CHAPTER IV  
TECHNOLOGY MISSIONS: WAY FORWARD

4.1 Historical Backdrop

4.1.1 Technology Mission as a technique or a method to achieve specific development goals was initiated in 1986 by the former Prime Minister late Shri Rajiv Gandhi. Five Technology Missions were initiated, out of which Technology Mission on Oilseeds was one. In his Convocation Address at the IARI, New Delhi in February, 1986, Late Shri Gandhi said - “One of our biggest problems today in the agricultural sector is the oilseeds. We are setting a thrust Mission for oilseed production. When we talk of a Mission we mean an exercise starting from engineering of the seeds and, finishing with the finished products of the vegetable oil, which could be delivered to consumer. We would like to put of one person in-charge of such a mission with full funding with no restriction on him whether bureaucratic or otherwise. The only limits will be certain achievements, which must come within a certain time frame. This will cut across a number of Ministries where you find a lot of hassles and we find our projects getting stalled because the interaction is not smooth enough. We have already decided on this particular Mission………..”

4.1.2 Till the 1980s, programmes for enhancing the production and productivity of various agricultural crops was sought to be achieved through investment in inputs and provisions of subsidies to farmers through specific programmes along with investment in infrastructure like major and minor irrigation etc. However, with the ascent of Shri Rajiv Gandhi as Prime Minister of India, it was felt that new approaches and methodologies were necessary to give the required fillip to various crops, particularly those which were items of mass consumption and whose shortage led to large import bills. Fortunately, this was the stage when the importance of technology driven growth in agriculture was realized more clearly. It was also the time when the problems of coordination in meeting the felt needs of the farmers and the need for an end to end approach towards growth of production and productivity was also realized. The 80s also saw the arrival of Dr. Sam Pitroda with his reputation in the field of science and technology and his known capacity to cut through the traditional methods of governance, for leading the Technology Missions.
4.1.3 These developments at the Centre were matched by substantial enthusiasm in the States because of the enthusiasm and vision of Shri Rajiv Gandhi in the context of his very large political mandate and the zeal of Dr. Sam Pitroda in converting the States into new thinking for rejuvenating agriculture.

4.1.4 The 80s therefore saw the congruence of several positive factors when the Technology Missions were born. The Centre had formulated a new methodology to ensure significant technology inputs and more efficient delivery mechanism for optimising yields of crops and the States were equally enthusiastic in implementing the ideas in order to gain political mileage and also benefit farmers in drylands.

4.1.5 The following key elements of the Technology Mission approach emerged:

(i) Effective transmission of available technology even while encouraging research on newer technologies.

(ii) An end-to-end approach in order to meet all the requirements of the farmers in an integrated way.

(iii) An effective integration of the activities of various Stakeholder Departments so that the needs of the farmers could be understood comprehensively rather than though segmented lenses.

(iv) Crops where there was a significant gap between the actual and possible productivity mainly due to insufficient/ inappropriate transmission of technology to the fields.

4.1.6 Briefly, the Technology Missions were designed to be technology rich and to comprehensively transfer the available technology enhance profitability and incomes of farmers through appropriate attention to both production and post-harvest and processing issues. This was expected to be achieved through full collaboration between the Centre and the States and collaboration amongst various departments involved.

4.1.7 These Missions were also supposed to be driven by dynamic and knowledgeable missions Directors who had the capacity to comprehend the technology as well as the delivery systems and who had the vision to deliver results in
a time bound manner. Last but not the least the Technology Missions were expected to be backed by appropriate policy support in order to protect the incomes of farmers.

With this historical background, the formulation and implementation of the discontinued as well as ongoing Technology Missions in the Agriculture Sector are being analysed.

4.2 Technology Mission on Oil-Seeds and Pulses (TMOP)

4.2.1 Between 1981-85, the area under oilseeds was fluctuating between 18-20 million hectares, production between 9-12.9 million tonnes and productivity between 563-684 kgs per hectares. The percentage of area under oilseeds, which received irrigation, was less than 14-17%. The soils in which oilseed crops were cultivated were mostly hungry and thirsty because the resource poor farmers particularly under dryland conditions were not able to provide the needed inputs of fertilizers, water or plant protection. The erratic monsoons further put the oilseed production at risk. There was no well-developed technology and high yielding varieties like in wheat and rice to push up the oil-seed production. Most of the oilseed crop varieties were susceptible to a large number of pests and diseases and they were also affected by abiotic stresses like drought, salinity, alkalinity etc., Devious market forces also dampened the enthusiasm of the farmers to go for oilseed cultivation. The efforts that had been made earlier through research and development activities had not increased production to any appreciable extent while the growing population and industrial needs of the vegetable oils, both edible, and non-edible had been steadily going up. To meet the growing demands India had to resort to import of edible oil which reached 1.6 million tonnes costing Rs.1319 crores in 1983-84 and 1.4 million tonnes costing Rs.1122 crores in 1984-85. This was a huge drain on foreign exchange resources of the country and if it was not controlled through proper strategies to step up the production of domestic vegetable oils, import of oils could reach an estimated Rs.3000 crores by 2000 AD. The major edible field oilseed crops of the country were groundnut, rapeseed-mustard, sesamum, safflower and niger and among the non-edible castor and linseed. Area under soybean and sunflower was limited and coconut oil consumption was localized. In this background, the Technology Mission on Oilseeds was expected to achieve the goal of self-sufficiency in a stipulated time frame.
4.2.2 A SWOT analysis revealed that we had the strength of soils, climate, research and developmental infrastructure to grow horizontally and vertically by encouraging oilseed crop cultivation and also by use of need-based necessary inputs. Since the soil and climatic conditions of the country were very diverse, a number of oilseed crops could be grown which was not the case in most of the countries around the globe. The yield gap was a great opportunity to exploit. The well laid out demonstrations by the scientists on farmers’ fields by use of available knowledge and technology had brought out clearly the possibility to raise the yield significantly. Besides, this opportunity there was a well-developed developmental infrastructure of Departments of Agriculture, Forestry, Scientific Institutions, input agencies and industry in the country. The major threat was the import of cheap vegetable oil from abroad without proper checks and balances that dampened the initiatives of the local farmers.

4.2.3 The target to raise the present oil seed production from 12.4 to 26.0 million tonnes and vegetable oil production from 3.6 to 8.0 million tonnes by 2000 A.D. was fixed as the goal of the Mission.

4.2.4 **Strategy Development:** To bring a new vigour into the vegetable oil scenario, several steps were taken. Intensive discussions between scientists of ICAR and administrators of Department of Agriculture and Cooperation (DAC) Government of India were taken up to take stock of the existing scenario and explore opportunities to step up oilseed production. This was followed up with interactions with the officials of the Commerce and Civil supplies Departments on supply-demand scenario, with the scientists of Council of Scientific and Industrial Research, on technological options on improving the efficiency of oil extraction and organizations and departments that fix the prices of the different oilseed crops.

Based on these deliberations at the Central level, similar interactions were organized at the level of different important oilseed crop growing States of the country.

4.2.5 Based on all these intensive discussions and keeping the critical role of the farmers who grew the oilseed crops for bettering their income, four MMs (MM) covering all the activities of the oilseed scenario in totality were started both at the
Central and State level and to impart momentum to the Mission. These four MMs were:

MM I – Dealing with crop technology
MM II – Farmer support system
MM III – Price support, processing, storage and marketing
MM IV – Post harvest and processing technology.

MMs I and IV where technology is involved, were to be operated by DARE and CSIR respectively and Missions II and III were to be looked after by DAC.

4.2.6 The leaders for these MMs were identified both at the Central and State levels. Seventeen different agencies were involved in the various activities dealing with vegetable oil scenario. To coordinate, facilitate and execute the different activities and programmes, a full time Mission Director was appointed. The Technology Mission on Oilseeds recognized at the very outset the critical role of technology in production and processing and coordinated and integrated action, with follow up. The participatory role of all the agencies and farmers was also fully realized and a bottom up rather than a top-down approach was followed. Incentive prices for each of the oilseed crops were announced from time to time to enthuse the farmers. The National Agricultural Research System involving ICAR, State Agricultural Universities, Central Commodity Boards, private industry, Oilseed Federations, CGIAR, CSIR, ICMR and other scientific institutions, development departments/ministries/agencies were all brought together and all of them identified themselves as partners in achieving the objectives of the Mission. This cooperative, coordinated approach with a sense of ownership and commitment by all partners was one of the reasons for the success of the Technology Mission on oilseeds.

4.2.7 The Technology Mission on Oilseeds launched in May 1986, drew up the following strategic plans after due deliberations:

1. Identification of crops/States/areas, which have the highest potential for increasing production.
2. Development of short term and long term plans.
3. Identification of institutions and leaders at every level who will implement the plans and programmes.
4. Organisation of field demonstrations on a massive scale with available technologies and sensitise farmers and extension workers.

5. Documentation of all the strategies with cooperation of scientists/administrators/policy makers at the Central and State levels.

6. Development of activity milestones, time frame and implementation and review methodologies.

7. Constant and frequent reviews by the Mission Director and mid term course corrections where and whenever needed.

8. Mission activities to be reviewed once in three months by the high powered Steering Committee headed by the Secretary, Agriculture and Cooperation and Secretary, DARE with all the MM leaders and the Mission Director. Reporting to the PMO on a regular basis about the progress.

9. Organisation of national seminars and States level seminars, regional workshops involving scientists, industry, policy makers etc., and organizing training programmes.


11. A very objective and result giving strategy laid out and followed which gave good results was:
   a. Identifying crops, technologies and areas that could be exploited for increasing production, productivity and extractability of oil at the shortest possible time
   b. Identification of non-traditional areas of the country where the crops could be introduced and exploited
   c. Introducing non-traditional crops on a large scale
   d. Improving the oil extraction technologies in different mills
   e. Exploitation of rice bran and cotton seed as a source of oil and
   f. Exploitation of tree species of forest origin.

12. In the strategy, high importance was given to –
   a. Rabi groundnut production
   b. Promoting rapeseed-mustard in a big way in Rajasthan and non-traditional areas like Central, South and East India
   c. Extending area of cultivation and intensifying production and processing technologies of soybean
d. Import of seed of high yielding varieties/hybrids of sunflower and popularising it

e. Introduction of high yielding tenera hybrid plant material of oil palm

f. Import of rice bran technologies from USA/North Korea

g. Improving solvent and other rice bran technologies

h. Announcing remunerative prices

i. Extension of existing knowledge and development of new knowledge

j. Extraction of oil from cotton seed and maize

k. Blending, package and storage technologies

l. Strong support of DAC by developing National Oilseed Development Programme (NODP)

m. Gradually reducing the import of oils

The above strategies based on scientific analysis gave significant boost to oilseed production and reduced the import bill. An attempt was also made to look at alternate crops like Simarouba glauca, Pongamia, Sal, Mahua and other tree species for meeting the needs of both edible and non-edible oils.

4.2.8 As a result of the thrust given by the Government of India, the Technology Mission on Oilseeds (TMOP) achieved the goals of increasing domestic production and reducing the dependence on imported oil.

(i) Between 1985-86 and 1998-99 the production of oilseeds increased from 10.83 to 24.75 million tonnes, yield per hectare increased from 570 to 944 kgs. and the area under oilseed crops increased from 19.02 to 26.23 million hectares.

(ii) The strategy of non-traditional areas and non-traditional crops paid rich dividends.

(iii) The thrust given to rabi groundnut, soybean, rapeseed-mustard, sunflower, oil palm paid well.

(iv) The solvent extraction technologies, the conversion of hullers to shellers and rice bran extraction technologies gave good results.

(v) By 1992-93, the import bill on vegetable oils came down very significantly.
4.2.9 Addition of Pulses

Buoyed by the initial success of the Technology Mission, pulses were also brought into the ambit in 1990. The objective of the Mission was expanded to increase the production and productivity of oilseeds and pulses and to make the country self reliant in these vital sectors. The total outlay of Ninth Plan for Oilseeds (OPP) and Pulses (NPDP) production programmes was Rs. 498 crore and Rs. 181 crore respectively. This went upto Rs. 540 crore and Rs. 215 crore for the Tenth Plan.

4.2.10 The pattern of assistance under Centrally Sponsored Integrated Scheme of Oilseeds, Pulses, Oil Palm and Maize (ISOPOM) is on 75:25 sharing basis between Govt. of India and State Govts. in all components except infrastructure development and publicity. Under infrastructure development, the pattern of assistance is 50:50 sharing basis whereas for publicity, 100% assistance is provided by GOI on lump sum basis (Rs. 2.00 lakhs for each State)

Table 4.1: Area, production and yield of oilseeds and pulses from 1986-87 to 2004-05

<table>
<thead>
<tr>
<th>Year</th>
<th>Oilseeds</th>
<th>Pulses</th>
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<tbody>
<tr>
<td></td>
<td>Area (Lakh ha.)</td>
<td>Production (Lakh tonnes)</td>
</tr>
<tr>
<td>1985-86</td>
<td>190.20</td>
<td>108.30</td>
</tr>
<tr>
<td>1986-87</td>
<td>186.30</td>
<td>112.70</td>
</tr>
<tr>
<td>1987-88</td>
<td>201.30</td>
<td>126.50</td>
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<tr>
<td>1988-89</td>
<td>219.00</td>
<td>180.30</td>
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<tr>
<td>1989-90</td>
<td>228.00</td>
<td>169.20</td>
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<tr>
<td>1990-91</td>
<td>241.50</td>
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<td>1991-92</td>
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<tr>
<td>1992-93</td>
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<td>1993-94</td>
<td>269.00</td>
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<td>2000-2001</td>
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<td>2003-2004</td>
<td>237.40</td>
<td>252.90</td>
</tr>
</tbody>
</table>
4.2.11 Following production constraints were noted in oilseeds and pulses

4.2.11.1 Oilseeds

(i) Low productivity primarily due to their cultivation in un-irrigated drought prone areas.

(ii) Highly risky crop affected by vagaries of nature like floods and drought in Kharif and frost in Rabi.

(iii) Susceptibility to a number of pests and diseases, which lower productivity.

(iv) Use of poor quality seeds by the farmers and their reluctance to provide cash inputs as growing of oilseeds was risky.

(v) Distress sale of oilseeds during the harvest period where marketing channel was weak.

(vi) Lack of high-yielding varieties suitable to the local agro-climatic regions.

(vii) Non-availability of hybrids in Mustard, Groundnut, Sesamum, Soybean, Niger and pests and disease resistant varieties.

4.2.11.2 Pulses

(i) Cultivation of pulses was less remunerative than that of cereals such as rice, wheat, and oilseeds or of other commercial crops. The farmers, therefore, diverted the better lands and resources for the cultivation of other crops.

(ii) Pulses were raised under rainfed condition on marginal and sub-marginal lands, which were poor in fertility with minimal input application.

(iii) The varieties available were susceptible to a number of diseases like yellow mosaic virus and powdery mildew in moong, urd and cowpea, sterility mosaic in arhar, wilt and blight in gram, reducing the yield; they were also vulnerable to termites and susceptible to pests.

(iv) No major break-through had been achieved in pulses production technology and improvement of high yielding germ plasm. The varieties evolved in pulses had narrow adaptability and, therefore, the farmer had to manage within the limited range of varieties for different seasons and agro-climatic situations.

(v) The production of pulses especially in summer/kharif season was affected by stray cattle and Blue Bull, which damaged pulse crops such as arhar, moong and urd more than any other crops.
(vi) Lack of proper marketing infrastructure and highly fluctuating prices led to uncertainty in economic returns.
(vii) Inadequate seed availability (about 2-5% seed replacement rates)
(viii) Inadequate transfer of technology programmes.
(ix) Poor storage facilities

4.2.12 The following suggestions for improving the relationship between financial outlay and output in terms of production, productivity and quality of produce can be made

(i) Timely administrative approval for implementation of the schemes.
(ii) Funds should be released directly to implementing agencies;
(iii) Timely issue of State Level Sanctions/release of funds by the State Govts. for the programme
(iv) Arrangements of inputs, well in time by the implementing agencies under the programme.
(v) Close monitoring of the implementation of the programme activities;
(vi) Review of programme on quarterly basis;
(vii) Advance planning for inputs, particularly for seed. 5-6 years rolling plan for seed, variety/hybrids, season-wise and year-wise, agro-climatic zone wise, should be prepared by the State;
(viii) More involvement of good private sector in input supply and extension activities as provision has been made in ISOPOM guidelines;
(ix) Use of maize for production of ethanol for its further use as fuel
(x) Encouraging primary processing facilities, rural godowns, marketing infrastructure etc. in rural areas.
(xi) Involvement of farmers associations/groups/societies in implementation of the programmes/activities;
(xii) Hiring of locally available, agriculture graduates/post graduates/doctorates at various levels, viz; grass root level, district level, States level, and national level, on contract basis.
(xiii) Setting up of maize processing industries used on dry maize processing at district level;
(xiv) Encouraging the production of speciality maize like QPM, Baby Corn, Sweet Corn, Pop Corn etc.;
4.2.13 Analysis

4.2.13.1 The substantial achievements of the TMOP were made possible not only by the political commitment and zeal at all levels but by a very favourable minimum support prices regime till 1994. The tide however, started turning in 1994-95 due to the changes in the Government. The sharp monitoring petered off after the departure of Shri Sam Pitroda. At the same time, voice of urban consumers for cheap edible oil became vociferous and international edible oil prices also registered a fall. The Government liberalized of import and put edible oil under Open General License (OGL). Even more importantly, and unfortunately, the bound rate for crude and refined soybean came down to 45 per cent whereas the bound rate for mustard and all other oils came to 75 per cent and 300 per cent. This was a death knell for the concept of self-sufficiency in edible oils. It also discouraged the oilseeds farmers within the country so much so that the production and area have tapered off ever since in sharp contrast to the impressive gains in the first ten years of the Mission. Briefly, therefore, the demands of the urban consumers and the interest of oilseeds producing farmers worked at cross-purpose and the trade policy negated the benefits of the Technology Mission on Oilseeds. While it can be argued that the policy move towards imports of edible oilseeds under Open General License was a component of the trade liberalization set in motion in 1991 for commodities across the board and that it was perhaps not possible to resist international pressure on reduction of bound rate for imports, it must be said that if the trade policy had to be adopted as a component of the country’s foreign and economic policy, the Technology Mission should have been wound up at that stage itself without having to be continued till 2002 and be blamed for failing to achieve its objective, in the last years.

4.2.13.2 India is now amongst the largest importers of edible oils in the world today. There is a significant co-relation between the trade policy, minimum support price and self-sufficiency in oilseeds. The reduction in import duty to 50 per cent in 2002-03 led to one of the lowest level of production of 155.7 lakh tonnes, thereby negating the gains of the Technology Mission since its inception. The percentage of self-sufficiency of around 95 percent during 1990-91 and 1992-93 came down to only 50 percent during 2002-03. While per-capita availability of edible oils has increased because of increased availability of imported oil, it has very severely affected the
production of oilseeds and edible oil within the country and correspondingly it has meant substantial decrease in the income of farmers through production of oilseeds.

4.2.13.3 After the initial success, several other problems also cropped up. Even though several posts were specifically created for the Mission, many of these remained unfilled. The posts were filled on the basis of administrative convenience rather than on specific suitability of the concerned officials. The situation was replicated in the States where the reduced priority/ fervour for the Technology Mission in the Centre was felt. Consequently the Technology Mission became another division of the DAC with its own problems of vacant posts and inappropriate staff.

4.2.13.4 Compounding the problems further, the various officers in the Technology Mission were burdened with responsibilities for many other crops also in view of overall constraints on the staff of the department. This also led to a reduced focus on the activities of the Mission and oilseeds became one of the several crops of crops in the overall umbrella of the Crops Division of the DAC. The Mission became a conduit for passage of subsidy for oilseeds crops with substantially reduced focus on technology generation and dissemination. An era of technology poor and subsidy rich Technology Mission thus began in mid 90s due to a combination of political, economic and administrative reasons. It would be very wrong therefore to place the blame on the Technology Mission as a concept and as an institution.

4.2.13.5 The picture would not be complete without commenting on the linkages amongst the MMs, since back to back approach was a critical component of the concept of Mission. In the first ten years of the Mission, CSIR played a very important role in providing the valuable component of post harvest technology and generated some viable research particularly for extraction units, which enhanced income opportunities for farmers and led to value addition. Fillip was also provided to establishment of oilseeds processing and extraction units and technologies for refining oil particularly soybean oil that led to very substantial growth of soybean oil consumption within the country with its well known benefits as a source of rich vegetable protein and simultaneous production of deoiled cake which commanded a premium price in international market for cattle feed production. This led to substantial growth in the incomes of the oil processing units and led to proliferation of
such units. The credit for the generation of this technology and the expansion of the skill of oilseeds processing industry must be given to CSIR which was an important stakeholder in the Technology Mission and whose representative was included in the regular staff of the Technology Mission.

4.2.13.6 The pulses component, however, failed to achieve the success achieved in the early years by the TMO, primarily because the new varieties with potential for quantum jump in yield could not be supplied by MM-I. For pulses, such major technological inputs were not available in 1990 and not much happened for generation and adoption of revolutionary packages of technologies. Moreover, necessary policy supports (inputs, pricing, marketing etc) were also not extended to pulses. Consequently, the productivity and profitability levels in pulses have remained stagnant in spite of its inclusion in the Technology Mission. Consequently, the farmers diverted better lands for other crops and only the marginal soils with little potential for quantum jump in productivity and profits were reserved for pulses. Obviously a Technology Mission could not achieve much in such cases especially when there was a lack of proper marketing infrastructure and price fluctuated in a wide range. Similarly, unlike oilseeds where processing and oil extraction held great opportunities for profit through domestic and international sales, pulses did not offer this incentive because of limited export market and inadequate technology for processing. Thus, even MM III & IV for pulses did not deliver the same results for pulses as they did for oilseeds.

4.2.13.7 In 1995-96, the then Union Agriculture Minister ordered the creation of a separate Technology Mission on Maize since maize offered good opportunities for quantum jumps in production and productivity, had a good export market particularly as cattle feed and also enjoyed a good market domestically as an industrial raw-material for starch. It therefore offered incentive for the farmers to increase production since the demand was growing. This was one crop, which was amenable to the Mission Mode. Unfortunately, since the Technology Mission on Oilseeds and Pulses had meanwhile started floundering due to indifference and adverse trade policies, the Planning Commission did not approve the setting up of Technology Mission on Maize. Strictly speaking therefore the Technology Mission Mode for Maize never really took off. It remained only a route to implement the existing
Accelerated Maize Development Programme of the DAC. Administratively, however, the Mission Director for the Technology Mission on Oilseeds and Pulses was also entrusted with the responsibilities for Technology Mission on Maize and maize was therefore taken off from the overall umbrella of crops under Agriculture Commissioner. Mission Mode for Maize was only a cosmetic appellation without the benefits associated with a true Mission.

4.2.14 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has also commented on the Technology Mission on Oilseeds and Pulses as under:

4.2.14.1 “Pulses yields continued to stagnate although these crops have been under a Technology Mission since early 1990s, and the area under cultivation has also shrunk. Despite some promising new varieties and proven benefits from micronutrients and sprinkler irrigation, there is as yet no breakthrough at the farm level. Although the MSP of pulses has been increased recently to encourage technology adoption, it is the view of the Commission for Agricultural Costs and Prices (CACP) that a sharp increase in imports has blunted this effort. Oilseeds have been under a Technology Mission since 1986 and there was substantial expansion of area, yield and production till the mid 1990s. But in the absence of technological breakthrough and because of pressure from cheaper imports, the Ninth Plan period saw stagnation in yield and decline in area. There was a rebound to a record 25.1 million tonnes in 2003-04, but growth continues to be negligible. In the current year, 2004-05, there has again been a marginal fall in output. Imports of edible oils are now at par with domestic production. Rising domestic demand, trade liberalization and a sharp fall in world edible oils prices in the late 1990s contributed to this rise in imports. Domestic prices of edible oils/oilseeds remained low and were disincentives to domestic producers. Productivity improvements are required for domestic oilseeds production to remain competitive. This calls for a fresh look at the working of the Technology Mission on Oilseeds and Pulses (TMOP), which appears to be falling in its objectives”.

4.2.14.2 Technology Mission on Oilseeds and Pulses and the Technology Mission on Maize were discontinued in the Tenth Plan (2002-07). It was felt that the
Technology Mission on Pulses had not led to any appreciable increase in the productivity of pulses. While Mission Mode approach in the Technology Mission for Oilsseeds has led to a significant increase in production and productivity, yet further increase in the production of oilseeds would be increasingly dependent on the market and price signal and the Technology Mission cannot \textit{per se} address these issues. It was, therefore, felt that the extension of the Technology Mission on Oilseeds and Pulses may not serve any effective purpose.

It was realised at highest level that Technology Mission had to address major issues regarding price procurement and custom duty and closely integrate research with development and Technology Mission with its present structure would not be able to achieve this objective. It was also noted that the DAC had not been able to suggest some alternate structure for this.

4.2.14.3 However, the importance of oilseeds crops for the farmers and for the country was recognized and the concerned departments were asked to continue various programmes and schemes for development of oilseeds, pulses and maize. There was, ample justification for giving special thrust to the oilseeds, pulses and maize not only from the point of view of reducing imports but also from the point of view of livelihood of farmers involved in their cultivation.

4.2.14.4 In this context it has however to be noted that DAC had prepared an alternative structure for the Technology Missions on Oilseeds and Pulses which could not be debated and meanwhile the Tenth Plan came into operation without the Technology Mission on Oilseed, Pulses and Maize.

4.2.14.5 However, TMOP was replaced by a comprehensive and integrated scheme of oilseeds, pulses, oil palm and maize with substantial outlays and with reasonably differentiated approach and restructuring of the erstwhile Oilseeds Production Programme, National Pulses Development Project / Accelerated Maize Development Programme and Oil palm. A greater flexibility was also provided to the States for inter-component diversion of funds and provision for innovations, participation of private sector in the implementation of the programme etc. Briefly, therefore, the stress on oilseeds, pulses, maize and oil palm was continued without the structure of the Technology Mission, which in any case had become fairly weak over the years.
due to several internal and external reasons mentioned earlier. It must also be said that it is doubtful whether the achievements of the Technology Mission on Oilseeds in the early years in a protectionist environment could be replicated in a far more open economic environment, both nationally and internationally, prevalent today.

4.3 Technology Mission on Cotton

4.3.1 Cotton is an extremely important commercial crop providing raw-material for 1500 mills, 4 million handloom and 7 million power looms providing livelihood to 60 million people who depend on cotton cultivation, processing and textile trade. On the economic front, India contributes around 15 per cent of the global cotton production and textiles including cotton contribute more than 20 per cent (2003-04) of total Indian export.

4.3.2 In view of lower yields and poorer lint quality of cotton as compared to many other countries, the Government of India launched Technology Mission on Cotton (TMC) in February 2000. The TMC is being implemented in 13 States viz. Andhra Pradesh, Gujarat, Haryana, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal and Tripura.

4.3.3 The Technology Mission on Cotton consists of four Mini-Missions (MMs), MM-I on research is being implemented by Indian Council of Agricultural Research (ICAR), MM-II for enhancing production and productivity is run by DAC and MM-III on the development of market infrastructure and MM-IV on modernisation of ginning / pressing factories are being dealt by the Ministry of Textiles.

4.3.4 The MM-I and MM-IV are 100% funded by Government of India, while the expenditure for MM-II and MM-III are shared by Government of India & States on 75:25 basis and 60:40 basis respectively. The concerned Ministries are providing funds for implementation of their Mini-Missions.

4.3.5 The approved outlay for Tenth Plan is Rs. 568 crores, Rs. 355 crores, Rs. 108 crores and Rs. 85 crores respectively for the four MMs.
4.3.6 Achievements under various Mini Missions are as under:

4.3.6.1 MM I

The output under MM-I is primarily related to handling of biological population and basic research on cotton, hence, the output is composite by including quantitative and biological indicators.

- About 15 diploid and tetraploid cotton cultivars with high fibre quality have been identified for different zones of cotton cultivation for fast track release by All-India Coordinated Cotton Improvement Programme.
- In germplasm screening, genotype resistant to cotton leaf curl virus and jassids have been selected. Some entries have additionally been identified for drought tolerance.
- Evaluation of promising cultures for cottonseed oil provided seed oil content up to 27%.
- Morphological markers have been developed and documented to characterize the varieties and hybrids (including the parents) on the basis of easily identifiable characters. Bio-chemical and molecular finger printing of cultivars is also progressing fast.
- Evaluation of soil suitability for cotton based cropping systems was undertaken in 9 States and database developed for soil suitability has been processed for its depiction on soil resource map.
- Newer strains of bio-inoculants have been developed for their mass multiplication to result in sustainable and cost effective production of high quality fibre.
- In integrated Pest Management, almost 50% reduction in insecticide sprays was possible in IPM blocks as compared to farmers' practice.
- In bio-control studies, fermented culture methodology was found suitable for mass production of *Tricoderma*.

4.3.6.2 MM II: Assistance has been provided during the Tenth Plan for distribution of certified seeds (37398 quintals), field demonstrations (60175), training of extension workers (883), Farmers’ training (4978), seed delinting plants (2), sprinklers (12339) and drip sets (2514) pest surveillance IPM demonstrations (5548) etc.
4.3.6.3 MM III: Improvement is undertaken in marketing infrastructure through setting up of new market yards, improvement of existing market yard and activation of dormant yards. 60 per cent of the cost of development being borne by GOI and the balance by APMC/State Governments. Central assistance is limited to Rs. 1.50 crores for new yards, Rs. 0.09 crores for improvement of existing yards and Rs. 0.25 crores for activation of dormant market yard, although this last category is no longer prevalent in the Tenth Plan. Grant in aid is provided to Agricultural Produce Market Committees. A total of 161 market yards have been sanctioned of which 93 have since been completed.

4.3.6.4 MM IV: Takes care of modernisation of ginning and pressing factories for which a capital subsidy @ 25% of the cost limited to Rs. 20 lakh per unit is provided. A total of 616 ginning and pressing factories have been sanctioned of which 322 factories have been completed. To achieve the enhanced targets, the Ministry of Textiles increased the number of consultants and the programmes have been placed at the disposal of the Cotton Corporation of India (CCI) in order to make the facility of manpower and infrastructure available in CCI for the project. CCI has a TMC cell headed by the ex-CMD of CCI which has been spearheading MM-III & IV. This strategy of earmarking a professional exclusively, with technical and administrative backup available from a professional body, can be cited as one major reason for the comparative success of MM-III&IV vis-à-vis other MMs.

4.3.7 Constraints impeding progress

(i) Nearly 65 percent cotton area is rainfed mainly in the Central and Southern zones.

(ii) Cotton crop is particularly prone to pests and diseases

(iii) The excessive use of pesticides and the synthetic pyrethroids have also led to development of immunity in insects against the pesticides.

(iv) Large scale use of linted seed by farmers causing poor plant stands resulting in loss of yields and buildup of disease and pests.

(v) Wide fluctuation in cotton prices and inadequate market infrastructure.

(vi) High incidence of contamination in cotton due lack of proper marketing infrastructure and modernized ginning / pressing facilities.
4.3.8 Technology Mission on Cotton has its four constituents MM under different administrative Department / Ministries. The DAC had entrusted impact evaluation study of MM-II of TMC to Agricultural Finance Corporation Ltd. (AFCL). The main recommendations / findings made by AFCL, were as under:

(i) Non-availability of certified seeds of new varieties / hybrids as a result of poor seed requirement planning by States.

(ii) The field demonstrations may be organized on five hectare size for more effective dissemination of technology.

(iii) Training courses for upgrading the knowledge and skills of farmers, extension officials are needed.

(iv) The establishment and production of bio-agents and their sale may be entrusted to private sector.

(v) Pheromone traps are not available in required number.

(vi) Adopting seed village concept would be appropriate for production of certified seeds.

(vii) The results of Insecticide Resistance Management (IRM) reported so far are encouraging and may usher in a new era in pest management in cotton.

(viii) All individual components of IPM need to be implemented as a package in the interest of cotton growing farmers.

4.3.9 The Ministry of Textiles have also taken up the impact assessment of the implementation of MM-III and IV by Textile Research Associations (TRAs) and Central Institute for Research on Cotton Technology (CIRCOT). Indian Cotton Mills' Federation (ICMR) and East India Cotton Association (EICA) have also been associated with the impact assessment. Preliminary report of impact assessment suggests that the development of market yards and modernization of G&P units will help textile industry in getting good quality of cotton. The trash percentage in cotton processed by the modernized ginneries has also come down from 6-8% to less than 2%.

4.3.10 The Technology Mission on Cotton has helped to achieve the target of production of cotton. The production target under TMC was set at 215 lakh bales by the terminal year of the Tenth Plan. The cotton production during 2005 has however touched a peak record at 232 lakh bales and record productivity of 440 Kg per hectare
as per the estimates of Cotton Advisory Board (CAB) in the Ministry of Textiles. Besides, pesticide consumption has decreased in cotton resulting in decrease in cost of cultivation and thereby raising income of farmers. However, the productivity of cotton in India needs to be increased further. To improve the production, productivity and quality, following points are suggested:

(i) To bring more area under irrigated / semi-irrigated conditions particularly in central and southern zones.

(ii) Providing matching share by State Governments under MM-II and MM-III of TMC and timely release of funds by them.

(iii) Immediate modernization of more ginning & pressing factories to improve the cotton quality.

(iv) In situ conservation of rainwater by dovetailing watershed and other such schemes.

(v) States to involve industries, cooperatives as stakeholders in the implementation of TMC particularly through contract farming.

(vi) All cotton growers to be covered under Crop Insurance.

(vii) Cotton Corporation of India, NAFED etc. needs to be strengthened so that no cotton is sold by farmers below MSP.

(viii) More efforts for educating farmers and others to reduce cotton contamination.

(ix) Stringed punishment for spurious sale of seeds included Bt-cotton as well as pesticides / bio-agents etc.

4.3.11 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has however commented on the Technology Mission on Cotton as under:

“Cotton production had also fared poorly during the Ninth Plan. Yields decline due to a combination of lower prices and increased pests incidence following rapid price-induced area expansion in the previous decade. India’s cotton economy continues to suffer from well-known problems causing low yield and poor quality. It is also well known that, if these problems are addressed, very large gains are possible with end of the Multi-Fibre Agreement. In view of this, a Technology Mission on Cotton (TMC) was launched in February 2000 and approval given for cultivation of Bt varieties. With limited results from these efforts thus far, mills are importing larger quantities of
quality cotton. There is an urgent need to re-look the TMC and in particular, to involve the textile industry more closely on cotton technology”.

4.3.12 Analysis

4.3.12.1 The Technology Mission on Cotton (TMC) has been analysed in the First Report of the NCF (Serving Farmers and Saving Farming, December 2004) in Chapter VI on “Enhancing Cotton Productivity, Quality and Global Competitiveness”. It has already being commented that the performance of the Technology Mission as a whole has been mixed. While MMs III & IV appear to be working satisfactorily towards achievement of physical targets for establishment and renovation of market yards and renovation and modernization of ginning units respectively, the achievement of MMs I & II do not appear to be on track. Mere increase in yield and production during 2003-04 and 2004-05 cannot go to prove the efficacy of the MMs I & II since good prices in increased areas of Bt hybrids as well as increased involvement of cotton mills and private sector for technology transfer have not been equally responsible for the higher yields. The core activity of MM-II would have involved a quantum jump of supply of seeds of open-pollinated varieties and the adoption of INM, IRM & IPM technologies beyond the project areas; this does not seem to have happened.

4.3.12.2 Another major shortcoming in the TMC appears to be the operation of the four MMs in seclusion without observable linkages and integrations. This has resulted in sub-optimal performance of the TMC. Some of the States also have not contributed their share of the budget and have consequently under-utilized the central resources particularly in MM-II. Consequently, the TMC is reduced to a routine departmental programme, individually implemented by the concerned departments. Unless the various MMs work together cutting across departmental lines and receive inputs and provide feedback to the other partner MMs and to the State governments, the benefits of the Mission approach would be difficult to achieve. Indeed, some growth in production and productivity would in any case come about in the normal course as has been happening with many other crops which do not have the benefit of a Mission for them. Even though cotton is an extremely important crop with wide ramifications for the income of farmers and export earnings for the country, the Technology Mission on Cotton has not performed comprehensively to its full potential.
4.3.12.3 It may be useful to analysis some of the reasons for the varying success of the various MMs under TMC.

4.3.12.3.1 Mini-Mission I

As regards MM-I, the progress had been slow because the process of research and development of new varieties of seeds is a time consuming job. This research job is undertaken either by the Government Department or by the Government Institutions where they have to follow all the procedures, which further take time.

4.3.12.3.2 Mini-Mission II

In MM-II again the transfer of technology is undertaken by the Ministry of Agriculture, Govt. of India through the State Governments. If the attitude of the State Government is indifferent naturally the progress becomes slow. It is felt that the results and the extent of success of MM-I and MM-II may become more clear after the passage of few years.

4.3.12.3.3 Mini-Mission III

As against MM-IV, the MM-III i.e. modernization of existing Market Yards or setting up of new modern Market Yard had been some what slow.

- In the initial years, the cash rich Market Yards came forward and modernized the Yards by taking TMC share, as they did not need any money from the State Government.
- However, Market Yards with shortage of funds had to depend on the State Governments for their share for modernizing and hence the progress of modernization of Market Yards has now become slower.
- The Market Yards undertaking modernization have to follow the prescribed procedure of the Government for sanction, tendering etc. which require lot of time.
- The participants in the modernization i.e. Market Yards, State Governments do not feel any direct economic benefit as in the case of Ginning & Pressing factories where direct economic benefit goes to the owners.
4.3.12.3.4 Mini-Mission IV

The reasons for the better success of MM-IV can be brought out as under:

- The first and foremost reason for the success had been the single window system between the Government through Technology Mission on Cotton and the entrepreneurs i.e. Ginning & Pressing Factory owners or prospective entrepreneurs.

- Due to expected increase in the productivity and production of cotton, the Ginning & Pressing factory owners were eager to modernize their factories to compete both domestically as well as globally for sale of their cotton and to have larger turnover and profits.

- Due to increased demand for cleaner cotton as well as for contamination free cotton and the willingness of the spinners (textile mills) to pay a premium on cleaner cotton, entrepreneurs came forward both for modernization of their existing factories as well as for setting up of new factories.

- The Cotton Corporation of India Ltd. (CCI), which was the implementing agency for TMC under the Ministry of Textiles, Govt. of India, started giving preference to the modernized units for processing its stocks. This also motivated many of the Ginning & Pressing factories to modernize.

- The technology i.e. machinery and equipment proposed for the modernization of the Ginning & Pressing factories was available indigenously from multiple manufacturers and hence the same was available on short notice and at competitive rates.

- Direct economic benefit to the Ginning & Pressing factories due to larger turnover, reduced complaints and better client relationship with the spinning mills motivated the Ginning & Pressing factories for modernization.

- The cost benefit analysis indicated larger profit margin in processing and packing of cotton to the Ginning & Pressing factories due to savings in electricity, repairs and labour as compared to conventional factories.

- The results were assured and guaranteed benefits in terms of productivity; quality of processing and reduction in contaminants and risk factor was limited one for the production of cotton in the catchments areas.

- The Ministry of Textiles, Govt. of India and CCI with the help of other institutions like Office of the Textile Commissioner, Textile Committee,
CIRCOT, ATIRA etc. held awareness meetings by involving all sectors like Ginning & Pressing factory owners, Spinning mills, farmers etc. to motivate for modernization.

4.3.13 Remedial Measures

4.3.13.1 Looking to the importance of cotton as a crop for a very large number of farmers, particularly in the dry lands and its downstream contribution, to a very large numbers of weavers and high end industrial products in textile which have vast foreign and domestic markets and considering the opportunities expected to arise due to the demise of the Multi-fibre Arrangement in 2005, it was only appropriate that the Mission approach for cotton was adopted in 2000, itself in order to achieve growth in production and productivity of cotton and expansion of facilities for marketing and processing of cotton into textiles. It was also conceptually in order to work through the four MMs since the goals of the Mission could not be achieved by a single department. Concerned departments like Agricultural Research, Agriculture and Textiles had to come together for coordination and implementation to achieve the prescribed goals within the shortest possible time. However, certain congenital problems need to be highlighted at this stage, which constrained the TMC from the very beginning. The Technology Mission must be a self-contained entity with its own full time professional Mission Director who could tap on the expertise of experts in research, extension, marketing and processing for value addition. As it were, the Agriculture Commissioner with his multifarious duties relating to various crops was designated as Mission Director. Notwithstanding his expertise seniority and position in the Government, he could not be expected to devote single minded attention to the activities of the Mission. Even the lower levels of the administrative hierarchy were burdened with other responsibilities for many other crops and this too acted adversely on the focus needed for cotton in the Mission Mode. Cotton, therefore, became just another crop in the portfolio of the Agriculture Commissioner thereby whittling down the very concept of Technology Mission.

4.3.13.2 It is further noted that no separate staff has been provided for the TMC and the work is being handled through deployment from amongst the existing departmental staff. Once again the degree of single-minded devotion to the goals of the Technology Mission seems to be missing. The staff also has not been selected on the basis of any specific suitability but on the basis of administrative convenience. A
specialized vehicle like a Mission cannot run to its full potential with such a diffused human resource.

4.3.13.3 Even, the Committee system of directing, controlling and monitoring, although well designed had its problems in practice because senior officers were not attending the various meetings due to their pre-occupation and adequate steps do not seem to have been taken to ensure their attendance. Consequently, the effectiveness of the meetings in sorting out coordination issues suffered. It would be necessary for instructions to be issued that only officers above certain levels should attend the meeting on these departmental committees for the various MMs.

4.3.13.4 Presently, the Cabinet Secretary is the Chairperson of the Empowered Committee and this is ample evidence of the importance attached by the Government to TMC. It is, however, seen that the meetings of the Empowered Committees are not frequent enough in view of the pre-occupation of the Cabinet Secretary who cannot be expected to devote enough time to the deliberations of the Committee on a continuing basis. It may perhaps be desirable to consider naming Secretary (Coordination) to be the Chairperson for the Empowered Committee on behalf of Cabinet Secretary.

4.3.13.5 In view of importance of cotton both for the farmers and India’s domestic and international trade, the TMC is a thrust area under the Prime Minister. While, this is very welcome, it has added to the volume of reporting by the TMC in respect of progress of the Mission. While monitoring is extremely important, a lot of time gets devoted to compilation of data, which become repetitive. There appears need to rationalize reporting of the TMC in order to ensure more time for the officers to devote to the actual work of the Mission. Particularly touring. Perhaps reporting only to the Empowered Committee and to the Planning Commission may suffice.

4.3.13.6 The Mission guidelines also provide for National Level Monitoring Team (NALMOT) consisting of officers from the Mission and knowledgeable retired officials who tour in the field in order to provide ground level information about the quality of implementation in stead of mere statistics. While this is a very welcome initiative it may be useful to make these monitoring teams a little more broad based with involvement of farmers/NGOs also. It is however learnt that the State Level Monitoring Team (SALMOT) have not functioned with equal efficacy. It may be
useful for the Empowered Committee to specially review the functioning of monitoring at the State level and give suitable directions to the defaulting States.

**Box-1**

**Insecticide Resistance Management in Cotton**

1. Cotton pest management has become complicated over the past one decade. The incidence and damage caused by American boll worm (*Helicoverpa* during the 1997-98 seasons was the most severe in recent times. It is estimated that yield losses up to 25-50% were caused; primarily due to *Helicoverpa armigera* coupled with bad weather and farmers were forced to use more insecticide applications of up to 20-30 rounds. Based on studies at Central Institute of Cotton Research (CICR), evidence indicates that excessive use of insecticides also led to problems of insecticide resistance in *Helicoverpa* and *Spodoptera*, which further necessitated the repeated application of insecticide. Scientists have focused on the management of resistant pests through the use of the insecticide resistance monitoring data generated over many years and a simple strategy based on ecological principles was designed to conserve beneficial organisms to assist pest management.

2. Area wide farmer participatory ‘Insecticide Resistance Management’ (IRM), field demonstrations were carried out by scientists in nine villages in Maharashtra, three villages in Andhra Pradesh, eleven villages in Punjab and one village in Tamil Nadu. These were just the beginning of a planned effort to help the Indian farmer appreciate the value of making good pest management decisions.

3. In an excellent case study in Wardha district in Maharashtra, about 650 farmers of nine villages have harvested an average of 800 to 1600 kg of seed cotton (kapas) per hectare with just two third of the normal production cost due to saving accrued from reduction in insecticide use. The IRM strategy was implemented in about 1200 hectares. Ninety per cent of the farmers sprayed 0-1 times at Economic threshold limit (ETL) of *Helicoverpa armigera* (American Bollworm) mostly with Endosulfan at a time when resistance of bollworm to this chemical was the least. This resulted in 70-80 per cent reduction in pest population.

4. Based upon the experience gained by scientists, Central Institute for Cotton Research (CICR) of Indian Council of Agricultural Research (ICAR), proposed to the DAC, Ministry of Agriculture to adopt this technology and provide funds as the institute will carry out the project.

5. Accordingly, the DAC provided funds to CICR for this purpose under MM-II of Technology Mission on Cotton. 26 districts in the country were selected where maximum pesticide consumption takes place. In each district 20 villages were selected. A Project Officer having sufficient knowledge in IRM was meant for each district while 20 skilled field worker (one for each village) was also assisted under the scheme for their salary etc. The Project Officer with a two-wheeler moves around 20 villages to guide continuously the field workers who will in turn guide farmers throughout the cotton season for the pest management particularly in the use of insecticides so that besides pest management, the resistant in pests does not evolve quickly with the results the number of sprays decreased and accordingly the pesticide use was reduced substantially. Furthermore, assistance was also provided under IRM project towards farmers’ field days, farmers’ exchange programme, training of project officers, field workers, publication of training manuals, booklets etc.

6. The IRM project made tremendous impact in pest control in the selected villages and improved productivity and economic conditions of the cotton growers substantially. This can be judged from the progress of IRM during 2004-05. As per report of CICR for the year 2004-05, the IRM project was implemented in 11 major cotton-growing states in the country covering 444 villages in 27 districts. 21617 farmers adopted these strategies on 61732 ha area under cotton crop. The average number of cotton sprays was reduced from 8.93 in case of non-adopting farmers to 4.8 in case of adopting farmers resulting in 46% reduction in number of sprays. Rs.2890/ha were saved in case of IRM farmers on account of the cost of plant protection and also 11% increase in the yield resulted in to Rs.6900 additional profit over the non-adopting farmers besides less environmental pollution.
Contract Farming in Cotton

1. The cotton produced by the farmers is used by the mills for the manufacture of textile goods. The value of textiles and garments depends upon the quality of cotton i.e. various characteristics of cotton fiber and contaminants therein. Therefore, the mills require a specific type of cotton to meet their specific requirements. In this process, it is very important that farmers should produce the type of cotton and the quantity required for use by the mills. In this respect, it will give more dividend if farmers i.e. the producer and the mills i.e. the user, are brought face-to-face for the type of cotton and quantity of the cotton required by the mills through a kind of contract farming. This will provide linkage between farmers and mills.

2. The necessary contract farming rules can be framed by both producer and user themselves. In fact, such contract farming has already started in India for cotton. The contract farming started by Appachi Indian Company, Pollachi and others as well as Cotton Corporation of India (CCI) in the Ministry of Textiles in some states during 2002-03, are the examples of such endeavours. CCI organized first such national level seminar in Hyderabad during 2002 and started such contract farming in cotton during 2002-03 itself.

3. Besides initiatives by private sector and CCI, the Tamil Nadu Government, with the active involvement of CCI, has also started contract farming in cotton with the mills in Tamil Nadu during 2005-06.

4. The benefit of contract farming is:

For the Industry:
Assured supply of good quality, unmixed and uncontaminated cotton, thus no more hassles of importing cotton.

For the Growers:
No dilemma about choice of seed / variety and buying inputs. Easy availability of loans for buying inputs. Higher yields with reduced expenditure leading to more profit from cotton cultivation. Easy and assured sale of cotton. Mills often facilitating supply of inputs / services for the success of contract

5. CCI is actively facilitating / catalyzing the contract farming in the country since 2002-05. Since 2005-06, CCI has also been involved for the implementation of MM-II of Technology Mission on Cotton which will help CCI to accelerate bringing farmers and mills in contract mode of cotton production and procurement. The mills and others involved in contract farming are as under:
   - Many mills come forward to collaborate contract-farming programme in cotton with CCI. Some of them are (i) Nahar Group of Mills, Ludhiana (ii) Golak Group of Mills in Kamataka (iii) Pratibha Sintex, Indore (iv) Super Spinning Mills, Coimbatore (v) Sangh Spinners India Ltd. Hyderabad.
   - Royal Classic Mills (Tamil Nadu) has also come forward for contract in collaboration with State Government and CCI.
   - Private organizations like Appachi Cotton Co., Pollachi that have followed contract programme since 2002-03, have also joined CCI for implementation of the project during 2005-06.

6. The coverage in cotton contract, which is still at initial stage, has shown very encouraging results. The coverage of the cotton contract since 2002-03 particularly by CCI is as under:
   - CCI has taken up programme project during 2002-03 for first time in four states, viz. Gujarat, Madhya Pradesh, Andhra Pradesh & Orissa covering an area of 2996 hectares in 92 villages involving 3157 farmers.
   - During the same year programme was also taken up by three other organizations viz. Super Spinning, Coimbatore, Appachi Cotton – Pollachi, and Amrit Traders in Andhra Pradesh, on an area of 11500 hectares. Thus, during 2002-03 contract farming in cotton was taken on an area of 14496 hectares in the country.
   - During 2003-04 CCI had taken up the programme on an area of 1250 hectares in the states of Haryana and Andhra Pradesh involving 713 farmers. Other organizations in the state of Maharashatra (4), Kamataka (2), Punjab (1), Haryana (1), Gujarat (1), Andhra Pradesh (1) & Tamil Nadu (1) have taken up the programme on an area of 4196 hectares.
   - During 2004-05 CCI has taken up the programme in collaboration with other companies on an area of more than 6000 hectares. Others have also undertaken on area of 2648 hectares on their own.

7. The past results obtained by CCI in such contract farming programme, are briefly as under:
   - Productivity was increased. Productivity increase from 80 kg to 240 kg was observed in different locations.
   - Cost of cultivation was lower.
   - The quality of cotton was superior in case of contract farming fields as compared to other fields, as mixing of variety was not there.
4.3.13.7 A major problem identified for the TMC is the financial release procedure for assistance. It must be remembered that Technology Missions must be treated as a special purpose vehicle for achieving specified goals in the shortest possible time. Obviously, therefore, the rules and procedures for Technology Missions must be different from those, which govern the normal programmes of the Ministries. Specifically speaking, it is well known that in spite of improvements, the procedures for release of funds from the Central Government to State governments take time and are in many cases not in tune with the requirements in the field, because of the time schedule of the budgetary exercise. There is a substantial delay in the release of funds received from the Central Government to the field, especially when the State share has to be provided. Such procedural bottlenecks are lethal for work in the field since crop cycle particularly for cotton demands availability of funds at the beginning of the crop season in April itself. This too is a issue which should be addressed on priority by the Empowered Committee. It may be worthwhile to follow the pattern whereby funds from the Ministry of Rural Development pass directly to the District Rural Development Agency. It may also be worthwhile to see whether the procedure followed in the Technology Mission for Horticulture in the North-Eastern region of routing funds through Central and States level Small Farmers Agri-Business Consortium (SFAC) could be followed.

4.3.13.8 In general, while it can be said that Technology Mission on Cotton has benefited due to the multi stakeholders’ involvement, it must also be commented that certain key areas still require greater and time bound attention for MM-I. It would be very necessary to develop extra long/long staple cotton varieties, which not only have the requisite length but also have the strength. This would help in generation of higher incomes for farmers undertaking production of extra long/long staple varieties of cotton and would also reduce and hopefully ultimately eliminate large imports of Egyptian cotton. Another area where ICAR would have to work harder in MM-I relates to research for Bt. Cotton hybrid in the public domain, in order to provide competition to the private sector, which rules this segment, and also to protect farmers from the high prices being charged by the private sector. Bt cotton has grown in terms of area coverage in most States, even though the varieties in the private sector were not formally released by the ICAR system for quite sometime simply because of its known high productivity and in spite of its high price. It is, therefore, clear that more
and more farmers would go in for Bt varieties if only they could get the quality assurance and reasonable price of seed.

4.3.13.9 While MMs III & IV have been doing well it must be recognised that the consumption of cotton in the mills is not rising, commensurate with the rising production in the wake of increase under Bt cotton and the work done by the MM-II for increasing the production and productivity of cotton. If this situation is allowed to continue, the higher supply and stagnant demand would lead to a fall in prices of cotton, causing substantial distress to cotton farmers and adverse effect on their desire to grow cotton as also their willingness to invest in the requisite quantities of inputs. While the Technology Upgradation Fund of the Ministry of Textile has benefited the mills substantially, a lot can still to be done beyond the stage of ginning. It is unfortunate that yarn is being exported to China and its conversion to textile through expansion of capacity and modernisation has not been up to the mark. It must be recognised that increase in area, production and productivity of cotton by itself may be desirable at the macro level but it is the income of the farmers which should be the major concern and this can be achieved only if the marketing arrangements and demands improve substantially. The real challenge lies in enhancing the quality awareness amongst farmers and ensuring transparent and scientific marketing and finally modernisation of the through the various stages. This can be and has to be achieved through more frequent interactions between the farmers and NGOs, scientists, and mills. TMC is the ideal instrument to facilitate this interaction on a continuing basis in order to positively assure incomes of cotton farmers.

4.3.13.10 Considering the priorities and potential of the TMC and taking in to account the operational problems which are making the Mission prone to business as usual approach and making it a clone of the normal Intensive Cotton Development Programme, it would be timely to set up a National Cotton Council with participation from farmers, Textile industry, NGOs, public sector and other major stakeholders under the chairmanship of Union Agriculture Minister and with Union Ministers of Textile and Commerce serving as Co-Chair persons. The establishment of the National Cotton Council on the lines of International Cotton Council has already been recommended in the First Report of the NCF. (Para 20 of Chapter VI)
4.4 Technology Mission for Integrated Development of Horticulture in North Eastern States, J&K, Himachal Pradesh and Uttarakhand

4.4.1 The Technology Mission for Integrated Development of Horticulture in North Eastern States, J&K, Himachal Pradesh and Uttarakhand Scheme was launched in the eight North-Eastern States namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim w.e.f. 29th February 2001. During the Tenth Plan, the scheme was extended for implementation in other three contiguous hill States namely Jammu & Kashmir, Himachal Pradesh and Uttarakhand w.e.f. 23rd August 2003.

The objectives of the Mission, now running in its fourth year, are as under:

- To establish Convergence and Synergy among numerous ongoing governmental programmes, achieve horizontal and vertical integration of these programmes
- To ensure adequate, appropriate, timely and concurrent attention to all links in the production, post harvest and consumption chain
- To maximize economic, ecological and social benefits from the existing investment and infrastructure created for Horticulture development and
- To promote ecologically sustainable intensification, economically desirable diversification and skilled employment.

4.4.2 The Mission is being implemented in a mission mode with an end-to-end approach which includes development and introduction of high yielding varieties and technologies, expansion of area, post harvest handling and management, marketing, value addition and processing of horticultural produce with the following four MMs.

4.4.2.1 MM I: Research – coordinated and implemented by Indian Council of Agriculture Research. This MM concentrates on technology generation appropriate to the region. Major components under MM-I are supply of basic seed and planting material, technology standardizations, refinement, on farm demonstration and training.
4.4.2.2 MM II: Production and Productivity – coordinated by DAC and implemented by State Departments of Horticulture/Agriculture. This MM aims at increasing production and productivity of Horticulture crops by adoption of improved production Technologies.

4.4.2.3 MM III: Post-harvest management and Marketing-coordinated by DAC and implemented by Directorate of Marketing & Inspection/ National Horticulture Board. This MM aims for efficient post-harvest management techniques, which include development of cold storage facilities, efficient transport and marketing facilities etc.

4.4.2.4 MM IV: Processing-coordinated and implemented by Ministry of Food Processing Industries, Government of India. This MM aims at promoting processing industry for value addition to Horticulture produce by promoting new processing units, up gradation of existing units.

4.4.3 A total of Rs.453.36 crores were allocated for the Mission since inception. By far, MM II accounted for the highest share of Rs. 368 crores followed by MM III with a share of Rs. 56 crores. MM I & IV lagged at Rs.18 crores and Rs. 9 crores, respectively. Together, MM II and III accounted for more than 90% of the funds allocated. The proportion of subsidy as a percentage of total outlay was as high as 95%. During the Tenth Plan a total of Rs. 386.11 crores were allocated out of which more than 90% was allocated for MM II and MM III. In fact, the allocation under MM II is nearly 20 times that under MM I.

4.4.4 Under MM I, the coordinating research institutes have identified suitable crops for developing technologies and for production of planting material in the region.

4.4.5 Under MM II, assistance was provided for promotion of potential horticulture crops in these States besides creation of infrastructure facilities for improving the productivity of the crops such as irrigation sources, integrated pest management, protected cultivation, organic farming, on-farm handling and other related activities. In addition, assistance was provided for training of farmers within
and outside the States, training of trainers as well as women entrepreneurs involved in horticulture programmes for large-scale adoption of scientific technologies in these States. Besides some of the major achievements reported under MM II include bringing an additional area of 55,087 hectares under various horticultural crops, which includes fruits (24887 ha), vegetables (9336 ha), spices (13445 ha), plantation crops (3713 ha), medicinal plants (1125 ha), aromatic plants (1683 ha), flowers (793 ha). This amounted to an increase of nearly 8%. Among the 8 NE States Sikkim, Mizoram recorded a maximum percentage increase in area of 38.11% and 34.83% followed by Arunachal Pradesh (17.45 %) and Nagaland (13.8%). Among the perennial fruits expansion of area under citrus fruits, which includes orange, lime, lemon is 7286 ha followed by banana, (4503 ha) passion fruit (3885 ha) pine apple (3214 ha) and apple (1113 ha) & litchi (1109 ha). Besides, Kiwi was introduced in an area of 65 hectares Among spices, ginger cultivation has increased by 3356 ha followed by large cardamom 3775 ha, black pepper and turmeric. An additional area 1125 ha of medicinal plants, 1683 ha of aromatic plants and 818 ha of flower crops have increased the opportunities for tapping the potential of high value crops over the pre-mission period (2000-01). A few States like Mizoram and Manipur have made impressive progress in vegetables, promoting cultivation of second crop in a year after paddy, adopting cluster approach, thus helping the growers to earn better returns from same unit area of land. Major success has been achieved in promoting Anthurium in Mizoram using planting material imported from abroad through a private company based in Bangalore. Besides, grapes (Bangalore Blue variety) are being promoted in and around Champai. Passion fruits of Kaveri variety of Bangalore are being popularised on a large scale in Mizoram, Manipur and Nagaland. A total of 295 nurseries have been set up. A successful mushroom unit has come up near Mao in Manipur cultivating ‘shitake’ and button mushrooms involving 200 farmwomen. Success was reported in creation of water bodies and on-farm water management. Under the component of organic farming, 535 earthworms /vermi compost units were reported to have been developed. Training of farmer/extension officers has also been taken up. The tissue culture laboratories have been mostly set up by the State Directorates of Agriculture.
4.4.6 Under MM III, assistance was provided for development of 29 wholesale markets, 199 rural primary markets, 26 Apni Mandis and 15 State grading laboratories.

4.4.7 Under MM IV, assistance has been provided for establishment of 9 processing units.

4.4.8 **Analysis of the constraints affecting the Mission:**

4.4.8.1 Unlike the other Missions, the TM for NE & Himalayan States is not restricted to a single crop. Keeping in view the diverse climate and favourable soil conditions conducive for their commercial exploitation in the Himalayan hill States, the Mission focuses on horticultural crops. The entire Himalayan region is a favourable agro-ecosystem for growing a wide range of fruits, vegetables, medicinal and aromatic plants and other cash crops. The holistic development of horticulture in the region with backward and forward linkage is expected to result in horticulture led transformation in terms of increased productivity, nutritional security, enhanced income and well being of the local farmers.

4.4.8.2 However, review of the Mission activities shows a large gap between the original concept and actual implementation in the field. This was brought out clearly in the First Report of NCF. A Committee was set up by Ministry of Agriculture to carry out the Technical Evaluation of this Technology Mission. This Committee submitted its Report in 2005, which highlights the problems observed in the implementation of the MMs.

4.4.8.3 A total of Rs. 18.8 crores was allocated under MM I. Five ICAR institutes/centre based in the North East region are involved in implementing the R&D programmes of MM I. R&D activities taken up under MM I do not provide need-based technological support for the crops and activities identified for development by the States. It was found that the States had not consulted the ICAR for the varieties/hybrids recommended for particular State/region of the crops identified for area expansion under MM II.
4.4.8.4 No evaluation of suitability and quality of varieties/hybrids marketed by the private companies and freely used by the farmers was undertaken by the ICAR Institutes.

4.4.8.5 Similarly, experimental trials had not been carried out for all the States to evolve package of practices appropriate to the agro climate condition for guidance to the departmental staff and the farmers. The State departments also did not place any requisition for specific information/technical advice before implementing the area expansion programme.

4.4.8.6 The ICAR Regional stations have also not taken up any systematic studies for developing packages of practices including vegetative propagation techniques. It was observed that the farmers were applying inputs in an arbitrary manner.

The ICAR units are also not involved in the working of different laboratories allotted to each State.

4.4.8.7 Under MM II, a total of Rs. 368 crores were allocated since inception. Every State has been allotted financial support for all crops and all the components, irrespective of the commercial potential and need, suggesting a lack of an agro-ecological and comparative advantage approach in priority setting.

4.4.8.8 It was also observed that each district had been allotted all the crops with small area fixed as target for each crop. Such an approach is not conducive to long-term impact of the investment being made in area expansion, nor is conducive for proper planning of infrastructure for storage, marketing or processing of the produce expected from each district.

4.4.8.9 Varieties / hybrids promoted are chosen arbitrarily mostly out of those available in the market, irrespective of the adaptability and superiority. In fruits, selection of some crops was done in an arbitrary manner without any established experience of the crops performance in the States; for example, Meghalaya was found promoting cultivation of peach and apricot in high altitude, which is not congenial for temperate fruits. A high mortality was observed in tree crops. The beneficiary farmers selected for area expansion in tree crops did not have any knowledge or training.
methods of planting, nursery plant in the open field and their after-care. No authentic records were maintained on the survival of the plant supplied, nor was any formal mechanism in operation in the district to monitor the performance. It can therefore be presumed that the area planted a few years back would have no surviving plants, and the same area could even be earmarked for area expansion programme in the coming years.

4.4.8.10 Production of planting material is yet to take off within the States and hence procurement is done from outside the State from untested sources. A permanent damage thus likely to be inflicted because of the perennial nature of the fruit species.

4.4.8.11 Procurement procedures for seed and planting material adopted leave considerable doubt about the quality of the planting material being used. In some States, procurement is done through authorised dealers who do not necessarily have knowledge of handling agricultural material. In a few other States, the farmers are asked to buy the planting material themselves, again leading to inferior material being used.

4.4.8.12 The subsidy per hectare for area expansion under MM-II is Rs. 13,000 per hectare wherever the seeds/planting material was supplied to the farmers by the Department. The cost of planting material was deducted from the total subsidy allowed and balance paid to the beneficiary for input purchase. Except in one or two States, no inputs seem to have been applied nor any instruction to the effect given by the staff. Consequently the objective of granting subsidy for input application as a component of improved technology was not achieved.

4.4.8.13 A total of 295 nurseries were set up but there was a shortage of planting material. The nurseries in the public sector suffer from acute shortage of funds and there is no verification of genuineness of mother plants being used for further multiplications in the private or public sector. Unless mother plants are developed from genetically superior clones of a particular variety, the nursery programme is bound to suffer from serious technical deficiency contributing to proliferation of inferior types through area expansion programme.
4.4.8.14 The design of organic farming structure varied from State to State despite the fact that the guidelines for the TMHNER had provided all the details and drawings. This clearly points to lack/absence of monitoring by technical staff of the State departments.

4.4.8.15 Assistance for highly technical units such as plant tissue analysis lab, disease forecasting lab, tissue culture units, plant health clinic etc has been provided to all States irrespective of the needs, competence of the staff and availability of appropriate technology for using the facilities for the farmers. Each State has been allotted more than one tissue culture unit for multiplying banana, Anthurium, orchid etc. This type of investment would be justified only when the demand for planting material is not less than one or two lakh plants for each unit to make these units economically viable. It will be difficult to sustain operations of these laboratories without trained manpower and recurring expenditure.

4.4.8.16 Under MM III a total of Rs 5600 lakhs were allocated since inception and 29 wholesale markets, 199 rural primary markets and 26 Apni Mandis were established, besides 15 State grading laboratories were reported to have been established as per the progress report of each State. However, Tripura and Nagaland have not set up any market. The structure created in Mizoram for collection and storage was found to be technically deficient in design, as it does not provide for any improved method of cleaning, grading, packing and storing. This could lead to post harvest loss. Infrastructure for Post Harvest Management (PHM) including marketing and processing is planned without any relation to the total production targeted at a given point of time.

4.4.8.17 The funds under MMIV were allocated for setting up new units as well as upgrading some existing units. In total 9 units have been set up out of which two are upgradation ventures. No established private sector firm has taken the advantage of MOFPI facilities under MM IV to set up units in the North Eastern Region. These were set up by NGOs or State/regional undertakings. Under MM IV a total of Rs. 9.66 crores was allocated since the start of the Mission. In the first two years Rs. 4.25 crores were released in the North-Eastern States for setting up processing units mostly in Manipur, Meghalaya and Mizoram. Out of this Rs. 2.15 crores or nearly 50% was
sanctioned to one unit in Mao, Senapati district Manipur, which is processing passion fruit. It was found that the plant was negotiating with the producers in three States for the supply of raw material. The plant should operate in two shifts each day for at least 200 working days in a year to make it a viable venture. During 2003–04, no funds were sanctioned for North-Eastern States. A total of Rs. 5.41 crores were sanctioned during 2003-04 & 2004-05 for the Himalayan States out of which Rs. 2.2 crores were released.

4.4.8.18 The Food Processing sector in the North-Eastern States has been in existence for more than 40 years on a very small scale. Performance of the existing units is far from satisfactory. Most of the units have becomes economically unviable resulting in closure. The common reasons for poor performance are:

- Lack of stable links between the grower and the processing units on the one hand and the processing units and markets on the other.
- Dependence of units on a single fruit rendering the plant un-operational for a major part of the year.
- Absence of adequate post-harvest management structure
- Absence of tetra / aseptic packaging
- Inadequate credit including working capital from banks and other financial institutions.
- Inadequate power supply
- High cost of transportation due to difficult terrain, frequent bandhs etc.
- Inability to take advantage of opportunities offered by border trade
- Lack of quality testing facilities
- Lack of good manufacturing practices
- Problems related to entrepreneurial ability and intent
- Problems of collateral security for raising bank finance given customary land tenure system

4.4.8.19 With the host of problems mentioned above, it is not surprising that private sector is reluctant to invest in this part of country in spite of incentives under the North-East industrial policy and departmental promotional programmes. For food processing units, heavy equipments are purchased including imported ones, which if
not utilized, would be deprived of the cover available for any defect under the warranty clause of each supply contract. The machines especially calibrated ones may lose their accuracy if kept idle for a long time. Therefore, without adequate supply of raw material and proper planning, investment on expensive equipments purchased in the beginning will go down the drain. With troubled history and failure of processing units to take off under the Technology Mission a serious mismatch may occur between MM II and MM IV.

4.4.8.20 The issues highlighted above clearly show that each MM is working independent of the other under the control of their respective administrative agencies. Linkages among the four MMs are weak.

4.4.8.21 With subsidies under MM II eating up the largest share and without any credible linkage established with MM I, the Mission has turned out to be subsidy rich and technology poor.

4.4.8.22 Consequently, the basic objective of the TMHNER of promoting integrated development of Horticulture in the region for improving production with the induction of improved technologies has not been achieved so far.

4.4.8.23 The research carried so far has remained stand alone without much responsive, corrective, participatory or prescriptive role. In general the coordination among ICAR Research Complex, State Agriculture University, Officers/Departments handling MM-II, III & IV was found weak resulting in communication gap among the four MMs both at the planning and implementation stages.

4.4.8.24 The State governments in the North Eastern Region are besotted with the problems of resource constraint to provide matching shares for centrally sponsored programmes and lack of technically skilled and dedicated staff for field level coordination and monitoring.

4.4.8.25 The Mission is headed by the Horticulture Commissioner, DAC and its progress is annually monitored by the Central Steering Committee headed by Secretary, DAC. The focus and leadership required to run the Technology Mission as
a special purpose vehicle may get compromised by treating the Mission Director's post as a routine post, without special staff and proximity to field required for running the Mission. A Directorate of Technology Mission was envisaged and till it comes to force, Small Farmers' Agri Business Consortium (SFAC) is performing its role of monitoring & reporting progress. In fact, funds under MM II, III, IV are routed through Central SFAC/ State SFAC. This was required due to typical lag in the release of funds in the region and funding the required administrative staff within the government machinery. SFAC has hired technical and managerial staff at the State level to monitor MM II, III & IV. This gives flexibility to its operations.

4.4.8.26 While the Technology Mission may not be flawed in conception, a substantial coordination and backward and forward linkages amongst participating Departments and various stakeholders in the public and private sector is needed to achieve Mission objectives. This has not happened adequately with the existing set up.

4.4.9 Remedial Measures

- Development of appropriate technologies, which bring about a strategic jump in production / productivity with full involvement of research agencies has to take place to make horticulture a commercially viable occupation for the stakeholders and improve their income and profitability.
- MM I needs to focus on creating adequate mother plant resources for supply to the nursery; Practices for production and post-harvest handling of passion fruits; evaluation of vegetable hybrids promoted by the private sector for their yield and resistance to the major diseases of the region; evaluation of variety / hybrids release by the public sector for their adaptability etc.
- Based on the various agro-climatic zones in States, crops should be selected for specialization and promotional activities should be in tune with this.
- A ban should be in place on import of planting material from outside the region and the nurseries both in private and public sector should be regulated.
- All the States have low capacity of absorption of new technology and therefore required to be exposed to basics of crop production and management before getting into higher levels of technologies.
• The beneficiaries identified for area expansion should get thorough training in improved methods of planting and other recommended packages of practices before distribution of seeds/planting materials. The guidelines should be published in local languages. Proper record should be maintained of the beneficiary, status of the crop, yield per unit area, return obtained etc. These are essential for analysing the impact of the investment and technology.

• Instead of providing cash subsidy, coupons should be provided for acquiring inputs from authorised dealers.

• Processing capacity should be projected given the availability of raw material and expected demand. The processing unit should be sanctioned based on this broad calculation.

• Marketing is one of the biggest lacuna and for the disposal of the surpluses. The Second Report of NCF had recommended that a campaign can be launched for development of Rural Periodic Markets (RPMs), Seasonal Markets, Daily markets and PRIs controlled markets preferably through Mission. Specialized marketing Self Help Groups (SHGs), Small Farmers Enterprises (SFEs) and marketing cooperatives should be promoted to undertake Group Marketing, linking the produce directly with the consumer/buyer. The NER could be integrated with South and South East Asian economy for converting this remote and isolated Region into the main route for trade and economic linkage of mainland India with South and S-E Asia. Steps should be undertaken to formalize the huge informal border trade in the region. Progressively, value addition should take place in India, so that farmers could benefit more.

4.5 Technology Mission on Coconut

4.5.1 Traditionally, coconut was grown for edible oil. It served as an ingredient for various industrial applications too. The changed food habits and availability of other cheaper edible oils both in the edible and industrial sectors, however, have brought out a drastic decline in the use of coconut oil in these areas. During the last few years, on account of heavy imports of cheaper vegetable oil, especially of the Palmolein, the price of coconut oil has been depressed despite the large-scale price support operations undertaken. The Price Support Scheme could not make much impact in pushing up the price level and was not beneficial to the farmers as expected.
In this context, it was realized that only diversification of coconut derived products and value addition could help the coconut growers in getting remunerative prices. The coconut crop has also been affected by severe pests and debilitating diseases. It was realized that a major initiative should be started towards controlling the pests and diseases in coconut to improve its productivity and promote product diversification and better value realization from various coconut products, thereby helping the marginal farmers to optimize their income from coconut.

4.5.2 Technology Mission on Coconut was formally launched on 30.1.2002 and it is being implemented as a part of the Coconut Development Board’s ongoing programmes with the following objectives:

- To establish convergence and synergy among numerous ongoing governmental programmes in the field of coconut development in order to bring in horizontal and vertical integration of these programmes.
- To ensure adequate, appropriate, timely and concurrent attention to all the links in the production, post harvest and consumption chain.
- To maximise economic, ecological and social benefits from the existing investment and infrastructure created for coconut development.
- To promote economically desirable diversification and value addition to generate skilled employment.
- To disseminate technologies using participatory approach through demonstration and promotion to address the gaps in a mission mode.

4.5.3 Mission Components & Programmes

The Technology Mission covers four major components / programmes:

- Development and adoption of technologies for management of insect pests and disease affected coconut gardens.
- Development and adoption of technologies for processing and product diversification.
- Market research and promotion.
- Technical support, external evaluation and Emergent requirement.
4.5.4 Total Outlay for the Mission since 2001-2002 upto 31st March, 2005 amounted to Rs. 39.50 crores

4.5.5 Subsidy ranging from 25% to 100% of the total cost is extended to government/private institutions for Development and adoption of technologies for i) management of insect pest and disease affected coconut gardens ii) processing and product diversification and iii) market research and promotion.

4.5.6 Some of the major programmes initiated under this programme and achievements made so far are as follows:

- Establishment of 16 integrated Coconut Processing Units with infrastructure facilities worth Rs. 11.92 crores with a capacity to process 90 million nuts per year with financial assistance of Rs. 2.08 crores for value addition and bye product utilisation.
- Establishment of 4 Tender coconut Preserving and Packaging unit with a capacity to process 10 Million nuts per year.
- Popularisation of use of Packed Tender Nut water and other convenience foods.
- Establishment of a processing unit for Activated Carbon with an installed capacity of 5 metric tonnes per day.
- Creation of awareness on the health aspects of coconut products.
- Creation of awareness on eco-friendly and sustainable production system.
- Extension of opportunities for diversification of coconut products.
- Containment of Root Wilt disease with in the endemic area by preventing the spread by removal of 6.94 Lakh Root Wilt diseased trees from the border districts of Kerala and replanting with quality planting material and adoption of better management practices.
- Enhancement of market potential for coconut products both in domestic and international markets.
- Management of pests and diseases.
- Setting up of three nos. of Bio-control laboratories for the control of leaf eating caterpillar.
- Action initiation for establishing Quality Control Lab for coconut and coconut products for the first time in the country at Bangalore and Kochi.
4.5.7 Constraints

(i) Difficulties faced by the State Governments in providing matching shares.
(ii) Reluctance of financial institutions for extending loan facility for setting up coconut processing units.
(iii) Violent fluctuations in the price of raw material viz. coconuts.
(iv) Apprehension about influx of coconut products at a much lesser price from Sri Lanka and other major coconut growing countries.
(v) Lack of price competitiveness of coconut products owing to high domestic price of raw material.
(vi) Lack of access to superior packaging technology act as bottleneck for coconut processing industries in the country.
(vii) Import substitute with cheaper products of similar nature for domestic use, greater competition for export and market share, inadequate market promotional activities, increased cost of production, improper labelling, non-uniformity of standards and improper packaging, not matching with consumers’ choice in price and package, inadequate shipping and shipyard facilities for storage, high freight charges and other related problems and the like will continue to pose threats and challenges.

4.5.8 Analysis

It appears that significant departures have been made from the original concept of a Technology Mission in the case of Coconut. The Technology Missions in other commodities have envisaged an end-to-end approach, which includes development and introduction of high yielding varieties and technologies, expansion of area, marketing and processing. Here, the entire focus is on disease control and product diversification. These issues may be having merit of their own in the context of coconut but whether Technology Mission is the most desirable way of achieving it is debatable. The functions of Coconut Development Board and Technology Mission also seem to be common and overlapping. This further dilutes
the essence of the Mission and renders it indistinguishable from the several ongoing Departmental programmes.

4.5.9 Recommendations

4.5.9.1 Technology transfer, motivation and capacity building at farmer’s level can be effectively done through Farmers Participatory Approach, Farmers Field Schools, forming coconut growers groups and exchange of ideas and technologies. Further, these farmers’ groups can be linked to market information so that they know the prices for their produce. This linkage should be available to all the villages and people should be trained to access such information. This automatically motivates the farmers to produce more if the prices are better.

4.5.9.2 These groups of farmers with adequate training and seed money coupled with micro credit facilities can go for farm level processing of primary products which in turn provide raw material for large scale production of coconut products. For example if the farm level processing as a group is producing husk, shell, coconut water and coconut meat, the bulk of raw material for further use are available at one place, it is easy to collect and transport to the big processing units. This can be a linked programme, which could be pro coconut grower and ensure public-private partnership for making coconut industry competitive. This programme could enable the coconut farmers or their groups to be shareholders in the large-scale process.

4.5.9.3 Coconut, a versatile crop, which yields innumerable products right from root to the tip of the palms, is known as “tree of life”. The prospects for coconut in the years to come are bright. Coconut can be processed as a food, drink, infant foods, pharmaceuticals, nutraceuticals etc. As a green fuel, coco biodiesel, bio lubricants are also gaining momentum in various other countries. R&D will be required to identify and standardize the diversified products. Processing component will require lot of attention. Briefly, The Technology Mission would need to be redesigned with an end-to-end approach, if it is to be continued in view of its potential.

4.6 National Horticulture Mission

4.6.1 The National Horticulture Mission has been launched in the country during the current financial year (2005-06) for implementation with an outlay of Rs. 2300
crores for remaining period of Tenth Plan which will address the issues of production, post harvest management and marketing. With a budgetary outlay of Rs 13,300 crores (Rs. 11,000 cr. For Eleventh Plan) for the next seven years (remaining 2 years of the Tenth Plan and 5 years of the Eleventh Plan), the National Horticulture Mission (NHM) aims to double the national horticulture production to 300 million tonnes by the year 2011-2012. The focus area of the Mission is an under:

- Capacity building for production and supply of adequate quality planting material including setting up of scion banks of high yielding mother plants
- Increased coverage of crops under improved/high yielding cultivars.
- Enhanced production and productivity of horticulture crops.
- Strengthening of infrastructure facilities such as soil and leaf analysis laboratories, survey and surveillance of pest and diseases, green house, poly houses, micro irrigation, plant health clinics, vermin compost etc.
- Build adequate infrastructure for on farm and post harvest handling.
- Enhanced production of high value low volume horticulture products for exports.
- Strengthening infrastructure facilities for marketing and export.
- Enhanced production of high value processed products.
- Build a strong base to enhance efficiency in adoption of technologies.

4.6.2 Sanction for Rs. 314 crores for 12 States has been issued during current financial year (2005-06).

4.6.3 The Mid Term Appraisal of Tenth Five Year Plan for the Agriculture and Food Security sector has also commented on the National Horticulture Mission as under:

4.6.3.1 “Given climatic diversity, India has long run comparative advantage in horticulture. But despite appreciable production growth through area expansion, yields and produce quality remain unsatisfactory on international comparison. The National Horticulture Board and the Technology Mission for the North East run a number of schemes but major constraints remain, namely, senility of many existing orchards, non-availability of quality planting material, lack of strong extension machinery and inadequate marketing, cold-storage and processing infrastructure. The
Tenth Plan had proposed to double horticulture production by 2011-12 through a National Horticulture Mission (NHM) linking ICAR, DAC, Ministry of Food Processing Industries (MFPI) and the private sector. With area under horticulture already growing and responding to demand, no special effort (e.g. subsidy) is necessary to shift areas from existing crops. Rather the priority must be on technology to improve yield and quality and on post-harvest management, infrastructure and processing."

4.6.3.2 It must, however, be said at this stage that even though Mid Term Review clearly speaks of priority on technology and in any case the Mission Mode is ideally suited for development and dissemination of technology in these times of knowledge based agriculture, the National Horticulture Mission somehow misses out the term "Technology" in its name. This gives the impression that unlike the Technology Mission on Oilseeds and Pulses and the Technology Mission on Cotton, the National Horticulture Mission is somewhat insipid on technology. This must not be allowed to happen.

4.6.4 Analysis

4.6.4.1 The National Horticulture Mission has taken off only recently and it would be premature to comment on its working. However, in a communication sent to the Planning Commission in January 2005, on the draft NHM, NCF had urged that the following facts and issues must be considered while firming up the design and implementation of the Mission;

- During the past 10 years, increase in horticulture production had occurred essentially through area expansion, whereas the overall productivity had remained low and even declined.
- The progress under the “Horticulture Revolution” has been skewed, both geographically and socially.
- The estimated post harvest losses in horticultural commodities continue to be at the level of 25% to 30%, valued at Rs. 20,000 crores to Rs. 80,000 crores, raising questions regarding the effectiveness of the huge investments made through the DAC, APEDA, NCDC, NAFED, MFPI etc. during the past 10 years or so for remediing this malady.
• Hardly 2% of the total horticultural produce is processed, and India’s share in the global market of horticultural products remains extremely low, about one percent.

4.6.4.2 A “business as usual approach” will not help to realize the goal of the Mission, especially the desired improvement in productivity and economic and ecological security. Our strategies and priorities would, therefore, need to be adjusted.

4.6.5 The key issues highlighted are as under

4.6.5.1 End-to-end Approach: The Mission should pay greater attention to “social engineering”, “inclusiveness” and “group dynamics”. In order to enhance the economies of scale for majority of small farmers, and to ensure end-to-end approach by integrating production – post harvest management – processing – marketing, Small Holders’ Horticulture Estates to institutionalise decentralized mass production by masses coupled with centralized services should receive high priority. Rural institutions such as PRIs, cooperatives, NABARAD and other banks (for credit flow), SHGs, KVKs and ATMAs must play a crucial role in production, processing, marketing, income generation, skill development and technology transfer and adoption. Appropriate mechanisms should be in place to ensure effective participation and contribution of these institutions. Highest priority should be given to the prevention of post harvest losses, processing, value addition, quality and marketing. From the very beginning, synergistic and holistic approach should be adopted to integrate production, quality, post-harvest management, processing, value addition, pricing, marketing, sustainability, profitability and equity. The worldwide concept of “Packing House” – a self-contained unit for cleaning, grading, sorting, packing, pre-cooling, storage, etc. of the fresh produce owned by the Small Farmers’ Horticulture Estate/Farmers’ Groups/Cooperatives should be adopted to link production with market. These “Houses” could also house agriclinics and soil and nutrient testing laboratories operated by Graduates (thus also promoting employment).

4.6.5.2 Capacity-building for Productivity Enhancement: Since our productivity is low and there are wide yield gaps, high attention should be paid to
increase per hectare yield and productivity through transfer and adoption of proven
technologies. Farm schools should be established and supported to promote farmer-
to-farmer learning. Demonstrations of high-density orchards, high-tech greenhouse
horticulture as well as low-cost greenhouse horticulture should be supported for
enhancing productivity and quality. There are serious research and technology gaps,
not only in production and quality but also in PHM, processing and marketing. These
gaps should be clearly identified for different settings and concerted effort should be
made to address them in a Mission mode. A strong information and database system
should support this venture.

Allocation of funds for establishment and renovation of tissue culture and leaf
analysis laboratories must be based on analysis of the existing facilities and location
specific needs. The past experience shows that adoption of drip/sprinkler
irrigation/fertigation has generally been subsidy driven, without arrangements for
certification and quality control which has brought bad name to this otherwise highly
acCLAIMed and proven technology. Appropriate monitoring and certification of
production and distribution of quality hardware components of micro irrigation should
assume high priority.

4.6.5.3 Critical Linkage: The Food for Work and Employment Guarantee
Programmes, should be used for area expansion of horticulture (e.g. in Maharashtra),
particularly in degraded and wastelands under integrated watershed development
programmes – a kind of asset creation. The funds thus saved should be redeployed
for further strengthening of the “humanware”, i.e. skilled human resources who could
move up in their employability and income and thus lessening the number in the
Below Poverty Line category.

4.6.5.4 Providing Services and Seeds: Greater support should be given to the
strengthening of services. Subsidy-driven horizontal expansion of horticultural area
should be a lower priority. It is unrealistic to expect diversion of sizable cultivable
area year after for new plantings/sowings of horticultural crops, as this will derail
production of staple food grains and commercial crops, thus jeopardizing food
security. A scientifically proven strategy would be required for adoption by each
State on priority basis for rejuvenating old plantations and replanting senile and
unproductive plantations.
Poor supply of quality planting materials is the key constraint and its redressal should receive the highest attention. Specialized women SHGs should be provided land in State Farms to produce seed and planting material of high value crops to obviate the constraint.

4.6.5.5 Accent on arid and semi-arid horticulture: Horticulture must play a pivotal role in enhancing and sustaining livelihood security in rainfed dry and semi-arid regions. In this context, rather than reinventing the wheel, the successful experience of horticultural revolution in Maharashtra, coupled with detailed analysis of national and international markets and trade, may be replicated in other parts of the country, with due adjustments based on location-specificity and avoiding the pitfalls encountered and other lessons learnt in Maharashtra.

4.6.5.6 Focused priorities: Given the multiplicity of horticultural species and the production, consumption and distribution settings, only a few high priority and wide-impacting programmes should be identified and implemented in each State through participatory approaches also involving private sector, NGOs, farmers, rural institutions such as Panchayats, cooperatives and SHGs. Thrust should be on those areas and commodities, which already have a commercial base or have the potential to become commercial. Public-private partnership will be crucial for creation of cluster-based production, processing and marketing through Nucleus-Estate and contract farming systems. These aspects should be covered in the planning process itself.

4.6.5.7 Increase domestic consumption: In order to achieve the nutritional goal and also for price stability, domestic consumption of horticultural products should be increased. Social marketing, such as bulk vending of fruit juices in Mother Dairy depots and involving Home Science Graduates in establishing Health Food Markets, should be actively promoted.

4.6.5.8 A separate Mission on medicinal and aromatic plants: Considering the vast gaps and opportunities along the production-processing-marketing chain of fruits, vegetables and flowers, the National Horticulture Mission may concentrate only on selected species of these commodities, and even promote precision and protected horticulture. Recognizing the treasure of rich biodiversity, indigenous knowledge and
fast-expanding global market of botanicals, a separate National Mission on Medicinal Plants in association with the National Medicinal Plants Board will prove more effective. China, with no greater treasures on biodiversity than that of India, annually exports medicinal and aromatic plants valued at over US $50 billion against India’s export of less than US$2 billion, let alone the vast potential of employment generation and realization of Farmers’ Rights.

4.6.5.9 Mission management: The National Horticulture Mission is designed and planned to be implemented on the pattern of the on-going Technology Mission for the Integrated Development of Horticulture in the North eastern Region. The structure proposed in the Mission does not inspire confidence. The progress of the Mission in the North eastern Region has so far not been commensurate with the volume of investments. Therefore, it will not be prudent to follow the pattern of the NER Mission. There should be a stronger built-in mechanism for monitoring, evaluation and adjustments and a greater sense of accountability at all levels.

In order to achieve convergence and synergy, the Mission capacity to comprehend technical issues and the ability to coordinate and implement through sufficient experience in the field and in the States should be managed by a full time Director, who should be a professional with a proven record of achievements, particularly in the commercial aspect of horticulture. He/She should be on contract for 5 years in the post and should have both authority and accountability. The Director of the Mission should be the Member Secretary of the proposed National Horticulture Council and the National Executive Committee. Treating the Mission Director’s post as a routine administrative posting will be a disaster.

4.6.5.10 State Governments: Horticulture being a State subject, the State Governments should agree to the Mission being operated on the model of a specific Mission, where all the links in the production, storage, processing, marketing and consumption chain function in an integrated manner.

4.6.5.11 National Horticulture Board (NHB): The National Horticulture Board was set up in 1984 on the recommendations of the ‘Group on Perishable Agricultural Commodities’ headed by Dr. M. S. Swaminathan. The Group had observed that different aspects of Horticulture Industry
were looked after by the various Departments/Organizations at the Central and State level. To coordinate the activities of these departments, and develop horticulture industry in an integrated manner with an end-to-end approach, it was felt necessary that a national organization should be set up. Under NHM NHB is setting up cold storages in selected clusters in the States. They also provide technical support for NHM schemes. The structure of National Horticulture Board (NHB) needs to be redesigned on the NDDB pattern.

4.7 Recommendations

4.7.1 Summing up, it is observed that there is a need for revival of the concept of Technology Mission and its potential for achieving productivity gains and higher incomes for farmers. NCF has also recommended the setting up of a Technology Mission on Sugarcane to bring the benefits similar to that reaped by oilseeds farmers in the early years of TMOP and for achieving end-to-end approach through infusion of technology and achievement of coordination amongst the stakeholders. However it is reiterated there is no use in having a faith in the concept of Technology Mission without bothering about its operational design. Technology Mission should be one, which is technology rich, and which is characterised by well defined outcome indicators and monitoring tools. It is also characterised by an end-to-end approach covering all subjects in the cultivation-consumption-commerce chain. Unfortunately, the Farm Technology Missions are tending to become subsidy rich and technology poor. Accountability has also been lacking and in the wake of inappropriate policy environment, the domestic production has stagnated and imports have increased. This has led to expansion in the distress of farmers particularly in the dry farming areas. The following ingredients therefore can be suggested as touchstone in the review of the existing Technology Mission and for the design of future Technology Missions:-

(i) The target crop should have available technology with inadequate dissemination.

(ii) It should have the potential for generation of technology, particularly new seed varieties capable of providing quantum jump in productivity and practices for adoption in the field.

(iii) The Technology Mission created for the target crop should be a stand-alone entity with its own full time Mission Director who should have a fixed five
years tenure and who should be having substantial technical and administrative abilities not only to comprehend issues relating to technology but also to get them implemented in the field through coordination amongst departments and coordination with the States. Above all, he should be accountable for the success of the Mission. The Mission should have a Core Group of multi disciplinary posts which should be filled on contract for a period of five years from amongst participating departments / public / private sector/NGOs. Incumbents to posts must not be on routine deputation or should not be holding additional charge.

(iv) The work of the Mission should be divided into MM for research, dissemination of technology, marketing, post-harvest technology and trade policies. The research components must not only cater to technologies for production of the crops but should also tap technologies for post-harvest technology. Department of Biotechnology and CSIR therefore could be successfully utilised for inputs in addition to ICAR.

(v) In consonance with the observations in the Mid Term Review of the Tenth Plan (2002-07), it must be stressed that Research and Development of technology under a MM must focus on the need to enhance the income of the resource poor farmers. Further, the research must take into account the cost return factor. If the cost risk factors are low and returns are high, the technology would be easily adopted by the farmers even with minimal extension efforts. Further, agriculture research/technology should be gender sensitive by devising agriculture equipments, which are women friendly and which result in reduction of drudgery.

(vi) Above all, with the experiences of TMOP where trade policies adversely affected the outcomes, a MM on Trade Strategy would be necessary since external environment is as important for production and income of farmers as dissemination of technology.

(vii) The Mission should place greater stress on marketing efficiency and price signals in addition to infusion of technology and not so much on mere passage of subsidy, which have been the hallmark of normal departmental programmes.
(viii) Decision-making at the Central level should be in the hands of an Empowered Committee headed by Secretary, Coordination in the Cabinet Secretariat. The Mission Director should be the Member Secretary of the Empowered Committee and should report the progress every quarter to the Prime Minister’s Office and to Deputy-Chairman of the Planning Commission. Excessive reporting which may cut into the time available for work in the field / touring should be curtailed.

(ix) The MMs could be headed by Additional Secretaries in the concerned Ministries since the Secretaries may not have the requisite time to devote.

(x) Planning Commission should ensure active collaboration from the States through its powers to approve the Plan outlays of the States.

(xi) Frequent inspection of the fields to check the adequacy and timeliness of the Mission inputs for the farmers should be ensured to supplement the efforts of the regular staff of the Mission. Small multi disciplinary teams consisting of retired officials, scientists, farmers, NGOs and representatives of the industry should be constituted to broad base the monitoring efforts.

(xii) Concurrent evaluation for mid course correction would also be critical and should be done through independent institutions like AFC / NABARD / State Institutes of Administration / Industry Associations etc.

(xiii) Internal financial / release procedures should be specially designed for the Mission. It should also be necessary to ensure that Central assistance is not blocked up in the States in view of their ways and means problems. This can be achieved if the funds in the Mission are made available to it and are routed through organisations like SFAC etc and channelised through similar State level societies directly to the field level implementing agencies. Mission activities would have a propensity to degenerate into normal programmes if these special instruments are not made available to it from the beginning.

(xiv) Mission should have a term of ten years in order to ensure that they maintain their vitality as well as a time bound focus.

(xv) Farmers should be associated at all levels in the decision making and monitoring activities of the Mission since they are central to the existence of the
Mission. The key indicators in the work of the Mission should include priority to the growth of income of farmers.

(xvi) In the States, activities of the Mission should be reviewed in the State Planning Board, in order to ensure that the Technology Mission is not seen as a departmental programme of a single department but as a priority of the Government as a whole. The State Planning Board would be in the unique position to ensure participation of all the concerned departments through its control over their Plan proposal.

(xvii) Another key ingredient for the success of Technology Mission would be to make the watershed or the irrigation command area the point of convergence and integration of all relevant Technology Missions like those relevant to oilseeds, pulses, maize, cotton, horticulture, milk etc. Convergence and synergy among the numerous technology missions now in progress will improve their utility and impact and also help to reduce overall transactions costs. All the Missions could be integrated under an umbrella set up which could be called “National Federation of Farm Technology Missions”. Pulses and Oilseeds are important nutrition and income providing crops in rainfed areas and farmers in dry farming areas would continue to suffer in poverty and deprivation unless the proposed National Federation of Farm Technology Mission extends to them the necessary help at the right time and place. Such a National Federation of Farm Technology Missions should be chaired by a practicing farmer who has a proven record of unleashing the power of creativity in small farmers management. Its major aim should be to enhance farming productivity and agrarian and rural prosperity. Recommendations in this regard have already been made in the First Report of the NCF Chapter 1 Para 9 (d).

(xviii) It is important for on going and future Technology Missions to realize that it is not merely the increase in area production and productivity of target crops which should be the key objective. It is far more important to focus on increase in the income level of farmers since it is the face behind the production statistics, which should never be forgotten. There have been
examples where increase in production and productivity without adequate price support and insufficient demand has led to decline in the farmers’ income from the crops. This is a very undesirable way of rewarding the farmers for their increased expenses for use of inputs whose cost have risen and his increased efforts in the field for achieving productivity. It is perhaps due to insufficient attention to the income of farmers that around 40 percent of the Indian farmers are willing to move out of Agriculture if they have an alternative. It has been noted in the Mid Term Review of Tenth Plan also that agriculture is becoming uneconomic as a profession and technologies are needed which can enhance the farmers’ income, particularly for the resource poor farmers.

(xix) Since technology is at the core of technology mission, it is necessary that Technology Missions, both ongoing and future ones, effectively use technology driven communication methodologies for speedier and more cost effective dissemination of know-how for the farmers to enable them to cope with demands of knowledge based agriculture. Technology Mission thus can benefit all the farmers through use of Village Knowledge Centres to be set up at the village level. The concept of Village Knowledge Centres has been extensively elaborated and recommended in Chapter VIII of the First Report of the NCF. President A.P.J. Abdul Kalam has also opined recently that Village Knowledge Centres would act as a front line delivery system

(xx) Last but not the least, it should be realised that agriculture is an extremely important subject, allocated to the Panchayati Raj Institutions in the wake of the 73rd amendment of the Constitution. The centrality of the Panchayati Raj Institutions must be built in while formulating the Technology Mission. At the same time, it should be realised that this would be feasible only if and when the technical staff at the grass root level is placed at the disposal of the Panchayati Raj Institutions, which has unfortunately not happened uniformly in the country.

4.8 Technology Missions: Way Forward

4.8.1 To sum up, the Technology Mission is an efficient tool for programme design and implementation for achieving well defined production goals on a time bound and cost effective basis. The Mission mode method of programme design helps
to facilitate concurrent and adequate attention to all links in the production-
processing-consumption-marketing chain. It has built in methods of continuous
monitoring and evaluation, so that mid-course corrections can be introduced in
operational strategies when needed. For its success, the following important
ingredient identified by late Shri Rajiv Gandhi is fundamental – “We would like to
put one person in charge of such a Mission with full funding and with no restriction
on him whether bureaucratic or otherwise. The only limits will be certain
achievements, which must come within a certain timeframe.

4.8.2 NCF recommends that the existing organizational and managerial
structures, in the case of the Technology Missions in Cotton and Horticulture be
reviewed in the above context. During the early years of planned development in
India, Jawaharlal Nehru said, “I do not want reasons for failure; I want to know how
to succeed”. A Technology Mission has a national vision and need behind it. To
achieve success, the Mission will need a dynamic Mission Director who is known to
be an achiever. He/she should be in position for a minimum five-year period, so that
there is adequate time to achieve results. Authority, Accountability, and
Achievement, should be the basic management principles underpinning Technology
Missions.

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