay has been proposed under the project.

## **THE PROJECT**

### **Rationale**

Food production sites are normally far away from the consumption sites with the resultant 'problem of plenty' at production site and the 'problem of scanty' at the consumption site not to mention about the food quality and quantity loss during transportation from plenty to scanty sites. Food storage and marketing are yet other issues to be addressed the problem of which has aggravated owing to the increase in the number of the small holder food producers. One answer to all these problems appears to be the Peri-Urban and urban concepts of food production which is gaining increased recognition globally because it utilizes local resources in the concept of green agriculture, and also promotes agriculture centric business avenues for local youths through different off farm activities from input production and supply to processing, packaging and marketing of the produce and hence is the proposal.

### **Objectives**

The project is proposed to be taken up with the following specific objectives:

1. Facilitating planned agricultural production (crops, vegetables, fish, eggs and milk) for a market led economy from production to consumption capitalizing on the hidden potentialities of the state to increase food production 3-4 folds with technology injection and service (input and output ) delivery from infrastructure to marketing.
2. Explore public- public and later on a public - private mode of doing 21st century agriculture addressing the stresses right from natural resources, abiotic and social / farmers stresses by providing door step support along the production to consumption value chain.

### **Target**

To produce 30% of total food entering from outside the state into the cities of Guwahati and Jorhat in the first year, 70% in 2<sup>nd</sup> year and 99% in 3<sup>rd</sup> year of the project utilizing the peri-urban areas surrounding the two cities.

The project initially will be taken up in two major cities of Assam viz. Guwahati and Jorhat, having a population of 10 lakh and 2 lakh respectively. The production centres around both these cities have the required potentiality to feed the urban population if due infrastructure and minimum support in terms of seeds, fertilizers, irrigation and technology are provided to these production centre.

### **Approach**

Based on the carrying capacities and suitability of land for crop of choices, activities will be undertaken in identified villages/cluster of villages through Krishi Vigyan Kendras (KVKs) of the University and Extension Functionaries (EF) of line Departments. Suitable Pockets will be identified for different products based on potentiality and other available ancillary facilities. Contract Farming approach shall be adopted to produce the required food items including the strategic production inputs like seed, bio-fertilize etc. The project aims at formation of primary and terminal markets at various delivery points of the identified urban areas. Based on the requirement, separate SHGs for input backstopping, production facilitation, storage and marketing shall be formed to ensure effective backward and forward linkages. Special focus will be given on production of high value food to capture elite consumers.

### **Pre-Requisite**

There will be some essential requirements for initiating the project in both the cities identified. These are:

- Availability of quality seeds and planting materials (Action: AAU, Agri-Horti Deptt.)
- Irrigation facilities- shallow tube well, drip and sprinkler irrigation (Action: Convergence with Irrigation Deptt.)

- Technology support for high-tech production system (Action: AAU)
- Selection of high value and low volume vegetable crops for production like broccoli, Chinese cabbage, capsicum, baby corn, tomato, leafy vegetables, root vegetables, peas, beans etc. (Action: AAU and Agri-Horti Deptt.)
- Proper harvesting, cleaning, grading and packaging of the produce (Action: AAU, State Deptt.)
- Planned production- to avoid market glut, market networks and transportation facilities' (Action: KVKs and EF)
- Infrastructure facilities like pre-cooling units cold storage, refrigerated transport system, packing houses etc. in production sites (Under the Project)
- Agro processing facilities as stand by to utilize surplus production (Under the Project)
- Capacity building for farmers and other stake holders (Action: KVKs)
- Farm machineries to support the production system (Action: AAU and State Deptt.)
- Need based road and transport facilities (Convergence with PWD)
- Market information and market intelligence support (Action: State Marketing Board and KVK)
- Credit linkage to support the production system. (NABARD)

## Methodology

### First Year

Based on the 33% requirement of food items (Rice, pulses, oilseed, milk and egg initially) by the population of Guwahati and Jorhat, KVK Kamrup and Jorhat, together with line department officials shall do the following:

- a. Identify suitable areas around the two cities and also the *mitra* (friendly) farmers so that the select and targeted commodities could be produced with farmers' involvement and in their land.
- b. Training programme on the select crop production shall be arranged together with building the needed infrastructure i.e. primary processing centre, computer centre, farm infrastructure, input production units including animal shed/fish pond etc.
- c. Quality input shall be provisioned as per the need of the product and size of operational holding.
- d. Small/ medium and large farm implements and machineries shall be arranged depending on operational holding, size to be used on custom hiring basis.
- e. A core team shall be formed for each commodity/ area (eg. Rice team, milk team) with the village headman as one of the members. The team shall consist of KVK staff, Agri-Horti-animal-fisheries Extension functionaries.
- f. Unit wise bank account shall be opened and fund placed under the disposal of the team.
- g. The team will facilitate formation of SHGs for different operations.
- h. Primary market outlet with proper storage facilities shall be established to assist the farmers' sale their products on cash payments.
- i. Provision for auto van shall also be made for linking the stored produce to the terminal markets in the two cities.
- j. Net profit earned through the sale shall be deposited in Bank to be reploughed after the project period.

- k. Problem solving and innovative methods of production and marketing shall be continuously evolved to make the production-consumption chain full proof.

## Second year

Based on the performance, operational area shall be extended to produce 66% of horizontal spread of the project benefit.

## Third year

Operational area shall be extended so that 99% of food requirement in the two cities is produced locally.

## CITY -WISE ACTIVITIES

### A : Greater Guwahati, Assam

- Estimated Population (as per Census 2011): 10 lakh Approx.
- Catchment Area: Peripheral districts of greater Guwahati (Kamrup, Nalbari, Darrang, Morigaon)
- Identified Feeder partners - district wise (Based on information from State Agriculture Department and KVKs)
  - Kamrup (Agriculture 8, Horticulture 8, Livestock 6 and Fisheries 4 units)
  - Morigaon (Agriculture 5, Horticulture 8, 4 and Fisheries 4 units)
  - Nalbari (Agriculture 5, Horticulture 5, Livestock 3 and Fisheries 4units)
  - Darrang (Agriculture 2, Horticulture 3, Livestock 2 and Fisheries 2 units)
- Prioritized Commodities: Rice, Rapeseed & Mustard, Pulses, Fruits (Banana, Pineapple, Mandarin Orange and Assam lemon), Vegetables (Major *Kharif & Rabi* vegetables), Milk, Egg and Fish
- Basis for estimation of commodity requirement: RDA as per ICMR recommendation

### B: Jorhat City

- Target city: Jorhat, Assam
- Estimated population: 02 lakhs
- Catchment area: Peripheral blocks of Jorhat district
- Feeder locations: Jorhat subdivision including majuli, Teok subdivision and Titabar subdivision
- Prioritized commodities: Rice, Rapeseed, Fruits(Banana, Pinapple, Assam lemon), Vegetables and spices ( Onion, Potato, Garlic, Capsicum, Tomato, Ginger Termeric) , milk, meat, Egg, and fish.

## The Food Scenario in the two cities

### A. Guwahati City

Sl No	Commodity	Availability	Requirement / year	Deficit
1	Rice	49426 MT	134370 MT	84944 MT
2	Rapeseed/ mustard	62 MT	9564 MT	9502 MT
3	Fruits	28515 MT	29860 MT	1345 MT
4	Vegetables	48960 MT	89580 MT	40620 MT
5	Milk	51749398 LT	89580307 LT	37830909 LT
6	Meat	1840 MT	8958 MT	7118 MT
7	Egg	29303204 Nos	147255300 Nos	117952096 Nos



**B. Jorhat City**

Item	Production	Requirement	Surplus/Deficit
1. Cereals (t)	271140	168079	(+)103061
2. Pulses (t)	3920	19542.03	(-)15622.03
3. Fruits (t)	136055	34179.50	(+)101875.50
4. Vegetables (t)	74020	54320.9	(+)19699.1
5. Meat (t)	1325.72	12,229	(-)10903.28

**SELECTED PERI-URBAN AREAS****A. Guwahati**

Kamrup	Morigaon	Nalbari	Darrang
<b>AGRICULTURE</b>			
Changsari	Gossarguri	Jagra	Pub Rongamati
Khetri	Bhurbandha	Tihu	Dumuni Chowki
Sualkuchi	RojaMayang	Bori	
Rongia	Jagi Bhagat Gaon	Adabari	
Rani	Jaluguti	Satama	
Sonapur			
Goreswar			
Hajo			
<b>HORTICULTURE</b>			
Boko	Moirabari	Jagra	Kharupetia
Jajikona	Jagiroad	Tihu	Kopati
Tulsibari	Bhorigaon	Belsar	Bhokotpara
Bongsar	Gossarguri	Pokowa	
Singimari	Bhurbandha	Banekuchi	
Dharapur	Jagi Bhokot Gaon		
Sonapur	Jaluguti		
Khetri	Mikirbheta		
<b>LIVESTOCK &amp; POULTRY</b>			
Khanapara	Jaluguti	Domdoma	Dumunichowki
Chandrapur	Bhurbandha	Tihu	Pub Rongamati
Jharubari	Roja Mayang	Adabari	
Satpakhali	Jagiroad		
Rangamati			
Jiyakur No. 1			
<b>FISHERIES</b>			
Kukumara	Roja Mayang	Borbhag	Kopati
Bortari	Lahorighat	Mukalmua	Bhokotpara
Hajo	Gerua	Chamota	
Amranga	Bhurbandha	Kaithalkuchi	

### B. Jorhat City

Sl. No	Crop/enterprise	Area selected
1	Rice	Titabar, Borhola
2	Oilseed	Majuli
3	Pulse	Majuli
4	Horticulture ( Fruit)	Mariani, Teok
5	Vegetables	Alengmora, Majuli , Teok
6	Fish	Garumora, Tilikiaam, Janji
7	Broiler	Teok, Hatigarh, Hatichungi
8	Goat	Kaliapani, Hanchara, Majuli, Teok
9	Duck	Titabar, Mariani

### ESTIMATED BUDGET REQUIREMENT

#### For Guwahati City

Rs. in Lakh

Sl. No.	Item	Year I	Year II	Year III	Total
1	Baseline Survey (Status Appraisal and Benchmarking)	15.00	15.00	--	30.00
2	Promotion of Farmers Association/ Groups	15.00	15.00	15.00	45.00
3	Capacity building/ Training of Farmers including Exposure Visits etc. (e-village community hall)	200.00	200.00	200.00	600.00
4	Seed/Breed/Fish Seed/ Planting Material (Seed/Milk village approach)	500.00	500.00	500.00	1500.00
5	Seed/Breed/Fish Seed/ Planting Material Infrastructure (Certified Seed Production, High Tech Nurseries, Facilities for Handling, Processing, Packing, Storage, Artificial Insemination etc.)	400.00	400.00	400.00	1200.00
6	Area Expansion (Open Condition) including Mechanization and Irrigation Support, Fodder Cultivation, Composite Fish Culture	--	300.00	500.00	800.00
7	Area Expansion (Protected Condition: Medium cost greenhouse, Naturally ventilated polyhouse and Shade net house)	250.00	300.00	500.00	1050.00
8	Promotion of INM/IPM (Setting up of Village Bio-input Production Units)	75.00	75.00	75.00	225.00
9	Organic Farming with Certification (Cultivation cost, Participatory Guarantee System for organic certification of produce for local market)	200.00	250.00	400.00	850.00
10	Post harvest Infrastructure and Management (Pack house, Pre cooling Unit, Mobile Pre cooling Unit, Cold storage Unit, Primary Processing Unit, Zero Energy Cool Chamber, Milk Chilling Unit)	300.00	500.00	800.00	1600.00

11	Marketing Infrastructure (Collection/Aggregation Centres at Production Cluster, Retail Markets/ Outlets, Motorized/Static Vending Cart, Market shed, Weigh Bridge, AC Refer van, Cold chain)	200.00	200.00	200.00	600.00
12	Management Support System (Manpower, Logistics, Monitoring, Evaluation, Reporting)	25.00	30.00	35.00	90.00
13	Poultry shed for 1 lakh birds X 6 units	1000.00	1500.00	2500.00	5000.00
14	Cattle shed for 100 cows X 15 sheds	400.00	600.00	612.00	1612.00
15	Goat sheds for 100 goats X 10 units	200.00	300.00	200.00	700.00
16	Milk chilling plants X 4 units	--	300.00	400.00	700.00
17	Custom hiring center for farm implements	500.00	500.00	300.00	1300.00
18	Fish ponds, 500 ha @Rs.8.0 lakh/ ha	500.00	1500.00	2000.00	4000.00
19	Miscellaneous like pol/ vehicle hiring/ consultancy/ contractual persons/ stationeries etc.	75.00	150.00	200.00	425.00
	<b>Total -A</b>				<b>22127.00</b>

**For Jorhat City****Rs. In Lakh**

Sl. No.	Item/Activities	Year I	Year II	Year III	Total
1	Baseline Survey (Status Appraisal and Benchmarking)	5.00	5.00	5.00	15.00
2	Promotion of Farmers Association/ Groups	15.00	15.00	15.00	45.00
3	Capacity building/ Training of Farmers including Exposure Visits etc. (e-village community hall)	100.00	100.00	100.00	300.00
4	Seed/Breed/Fish Seed/ Planting Material (Seed/Milk village approach)	200.00	200.00	200.00	600.00
5	Seed/Breed/Fish Seed/ Planting Material Infrastructure (Certified Seed Production, High Tech Nurseries, Facilities for Handling, Processing, Packing, Storage, Artificial Insemination etc.)	150.00	150.00	150.00	450.00
6	Area Expansion (Open Condition) including Mechanization and Irrigation Support, Fodder Cultivation, Composite Fish Culture	200.00	200.00	200.00	600.00
7	Area Expansion (Protected Condition: Medium cost greenhouse, Naturally ventilated polyhouse and Shade net house)	50.00	50.00	50.00	150.00
8	Promotion of INM/IPM (Setting up of Village Bio-input Production Units)	40.00	30.00	30.00	100.00
9	Organic Farming with Certification (Cultivation cost, Participatory Guarantee System for organic certification of produce for local market)	50.00	50.00	25.00	125.00
10	Post harvest Infrastructure and Management (Pack house, Pre cooling Unit, Mobile Pre cooling Unit, Cold	150.00	150.00	100.00	400.00

	storage Unit, Primary Processing Unit, Zero Energy Cool Chamber, Milk Chilling Unit)				
11	Marketing Infrastructure (Collection/Aggregation Centres at Production Cluster, Retail Markets/ Outlets, Motorized/Static Vending Cart, Market shed, Weigh Bridge, AC Refer van, Cold chain)	100.00	100.00	50.00	250.00
12	Management Support System (Manpower, Logistics, Monitoring, Evaluation, Reporting)	15.00	15.00	10.00	40.00
13	Fish ponds, 50 ha @Rs.8.0 lakh/ ha	50.00	150.00	200.00	400.00
14	Poultry shed for 0.5 lakh birds X 4 units	500.00	500.00	625.00	1625.00
15	Cattle shed for 50 cows X 10 sheds	230.00	200.00	100.00	530.00
16	Goat sheds for 100 goats X 5 units	100.00	100.00	105.00	305.00
17	Milk chilling plants X 2 units	100.00	92.00	--	192.00
18	Custom hiring center for farm implements	150.00	100.00	150.00	400.00
19	As under A above	25.00	75.00	100.00	200.00
<b>Total - B</b>					<b>6727.00</b>

#### **Total Cost projection for two cities**

**A) = Rs. 22127.00 lakhs**

**B) = Rs. 6727.00**

**Grand Total = Rs. 28854.00 lakh**

#### **Expected outcome**

- A systematic chain of food production model to attract both "On and Off" farm activities.
- Development of competitiveness of producer-growers-processors-marketers to capitalize on the upcoming 'Act-East' policy trade related to agriculture and allied sector.
- Agriculture in business mode in this part of the country attracting youth to agriculture.
- Food and nutritional security and contribution of food to national food basket.
- An agricultural revolution in Assam