

1. Introduction

Horticulture being one of the most potential sector for economic development of the state , generation of employment and sustainable management of bio-resources, each segments of its development covering research, production & productivity , post harvest care and management, marketing and processing have to be adequately addressed for bringing desirable change in 12th five year plan. With the rapid change in technology inputs, growing demand for fruits, nuts, vegetables, spices and flowers, special market for regionally differentiated niche products, increasing opportunities for export of few crops and availability of additional area under FRA , the scope had actually increased for increasing production and productivity, maximizing economic benefits, developing infrastructure for post harvest care, management and processing and providing skilful employment to horticultural entrepreneurs.

2. Trend in growth

There have been significant improvements over the years especially in terms of area expansion of different crops, respective production volumes and in adoption of modern technologies. A linear growth trend in production of major components of horticulture i.e. fruits, vegetables and spices in the last two five year plans , can be well derived from the table indicating average annual growth rate of production of these crops during 10th and 11th Plan.

| Crop | 10 th Plan | 11 th Plan | 12 th Plan (Projected) |
|------------|-----------------------|-----------------------|-----------------------------------|
| Fruits (%) | 3.50 | 5.20 | 8.20 |
| Veg. (%) | 6.80 | 5.75 | 8.75 |
| Spices (%) | 1.52 | 6.50 | 7.70 |

Keeping these growth rates in view, and probable availability of resources, the annual targets of production and corresponding growth rates of fruits, vegetables and spices have been fixed for 12th five year plan.

3. Perspective Plan – Major achievements and shortfalls

A ten year “ Perspective Plan for Development of Horticulture “ (2002-2012) was adopted with target for bringing additional 21,807 Ha under cultivation , in addition to existing 71,953 Ha with necessary interventions for production of 6.05 lakh MT

fruits, 4.38 lakh MT vegetables, 1.14 lakh MT Potato, 0.22 lakh MT nuts, 0.20 lakh MT spices and 0.01 lakh MT flowers. The achievements made till 2010-11, as shown in the table below indicates a marginal shortage in achieving the targets of vegetables, potato, spices and flower which are expected to be fulfilled by the end of terminal year i.e. 2011-12

| Sl. No | Component | Status during base year (2001-02) | Target for terminal year (2011-12) | Production during 2010-11 (Provisional) | Excess/ Short fall |
|--------|--------------|-----------------------------------|------------------------------------|---|--------------------|
| 1 | Fruit crops | 3.00 | 6.05 | 6.36 | + 0.31 |
| 2 | Plant. crops | 0.09 | 0.22 | 0.23 | + 0.01 |
| 3 | Spices | 0.17 | 0.20 | 0.18 | - 0.02 |
| 4 | Vegetables | 2.25 | 4.38 | 3.74 | - 0.64 |
| 5 | Potato | 1.11 | 1.14 | 1.09 | - 0.05 |
| 6 | Flower | - | 0.01 | 0.009 | - 0.001 |
| | Total | 6.62 | 12.00 | 11.609 | - 0.391 |

Major Achievements of the perspective Plan include (i) increase in production and productivity of most of the selected crops and adoption of cluster approach in cultivation of fruits and plantation crops (ii) Introduction and rapid expansion of areas under “Amrapalli” mango, expansion of areas under “Sabri” & Grande Naine” variety of Banana (iii) Off-season cultivation of Cabbage, Cauliflower and Tomato (iv) introduction of exotic vegetables like, Capsicum, Carrot, Squash, Beet-root, Red Cabbage etc. (v) production of certified vegetable seeds of Bhindi, Radish, Chilli, Brinjal, Cauliflower and Cabbage (vi) commercial cultivation of flower (vii) establishment of 47 multi-crop nursery in private sector (viii) cultivation of hybrid vegetables in about 42% vegetable area (ix) primary mechanization through distribution of power tillers, sprayers, pump sets and other power operated machines & (x) promotion of SHGs for home scale processing of horticultural produces.

Shortfalls experienced in realizing few goals of the Perspective Plan include the following

- (i) **Less availability of quality seeds and planting materials:** In spite of establishment of a good number of private nurseries, most have not reached the stage of supplying required seeds and planting materials. In some blocks, especially in Dhalai and North district few more nurseries are to be established at private sector to meet the demand of the district.
- (ii) **Lower productivity of fruits:** This is mainly because of low surviving density of plants in the first year in absence of proper watering arrangements during dry season coupled with very less care, maintenance and fertilization by the growers.
- (iii) **Unstable supply of vegetables:** In the given seasonal opportunity, vegetables are mostly cultivated during summer & winter without any staggering arrangements for extending harvests during the lean period from May to August.
- (iv) **Less area expansion of potato:** This is mainly because of non availability of assured irrigation facilities, certified seed tubers, fertilizers and credits.
- (v) **Lack of proper knowledge of farmers of modern production techniques, post harvest handling and marketing practices:** Extension delivery system at grass root has been very much inadequate.
- (vi) **Absence of farm gate infrastructure for reducing losses:** There has been a significant quantum of loss in total produce of crops at farm gate itself for want of proper facilities for cleaning, sorting, grading, packing and temporary storage.
- (vii) **No insurance coverage of crops other than Potato:** This has been largely due to non availability of necessary statistical data of all horticultural crops in the state for last ten years. Strengthening of horticultural statistics is therefore very much necessary for extending benefits of insurance to all small and marginal growers.

Thus, experience of implementation of the “**Perspective Plan for Development of Horticulture in Tripura (2002-2012)**” has guided well in short listing sector specific initiatives/priorities necessary for further improvements in fruits, vegetables, plantation crops, flowers, spices, & related general areas to incentivize investment and to supplement income generation for beneficiaries in the twelfth five year plan (2012-2017).

4. SWOT Analysis : The existing farming systems were analyzed in a comparative manner and the gaps were identified for each sector separately and keeping in view the trends of SWOT analysis, proposals made for consideration in the 12th five year plan.

Strength

- Favourable climate for production of different quality fruit (especially mango, litchi, citrus, ber, pineapple, drumstick, papaya, cashew nut, jackfruit) and vegetable crops.
- Good road connectivity.
- Homestead farming accommodating many horticultural crops.

Weaknesses

- Lack of reliable data-base of horticultural crops.
- Lesser availability of quality seeds and planting materials in time.
- Non-availability of sufficient Labour, especially at crucial stage .
- Lack of proper knowledge of farmers of modern production techniques, post harvest handling and marketing practices.
- Lack of farm gate infrastructure for reducing losses.
- High transportation cost.
- No insurance coverage of crops other than potato.

Opportunities

- Growing marketing opportunities for fresh & processed fruits/vegetables to the regional and international markets.

- Increasing urbanization and changing food habits with preferences towards fruits and vegetables and agro products.
- Availability of additional area under FRA.
- Scope for organic farming.
- Wasteland and undulating land suitable for horticulture can be brought under mixed orchard.
- Development of water harvesting systems and extending micro-irrigation facilities.

Threats

- Inefficient and less transparent marketing with monopoly of traders and multiple level of intermediation.
- Weaker post harvest management, marketing facilities like cold storages / chains, pre-cooling and waxing centres.
- Wide fluctuation in prices.
- Increased incidence of pests and diseases.

5. Vision for 12th Plan :

- (i) Harnessing potential of horticulture in the state by increasing production and productivity of horticultural crops
- (ii) Maximizing; economic, ecological and social benefits; through desirable diversification.
- (iii) Developing additional infrastructure for production of planting material, storage and marketing of horticultural produce.
- (iv) Providing skillful employment in the state.

6. Plan Strategy :

The Plan strategies are as follows

- i. Bringing more area under Fruits, Plantation crops, Vegetables, Potato & Spices in normal as well FRA areas.
- ii. Bringing more area under high density planting with Pineapple, Guava, Litchi, lemon & Mango.
- iii. Supplying good quality planting materials/ propagating units and all technology inputs e.g. ICM, INM, etc.

- iv. Enhancing productivity, profitability & sustainability through rejuvenation of old unproductive orchards.
- v. Giving emphasis on minor fruit crops like, Bael, Jackfruit, Ber, Tamarind, Carambola, Olive, Blackberry, Lotkon, Hog plum, Custard apple & Karonda.
- vi. Giving emphasis on indigenous vegetables like Tree bean, Country bean, Moringa, Bitter Gourd, Ridge Gourd, Spine Gourd & some tropical tuber crops.
- vii. Introducing new fruit crops like Strawberry & Grapes; vegetables like Broccoli, Gherkin, Capsicum and spices crops like Onion & Garlic.
- viii. Promoting commercial cultivation of high value flowers & ornamental foliage.
- ix. Encouraging adoption of GAP and Organic Farming under certification arrangements for selected crops.
- x. Increasing productivity of fruits & vegetable crops through micro irrigation arrangements i.e. through installation of Drip & Sprinkler systems.
- xi. Enhancing productivity of labour through farm mechanization with effective tools & implements.
- xii. Following a strong HRD programme for quick dissemination and adoption of related technologies.
- xiii. Creating common infrastructure at Farm Gate of production clusters for reducing post harvest losses.
- xiv. Developing market infrastructure & proper linkage with the growers.
- xv. Strengthening horticultural statistics and bringing all crops under insurance coverage.

7. Interventions : The specific interventions considered for bringing desired level of production and productivity of most of the selected crops during 12th Five year Plan are the following ,

- Area expansion of perennial fruits in 4,350 Ha, semi perennial fruits in 21,290 Ha & minor fruits in 100 Ha areas.
- Area expansion of plantation crops in 2945 Ha
- Maintenance of 10,000 Ha existing garden of fruits and plantation crops.
- Additional coverage of 5100 Ha summer & 2400 Ha winter vegetables.
- Area expansion of Potato in 1,000 Ha.
- Area expansion of spices in 500 Ha and additional 500 Ha in each year from 2nd year onwards in FRA area as intercrop.
- Replacing 33% potato seeds with TPS Tuberlets to ensure 30 kg table potato per capita availability per annum by 2016-17.
- Promoting cultivation of minor fruits in 100 Ha areas.
- Promoting cultivation of indigenous vegetables in 500 Ha areas.

- Production of HYV vegetable seeds in 125 Ha area under RGP for covering 2000 Ha vegetable area.
- Commercial cultivation of remunerative flowers and ornamental foliage in 250 Ha area.
- Creating 500 nos. water harvesting structures for enhancing irrigation facilities.
- Bringing 2500 Ha under micro irrigation facilities in upland areas.
- Bringing 1000 Ha area of fruits, spices and other minor crops under organic farming.
- Bringing 1000 Ha area under GAP certification arrangements.
- Creating more vermicompost units for additional production of 1.00 lakh MT compost.
- Farm mechanization through distribution of 1000 nos power operated tools & implements.
- Capacity building on latest production technologies through training of 50,000 farmers, 200 trainers and arranging exposure visits of 2000 farmers to areas of horticultural repute in India.
- Creating cluster wise common infrastructure facilities at rural collection centers – 20 nos.
- Development of infrastructures for whole sale market 5 nos and rural primary market 25 nos.
- Organizing market extension, quality awareness and market – led extension activities for fresh products – 30 nos.

8. Research and Development :

- There will be more concentration on technology generation / assessment/ refinement, appropriate to the state, keeping in view the specific agro-climatic and socio –economic conditions. Also, emphasis will be on effective transfer and dissemination of production technologies available in other parts of the country and abroad.
- Horticultural Research Centre (HRC), Nagicherra, in association with ICAR, State centre and other research institutes / organizations in public and private sectors having capability in this area, will be partners in research programmes. Field experience of growers will be drawn upon to shape and design necessary interventions.
- Supply of Nucleus/Basic Seed and planting Material for horticultural crops : For the production of required quantity of breeder/foundation seed and planting material of selected horticultural crops, support has to be provided in terms of technology and skill up-gradation. Nucleus planting material and breeder/ foundation seed will be provided along with guidance for large scale production.
- Technology refinement, on-farm trials on farmers' field and imparting training to extension functionaries: The technologies identified and standardized for

the horticulture production in the state will have to be popularized through field testing and by providing wider awareness among the farmers. For this, training of the trainers will be required, who can carry on demonstrations on the farmers' field for effective technology transfer and refinement. Similarly, for the improved production technologies and spread of improved cultivars and their production practices, training will have to be imparted to the extension functionaries. HRC, Nagicherra, ICAR, State centre and other research institutes will organize training of group of farmers, as per the needs and also test the proven technologies as per the agro-climatic conditions through farmers' participation.

- HRC, Nagicherra shall identify the technological needs and provide support, accordingly, including acquisition of technologies/seed and planting material from outside.

Financial Involvement

Research & Development

(Rs. in lakh)

| Sl no | Item | Year | | | | | Total |
|-------|---|--------|--------|--------|--------|--------|--------|
| | | 1st | 2nd | 3rd | 4th | 5th | |
| 1 | Research activities- technology generation/ assessment/ refinement, On Farm Trials & Imparting training to extension functionaries etc. | 30.000 | 34.500 | 39.675 | 42.625 | 53.200 | 200.00 |

9. Production & Productivity

9.1 Fruit Sector:

- The plan will specially focus on increasing both production and productivity through adoption of improved and appropriate technologies for ensuring quality, including genetic up-gradation of all and addressing challenges of climate change. Special emphasis will be given on adoption

of area based cluster approach for developing regionally differentiated crops. Availability of good quality planting material being central to development of horticulture, will receive focused attention and efforts will

- be made to create necessary infrastructure in the form of nurseries with strict regulation of quality under proper legislation (i.e. through enactment of a Nursery Act) and up-gradation of existing tissue culture unit, which will be supplemented with plantation development programmes through addition of new areas under improved varieties to meet market demand.
- To ensure proper nursery management activities, mandatory basic infrastructures specified include (i) proper fencing, (ii) establishment and maintenance of mother/ scion block for multiplication of planting material (iii) Raising seedling rootstock for mass multiplication of planting material (iv) creation of infrastructure facilities (greenhouse/ net house/micro irrigation, etc. for year round multiplication of planting material (v) pump house to provide sufficient irrigation to the plants and water storage tank to meet at least 2 days requirement (vi) soil sterilization / solarization system. Assurances will be there for setting up of a nursery having a minimum area of 1 ha and maximum area of 4 ha. Nursery of size of 1 ha will be classified as small nursery and beyond that will be classified as large nursery. Each nursery will be required to produce a minimum number of 50,000 plants per ha per year of the mandated perennial fruit plant/ tree species/plantation crop through vegetative propagation each year.
- **Establishment of Progeny and Herbal Gardens (PHGs)** for conservation of the traditional fruit etc. plants will be encouraged among the NGOs and private sector with an assistance of 50% of the total cost of the garden subject to a maximum financial limit.
- **Replacement/Rejuvenation of Senile Plantations:** low productivity of fruit/plantation crops, is primarily due to preponderance of old and senile trees and poor management of orchards. Old and dense orchard is generally characterized by intermingling, overcrowding and insect and disease infested branches with more of wood mass and canopy of unhealthy thin shoots, which are quite unfavorable for bearing optimum quality crop. In the present plan, provision is kept for taking up

productivity improvement programmes through rejuvenation of senile plantations/top working/ re-plantation with fresh stock supported with grafting, uniform cultural practices and plant protection measures.

- **Creation of Water Sources:** Assistance will be provided for creating water sources through construction of community tanks, farm ponds/reservoirs with plastic/RCC lining to ensure life saving irrigation to horticultural crops. This will be in conjunction with MGNREGS and wherever possible adequate convergence with other sources will be ensured. In many cases, these water bodies will be linked with **Micro-Irrigation** facility for judicious use of water.

Fruit Sector: Initiatives suggested

- Establishing nucleus mother blocks and mother plants for good quality rootstocks – for nursery management towards attaining self sufficiency at district level.
- Production of disease free, quality seed and planting materials in progeny orchards and private nurseries with better technical care and management, rationalizing production targets of each crop.
- Area expansion in FRA areas – with more intensive cropping, care and management.
- Bringing more area under high density planting through canopy management based cluster approach – Pineapple (20% of total area), Guava, Litchi, Lemon, Aonla, Mango etc.
- Enhancing productivity, profitability and sustainability through topping and hedging (rejuvenation pruning) in old and unproductive orchards.
- Emphasis on minor fruit crops e.g bael, jackfruit, ber , tamarind, carambola, olive, black berry, lotkon, Hogplum, custard apple, Karonda
- Promotion of New fruits – strawberry and grapes
- Adoption of Integrated Nutrient and Water Management technologies
- Use of plastic mulching etc.
- Water harvesting (roof water harvesting) for increased crop intensity and production
- Arrangement of micro irrigation facilities in high density plantations of pineapple, banana, and papaya.
- Creation of farm gate infrastructure at selected clusters including sorting, grading cleaning, pre-cooling and temporary storage – for reducing wastage.
- Facilitation for engagement of aggregators for back ward linkages for better forward linkages
- Devising suitable packing system for pineapple and banana
- Branding “Queen” variety of pineapple for attracting better market in and outside the country.
- Arranging organic certification for pineapple – for export

Financial Involvement

Fruits

(Rs. in lakh)

| Sl no | Item | Year | | | | | |
|-------|--|----------------|----------------|----------------|----------------|----------------|-----------------|
| | | 1st | 2nd | 3rd | 4th | 5th | Total |
| 1 | Nursery Development | 100.50 | 115.56 | 132.87 | 129.69 | 146.38 | 625.00 |
| 2 | Area expansion (including areas under FRA) | 2077.31 | 2387.95 | 2745.88 | 2591.20 | 2981.10 | 12783.44 |
| 3 | Rejuvenation of old gardens @ Rs. 0.15 lakh/Ha | 180.90 | 208.01 | 239.18 | 233.44 | 263.47 | 1125.00 |
| 4 | Other Related items (INM, Creation of water sources, , plastic mulching etc.) @ Rs. 0.08 lakh for INM etc. & Rs. 1.03 lakh/WHS | 275.77 | 317.10 | 364.61 | 355.87 | 401.65 | 1715.00 |
| | Total of Fruits | 2634.48 | 3028.62 | 3482.54 | 3310.19 | 3792.60 | 16248.44 |

9.2 Vegetable Sector :

- Plan envisages addressing all concerns related to both the demand and supply side of the vegetables in state capital and all sub-divisional towns , and in rural areas, enhancing production and productivity, improving
- Nutritional security and income support to vegetable growers. There would also be encouragement for establishment of an efficient supply chain there by leading to employment opportunities and incomes for intermediate service providers and safe, good quality, fresh vegetables at competitive price for urban consumers.
- All measures for production and productivity enhancement by adopting improved cultivars, (coordinating with ICAR/other research institutes for obtaining improved varieties of vegetable seeds/ seedlings and for introduction of innovative technologies, as required), production technologies using precision farming techniques, protected cultivation, micro irrigation etc will be adequately addressed during this plan period.

- Production of disease free seeds/seedlings of open pollinated vegetables under certification programme will be encouraged specially against hybrids of those vegetables whose seed is very costly and there is low germination of seeds with heavy mortality of seedlings in open nurseries. In some cases, plug technology under controlled condition for production of seeds/seedlings will be introduced. This will ensure production of seedlings for early and late crops which in turn will ensure that production of vegetable takes place over a longer period.
- **Protected cultivation:** Activities like construction of shade net house, green houses, mulching, and plastic tunnels, anti bird/ hail nets would be promoted for off-season and high value crop cultivation in selected areas for production of crops like Capsicum, Tomato, cabbage & cauliflower during off-season. .

Vegetable Sector: Initiatives suggested

- Baseline survey for assessment of the demand-supply position and market dynamics.
- Focus on crops requiring almost round the year production – Tomato, Brinjal, cowpea, French bean, Papaya, Plantain, Cucumber, Pumpkin, Bottle gourd, Cabbage, Bhindi
- Promoting leafy vegetable for nutrition – Amaranthus, Spinach , Basella, *Ipomea aquatica*
- Promoting off-season production technologies in different areas and crops – cauliflower, cabbage, Tomato, Capsicum and Cucumber.
- Promotion of exotic vegetables and protected cultivation to improve the productivity - Broccoli, Gherkin, Capsicum.
- Promotion of commercial cultivation of some indigenous vegetables – Tree bean, Moringa, country bean, all tropical tuber crops, bitter gourd, Ridge gourd, spine gourd etc.
- Establishment of second station for production of TPS – prod. of tuber - let through RGP
- Production of HYV vegetable seeds under RGP.
- Facilitation for engagement of aggregators for better forward linkages.

Financial Involvement

Vegetables

Rs. In lakh

| Sl no | Item | Year | | | | | Total |
|-------|--|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | 1st | 2 nd | 3 rd | 4 th | 5 th | |
| 1 | Area Expansion | 470.34 | 540.83 | 621.86 | 606.94 | 685.04 | 2925.00 |
| 2 | Input assistance for major vegetables (Tomato, Brinjal, Cabbage, Cowpea, French bean, Papaya, Plantain, Pumpkin, Bottle Gourd, Cucumber, Bhindi) @ 10,000 Ha/Year @ Rs. 0.225/Ha | 1809.00 | 2080.13 | 2391.75 | 2334.38 | 2634.75 | 11250.00 |
| 3 | Leafy Vegetables 100 Ha @ Rs.0.10/Ha | 8.04 | 9.25 | 10.63 | 10.38 | 11.71 | 50.00 |
| 4 | Promotion of indigenous vegetables in 1000 Ha @ Rs. 0.10/Ha | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| 5 | Promotion of off-season & exotic vegetables (Cauliflower, Cabbage, Tomato, Capsicum, Broccoli, Gherkin) in 100 Ha/Year @ Rs, 1.00/Ha | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| 6 | Production of HYV seeds under RGP | 4.52 | 5.20 | 5.98 | 5.84 | 6.59 | 28.13 |
| 7 | Area expansion of Potato | 54.19 | 62.31 | 71.65 | 69.93 | 78.93 | 337.00 |
| | Total of Vegetable | 2506.89 | 2882.61 | 3314.46 | 3234.95 | 3651.21 | 15590.13 |

9.3 Plantation Crops : Among different plantation crops, Coconut, Arecanut, Cashewnut along with betel vine (condiments) are suitable and profitable for cultivation in Tripura. Major action plan suggested for this plan include (i) production of quality planting materials of desirable varieties (ii) Increasing production and productivity with desirable variety, maintenance of proper density of plants per ha and application of ICM techniques (iii) rejuvenation of old, senile gardens (iv) Post harvest care and management with proper forward linkages and (v) capacity building of the growers on related technologies and market information.

- Crops – Cashewnut, Coconut ,Arecanut & Betelvine
- Production of quality planting materials of desirable varieties – in public orchards & private nurseries
- Application of improved technologies including ICM for improving productivity.
- Rejuvenation and replanting (Cashewnut) of old, senile gardens
- Better PHM and forward linkages
- Capacity building of the growers.

Financial Involvement

| Plantation Crops | | | | | | | |
|------------------|--|---------------|--|---------------|---------------|---------------|----------------|
| Sl no | Item | Year | | | | | |
| | | 1st | 2nd | 3rd | 4th | 5th | Total |
| | | 1 | Area Expansion including FRA areas (Cashewnut, Coconut & Arecanut and the condiment, Betelvine) | 188.00 | 216.18 | 248.56 | 242.60 |
| 2 | Rejuvenation of old gardens 2000 Ha/year @ Rs 0.15 lakh/Ha | 60.30 | 69.34 | 79.73 | 77.81 | 87.83 | 375.00 |
| 3 | Assistance for INM in Coconut plantations, 1000 Ha/year @ Rs. 0.08 lakh/Ha | 64.32 | 73.96 | 85.04 | 83.00 | 93.68 | 400.00 |
| 4 | Assistance for area expansion of Betel-vine, 50 Ha per year @ Rs. 1.00/Ha | 40.20 | 46.23 | 53.15 | 51.88 | 58.55 | 250.00 |
| | Total | 352.82 | 405.70 | 466.48 | 455.29 | 513.87 | 2194.16 |

9.4 Spices :

- The major programmes suggested for spices development in the state during 12th plan period include production and distribution of quality planting materials, area expansion of selected spices(Ginger, Turmeric, Chilli and Black pepper), promotion of Onion & Garlic, encouraging multi-storied cropping, increasing production and productivity, training to the spices growers, post harvest management, processing and value addition and organic certification of selected spices.
- Only the suitable, high yielding, desirable varieties of Ginger (viz. Mahima, Varada, Rejatha & Nadia), Turmeric (viz. Prabha & Pratibha), Black pepper

(viz.Paniyur), Onion (viz. Nashik, &) and Garlic (viz. Yamuna Safed-3, Ooty & G-41), as recorded in the trials at Nagicherra HRC, will be utilized for expansion of areas.

- Special thrust given for area expansion of green chillies for making it available round the year in Agartala and all sub-divisional markets.
- Provision kept for establishment of small processing plants for turmeric, at least one in each district to be run by the SHGs, recommended by the DLCs’.

Spices Sector : Initiatives suggested

- Production of clean, disease free seed and planting material of high yielding varieties of spices crops under GAP – Zinger, Black Pepper etc.
- Promotion of Onion and Garlic.
- Encouraging multi-storied and inter-cropping systems especially in FRA areas.
- Promotion of cultivation of export oriented varieties of ginger with low fibre content,
- Area expansion of green chillies to ensure round the year availability and promotion of Red Chillies for supply as dry chilly.
- Processing of Turmeric by the SHGs.
- Organic certification of Ginger for export purposes
- Training of the growers.

Financial Involvement

| Spices | | | | | | | |
|---------------|--|---------------|---------------|---------------|---------------|---------------|----------------|
| (Rs. in lakh) | | | | | | | |
| Sl no | Item | Year | | | | | Total |
| | | 1st | 2nd | 3rd | 4rth | 5th | |
| 1 | Area Expansion Programme (Ginger, Turmeric, Chilli & B/pepper | 175.88 | 202.23 | 232.53 | 226.95 | 256.16 | 1093.75 |
| 2 | Production of Quality seed & planting materials of HYV of Ginger, Black Pepper etc | 16.08 | 18.49 | 21.26 | 20.75 | 23.42 | 100.00 |
| 3 | Promotion of Onion, Garlic, Red Chillies etc. | 24.12 | 27.74 | 31.89 | 31.13 | 35.13 | 150.00 |
| 4 | Post Harvest Management & Processing , 4 nos. @ Rs. 8.00 lakh each. | 5.15 | 5.92 | 6.80 | 6.64 | 7.49 | 32.00 |
| | Total of spices | 221.22 | 254.38 | 292.48 | 285.47 | 322.20 | 1375.75 |

9.5 Flower :

- In view of the increasing economic importance of the sector, action plans suggested for 12th five year plan include (i) production of commercially remunerative open-field flowers (ii) promoting bulb production of high value bulbous ornamentals (iii) promotion of high value flower crops and (iv) encouraging production of ornamental foliage.
- Cultivation of two of the most commonly preferred open field flowers, namely Marigold (round the year production) and Rose will be promoted in all the four districts of the state.
- Cultivation of three most important bulbous flowers namely , Tuberose, Gladiolus and Lily for commercial production and sale of both the cut flower and bulbs have been suggested in all the four districts considering their increasing demand.
- Cultivation of high value commercial flowers like Anthurium, Orchid (*Dendrobium spp.*) and Gerbera are also suggested in few sub-divisions in
- West District (for easy market outside the state) as alternative employment opportunities for unemployed, educated youths.
- Cultivation of some commonly used ornamental foliage plants – mainly used for landscaping and beautification works and in bouquet making – is suggested in all the four districts in private sector on nursery basis.

Flower Sector : Initiatives suggested

- Promoting bulbs production of high value bulbous ornamentals.
- Encouraging production of ornamental foliage.
- Promotion of high value exotic flower crops like Anthurium, Orchid & Gerbera
- Production of commercially viable open field flowers
- Training of the flower growers.

Financial Involvement

Flowers

(Rs. in lakh)

| Sl no | Item | Year | | | | | |
|-------|----------------------------------|---------------|---------------|---------------|---------------|---------------|----------------|
| | | 1st | 2nd | 3rd | 4rth | 5th | Total |
| | Open field Flowers | 28.14 | 32.36 | 37.21 | 36.31 | 40.99 | 175.00 |
| | Bulbous ornamental | 33.53 | 38.55 | 44.33 | 43.27 | 48.83 | 208.51 |
| | High value flower crops | 554.76 | 637.91 | 733.47 | 715.88 | 807.99 | 3450.00 |
| | Production of ornamental foliage | 10.05 | 11.56 | 13.29 | 12.97 | 14.64 | 62.50 |
| | Total of flower | 626.48 | 720.37 | 828.29 | 808.42 | 912.44 | 3896.00 |

10. General Initiatives :

- **Good Agricultural Practices (GAP)** : Good Agricultural Practices for reduction in microbial food safety hazards during farming, grading, packaging and storage operations will be encouraged in selected crops. This component has been suggested for farmers to be in line with global GAP, so that they are able to get better remuneration for their produce in up-coming retail markets within and out side the state. For this purpose, related certification agencies in the country will be involved.
- **Organic Farming** : Organic farming in horticulture is becoming increasingly important especially for export opportunities of some niche product like pineapple, Ginger etc. Its environmental and economic benefits have captured attention in many countries. Consumers' demand for organically produced food products and society's demand for more sustainable development provide new opportunities for farming and business around the world. In order to help growers obtain required certification for organically produced crops, awareness will be created through training and distribution of information material and for adopting organic farming for perennial / non-perennial fruit crops, vegetables, spices, etc. additional assistance is suggested over and above the assistance under area expansion programme.
- Assistance will be given for generating on farm inputs. Financial assistance will also be given for group of farmers , covering an area of 50 ha or more, on

case to case basis, for certification of organic process/produce to meet cost of documentation, training and charges of service provider and certification agencies accredited by APEDA.

- **Vermi-compost units/ organic production units** : For promotion of vermin compost units/organic production units, assistance suggested upto 50% of the cost of construction/HDPE Vermi bed , as per accepted specification and design parameter of central sector scheme of HMNEH.

Good Agricultural Practices (GAP)

- Encouraging good agricultural practices for majority of crops to reduce microbial food safety hazards.

Organic Farming

- Promotion of the concept of organic villages with niche commodities.
- Developing standards pertaining to cultivation practices and certification both for domestic and export purposes.
- Developing mechanism for transfer of technologies.

Financial Involvement

Organic Farming

(Rs. in lakh)

| Sl no | Item | Year | | | | | |
|-------|---|--------------|--------------|---------------|---------------|---------------|---------------|
| | | 1st | 2nd | 3rd | 4th | 5th | Total |
| 1 | Organic Farming with certification arrangement (Promotion of concept of organic village) 1000 Ha/year @ Rs. 0.20 lakh/Ha | 16.08 | 18.49 | 21.26 | 20.75 | 23.42 | 100.00 |
| 2 | Organic Certification, 1000 Ha per year @ Rs. 5.00 lakh for a cluster of 50 Ha | 16.08 | 18.49 | 21.26 | 20.75 | 23.42 | 100.00 |
| 3 | Vermi- compost | 48.24 | 55.47 | 63.78 | 62.25 | 70.26 | 300.00 |
| | Total | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |

11. Micro Irrigation :

- Although water is a renewable resource, its availability in appropriate quality and quantity is under severe stress due to increasing demand from various sectors. Lack of adequate or even life saving water, especially during dry months, is one of the reasons for poor productivity of most of the fruits , plantation crops and vegetables being cultivated in the state. Thus, overall development of horticulture sector and the intended growth rate in GDP is largely dependent on the judicious use of the available water resources. It has been recognized that use of modern irrigation methods like drip and sprinkler Irrigation is the only alternative for efficient use of surface as well as ground water resources. Hence, Micro Irrigation (MI), which aims at increasing the area under efficient methods of irrigation is given priority in the 12th five year plan.
- The focus will be on all the fruit and plantation crops being grown in upland areas in cluster basis. Assurances, upto 75% of cost of installation, of drip and sprinkler irrigation will be provided to all small and marginal growers.
- There will be a strong HRD input for the farmers, field functionaries and other stake holders at different levels. Besides, there will be publicity campaigns, seminars/workshops at extensive locations to develop skills and improve awareness among farmers about importance of water conservation and management.
- Supply of good quality system both for drip and sprinkler irrigation system having BIS marking, proper after sales services to the satisfaction of the farmers will also be ensured from the side of the Government.

Irrigation

- Increasing crop productivity through micro irrigation- drip
- Demonstration on drip & sprinkler irrigation in plantations in upland areas
- Development of water harvesting structures for life saving irrigation.
- Strong HRD for quick dissemination of the technology.

Financial Involvement

| Micro Irrigation | | | | | | | |
|------------------|---|--------|--------|--------|--------|--------|---------|
| (Rs. in lakh) | | | | | | | |
| Sl no | Item | Year | | | | | Total |
| | | 1st | 2nd | 3rd | 4th | 5th | |
| 1 | Micro Irrigation (Drip, Sprinkler) and creation of related water sources, 1000 Ha per year @ Rs. 0.60 lakh/Ha | 241.20 | 277.35 | 318.90 | 311.25 | 351.30 | 1500.00 |

12.Horticulture Mechanization : Horticulture Mechanization has been given more emphasis to promote mechanization of various horticultural operations to improve farm efficiency and reduce drudgery of farm work force. Assistance in this regard will be provided for procurement of different power operated machines and tools, besides introduction of some new machines for demonstration purposes under public sector. Assistance (50%) for such mechanization will also be available to such grower associations, farmer groups, self help groups, women farmer groups etc. having at least 10 members, who are involved in cultivation of horticultural crops , enter in some kind of MOU to ensure proper upkeep, running and maintenance of the machines and tools.

Mechanization : suggested initiatives

- Enhancing productivity of labour through effective tools and implements.
- Making available more number of farm machineries to the beneficiaries.

Financial Involvement

| Mechanization | | | | | | | |
|---------------|---|-----------------|-----------------|-----------------|-----------------|-----------------|--------|
| (Rs. in lakh) | | | | | | | |
| Sl No | Items | Year | | | | | Total |
| | | 1 st | 2 nd | 3 rd | 4 th | 5 th | |
| 1 | Assistance for power operated tools and machineries | 28.14 | 32.35 | 37.21 | 36.31 | 40.99 | 175.00 |

13. Human Resource Development (HRD) in Horticulture :

- Human resource development through trainings and demonstrations is an integral part of horticulture development. Under this programme , training of farmers, entrepreneurs, field level workers and officers will be taken up. Programme for providing appropriate training to farmers for adoption of high yielding varieties of crops and farming system will be taken up at sub-division level, district level, state level and outside the state. Programme for training of officials concerned with implementation, field level workers who will in turn train / guide farmers will also be taken up . An important activity under training component is to provide resource material to farmers and to acquaint them with various farming techniques through exhibitions and demonstrations. In order to ensure wider and full participation, publicity about training programmes will also be required. Assistance will be provided to agencies involved in training programme. Successful and progressive farmers' field will also be used as training centres. In order to familiarize /train farmers, about production practices being followed in other districts and states, field visits outside the district and state will also be taken up. Training cum visit will be organized for a period ranging between 2 to 5 days.
- Technical staff and field functionaries/extension workers will be trained in modern technological advances in horticulture at various ICAR Institutes in or outside the state. For this purpose , actual cost plus TA/DA, as admissible will be provided. For study tour of technical staff/field functionaries outside state actual cost plus TA/DA, as admissible, will be provided. For study tours of technical staff/ field functionaries outside the country to have firsthand knowledge about major technological innovations in horticulture, up to Rs. 5.00 lakh per participant is suggested.
- Strong institutional set up will be created with basic infrastructural facilities like classrooms, staff, hostel facilities, etc. for training in horticulture inside the state. The trainers will be given further training/exposure, as per necessity, for engagement in the training institutes.

- 100 % assistance suggested for information dissemination through publicity, printed literature, etc. on new crop/varieties, production technologies, success stories etc.
- Total cost for development of technology packages in electronic form to be shared through IT network would be funded under central sector HMNEM programme.

Human Resources Development (HRD)

- Enriching horti-farmers with latest horticultural technologies.
- Encouraging farmers/people to take up horticulture as a profession.
- Entrepreneurship development.
- Training field level extension agencies – exposure visits
- Annual training calendar .

Financial Involvement

| HRD | | | | | | | |
|---------------|---|---------------|---------------|---------------|---------------|---------------|----------------|
| (Rs. in lakh) | | | | | | | |
| Sl no | Item | Year | | | | | Total |
| | | 1st | 2nd | 3rd | 4th | 5th | |
| 1 | Training of Farmers (Including exposure visit outside State) | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| 2 | Training of Trainers (Including exposure visit outside State both for officers & field functionaries) | 8.04 | 9.25 | 10.63 | 10.38 | 11.71 | 50.00 |
| 3 | Creation of Institutional set-up / Strengthening of existing Extension Delivery System | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| 4 | Dissemination of information/ Technology through Publicity by Printed literature, electronic media & IT network | 8.04 | 9.25 | 10.63 | 10.38 | 11.71 | 50.00 |
| | Total | 176.88 | 203.39 | 233.86 | 228.25 | 257.62 | 1100.00 |

14. Post Harvest Management :

- Post harvest management includes sorting, grading, packaging, transportation, curing and ripening and storage. These facilities are essential for increasing marketability of horticulture produce, adding value to produce, increasing profitability and reducing losses. It is proposed to create a network of infrastructural facilities for storage of horticulture produce, transportation, marketing, packaging and grading. The existing schemes of the NHB, DMI and National Cooperative Development Corporation (NCDC) will be made use of to the maximum possible extent. In this context, specific programmes which would be taken up under HMNEH would include establishment of pack houses, pre-cooling units, mobile pre-cooling units, cold storage units, Controlled Atmosphere (CA) storage/ Modified Atmosphere (MA) storage/ supply of refrigerated vans/containers, primary/mobile processing units, ripening chambers, evaporative/low energy cool chambers, preservation units, onion storage units and zero energy cool chambers. All these projects will be entrepreneur driven through commercial ventures for which Government assistance will be in accordance with the cost norms of the central sector schemes. PSUs and cooperatives, growers' association, farmers' groups, self help groups, women farmers' groups, recognized/ registered by the DLCs, having at least 25 members, will also be entitled to avail assistance for such activities.
- Assistance for setting up of new cold storage/CA storage/MA storage will be available only to multi-chamber cold storage units with latest/new technologies, which are energy efficient with provision for insulation, humidity control, advanced cooling systems etc. having specifications and standards approved by the Ministry.
- Assistance will be given for development of infrastructures for whole sale (5 nos) and rural primary markets (25 nos) , as per cost norms of the central sector HMNEH programme.
- There will be provision for organizing events like "RoadShows" of fresh horti products like, Pineapple, Scented Lemon, Ginger, *Dheki Shag (Dryopteris filixmas)* etc. for promotion of market-led extension of these niche products.

Post Harvest Management : Initiatives suggested

- Technology up-gradation both in public and private institutions for maintaining quality of horticulture produce.
- Creation of cluster wise common infrastructure facilities for grading and packaging at rural collection centres.
- Strengthening value chain like cold storage, refrigerated transport system etc to enhance shelf life and minimize post harvest losses at different points.

Marketing

- Development of market infrastructure (Whole sale and rural primary markets) and linking farmers to market.
- Market Extension, Quality awareness and Market-led extension activities for fresh products.

Financial Involvement

| Post Harvest Management | | | | | | | |
|--------------------------------|---|----------------|----------------|----------------|----------------|----------------|-----------------|
| (Rs. in lakh) | | | | | | | |
| Sl no | Item | Year | | | | | Total |
| | | 1st | 2nd | 3rd | 4rth | 5th | |
| 1 | Creation of cluster wise common infrastructure facilities for grading and packaging at rural collection centres | 32.16 | 36.98 | 42.52 | 41.50 | 46.84 | 200.00 |
| 2 | Assistance for setting up of new cold storage / CA storage/ MA storage and Refrigerated transport system | 64.32 | 73.96 | 85.04 | 83.00 | 93.68 | 400.00 |
| 3 | Development of market infrastructure: | | | | | | |
| | a) Whole sale market | 1540.08 | 1770.90 | 2036.20 | 1987.35 | 2243.80 | 9578.33 |
| | b) Rural market | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| | Total | 1716.96 | 1974.29 | 2270.06 | 2215.60 | 2501.42 | 10678.33 |

15. Horticultural Statistics, Insurance and Credit Plan :

In recent years, Horticulture sector has been emerged as an important component of our economy. Hence, proper generation and upkeep of horticultural statistics has also become a crucial programme for all planning purpose for which

the availability of adequate, reliable and timely statistics on area, yield and production estimates are very much essential.

However, the horticulture statistics is a weak link in the agricultural statistics system of our state. The Central Sector scheme namely "Crop Estimation Survey on Fruits and Vegetables" is not covered in Tripura. The methodological and institutional arrangements are required to be developed to obtain a reliable data in this sector. Sample survey of Horticulture Crops may be launched in the State at the earliest, adopting the approach of farmers' appraisal instead of the traditional method of obtaining the area under crops and multiplying area estimates with yield rates to get the estimated production. There exists a need for immediate launching of a survey programme for obtaining accurate estimates on area, yield and production of all horticultural crops on scientific basis. To cross validate such data collected through farmers' appraisal, it would be desirable to take into account the market arrival data as also the Export/Import statistics and NSS consumption data in respect of all Horticulture Crops.

There are certain organizational weaknesses with regard to obtain horticultural data on area, production and yield estimates of different horticultural crops. Absence of a proper statistical staff up to grass root level of this department to undertake such large exercise has made the task difficult. The farmers are not getting the Crop Insurance benefit for horticultural crops except for Potato.

It is, therefore, proposed that a well-structured Statistical Wing with appropriate qualified personnel may be set up during the XII Five Year Plan extending up to grass root level. Alternatively, the Crop Estimation Survey works may be done through outsourcing. A tentative estimate for the purpose is placed below for showing per year involvement.

Crop Insurance & Credit : Suggested initiatives

- Field survey for generating reliable data on area, production and productivity of crops- crop cutting experiments.
- Scale of finance for Flowers and other annual capital intensive crops.
- Updating estimates for crops taking more than one year.
- Strengthening horticultural statistics – creation of separate agency, out sourcing , if necessary.

Financial Involvement

| Horticultural Statistics & Insurance | | | | | | | |
|--------------------------------------|---|---------------|---------------|---------------|---------------|---------------|----------------|
| (Rs. in lakh) | | | | | | | |
| Sl no | Item | Year | | | | | |
| | | 1st | 2nd | 3rd | 4rth | 5th | Total |
| 1 | Field Survey | 208.78 | 240.07 | 276.04 | 269.42 | 304.08 | 1298.39 |
| 2. | Cost of survey materials and stationery items | 5.63 | 6.47 | 7.44 | 7.26 | 8.20 | 35.00 |
| 3. | Training including preparation of training material | 3.22 | 3.70 | 4.25 | 4.15 | 4.68 | 20.00 |
| 4. | Monitoring & Supervision in CES_F&V | 5.63 | 6.47 | 7.44 | 7.26 | 8.20 | 35.00 |
| 5. | Conducting crop-cutting experiment | 140.03 | 162.10 | 188.27 | 181.58 | 201.62 | 873.60 |
| 6. | Printing of forms for CCEs | 4.01 | 4.61 | 5.31 | 5.18 | 5.84 | 24.95 |
| | Total | 367.30 | 423.42 | 488.75 | 474.85 | 532.62 | 2286.94 |

16. Sector wise total involvement of Fund :**Financial Involvement**

(Rs. in lakh)

| SI No | Items | Year | | | | | Total |
|-------|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | 1 st | 2 nd | 3 rd | 4 th | 5 th | |
| 1 | Research & Development | 30.00 | 34.50 | 39.68 | 42.63 | 53.20 | 200.00 |
| 2 | Prodn. & productivity | | | | | | |
| | a. Fruits | 2634.48 | 3028.62 | 3482.54 | 3310.19 | 3792.60 | 16248.43 |
| | b. Vegetables | 2506.89 | 2882.61 | 3314.46 | 3234.95 | 3651.2 | 15590.12 |
| | c. Plantation Crops | 352.82 | 405.70 | 466.48 | 455.29 | 513.87 | 2194.16 |
| | d. Spices | 221.22 | 254.38 | 292.48 | 285.47 | 322.20 | 1375.75 |
| | e. Flowers | 626.48 | 720.37 | 828.29 | 808.42 | 912.44 | 3896.00 |
| 3 | GAP & Organic Farming | 80.40 | 92.45 | 106.30 | 103.75 | 117.10 | 500.00 |
| 4 | Micro Irrigation | 241.20 | 277.35 | 318.90 | 311.25 | 351.30 | 1500.00 |
| 5 | Mechanization | 28.14 | 32.35 | 37.21 | 36.31 | 40.99 | 175.00 |
| 6 | Human Resource Dev. | 176.88 | 203.39 | 233.86 | 228.25 | 257.62 | 1100.00 |
| 7 | Post Harvest Management | 1716.96 | 1974.29 | 2270.06 | 2215.60 | 2501.42 | 10678.33 |
| 8 | Statistics, Insurance & Credit | 367.30 | 423.42 | 488.75 | 474.85 | 532.62 | 2286.94 |
| | Grand Total | 8982.77 | 10329.43 | 11879.01 | 11506.96 | 13046.57 | 55744.73 |

17. Source wise allocation of Fund : Continued central sector scheme of Horticulture Mission for North East and Himalayan States (HMNEH), Rashtriya Krishi Vikash Yojana (RKVY), National Mission on Micro Irrigation (NMMI) and Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) have been considered for proposing allocation of fund during 12th five year plan, beside allocations under state plan budget. In many programmes there would be a share of 25 % of expenditure from the side of growers, other than his fixed capital in the shape of land, water etc.. The source wise total amount required for the plan, excluding the share of farmers is indicated in the following table.

| Sl. No. | Plan/Scheme | Allocation during XI th Plan (Rs. in lakhs) | Allocation proposed for 12 th Plan (Rs. in lakhs) | % share proposed |
|---------|--------------|---|--|------------------|
| 1. | State Plan | 2937.00 | 6503.39 | 11.67 |
| 2. | HMNEH | 13981.72 | 32800.00 | 58.84 |
| 3. | RKVY | 1187.30 | 3935.97 | 7.06 |
| 4. | NMMI | 450.00 | 1500.00 | 2.69 |
| 5. | NEC | 167.36 | 0.00 | 0 |
| 6. | MGNREGA | 2242.68 | 11005.37 | 19.74 |
| | Total | 18029.06 | 55744.73 | 100 |

18. Deliverables : Crop wise total production of selected fruits, plantation crops, spices, vegetables, potato, flower, vermin-composts, other organic inputs during the terminal year of Twelfth Five Year Plan (2016-17) & corresponding value thereof, as estimated, is indicated in the following table :

| Sl No | Crop /Compost | Cumulative Production ('000 MT) | Rate / MT (Rs. in lakh) | Value (Rs in Crores) |
|-------|--------------------------------------|---------------------------------|-------------------------|----------------------|
| A. | Fruits | 5561.00 | 0.08 | 4448.80 |
| B | Plantation crops | 1009.00 | 0.20 | 2018.00 |
| C | Spices | 107.00 | 0.30 | 321.00 |
| D | Vegetables | 2980.00 | 0.20 | 5960.00 |
| E | Flower | 5.70 | 0.50 | 28.50 |
| F | Vermi Compost & other Organic manure | 29.60 | 0.05 | 14.80 |
| | Grand Total | 9692.30 | - | 12791.10 |

The projected population of the state during 2016-17 is 39.15 lakh. As per above target per capita per day availability works out to be 870 gm and 480 gm respectively for fruits and vegetables, against the minimum dietary requirements of 100 gm and 300 gm as per ICMR recommendations.