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# Acknowledgement

The Evaluation Study of Central Sector Scheme for Post Harvest Technology and Management was undertaken by NABARD Consultancy Services (P) Ltd. on behalf of Mechanization & Technology Division, Dept. of Agriculture & Cooperation, Ministry of Agriculture, Govt. of India covering the period of XI Five Year Plan, with a view to assessing the scheme’s adequacy, effectiveness and its performance in addition to evaluating operational roles of various stakeholders, identifying constraints and bottlenecks and suggesting areas for improvement. NABCONS would like to offer special thanks to MoA for their financial support to this study.

We would also like to place on record, our special gratitude to Shri. Narendra Bhushan, Joint Secretary, and Mechanization & Technology Division for extending his supports & cooperation. We also thank Shri. H.K. Suanthang, Deputy Secretary, Shri. V. N. Kale, Additional Commissioner, Shri. A. N. Meshram, Deputy Commissioner and Shri. Himmat Singh Director, NRFMTTI for their valuable inputs and contribution during the course of the study.

The cooperation, support, valuable inputs and insights received from the following Senior Officials of NABCONS/NABARD and other distinguished persons in finalizing this study report, is gracefully acknowledged:

Shri. Krishan Jindal, Chief Executive Officer, NABCONS, H.O. Mumbai

Shri. P V S Suryakumar, CGM NABARD and Principal Consultant, NABCONS, New Delhi

Shri. Himmat Singh, Director, NRFMTTI, Hissar, Haryana

Shri. Pitam Chandra, Director, CIAE, Bhopal

Shri. S.K Nanda, Project Coordinator (PHT, PAU, Ludhiana)

The study team would like to thank all the Directors of Agriculture of respective states, CIAE, and State Agriculture Universities and CIPHET Centers without the support of whom the study would not have been completed. The cooperation received from the Nodal Officers and Consultants of NABCONS and other Officers of various Regional Offices of NABARD in conducting the study, especially in data collection and compilation of preliminary study observations is also duly acknowledged.

The study would not have been completed successfully but for the best efforts put in by the staff attached to the Zonal Office of NABCONS, New Delhi who deserves our appreciation.

# List of Abbreviations

|  |  |
| --- | --- |
| AICRP | All India Coordinated Research Project |
| ATMA | Agriculture Technology Management Agency |
| AP | Andhra Pradesh |
| CIAE | Central Institute of Agriculture Engineering |
| CIPHET | Central Institute of Post Harvest Engineering and Technology |
| CSIR | Council of Scientific and Industrial Research |
| CCSHAU | Chaudhary Charan Singh Haryana Agriculture University |
| DoA | Directorate of Agriculture |
| DoAC | Department of Agriculture and Cooperation |
| FMTTI | Farm Mechanization Training and Testing Institute |
| FYP | Five Year Plan |
| GKVK | Gandhi Krishi Vigyan Kendra |
| GBPU | Govind Ballabh Pant University |
| GoI | Government of India |
| ICAR | Indian Council for Agriculture Research |
| J&K | Jammu & Kashmir |
| KVK | Krishi Vigyan Kendra |
| MoA | Ministry of Agriculture |
| MP | Madhya Pradesh |
| MPUAT | Maharana Pratap University of Agriculture and Technology |
| NABARD | National Bank for Agriculture and Rural Development |
| NABCONS | NABARD Consultancy Service Pvt. Ltd. |
| NABFINS | NABARD Financial Services Pvt. Ltd. |
| NGO | Non Government Organization |
| OBC | Other Backward Classes |
| PHT | Post Harvest Technology |
| PHTM | Post Harvest Technology and Management |
| SAU | State Agriculture University |
| SC | Schedule Castes |
| SHGs | Self Help Groups |
| ST | Schedule Tribes |
| TNAU | Tamil Nadu Agriculture University |
| UT | Union Territory |
| UAS | University of Agriculture Science |
| UGs | User Groups |
| UK | Uttarakhand |
| VPKAS | Vivekanand Parvatiya Krishi Anusandhan Sansthan |

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# Executive Summary

1. The estimated total food grain production in the country has increased from 196.8 million tonnes in 2001-02 to 259.29 million tonnes in 2011-12 (MoA, GoI) recording a CAGR of 3%. Agriculture mechanization has played a vital role in increasing agriculture productivity and overall production. Although the farm mechanization has significantly contributed to the overall productivity of food crops, post harvest losses have always denied the legitimate benefits from accruing to the farmers. The country has been reportedly incurring post harvest losses of Rs. 2.00 lakh crores of fruits and vegetable crops and 12-16 million tonnes of food grain, annually. This is largely due to absence of processing units, storage facilities and an effective strategy for tackling post harvest losses in the production catchment areas.
2. Department of Agriculture and Cooperation (DoAC) through its Mechanization and Technology Division has adopted a multi pronged strategy for reforming agricultural markets by Post Harvest Technology and Management through implementation of Central Sector Scheme of “Post Harvest Technology and Management”. The scheme was implemented during the XI Five Year Plan with the aim to create adequate infrastructure in production catchment/ rural areas for primary processing, value addition to reduce post harvest losses at the field level and add value to the products being sold in the market.
3. **Component of Scheme and its Salient Features**

The main components of the Post Harvest Technology and Management Scheme are:

1. Establishment of units for transfer of primary processing technology, value addition, low cost scientific storage, packaging units and technologies for by-product management in the production catchments under tripartite agreement.
2. Establishment of low cost Post Harvest Technology (PHT) units/supply of PHT equipments with Government assistance.
3. Demonstration of technologies.
4. Training of farmers, entrepreneurs and scientists.
5. **Need for the Study**

The Scheme of “Post Harvest Technology and Management” was implemented during the XIth Five Year Plan (2007-12) through State Governments and Government Sponsored Institutions such as Indian Council of Agriculture Research (ICAR) which further designated the responsibility to Central Institute of Post Harvest Engineering and Technology (CIPHET), an institution which was set up under All India Coordinated Research Project (AICRP). After completion of the XIth Five Year Plan, the M&T Division under DoAC desired to know the status of implementation of scheme with respect to physical and financial progress, extent of adoption of technologies by the farmers and their opinion on the availability and usefulness of the equipments being demonstrated or adopted and accordingly suggest any improvements required for its effective implementation. Accordingly, NABCONS was commissioned to conduct an elaborate and comprehensive evaluation of the scheme.

1. **Terms of Reference**

The Terms of Reference of the Evaluation Study of the scheme for Post Harvest Technology and Management are:

1. To study the impact of establishing low cost Post Harvest Technology (PHT) units towards adoption of new technology/ equipments in the demonstration area as well as in the state as a whole.
2. To assess the opinion of farmers about availability and usefulness of these equipments.
3. To suggest any improvement that may be required in this component.
4. NABCONS adopted a comprehensive approach for evaluation by analysing both primary as well as secondary information provided by the Department of Agriculture and Cooperation, CIPHET and its implementing centres in different states and Directorate of Agriculture. Primary information was gathered from the beneficiaries, who have attended the training programs and demonstrations or acted as the host farmers/ entrepreneurs for setting up post harvest processing or management units. The evaluation focussed on effectiveness of training and demonstration, their appropriateness towards post harvest technology and management practices and the skills, towards better post harvest handling of crops, types of post harvest equipments/ technologies and their usefulness and adoptability. The opinions of farmers with respect to training and demonstrations and equipments demonstrated/ used were also captured.
5. **Study Finding**
   1. **Fund Allocation and Utilization**
      1. The total fund allocated during the XIth Five Year Plan for the Implementation of Post Harvest Technology and Management Scheme was Rs. 2608 lakh of which Rs. 2099 lakh (80%) was allocated to State Directorate of Agriculture while Rs. 509 lakh (20%) was allocated to ICAR.
      2. Of the total funds Rs. 1897 lakh (73%) was allocated during the last two years (2010-11 & 2011-12) while Rs. 711 lakh (27%%) was allocated during the first two years (2007-08 to 2009-11) of the XIIth Five Year Plan.
      3. Out of total 27 states funds were allocated to only 19 states with North Eastern Zone accounting for the highest share of Rs. 965 lakh (46%) with West Zone accounting for the lowest at Rs. 25 lakh (01%). Rajasthan was the only state in the West Zone to receive funds under the PHTM Scheme.
      4. Out of 19 states which received funding under the PHTM Scheme, 7 states (37%) utilized the funds to an extent of 30%, 4 states (21%) used the funds to an extent of 30% to 60% and 8 states (42%) utilized funds to and extent of more than 60%. Five states, viz., Haryana, Himachal Pradesh, Karnataka, Jammu & Kashmir and West Bengal utilized the entire allocated funds. Andhra Pradesh, Assam, Kerala, Sikkim and Uttarakhand did not utilize their allocated fund at all during the XI FYP.
      5. More than 70% of the funds allocated during the first three years of XI Five Year Plan was utilized while only 56% of the funds allocated during the last two years were utilized indicating a higher probability of use of funds if allocated in time.
      6. It is also observed that 10 out of 14 states which were allocated funds in the first 3 years utilised the funds completely. Out of the 12 states which received the funding during the last two years, 10 states failed to utilize the fund completely, which further supports the higher probability of utilization if the funds are allocated during the earlier years of the Five Year Plan.
      7. Out of the total Rs. 509 lakh allocated to ICAR, only Rs.120.40 lakh (23%) was utilised by the CIPHET for conducting demonstration.
   2. **Conduct of Training and Demonstration**
      1. All the states did not organise the training and/ or demonstration. The demonstration remained the primary activities of both State Directorate as well as the CIPHET Centres. Out of sample 10 states, the training program on PHTM Scheme was organized by three states, namely Madhya Pradesh, Odisha and Uttarakhand.
      2. The demonstrations of equipments of PHTM were organized by the CIPHET centres across 12 states. The total demonstration organized during the XIth FYP by the CIPHET centres was 525 benefitting approximately 15000 farmers. The highest numbers of demonstration (421) were organized by the CIPHET centres in West Zone comprising of the states of Maharashtra, Rajasthan and Gujarat, with 200 demonstrations in Rajasthan alone.
      3. On an average the participation per demonstration was 28 with the least in Himachal Pradesh at 01 and maximum in Rajasthan at 51. Information on the number of participants per demonstration was not available from the State Directorates of Agriculture.
      4. The range of equipments demonstrated through CIPHET centres was better than the State Directorates of Agriculture.
      5. From the sample states where field visits were made, training was found to be organized only by three states; Madhya Pradesh, Odisha and Uttarakhand. It was observed that majority of training participants on PHTM components were large farmers indicating bias in selection of training participants.
      6. The average duration of training was 3 days. Many of the beneficiaries felt the need for increase in the duration to 5 days.
      7. The major motivators accounting for training need is enhancement of skill, enhanced awareness and utilization of post harvest technology and management practices which accounted for 32%, 29% and 22% of the total responses.
      8. Majority of respondents opined the course material to be useful and duration to be appropriate. 94% of the total training participants found the training to be relevant while 9% felt to be partially relevant. 96% of the total training participants found the contents of training to be appropriate while 4% found it not appropriate.
      9. 89% of the demonstration participants indicated that equipment demonstrated were useful and adoptable, depending on factors such as existing cropping pattern in the region.
      10. Out of the total 301 responses obtained from 209 beneficiaries who participated in demonstrations of different equipment of Post Harvest Management, only 28% indicated adoption of equipments/technology fully, while 20% pertains to partial adoption.

The overall training program was satisfactory and has been able to achieve its objectives but at the same time, efforts need to be intensified to increase the adoption rate through proper extension methods. The training component of the scheme needs to continue with an objective of higher adoption rate.The demonstration activity of the scheme responded mixed feelings from the beneficiaries who attended the demonstration of Post Harvest machineries. A significant number of beneficiaries were not happy with the way the demonstration was carried out and felt that there is scope for improvement in the future. There were also demands for increase in the time of demonstration on the field.

However, demonstration is an important activity and its continuation is vital in order to educate farmers on the use of post harvest machines to reduce the losses at the farm level.

1. **Recommendations**

**a. Recommendations on Better Fund Allocation and Utilization**

1. Funding support under the scheme needs to be equitably spread across the implementation period. Further release of funds at the end of the Financial Year should be avoided. The Government should fine tune the funding under the scheme for its proper and effective utilization at the ground level.
2. The fund allocation should be made to agriculturally developed states too giving adequate priority to less agriculturally developed states and north eastern states.
3. A uniform pattern of fund allocation should be made to states and in timely manner so that proper planning for organizing demonstration/ training could also be made by the implementing agencies at the ground level.

**b. Recommendations for more Effective & Efficient Implementation Of Training And Demonstration**

1. A monitoring and feedback system needs to be introduced to monitor the progress of scheme with regards to physical and financial progress.
2. The training and demonstrations were mostly supply driven rather than demand driven. There is a need to conduct a preliminary survey to identify the needs and preferences of the farmers/ entrepreneurs before organizing the demonstration and training which could improve adoption.
3. The training content should be developed well in advance and should be conducted in tune with the objectives of the scheme as many respondents from Madhya Pradesh who participated training under PHTM revealed that training were organized on cultivation practices, nursery management, nursery growing etc which has nothing to do with post harvest and management practices.
4. Rather than conducting demonstration of individual equipment as a stand alone activity, demonstration of a range of equipments required for complete processing and value addition of a commodity should be organised.
5. As envisaged in the guidelines that units for post harvest processing, value addition, low cost scientific storage, packaging, etc., may be established under a tripartite agreement of State Government, ICAR/CSIR and well functioning Self Help Groups/User Groups etc. However, very few interventions of such categories were found in the field. Most of the units/ enterprise established were individually operated and mostly by the large farmers who either have their existing units capable of handling the post harvest processing or capable of running the units without any external assistance. The adoption rate among the small and marginal farmers was not encouraging. Hence, a group based approach may prove to be beneficial for increasing the adoption rate. Linkages with NGOs working in the area may be explored to scale up the intervention and meet the desired objectives of increasing the adoption rate among the less privileged farmers.
6. The demonstration of low cost PHT can be scaled up through convergence with the existing schemes of MoA implemented by Small Farmers Agribusiness Consortium (SFAC) particularly in their vegetable clusters. The SFAC is implementing the Farmers Producer Organization Initiative Project, organizing farmers growing vegetables and pulses through Resource Institutions. The CIPHET Centres can work in collaborations with Resource Institutions which are promoting the FPOs to demonstrate Post Harvest Technology.
7. Majority of the training and demonstration participants and the entrepreneurs were large farmers indicating a bias in favour of them. Efforts need to be intensified to improve coverage of small farmers from the project locations.
8. The CIPHET Centres established in the State Agriculture Universities have been assigned the responsibilities of Post Harvest Technology and Management Scheme. As the professors are burdened with regular academic activities, it is may be difficult for them to provide required attention to the activities under the scheme. It is therefore recommended that the option of earmarking separate dedicated staff exclusively for the scheme in each CIPHET Centres responsible for effective implementation of scheme may be explored.
9. An effective system needs to be put in place for monitoring the progress of the scheme. It is therefore suggested that a system of maintaining information of trainees may be instituted.

# Chapter 1: Introduction

Ministry of Agriculture, Government of India has estimated that the total food grain production of the country has increased from 196.8 million tonnes in year 2001-02 to 259.29 million tonnes by 2011-12, reflecting a compounded annual growth rate of 3%. Agriculture machineries have played a crucial role in increasing the productivity and overall production through mechanization of production and post production agriculture. While the enhanced productivity is an essential component of agricultural sector, improved post harvest handling and processing is essential to reduce wastage and ensure that high quality products reach the market. Despite yields being high, producers lose income due to poor post harvest practices. Food processing helps all the sections of the society, from producer to the end consumer. The farmers get higher yields, better revenue thus lowering the risk drastically. Consumers in turn have access to greater variety and better prices. The overall economy gets benefitted with creation of new business opportunities for entrepreneurs which generates additional employment.

## 1.1 Challenges of Post Harvest Management

Though farm mechanization has significantly contributed to the overall productivity of food crops, post harvest losses have always denied the legitimate benefits from accruing to the farmers. Our country as a whole is, reportedly incurring post harvest losses of Rs. 2 lakh crores per year only in fruits and vegetable crops, which is largely due to the absence of processing units, storage facilities and an effective strategy for tackling post harvest losses. The post harvest losses estimated in food grains amount to 12-16 million metric tonnes annually (Nagpal et.al. 2012), valued at more than Rs 50000 crores (Singh, 2010). The reasons for such losses are inadequate infrastructure in the production catchment area, long distances from the areas of production and storage, reluctance on the part of the small producers to pay rental charges as many of them depend on more frequent sales for their income and also difficulty in accessing large markets discouraging farmers from moving to growing of commercial crops.

## 1.2 Scope of Mechanization

With this intent, the Department of Agriculture and Cooperation through its Mechanization and Technology Division (M&T) has adopted a multi pronged strategy for reforming agricultural markets & promoting post harvest technology by implementing the Central Sector Scheme of “Post Harvest Technology and Management” during the XI Five Year plan. The aim of the scheme is to create adequate infrastructure in the production catchment/ rural areas for primary processing and value addition that can reduce post harvest losses on the farm and add value to the products being sold in the market. The scheme focuses on the lower end of the spectrum of post harvest management and processing that are not covered under the programmes of the Ministry of Food Processing or under National Horticulture Mission (NHM).

Under the scheme, the technologies developed by ICAR, CSIR and those identified from within the country and abroad for primary processing, value addition, low cost scientific storage and transport and by-product management have been given importance.

## 1.3 Components of the Scheme & Salient Feature

The main components of the Post Harvest Technology and Management Scheme are:

1. Establishment of units for transfer of primary processing technology, value addition, low cost scientific storage, packaging units and technologies for by-product management in the production catchments under tripartite agreement.
2. Establishment of low cost Post Harvest Technology (PHT) units/supply of PHT equipment with Government assistance.
3. Demonstration of technologies.
4. Training of farmers, entrepreneurs and scientists.

## 1.4 Need for the Study

The Scheme for “Post Harvest Technology and Management” has been implemented during the XI Five Year Plan (2007-2012) through State Governments; Government Sponsored Institutions such as Central Institute of Post Harvest Engineering and Technology (CIPHET) and State Agriculture Universities. The scheme has been implemented in 27 states/union territories with a total financial outlay of Rs. 40.00 crores during the XI Five Year Plan. After completion of the XI Five Year Plan, the Mechanization and Technology Division under the Department of Agriculture and Cooperation desired to know the status of actual implementation of the scheme with respect to physical and financial progress, extent of adoption of technologies by the farmers and constraints and bottlenecks encountered during the implementation of the scheme. Such critical inputs become necessary to further refine and improve the effectiveness of the scheme by improving the overall implementation management plan through required policy changes. Accordingly, the Mechanization and Technology Division has assigned the responsibilities to NABCONS to conduct an elaborate and comprehensive evaluation of the scheme with specific Terms of Reference.

## 1.5 Term of Reference

The Terms of Reference of the Evaluation Study of the scheme for Post Harvest Technology and Management are:

1. To study the impact of establishing low cost Post Harvest Technology (PHT) units on towards adoption of new technology/ equipments in the demonstration area as well as in the state as a whole.
2. To assess the opinion of farmers about availability and usefulness of these equipments.
3. To suggest any improvement that may be required in this component.

# Chapter 2: Research Design & Methodology

To evaluate the performance of PHTM Scheme, a holistic approach was adopted to collect data on selected parameters such as physical and financial progress, establishment of low cost PHT units, adoption of new technology under PHT, demonstration of PHT, opinion of farmers on PHT equipments and their usefulness.

The scheme has been implemented with the help of State Department of Agriculture and Central Institute of Post Harvest Technology (CIPHET), established under All India Coordinated Research Project (AICRP). The CIPHET has implemented the scheme through their cooperating centre in different states. Therefore, nodal officers of the State Department of Agriculture and CIPHET/ CIPHET Centres were contacted to obtain information on physical progress Primary beneficiaries and entrepreneurs were interviewed in person to obtain information on their demographic profile, types of equipment demonstrated, usefulness of demonstrated equipment, availability and overall feedback on demonstration.

## 2.1 Types of Data Used for the Study

Secondary Data: The data on fund allocation and utilization for each state and ICAR institute were obtained from the M&T Division, DoAC (MoA). Further physical and financial progress in respect of the sample states were collected from the State Department of Agriculture and CIPHET/CIPHET Centres for analysis.

Primary Data: The primary information was collected from the beneficiaries and entrepreneurs level from the field who had adopted the post harvest technologies and equipments provided by the implementing agencies. The information from three different stakeholders- entrepreneurs, trainees who attended the training program under the scheme and host farmers which had demonstrated the PHT technology was collected through personal interviews. The variables on demographic details, types of PHT units installed/ technology adopted, their capacity, ownership, performance of training and demonstration, their usefulness, organization of demonstration and usefulness of equipment/technology and their availability in the market and overall opinion of farmers were captured.

## 2.2 Sampling Design

The sample states were selected based on the fund allocation under PHTM Scheme during the XI Five Year Plan. Out of total 27 states, 19 states were allocated the funds for implementation of PHTM Scheme. In addition, the CIPHET also implemented the scheme in 8 states across the country.

1. Multistage purposive sampling technique was adopted for sampling the state under the study. The states were first sorted in ascending order of amount of funds allocated. The states were then categorised into six regions (North Eastern Region, Eastern Region, Central Region, Northern Region, Western Region and Southern region) and the sample states were selected from each region for the purpose of field study.
2. Out of 19 states, 10 states were selected which account for more than 50% of the total states that received financial allocations during the XI FYP. The list of sample state is given in table 1 below.

Table List of sample state covered in PHTM Scheme

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Southern Region | North Eastern Region | Central Region | Eastern Region | Western Region | Northern Region |
| Andhra Pradesh | Manipur | Madhya Pradesh | Odisha | Rajasthan | Haryana |
| Karnataka |  |  | West Bengal |  | Punjab |
| Tamil Nadu |  |  |  |  | Uttarakhand |

1. Since the exact physical achievements were not available, a tentative number of participants of trainees, entrepreneurs, scientists, host farmers, and demonstration participants were arrived at for the purpose of personal interviews. A total of 437 PHTM participants were targeted to be covered for personal interview. The PHTM participants who had participated under the guidance of State Department of Agriculture and Central Institute of Post Harvest Engineering and Technology were selected.
2. Table 2 below gives the details of the sample targeted and actually covered in the state.

## 2.3 Selection of Institutions

Three different types of institutions were involved for implementation of Post Harvest Technology and Management Scheme viz., State Department of Agriculture, the CIPHET Centres and State Agriculture Universities. The State Agriculture Universities acted as extended arms of both the State Agriculture Departments and CIPHET. Respondents were selected from each type of institutions so as get a comprehensive feedback on the progress of the scheme, its impact and opinion of users about the technology demonstrated. A separate questionnaire was developed to capture the details from implementing agencies viz., State Agriculture Department, CIPHET Centres and State Agriculture Universities to record their insights and opinion on the scheme.

## 2.4 Limitations of the Study

The study has the following limitations:

1. A sample of states where the scheme has been implemented only has been covered.
2. Availability of information in properly documented format both physical and financial progress, at the implanting agency’s level, was the major constraint. The basic information required as a prerequisite to launch of the field study had to be provided by the State Agriculture Departments and CIPHET.
3. The basic information on the status of Scheme such as fund utilization and physical progress was not made available to the study team. This affected the evaluation of the actual progress and the impact of its various components.

Table Sample Coverage under PSAMTT&D Scheme

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Region | State | Institution | Sample to be covered | | | | | Total (PHTM) | Actual Coverage |
| **Trainees** | | | **Demonstration** | |
| **Farmers** | **Entrepreneurs** | **Scientist** | **Demonstrators** | **Demonstration Participants** |
| Southern | Tamil Nadu | CIPHET-TNAU- Coimbatore Centre |  |  |  | 5 | 30 | ***35*** | ***37*** |
| Karnataka | CIPHET-GKVK- Bangalore Centre |  |  |  | 2 | 30 | ***32*** | ***21*** |
| CIPHET-UAS-Raichur Centre |  |  |  | 5 | 30 | ***35*** |
| North East | Manipur | Directorate of Agriculture | 25 | 2 | 2 | 2 |  | ***31*** | ***35*** |
| Western | Maharashtra | CIPHET-Dr. Punjab Rao KV-Akola Centre |  |  |  | 3 | 30 | ***33*** | ***Nil*** |
| Rajasthan | CIPHET- MPUAT- Udaipur Centre |  |  |  | 3 | 30 | ***33*** | ***33*** |
| Northern | Haryana | Directorate of Agriculture | 20 | 2 | 2 | 2 |  | ***26*** | ***0*** |
| CIPHET-CCSHAU Centre |  |  |  | 2 | 20 | ***22*** | ***22*** |
| Uttarakhand | Directorate of Agriculture | 25 | 5 | 2 | 2 |  | ***34*** | ***6*** |
| CIPHET-VPKAS-Almora Centre |  |  |  | 2 | 30 | ***32*** | ***44*** |
| CIPHET-GBPU-Pantnagar Centre |  |  |  | 2 | 30 | ***32*** |
| Central | Madhya Pradesh | Directorate of Agriculture | 25 | 5 | 2 | 2 |  | ***34*** | ***63*** |
| CIPHET- JNKVV Centre |  |  |  |  |  |  | ***22*** |
| Eastern | Orissa | Directorate of Agriculture | 25 | 2 | 2 | 2 |  | ***31*** | ***49*** |
| West Bengal | Directorate of Agriculture |  |  |  | 2 | 25 | ***27*** | ***20*** |
| Total | | | **195** | **22** | **16** | **47** | **320** | **437** | **352** |

# Chapter 3: Contextual Background and Implementation

The Scheme for Post Harvest Technology and Management has been implemented across 19 states/UTs in the country. The scheme has been implemented with the help of State Directorates of Agriculture and Central Institute of Post Harvest Engineering and Technology (CIPHET). The State Directorates of Agriculture have implemented the scheme through their extension wings at the district level while Krishi Vigyan Kendra and CIPHET have implemented the scheme through their centres established under AICRP on PHT across different states.

3.1 Component of Scheme

There are four broad components of the scheme and their features are presented below:

* + 1. Establishment of units for transfer of primary processing technology, value addition, low cost scientific storage, packaging units and technologies for by-product management in production catchment under tripartite agreement.
       - 1. Development of scientific storage, packaging technologies and technology for by-product management for various perishable commodities shall be established under the tripartite agreement amongst the state government, ICAR and Self Help Groups (SHGs)/ User Groups (UGs)/ Cooperative Societies of Farmers/ Non Government Organizations (NGOs).
         2. The committee constituted of the representative of AICRP Centre of ICAR, official of State Department of Agriculture, Lead Bank Officer, representative of KVK from the district will identify the beneficiaries under the scheme.
         3. The SHGs/UGs of farmers/ Cooperative Society who are ready to invest 60% of the project cost and are ready to enter the tripartite agreement will be selected by the State Department of Agriculture in association with other centres.
         4. The units established under scheme will be operated by the user groups (SHGs/UGs/Cooperative Societies) with technical support of AICRP on PHT. After successful implementation and operations for one year, the units will be transferred fully to the user groups.
         5. The subsidy assistance of 40% (limited to Rs. 4.00 lakh) shall be released through the Technical Institution of ICAR after the approval of Government of India.
         6. During the implementation of the scheme, the Implementation and Monitoring Committee shall ensure that 16% of the total available funds are allotted to the SC beneficiaries, 8% to the ST beneficiaries and 30% of the fund to the women beneficiaries.
    2. Establishment of low cost post harvest technology units/supply of PHT equipments with Government assistance.
       - 1. For primary processing and value addition, the equipment not requiring high capital (up to Rs. 2.00 lakh) investment shall be established in the farmer’s field.
         2. The beneficiaries are selected by the committee constituted by the Engineers/Representative of AICRP Centre, Officer of State Agriculture Department/ATMA, District Lead Bank Officer and representative of KVKs. The committee decides the technology to be promoted from the list of technologies.
         3. The proposal, once developed, will be forwarded to the Department of Agriculture and Cooperation, GoI, which will study the viability of proposal and accordingly release the fund to the state Government.
         4. The government will provide 40% subsidy on the total cost of the proposal and 60% shall be contributed by the beneficiaries.
    3. Demonstration of Technology.
       - 1. The demonstration is meant for disseminating the technology at a faster rate for adoption by the farmers. The demonstration shall be taken up through ICAR, CSIR, SAUs and the State Agriculture Department.
         2. Government of India shall provide 100% of the assistance for the procurement of technology equipment and contingency expenditure.
         3. The State Government, ICAR/CSIR Centres shall identify the technology suitable for the catchment and shall forward the detailed proposal.
         4. The remaining criteria for selection of beneficiaries and implementation of the scheme remain the same as for the other components.
         5. The supervisory role has to be carried out with the help of officers of FMTTIs and officers from MoA through random visits to measure the actual implementation and assess the performance of the equipment demonstrated and their acceptability among the farmers.
         6. There should be proper documentation of cases that may be published in the popular journals/ periodicals.
    4. Training of Farmers, Entrepreneurs and Scientists.
       - 1. The objective is to improve the technical know-how of the users of post harvest technology for its proper and effective utilization, to incentivize manufacturers to take up commercial production of technologies and to train scientists for propagation of technologies developed by AICRP, KVKs of ICAR and other centres.
         2. The financial assistance shall be provided to the institution identified for training at the rate of Rs 2600.00 per person per week for farmers and Rs 3000.00 per person per week for entrepreneurs and scientists.
         3. Implementing agencies should ensure that 30% of the beneficiaries under the scheme are women, 16% of the beneficiaries belong to the SC category and 8% to the ST category as per the Government of India Guidelines.

The implementing agencies, which consist of State Departments of Agriculture and Central Institute of Post Harvest Engineering and Technology, have implemented the demonstration and training components of the scheme.

## 3.2 Fund Allocation under the PHTM Scheme.

### 3.2.1 Year wise Fund Allocation

During the XI Five Year Plan, the scheme has been implemented across 19 states/union territories. The total financial allocation made during the XI Five Year Plan under the Centrally Sponsored Schemes (CSS) of PHTM was Rs. 2608 lakh. The year wise fund allocation during the XI Five Year Plan is given in figure 1 below.

Figure Year wise fund allocation under PHTM Scheme during XI FYP

Allocation for implementation of Post Harvest Technology and Management Scheme (PHTM) was highest during the financial year 2011-12 and lowest during the year 2007-08. The first three years of the plan period received only Rs. 711 lakh (27%) out of the total Rs. 2608 lakh whereas the last two years received Rs. 1897 lakh (73%). It must be noted that this uneven flow of funds affected the implementation of the program to a very large extent, as explained in subsequent chapters.

The pie chart below further highlights the percentage distribution of funds allocated during the XI Five Year Plan. It can be seen that 73% of the total allocated fund was released in the last two years, 38% during the last year of XI FYP (2011-12) and 35% during the preceding year (2010-11). Only 4% of the total amount of Rs. 2608 lakh was allocated during the year 2007-08 and 5% during the year 2009-10. This skewed pattern of fund allocations has a dual effect of impacting the implementation of the project adversely and hindering the evaluation process as projects are still in their gestation period.

Figure Year wise percentage distribution of allocated fund during the XI FYP

### 3.2.2 Institution wise fund allocation

The scheme has been implemented by the State Directorates of Agriculture and ICAR through CIPHET which was established under the AICRP. During the XI FYP, funds were released to 19 State Governments, in addition to ICAR, which further allocated it to CIPHET. Out of the total fund of Rs. 2608 lakh, 80% (Rs. 2099 lakh) was released to the State Governments and the rest 20% (Rs. 509 lakh) was allocated to ICAR.

Figure Institution wise fund allocation under PHTM scheme during XI FYP

Out of the total Rs. 2608 lakh allocated to the States during the XI Five Year Plan, Manipur received the highest at Rs. 452 lakh, accounting for 17% of the total funds allocated. Kerala received the lowest, accounting for just 0.53% (14 lakh) of the total. Out of the total 27 states, eight states, viz., Gujarat, Jharkhand, Maharashtra, Meghalaya, Orissa, Tamil Nadu, UP, and Tripura did not receive any funds. Figure 4 below gives a snapshot of funds allocated to States during the XI Five Year Plan.

Figure State wise allocation of fund during the XI FYP

A detailed analysis of the graph tells us that agriculturally less developed states got a better share of the fund allocation, which is a positive sign from the development point of view. The North Eastern States; Manipur, Nagaland, Assam, Mizoram and Sikkim have also received significant funds for the implementation of PHTM Scheme.

### 3.2.3 Zone wise fund allocation

The 19 states where the PHTM program was implemented were divided into six zones as under (Table 3). Of these, 8 states did not receive any funds and therefore were not considered for the purpose of analysis. Hence, it can be seen that 3 states each East and South Zone were allocated funds by the MoA for the implementation of the scheme where 4 states received funding in North Zone. From the West Zone, only Rajasthan received funding for implementation of the program. Out of 8 North Eastern states, 6 states were allocated funds, while in the Central Zone, both Chhattisgarh and Madhya Pradesh received funding.

Table Zone wise segregation of states implemented PHTM Scheme during the XI FYP

|  |  |
| --- | --- |
| Zones | States |
| North Zone | Haryana, Himachal Pradesh, J&K, UK |
| East Zone | Bihar, West Bengal, Odisha |
| West Zone | Rajasthan |
| Central Zone | MP, Chhattisgarh |
| North East Zone | Arunachal Pradesh, Assam, Manipur, Mizoram, Nagaland, & Sikkim |
| South Zone | AP, Karnataka, Kerala |

I

Figure Zone wise fund allocation during XI FYP

As seen in the case of state wise allocation of funds, zone wise allocation also indicates a positive bias towards the less developed East, Central and North Eastern Zones. North Eastern states accounted for a major share of the allocated funds (Figure 5). They received a total of Rs. 965 lakh (45%) followed by Central and Eastern Zone at Rs. 404 lakh (25%) and Rs. 313 lakh (15%) respectively. The other two zones i.e. North Zone and South Zone received Rs 175 lakh (7%) and Rs 217 lakh (14%) of the total allocation during the XI Five Year Plan.

### 3.2.4 Year wise shares of fund allocation across various zones

An analysis of the funds allocated under the PHTM scheme, indicates a rightward skew with respect to the time frame of allocation of funds. Table 4 below gives the details of percentage of allocation of funds.

Table Year wise share of fund allocation across six zones during the XI FYP

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Zone | Total Fund allocated(In Rs. Lakh) |  | Years | | | |
| 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 |
| South Zone | 217 | 0% | 0% | 18% | 23% | 59% |
| North East Zone | 965 | 3% | 21% | 3% | 22% | 52% |
| Eastern Zone | 313 | 11% | 21% | 22% | 29% | 17% |
| Central Zone | 404 | 0% | 18% | 0% | 28% | 55% |
| Western Zone | 25 | 0% | 0% | 0% | 100% | 0% |
| Northern Zone | 175 | 0% | 46% | 0% | 9% | 45% |

The above table indicates that nearly half of the allocations for South, North-East, Central and North zones were made in the last year of the XI Five Year Plan. Of these, the East Zone comprising of Bihar, Jharkhand, West Bengal and Odisha was the only zone to have a proper time spread with regard to allocation of funds. In the West Zone, Rajasthan was the only state which received the allocation under PHTM Scheme, that too during the year 2010-11.

### 3.2.5 Fund Utilization

Utilization is the process of making use of the funds allocated for a specific plan. To understand the utilization pattern, states have been categorised into 3 broad categories. Table 5 below presents a snapshot of extent of utilisation of funds w.r.t. number of states.

Table Distribution of states based on extent of fund utilized under PHTM scheme during the XI FYP

|  |  |  |
| --- | --- | --- |
| Fund Utilization Range | Number of States | Percentage |
| 0-30% | 7 | 37 |
| 31-60% | 4 | 21 |
| 61-100% | 8 | 42 |
| Total | 19 | 100 |

Out of 19 states which have been allocated funds for the PHTM Scheme, 7 states utilized only up to 30% of the total fund, 4 states utilized between 30% and 60% of the total allocations; only 8 states utilized more than 60% of the total allocations. Therefore 11 out of 19 States (58%) utilized less than 60% of the total funds allocated to them.

One of the key reasons for low utilization is the skewed pattern of fund allocation. As the funds were generally received in the last or the second last year of the XI Five Year Plan, it was difficult for the states to utilize them on time.

Figure 6 State wise fund utilization pattern during XI FYP

As evident from figure 6 above, out of 19 states where the PHTM program has been implemented, 5 states, viz., Haryana, Jammu and Kashmir, Himachal Pradesh, Karnataka and West Bengal, spent 100% of the funds in program implementation. Six states, viz., Andhra Pradesh, Assam, Kerala, Rajasthan, Sikkim and Uttarakhand did not spend any amount for the implementation of the scheme and hence no progress has been reported by the State Directorates of Agriculture in these states. Even among zones, out of 4 states in Northern Zone which received the allocation, 3 states utilized the funding to an extent of 100%. The performance of states in East Zone remains average, except West Bengal which performed well, utilizing 100% of the assistance during the XI Five Year Plan.

### 3.2.6 Utilization of fund- a time frame comparison

In the beginning of this chapter, we have stated that discrepancies in the allocation of funds hampered its utilization. Here, in this section we can clearly see the effect. To understand the effect, we have divided the five year timeline into two groups. The first group comprises of the first three years of the plan period i.e. 2007-08, 2008-09 and 2009-10 and the second group comprises of the last two years of the plan period i.e. 2010-11 and 2011-12. The pie charts (Figure 7) depicts the aggregate fund utilization pattern in these two groups-

Six of the total 19 states which received assistance under the PHTM program did not utilize the funds provided.

|  |  |
| --- | --- |
|  |  |

Figure 7 Aggregate fund utilization in time frame

During the first three years of the plan period i.e. 2007-08, 2008-09 and 2009-10, out of the total funds of Rs. 613 lakh, Rs. 447 lakh (73%) was utilized for the implementation of the scheme, whereas during the last two years of the plan period i.e. 2010-11 and 2011-12, out of the total Rs. 1486 lakh allocated, Rs. 837 lakh (56%) was utilized. Though the utilization at an aggregate level does not show any signs of large differences, state wise analysis brings out the difference in a more pronounced manner. It can be seen from figure 8 below that 10 out of the 14 states which received funds in the first three years of the XI Five Year Plan, completely utilized the funds, while from figure 9 below, it can be inferred that 10 out of the total 12 states which received funds in the last two years failed to utilize the funds completely. Thus, we can say that late allocation of funds hampered the implementation and hence, the funds allocated for the purpose remain unutilized.

Figure 8 Aggregated fund utilization by the states in first three year of XI FYP

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Figure Aggregated fund utilization by the states in last two year of XI FYP

### 3.2.7 Disbursement of Fund to CIPHET for implementation of PHTM Scheme

As stated earlier, the PHTM Scheme has also been implemented through the government sponsored institution- ICAR. CIPHET is the nodal agency of ICAR which has been implementing the PHTM Scheme under the purview of All India Coordinated Research Project on Post Harvest Technology (AICRP on PHT). The institution has been implementing the scheme through their designated centres across the country.

During the XI Five Year Plan, ICAR has been allocated total funds of Rs. 509 lakh, of which, as per the report of M&T Division (DoAC), MoA, only Rs. 98 lakh has been utilized. However, as per the report provided by CIPHET, under the Scheme Rs. 120.40 lakh has been disbursed to its different centres. Table 6 gives the details of fund allocation to ICAR and funds reportedly used by CIPHET for demonstration of equipment during the XI FYP. The highest disbursement of Rs. 52.15 lakh by CIPHET was made during the last year of the XI Five Year Plan with an average allocation of Rs 7.4 lakh per centre. During the year 2008-09 and 2010-11, disbursement worth Rs 36.59 lakh and Rs 31.67 lakh respectively was made to 14 centres, hence, on an average, each centre received Rs. 2.61 lakh and Rs. 2.26 lakh respectively, which is almost 3 times less than what was allocated during the last financial year of XI Five Year Plan.

Table Fund allocated to ICAR and disbursed by CIPHET during the XI FYP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | Fund allocated to ICAR (Rs in lakh) | Fund disbursed by CIPHET (Rs in lakh) | Remark | Name of Centres |
| 2007-08 | 40 | nil | - |  |
| 2008-09 | 58 | 36.58 | Fund released by CIPHET for demonstration to 14 Centers | Akola, Almora, Bangalore, Bhubaneswar, Coimbatore, Hissar, Jabalpur, Junagarh, Ludhiana, Pantnagar, Trivandrum, Udaipur, Raichur, Kasargod |
| 2009-10 | 0 | 31.67 | Fund released by CIPHET for demonstration to 14 Centres | * Do - |
| 2010-11 | 411 | nil | - |  |
| 2011-12 | 0 | 52.15 | Fund released by CIPHET for demonstration to 7 Centres | Bhubneshwar, Banagalore, Coimbatore, Jabalpur, Pantnagar, Trivandrum, Udaipur |
| Total | **509** | **120.4** |  |  |

### 3.2.7 Year wise and centre wise demonstration on PHTM organized by CIPHET

CIPHET has organized the demonstration of equipment and units under Post Harvest Technology & Management Scheme in 11 states through its 14 cooperating centres during the XI FYP. Table 7 below presents the total demonstrations organized by the CIPHET centres each year.

During the XI Five Year Plan, 525 demonstrations were organized by CIPHET covering more than 14000 farmers/ beneficiaries. The activities organized during the first two years, 2008-09 and 2009-10, were more as compared to the last two years (2010-11 and 2011-12) and therefore the participation recorded during the first two years was also more than the last two years. Out of 525 demonstrations organized during the XI Five Year Plan, 467 (89%) demonstrations were organized during the year 2008-09 and 2009-10, while only 58 demonstrations (11%) were organized during the year 2010-11 and 2011-12.

Table Number of demonstrations organized by CIPHET centres during the XI FYP

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Zone | States | No of Centers | 2008-09 | | 2009-10 | | 2010-11 | | 2011-12 | | Total | |
| Demo (no) | Farmers (no) | Demo (no) | Farmers (no) | Demo (no) | Farmers (no) | Demo (no) | Farmers (no) | Demo (no) | Farmers (no) |
| North Zone | Uttarakhand | 2 | 34 | 1300 | 10 | 362 | 0 | 0 | 0 | 0 | 44 | 1662 |
| Himachal Pradesh | 1 | 0 | 0 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 |
| Punjab | 0 | 0 | 20 | 742 | 0 | 0 | 0 | 0 | 20 | 742 |
| *Sub Total* | | ***3*** | ***34*** | ***1300*** | ***32*** | ***1106*** | ***0*** | ***0*** | ***0*** | ***0*** | ***66*** | ***2406*** |
| East Zone | Odisha | 1 | 0 | 0 | 2 | 53 | 0 | 0 | 6 | 52 | 8 | 105 |
| *Sub Total* | | ***1*** | ***0*** | ***0*** | ***2*** | ***53*** | ***0*** | ***0*** | ***6*** | ***52*** | ***8*** | ***105*** |
| West Zone | Maharashtra | 1 | 24 | 1339 | 22 | 749 | 0 | 0 | 13 | 221 | 59 | 2309 |
| Rajasthan | 1 | 27 | 1283 | 28 | 1557 | 0 | 0 | 5 | 200 | 60 | 3040 |
| Gujarat | 1 | 0 | 0 | 2 | 20 | 1 | 15 | 0 | 0 | 3 | 35 |
| *Sub Total* | | ***3*** | ***51*** | ***2622*** | ***52*** | ***2326*** | ***1*** | ***15*** | ***18*** | ***421*** | ***122*** | ***5384*** |
| South Zone | Karnataka | 2 | 35 | 960 | 62 | 1242 | 14 | 310 | 4 | 47 | 115 | 2559 |
| Kerala | 2 | 20 | 965 | 51 | 2081 | 0 | 0 | 0 | 0 | 71 | 3046 |
| Tamil Nadu | 1 | 60 | 388 | 68 | 548 | 4 | 75 | 4 | 75 | 136 | 1086 |
| Andhra Pradesh | 1 | 0 |  | 0 |  | 0 |  | 7 | 236 | 7 | 236 |
| *Sub Total* | | ***6*** | ***115*** | ***2313*** | ***181*** | ***3871*** | ***18*** | ***385*** | ***15*** | ***358*** | ***329*** | ***6927*** |
| Total | | **13** | **200** | **6235** | **267** | **7356** | **19** | **400** | **39** | **831** | **525** | **14822** |

The zone wise and state wise analysis also reveals that in the South zone which comprises of states of Karnataka, Kerala, Tamil Nadu and Andhra Pradesh, the activities were implemented almost every year and in more numbers as compared to other regions. Out of the 4 states, the CIPHET centres in Karnataka and Tamil Nadu implemented 76% of the total demonstrations organized in the South Zone, while Kerala and Andhra Pradesh organized 24% of the demonstrations.

The demonstrations among the states of the North zone remained confined to 2008-09 and 2009-10. The only state of north zone which organized demonstrations for two years was Uttarakhand, while the other two states viz., Himachal Pradesh and Punjab, the demonstration activities were organized only during the year 2009-10. Similarly, the CIPHET centre in Odisha organized demonstrations every second year.

#### 3.2.7.1 Participation Rate

Table 8 below presents the participation of beneficiaries/ farmers in the demonstrations organized by the CIPHET through their centres. The average participation per demonstration was 28, with the highest participation rate of 44 participants per demonstration in West Zone followed by North Zone.

Table Participation/ demonstration organized by CIPHET centres during the XI FYP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Zone | States | Total | | Average Participation (Participant/ demonstration) |
|  |  | Demo (no) | Farmers (no) | |
| North Zone | Uttarakhand | 44 | 1662 | 38 |
|  | Himachal Pradesh | 2 | 2 | 1 |
|  | Punjab | 20 | 742 | 37 |
| *Sub Total* | | ***66*** | ***2406*** | ***36*** |
| Eastern Zone | Odisha | 8 | 105 | 13 |
| *Sub Total* | | ***8*** | ***105*** | ***13*** |
| Western Zone | Maharashtra | 59 | 2309 | 39 |
|  | Rajasthan | 60 | 3040 | 51 |
|  | Gujarat | 3 | 35 | 12 |
| *Sub Total* | | ***122*** | ***5384*** | ***44*** |
| South Zone | Karnataka | 115 | 2559 | 22 |
|  | Kerala | 71 | 3046 | 43 |
|  | Tamil Nadu | 136 | 1086 | 8 |
|  | Andhra Pradesh | 7 | 236 | 34 |
| *Sub Total* | | ***329*** | ***6927*** | ***21*** |
| Total |  | 525 | 14822 | 28 |

Among the states, the highest participation rate was in Rajasthan followed by Kerala, while the lowest with only one participant per demonstration was in Himachal Pradesh followed by Tamil Nadu (8 participant/ demonstration).

Out of 14822 participants, 4534 were women participants, accounting for 31% of the total participants.

Hence, despite the efforts, continuity of organizing demonstrations was not maintained except by two centres, Karnataka and Tamil Nadu, which organized demonstrations throughout the XI FYP. This defeats the very purpose of organizing demonstrations for popularising the equipment/ technologies and for faster adoption of the same. Also, the participation in demonstration is not very encouraging as evident from the table 8 above and centres in Himachal Pradesh, Odisha and even Tamil Nadu may take corrective measures to improve the situation in future.

### 3.2.8 Equipments/ Technology Demonstrated by CIPHET

Table 9 illustrates the equipment/ technologies demonstrated by the CIPHET Centres in respective states. The enlisted equipment/ technologies were demonstrated by the centres during each year wherever the demonstrations were organized for more than one year. Changes with respect to the demonstrated technologies/ equipment were not observed during the entire plan period.

Table Equipments demonstration in PHTM schemes by CIPHET through its centre during XI FYP

|  |  |
| --- | --- |
| State | Machines/ Technology Demonstrated |
| Karnataka | |
| Bangalore Centre | 1. Manual operated arecanut dehusker 2. White pepper machine 3. Tamarind dehuller cum deseeder 4. Eco friendly pulse storage technology |
| Raichur centre | 1. Chilly dryer 2. Pedal operated Ice crusher |
| Kerala | |
| Kasargod centre | 1. Snow ball tender nut 2. Tender nut punch 3. Tender nut cutter |
| Trivandrum centre | Cassava chipping machine  Cassava rasper  Mobile starch extraction plant |
| Maharashtra | |
| Akola Centre | PKV Mini Dal Mill  Chilly seed extractor  Fruit grader |
| Rajasthan | |
| Udaipur Centre | Garlic bulb breaker  Garlic Flaking machine  Ginger piller cum polisher |
| Tamil Nadu | |
| Coimbatore Centre | Turmeric boiler  House hold paddy parboiling unit  Mini Dal mill  Tomato seed extractor  Hand operated pepper thresher  Power operated pepper thresher  White pepper thresher cum washer |
| Uttarakhand | |
| Almora centre | Millet thresher cum point alarm  Jiggery storage bin  Potato peeler |
| Gujarat | |
| Junagarh centre | Cumin cleaner cum grader  3 in 1 decorticator  Fruit grader |
| Himachal Pradesh | |
| Ludhiana centre | Electric cum battery heated uncapping knife |
| Odisha | |
| Bhubneshwar centre | Millet thresher cum pearler |
| Punjab | |
| Ludhiana centre | Turmeric washing cum polishing machine  Electric cum battery heated uncapping knife |
| Andhra Pradesh | |
| Anakapalli centre | Jaggery processing and storage  Straw baler  Mini Dal mill  Maize sheller/ dehusker |

### 3.2.9 Equipments/ Technology Demonstrated by State Agriculture Departments (Sample States)

Table Equipment/ Technology demonstrated through State Departments on PHTM Scheme

|  |  |  |  |
| --- | --- | --- | --- |
| State | Fund allocated | Equipments Demonstrated | Remark |
| Andhra Pradesh | Rs. 24 lakh (2009-10) | NA | Information not available |
| Tamil Nadu | Nil |  | No Fund was allocated |
| Karnataka | Rs 50 lakh (2010-11) and Rs. 129 lakh (2011-12) | Straw baler  Mini Dal Mill  Maize sheller/ dehusker  Ground nut sheller | Fund allocated during 2010-11 and Rs 2011-12. |
| Manipur | Rs. 452 lakh | Paddy Thresher | Fund was allocated during all the years of XI FYP |
| Rajasthan | Rs 25 lakh (2010-11) |  | Fund was further allocated to MPUAT for demonstration of equipment |
| Maharashtra | Nil |  | No fund was allocated |
| Uttarakhand | Rs 79 lakh (2011-12) | Millet Thresher  Dal Mill  Jaggery Storage bin  Potato chip cutter machine | Rs 79 lakh was sanctioned during 2011-12. However, there being no provision at the state government level due to technical reasons, the amount was revalidated to be spent during 2012-13. |
| Madhya Pradesh | Rs 64 lakh (2008-09)  Rs 44 lakh (2010-11)  Rs 221 lakh (2011-12) |  | Training as well as demonstration were organized |
| Odisha | Rs 34 lakh (2007-08)  Rs 90 lakh (2010-11)  Rs 54 lakh (2011-12) | Mini Dal Mill  Power Groundnut Decorticator  Power ground  nut Stripper  Power maize  dehausker  sheller  R.R Rice sheller/  Polisher  Tomato Seed  Extractor  Power Pulse  Thresher  Pulse cleaner  cum Grader | Training and Demonstrations were organized |
| West Bengal | Rs 70 lakh (2009-10) | Seed Grader  Seed Processing Machine | Training and demonstrations organized by State Ag. Department |

Among the sample states, no funds were allocated to Tamil Nadu and Maharashtra and therefore no demonstrations or training programs were organized. An amount of Rs. 25 lakh was allocated to Rajasthan State Agriculture Department during the year 2010-11 which was further given to MPUAT for organizing the demonstration activities. Manipur received the funds for demonstration activities in all the five years of XI Five Year Plan amounting to Rs. 452 lakh, the major portion being received during the years 2011-12 and 2010-11, at Rs. 253 lakh and Rs. 115 lakh respectively.

# Chapter 4: Findings from Field

To capture the responses from participants of Post Harvest Technology and Management Scheme, primary research were conducted in 10 states as indicted in table 2 of chapter 2. Two different categories of beneficiaries (i) the training beneficiaries who have attended the training program and (ii) the demonstration beneficiaries who have adopted/ used the equipment or technology were administered in person to understand their views and opinion on the demonstration as well as to assess the effectiveness and usefulness of the scheme and equipment being used under demonstration. This information was collected using structured questionnaires.

The nodal officers from the respective institutions which includes the CIPHET implementing agencies and State Agriculture Departments were also interviewed using semi structured questionnaires and open interviews.

The sections in this chapter give a detailed analysis of primary research carried out for the PHTM Scheme.

## 4.1 Participant’s Response on Trainings organized under PHTM Scheme

The training participants were covered from three states, viz., Madhya Pradesh, Odisha and Uttarakhand. The beneficiaries were selected on the basis of information shared by implementing agencies and availability of participants. A total of 118 training participants were covered, out of which 63, 49 and 6 beneficiaries belonged to Madhya Pradesh, Odisha and Uttarakhand, respectively.

### 4.1.1 Demographic Details of Respondents participated in training program

Table Demographic profile of Training respondents under PHTM Scheme

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Total Sample | Age (Years) | | | Gender | | Caste | | | |
| Average | Min | Max | Female | Male | SC | ST | OBC | Others |
| Madhya Pradesh | 63 | 43 | 17 | 70 | 13 | 50 | 3 | 9 | 30 | 21 |
| Odisha | 49 | 38 | 22 | 78 | 13 | 36 | 6 | 17 | 2 | 24 |
| Uttarakhand | 6 | 51 | 37 | 60 | - | 6 | 5 | - | 1 | - |
| Total/Overall | **118** | **41.1** | **17** | **78** | **26** | **92** | **14** | **26** | **33** | **45** |

Overall average age of the participants was found to be 41 years with minimum age being 17 years and maximum age being 78 years. Among the states, the average age of participants of Uttarkhand was found to be the highest compared to Madhya Pradesh and Uttarakhand. Out of 118 samples, the participation of females in the training program from the sample state was 22% (26) while 78% (92) were male participants.

Of the total, 13%, 27%, 37% and 28% belonged to Scheduled Castes, Scheduled Tribes, Other Backward Classes and Others respectively. Among the three states, the representation of Scheduled Castes and Scheduled Tribes in Odisha have been encouraging, with 12% and 35% respectively. The rest 27% and 24% of the participants belong to OBC and general category. In Madhya Pradesh 48% of the participants belonged to Other Backward Class and 33% belonged to general category. The participation of scheduled tribes was 14%.

### 4.1.2 Educational Status of Participants and Occupation

Table 12 below gives the details of participants who have undergone training under PHTM Scheme with respect to their educational status and the occupational status.

Table Educational status and occupation of respondents under PHTM Scheme

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Education | | | | | Occupation | | Average Land Holding (Acre) |
| Primary | Sec | H. Sec | Grad & Above | None | Farming | Non Farming |
| Madhya Pradesh | 31 | 14 | 7 | 6 | 5 | 58 | 5 | 10.67 |
| Odisha | 6 | 17 | 2 | 24 | 0 | 49 | 0 | 12.18 |
| Uttarakhand | 4 | 2 |  |  |  | 6 | 0 | 0.5 |
| Total/Overall | **41** | **33** | **9** | **30** | **5** | **113** | **5** | **11.41** |

It is evident from the table above that the majority of the training participants were educated at least till the primary level. Of the total 118 participants, only 4% of them were illiterate. Interestingly, 25% of the 118 participants were either graduates or above. 35% and 28% of the total were educated up to primary and secondary levels respectively. Among the participants having education up to graduate level & above, a significant 20% were from Odisha, while the majority of participants having primary and secondary education belonged to Madhya Pradesh. Since, the number of participants from Uttarakhand was very less; the analysis for the state is not relevant.

Nearly all the participants who have attended the training program organized under the PHTM scheme were farmers and only 5 participants were not engaged in farming activity. 85% of the farmers also reported to be directly engaged as farm workers while 15% do have direct engagements. The average land holding was 11.41 acre with highest of 12.18 acre among the participants of Odisha and lowest with 0.5 acres among the farmers of Uttarakhand.

### 4.1.3 Training Topics

In Madhya Pradesh, the implementing agencies such as Directorate of Agriculture and CIAE have organized the program under the PHTM scheme. The topics being covered by the DoA were mostly on the equipments used for Post Harvest Management of crops and practices involved in Post Harvest managements while the training being organized by CIAE mostly covered topics on value addition of products such soya bean, pickle making, post harvest handling of food grains, storage practices etc. In Uttarakhand, the trainings were organized for skill development of participants on agriculture processing and technologies. In Odisha, the training mostly covered topics operations of oil mill and dal mills as well as post harvest and value addition of agriculture products.

### 4.1.3 Duration of Training and sources of information

The training duration varied from state to state as well as from institution to institution. The average duration of training organized by CIAE Bhopal was 3 days with a minimum of 1 day training and a maximum of 10 days. The duration of training program organized in Odisha was found to be more than 3 days. Although the number of participants in Uttarakhand was less, but according to their response, the average duration of training is reported to be more than 5 days. The implementing agencies in Odisha also availed services of NGOs to organize training.

Figure Sources of information for training program under PHTM Scheme

As evident from the figure 10 above, the major source of information about the training program remains the government officials and departments as 88% of the respondents said that they received the information about the training program from them. 6% of the respondents received the information through word of mouth from their relatives, friends and neighbours while 6% of the respondents received the information from other sources, which in this case, are NGOs working in the region who have their contacts with the line department. Hence, the government has put in efforts to popularise the post harvest activities among the farmers through training program.

### 4.1.4 Motivation for attending the training program

With a view to understand the motivation of beneficiaries for attending training program, the responses have been compiled in figure 11 below. A total of five options were provided to the respondents to indicate the reason for attending the training program. Since the responses indicated by the beneficiaries were more than one, percentage response for each option was calculated to see the relative importance of each option.

Figure Motivation for attending the training course under PHTM Scheme

From the figure above, it becomes evident that need for Enhancement of Skill, Enhanced Awareness and Utilization of Post Harvest Equipment/ Post Harvest Technology and Management were major motivators accounting for 32%, 29% and 22% , respectively. In Madhya Pradesh, 39% of the responses pertain to Enhancement of Skills and 33% pertains to Enhancement of Awareness on PHTM practices, clearly indicating their priority on these two aspects; while in Odisha, the priority is also to Utilize Equipment and Technology on Post Harvest Management of Crops. In Uttarakhand, the beneficiaries indicated the priority equally across all the options. This is due to the lesser number of observations that constrain the variations in observations.

### 4.1.5 Effectiveness of Training Program

The effectiveness of training organized by implementing agencies under PHTM Scheme has been evaluated with reference to 5 different factors, viz., Relevance of Training Program to beneficiary need, Appropriateness of Training Content, Provision of Course Material, Usefulness of Training and Duration of Training. The variables are measured based on the beneficiary’s opinion, which is presented in table 13 and 14 below. Overall 94% of the beneficiaries found the training program organized under the PHTM to be relevant, while 6% opined the program to be partially relevant. All the beneficiaries in Odisha and Madhya Pradesh opined the training course to be relevant while 11% beneficiaries from Madhya Pradesh felt the training to be partially relevant.

Table Effectiveness of Training Program organized under PHTM Scheme

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Training Program relevance to need of trainees | | | | | | Appropriateness of Content | | | |
| **Relevant** | **%** | **Partially Relevant** | **%** | **Not Relevant** | **%** | **Appropriate** | **%** | **Not Appropriate** | **%** |
| Madhya Pradesh | 56 | 89% | 7 | 11% | 0 | 0% | 62 | 98% | 1 | 2% |
| Odisha | 49 | 100% | 0 | 0% | 0 | 0% | 45 | 92% | 4 | 8% |
| Uttarakhand | 6 | 100% | 0 | 0% | 0 | 0% | 6 | 100% | 0 | 0% |
| Overall | **111** | **94%** | **7** | **6%** | **0** | **0%** | **113** | **96%** | **5** | **4%** |

With respect to Appropriateness of Content in training, 96% of the training beneficiaries believed that the Content of Training Program was appropriate while 4% believed the training content was not appropriate; 8% of beneficiaries from Odisha also considered the content to be not appropriate.

Of the total beneficiaries 96% indicated that they received the training course material; 8% of the participants from Madhya Pradesh reported non receipt of any course material during the training program. On receiving the training material, 83% of the total training participants found the course material to be useful while 17% found the materials to be partially useful. The highest percentage of participants who said that the training material was partially useful was from Madhya Pradesh. Since, the participants from Uttarakhand were very few, it would not be appropriate to explain such variations; however, majority believed that the materials were partially useful. The average number of training days was found to be approximately 3 days, which 94% of the beneficiaries believed to be adequate, although 10% of the participants from MP believed that such training may be imparted for a longer time period of approximately 5 to 7 days.

Table Effectiveness of Training Program organized under PHTM

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Provision of Course Material | | | | Usefulness of Course Material | | | | | | Duration of Training | | | |
| **Yes** | **%** | **No** | **%** | **Useful** | **%** | **Partially Useful** | **%** | **Not Useful** | **%** | **Adequate** | **%** | **Not Adequate** | **%** |
| Madhya Pradesh | 58 | 92% | 5 | 8% | 48 | 76% | 15 | 24% | 0 | 0% | 57 | 90% | 6 | 10% |
| Odisha | 49 | 100% | 0 | 0% | 49 | 100% | 0 | 0% | 0 | 0% | 48 | 98% | 1 | 2% |
| Uttarakhand | 6 | 100% | 0 | 0% | 1 | 17% | 5 | 83% | 0 | 0% | 6 | 100% | 0 | 0% |
| Overall | **113** | **96%** | **5** | **4%** | **98** | **83%** | **20** | **17%** | **0** | **0%** | **111** | **94%** | **7** | **6%** |

### 4.1.6 Appropriateness of Training Logistics

The training logistics made available during the training program were evaluated against four variables:- Training Material Provided, Boarding and Lodging facilities, Equipment shown/ made available during the training program and use of modern equipment of training such as Audio Visual Aids. The findings, as opined by the participants, are presented in table 15 below.

Table Appropriateness of Training Logistics

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Training Material | | | | Boarding/ Lodging Facilities | | | | | | Equipments shown/ Demonstrated | | | | Audio Visual Aids Used | | | |
| **Adequate** | **%** | **Not Adequate** | **%** | **Satisfactory** | **%** | **Partially Satisfactory** | **%** | **Not Satisfactory** | **%** | **Adequate** | **%** | **Not Adequate** | **%** | **Yes** | **%** | **No** | **%** |
| Madhya Pradesh | 60 | 95% | 3 | 5% | 54 | 86% | 9 | 14% | 0 | 0% | 61 | 97% | 2 | 3% | 61 | 97% | 2 | 3% |
| Odisha | 49 | 100% | 0 | 0% | 38 | 78% | 11 | 22% | 0 | 0% | 49 | 100% | 0 | 0% | 42 | 86% | 7 | 14% |
| Uttarakhand | 6 | 100% | 0 | 0% | 6 | 100% | 0 | 0% | 0 | 0% | 6 | 100% | 0 | 0% | 0 | 0% | 6 | 100% |
| Overall | **115** | **97%** | **3** | **3%** | **98** | **83%** | **20** | **17%** | **0** | **0%** | **116** | **98%** | **2** | **2%** | **103** | **87%** | **15** | **13%** |

From table 15 above it could be seen that, more than 90% of the beneficiaries gave positive feedback on the Adequacy of Training Materials, Equipment used/ demonstrated; however, a significant 17% of the beneficiaries showed concern on the boarding/ lodging facilities arranged. Almost 22% and 14% of the participants from Odisha and MP rated the arrangement under this category to be partially satisfactory. This may be improved in future. 87% of the beneficiaries said that the Audio Visual Aids were used for training which made the sessions more interactive. No audio visual aids were used in Uttarakhand as the training organized was on field and not in house.

### 4.1.7 Usefulness and Utilization of Training Program under PHTM

Table Utilization of Training Skills by the participants after attending PHTM Training

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Total | | | | Brought/Setup PH Equipment | | | | Better maintenance and use of Equipment | | | | Adopted change in PH Practices | | | | Training/Helping other farmers | | | |
| **Used** | **%** | **Not Used** | **%** | **Yes** | **%** | **No** | **%** | **Yes** | **%** | **No** | **%** | **Yes** | **%** | **No** | **%** | **Yes** | **%** | **No** | **%** |
| Madhya Pradesh | 52 | 83 | 11 | 17 | 7 | 11 | 56 | 89 | 20 | 32 | 43 | 68 | 27 | 43 | 36 | 57 | 23 | 37 | 40 | 63 |
| Odisha | 42 | 86 | 7 | 14 | 7 | 14 | 42 | 86 | 48 | 98 | 1 | 2 | 46 | 94 | 3 | 6 | 42 | 86 | 7 | 14 |
| Uttarakhand | 6 | 100 | 0 | 0 | 0 | 0 | 6 | 100 | 6 | 100 | 0 | 0 | 6 | 100 | 0 | 0 | 0 | 0 | 6 | 100 |
| Overall | **100** | **85** | **18** | **15** | **14** | **12** | **104** | **88** | **74** | **63** | **44** | **37** | **79** | **67** | **39** | **33** | **65** | **55** | **53** | **45** |

Out of 118 participants who attended the training program under PHTM Scheme, 100 (85%) indicated that they used the knowledge gained in some way or the other. 14 beneficiaries adopted equipment demonstrated under the scheme. The highest adoption rate was in Odisha followed by MP at 14% and 11%, respectively. Overall, 67% of the participants adopted better Post Harvest Management practices. In Odisha, 94% of the beneficiaries said that adopted better Post Harvest Management Practices and 43% of the participants in Madhya Pradesh also reported adoption of better Post Harvest Management Practices. 55% of all the participants indicated that they advocated and shared the practices with other farmers on post harvest management. Though in terms of adoption of technology, the feedback was not encouraging as only 14% said that they adopted the new equipment and technology, but in terms of improving the practices in post harvest and sharing their learning with other farmers, the participants had played a significant role.

### 4.1.8 Impact of PHTM Training Program

The beneficiaries were administered on different variables to assess the post training impact on Post Harvest Technology & Management. The beneficiaries were asked to give their opinion on selected variables such reduction in post harvest Losses, reduction in wastage (asked to rate on a 5 point scale in pre and post training periods), adoption of practices such as cleaning, drying and grading, usage of storage devices, change in income due to reduction in losses/ surplus product due to adoption in improved practices and change in skill level (rate in 5 point scale in pre and post training periods). The findings are presented in table 17 below.

Out of 118 participants, 69 (58%) reported reduction in post harvest losses by adopting improved practices. The average post harvest losses reported by participants on a 5 point scale before attending the training was 2.68 which reduced to 2.08 after training; thereby accounting for a reduction of 22 percentage points. The highest reduction was reported by the beneficiaries from Odisha (55% points) followed by Madhya Pradesh (45%). Almost 24 beneficiaries reported adoption of practices such as cleaning, drying and grading practices as well which is 20.3% of the total participants. Eighteen participants have adopted improved storage practices after attending the training program on Post Harvest Technology & Management. Almost 37% of the participants reported increase in income due to reduction in crop losses. In monetary terms, the participants from Madhya Pradesh reported savings from Rs 400 to Rs 6000, while the participants from Odisha reported increase in income by 20% to 35% from the previous period on the same crops. The participants from Uttarkhand reported increase in income due to reduction of crop losses, though it was difficult to quantify.

Table Impact of PHTM Training Program

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Reduction in Post Harvest Losses | | | | Reduction in Wastage of Produce (Avg Points) | | Adoption of Improved practices (Cleaning, Drying and Grading ) | Use of Storage/ Packaging devices | Change in Income | Change in Skill Levels | |
| **Yes** | **%** | **No** | **%** | **Pre Training** | **Post Training** | **Post Training** | **Post Training** | **Post Training** | **Pre Training** | **Post Training** |
| Madhya Pradesh | 37 | 59% | 26 | 41% | 2.66 | 1.45 | 11 | 5 | 27 | 1.25 | 2.69 |
| Odisha | 26 | 53% | 23 | 47% | 3.05 | 1.36 | 7 | 7 | 11 | 2.36 | 4.26 |
| Uttarakhand | 6 | 100% | 0 | 0% | 4 | 2 | 6 | 6 | 6 | 2 | 5 |
| Overall | **69** | **58%** | **49** | **42%** | **2.68** | **2.08** | **24** | **18** | **44** | **1.77** | **3.48** |

The participants also reported change in skill level after attending the training program from 1.77 points to 3.48 points, which is significant.

### 4.1.9 Overall Rating of Training Program

The training participants were also asked to rate the training program on a scale of 10 where 0 being the worst and 9 being excellent, based on overall experiences.

Table Average rating score given by the participants of PHTM training

|  |  |
| --- | --- |
| State | Average Score |
| Madhya Pradesh | 7.19 |
| Odisha | 5.79 |
| Uttarakhand | 8.66 |
| Overall | **6.68** |

On an average, the rating given by the participants is 6.68. The lowest score was given by the participants in Odisha while the highest was given by the participants from Uttarakhand. In Odisha, the participants also suggested improvements in the training program through more elaborative sessions and by incorporating practical sessions.

### 4.1.10 Opinion on Training Component of the Scheme

The training program, overall, was satisfactory and has been able to achieve its objectives. However, efforts need to be intensified to increase the adoption rate through proper extension methods. Improving the rate of adoption of new technology should continue to be focus of the training programme.

## 4.2 Response on Demonstration by Host Farmers and Entrepreneurs

The demonstration participants were covered from Haryana, Manipur, Madhya Pradesh, Rajasthan, Tamil Nadu, Uttarakhand and West Bengal. The findings with respect to demonstration of equipments on Post Harvest Management Practices have been presented in the following sub-sections.

### 4.2.1 Demographic Profile of Demonstration Participants

Table Demographic profile of demonstration participants under PHTM Scheme

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Total Sample | Age (Years) | | | Gender | | Caste | | | |
| Average | Min | Max | Male | Female | SC | ST | OBC | Others |
| Haryana | 20 | 38 | 25 | 49 | 20 | 0 | 4 | 0 | 16 | 0 |
| Manipur | 35 | 45 | 37 | 68 | 33 | 2 | 5 | 9 | 7 | 14 |
| Madhya Pradesh | 22 | 35 | 27 | 59 | 22 | 0 | 3 | 5 | 7 | 7 |
| Rajasthan | 33 | 40 | 18 | 70 | 23 | 10 | 0 | 23 | 2 | 8 |
| Tamil Nadu | 37 | 45 | 27 | 67 | 24 | 13 | 1 | 1 | 32 | 3 |
| Uttarakhand | 43 | 49 | 30 | 70 | 41 | 2 | 4 | 0 | 17 | 22 |
| West Bengal | 19 | 34 | 19 | 52 | 19 | 0 | 5 | 2 | 11 | 1 |
| Total | **209** | **43** | **18** | **70** | **182** | **27** | **22** | **40** | **92** | **55** |

Average age of the participants was found to be 43 years with a minimum of 17 years and a maximum of 78 years. Among the states, the average age of participants of Uttarakhand is higher when compared to the participants of other states. Out of 209 samples, participation of females in the demonstration is 13% while the male participation remains higher at 87%. With respect to caste, the participation has been highest from the OBC categories (92, 44%) followed by General category (55, 26%). The representation of ST and SC category has been 19% and 10.5% respectively. Highest participation of tribal farmers was recorded in Rajasthan where 70% of the total participants were Scheduled Tribes.

### 4.2.2 Educational and Occupational Status Demonstration Participants of PHTM Scheme

Table 20 below gives the details of educational and occupational details of demonstration participants who have participated under the demonstration activity organized under PHTM Scheme.

Table Educational and Occupational Status of Demonstration Participants

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Education | | | | | Occupation | | Average Land Holding (Acre) |
| Primary | Sec | H. Sec | Grad & Above | None | Farming | Non Farming |
| Haryana | 0 | 15 | 5 | 0 | 0 | 20 | 0 | 3.75 |
| Manipur | 5 | 23 | 7 | 0 | 0 | 35 | 0 | 2.46 |
| Madhya Pradesh | 7 | 6 | 7 | 2 | 0 | 22 | 0 | 8.27 |
| Rajasthan | 6 | 9 | 1 | 5 | 12 | 33 | 0 | 9.29 |
| Tamil Nadu | 14 | 10 | 2 | 8 | 3 | 37 | 0 | 14.35 |
| Uttarakhand | 4 | 10 | 26 | 3 | 0 | 43 | 0 | 7.83 |
| West Bengal | 6 | 9 | 1 | 1 | 2 | 19 | 0 | 2.31 |
| Total | **42** | **82** | **49** | **19** | **17** | **209** | **0** | **6.89** |

Majority of the participants (92%) were literate. Only 8% of the total participants were illiterate. Rajasthan is one of the states with highest number of participants with no educational background. All the participants have agriculture as the primary occupation with average land holding of 6.89 acres, the lowest recorded 2.31 acres among the participants from West Bengal and highest among the farmers of Tamil Nadu (14.35 acre).

### 4.2.3 State wise demonstration hour and participation rate

Table 21 below gives the overview of demonstration time and average participation per demonstration.

Table Hours of demonstration and participation rate under PHTM Scheme

|  |  |  |
| --- | --- | --- |
| State | Demonstration (Hrs) | Average Participation |
| Haryana | 9.1 | 45 |
| Manipur | 1.66 | 26 |
| Madhya Pradesh | 1.23 | 35 |
| Rajasthan | 2.48 | 175 |
| Tamil Nadu | 3.85 | 40 |
| Uttarakhand | 0.92 | 26 |
| West Bengal | 1 | 28 |
| Overall | 2.8 | 53 |

The overall average time of demonstration was 2.8 hours with average participation of 53 persons. It is observed from the table above that except Uttarakhand, West Bengal, Madhya Pradesh and Manipur, the average hour of demonstration is relatively greater (2.48 hrs to 9.1 hours). The time taken for demonstration in Haryana is found to be highest with average 9.1 hours per demonstration but, on an average, the participation per demonstration is only 45 participants. This clearly reveals the fact that farmers have used the technology in the name of demonstration. Rajasthan is one of the states which recorded the highest participation of farmers, which may be due to new innovative technology being demonstrated in the area. The participation recorded is 175 per demonstration. The least participation was found in hilly states such as Manipur and Uttarakhand where the average participation was 26.

### 4.2.4 Equipments Demonstrated and their Usefulness

Out of the various equipments demonstrated and based on farmers opinion and perception on the usefulness of the equipments is given in the table 22 below.

It is evident from the table 22 below, that the majority of responses (89%) have indicated the equipments demonstrated are useful and can be adopted, however the adoption of any equipments also depends on the existing cropping pattern of the region. The equipment which meets the local cropping pattern appears to be more popular. From the table it can be very clearly seen that equipments such as paddy thresher, paddy parboiling units, dal mills, millet threshers are relatively more useful than other equipments. The local cropping pattern as well as additional equipments and technology also determines the usefulness of any technology. For example, the farmers from Rajasthan though convinced of ginger peeler cum polisher but because the region does not produce any ginger and marketing problems related to ginger, the equipments may not be adopted. Moreover, the demonstration of ginger peeler cum polisher is a standalone demonstration which will not serve the overall purpose unless and until it is properly supplemented with washer and drier. Similarly, the alovera gel extractors and garlic bulb breaker may not be of use for the farmers where the demonstrations have been organized. The cost of equipments is also an determining factors in its adoption.

Table Equipments demonstrated and their usefulness

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| State | Equipments Used/ demonstrated | Total Responses (No) | Farmers Perception | | | |
| Useful | % | Not so useful | % |
| Haryana | Carrot Washer | 12 | 10 | 83% | 2 | 17% |
|  | Power driven Chaff cutter | 8 | 8 | 100% | 0 | 0% |
| Manipur | Paddy Thresher | 35 | 35 | 100% | 0 | 0% |
| Rajasthan | Ginger peeler cum polisher | 26 | 23 | 88% | 3 | 12% |
|  | Aloevera gel extractor | 16 | 8 | 50% | 8 | 50% |
|  | Garlic bulb breaker | 8 | 4 | 50% | 4 | 50% |
| Tamil Nadu | Tomato Seed Extractor | 18 | 14 | 78% | 4 | 22% |
|  | Paddy parboiling unit | 32 | 31 | 97% | 2 | 6% |
|  | Mini Dal Mill | 14 | 14 | 100% | 0 | 0% |
|  | Pepper Thresher | 6 | 4 | 67% | 2 | 33% |
|  | Pepper Peeler cum washer | 5 | 4 | 80% | 1 | 20% |
|  | Pepper grader | 6 | 5 | 83% | 1 | 17% |
| Uttarakhand | Millet Thresher | 18 | 18 | 100% | 0 | 0% |
|  | Dal Mill | 4 | 4 | 100% | 0 | 0% |
|  | Jaggery Storage Bin | 16 | 14 | 88% | 2 | 13% |
|  | Potato chip cutter | 5 | 4 | 80% | 1 | 20% |
|  | Maize sheller | 23 | 19 | 83% | 4 | 17% |
|  | Paddy Thresher | 18 | 18 | 100% | 0 | 0% |
| West Bengal | Seed Grader | 19 | 19 | 100% | 0 | 0% |
|  | Sun Flower thresher | 12 | 12 | 100% | 0 | 0% |
| Overall |  | **301** | **268** | **89%** | **34** | **11%** |

The equipments such as seed grader and sun flower thresher may not suit the farmers with small land holding or until it is set up as an enterprise covering large number of users.

### 4.2.5 Post Demonstration Impact at Output Level

Table 23 presents the details of technology demonstrated, extent of adoption and future prospects of adoption of demonstrated technology. The table also demonstrates the priority of beneficiaries for the types of equipment based on their future usability.

As evident from the table, 143 (48%) out of 301 respondents have used the technology either fully or partially. Out of the 143 respondents who used the technology, 83 of them adopted the technology to its full extent while 60 of them used it partially which is 28% and 20% of the total respondents, respectively. Hence it can be said that out of the total sample respondents, 28% of the participants have adopted the technology to its full extent. Additionally, 96 participants (32%) who have either partially used the equipment/ technology or have found it beneficial have shown inclination to use and adopt the technology in future.

Table Technology demonstrated, used and future prospect of adoption

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Equipments Used/ demonstrated | Total Respondents (No) | Technology  Used | | Extent of Technology Adoption | | Plan to adopt the equipment | |
| Yes | No | Fully | Partially | Yes | No |
| Haryana | Carrot Washer | 12 | 4 | 8 | 4 | 0 | 8 | 0 |
|  | Power driven Chaff cutter | 8 | 8 | 0 | 8 | 0 | 0 | 0 |
| Manipur | Paddy Thresher | 35 | 28 | 7 | 3 | 25 | 25 | 0 |
| Rajasthan | Ginger peeler cum polisher | 26 | 1 | 25 | 1 | 0 | 0 | 25 |
|  | Aloevera gel extractor | 16 | 0 | 16 | 0 | 0 | 0 | 16 |
|  | Garlic bulb breaker | 8 | 1 | 7 | 0 | 1 | 3 | 5 |
| Tamil Nadu | Tomato Seed Extractor | 18 | 0 | 18 | 0 | 0 | 0 | 18 |
|  | Paddy parboiling unit | 32 | 12 | 20 | 12 | 0 | 20 | 0 |
|  | Mini Dal Mill | 14 | 14 | 0 | 14 | 0 | 0 | 0 |
|  | Pepper Thresher | 6 | 2 | 4 | 1 | 1 | 4 | 0 |
|  | Pepper Peeler cum washer | 5 | 2 | 3 | 2 | 0 | 3 | 0 |
|  | Pepper grader | 6 | 2 | 4 | 2 | 0 | 2 | 0 |
| Uttarakhand | Millet Thresher | 18 | 18 | 0 | 3 | 15 | 13 | 2 |
|  | Dal Mill | 4 | 1 | 3 | 1 | 0 | 1 | 2 |
|  | Jaggery Storage Bin | 16 | 7 | 9 | 5 | 2 | 2 | 7 |
|  | Potato chip cutter | 5 | 4 | 1 | 4 | 0 | 0 | 1 |
|  | Maize sheller | 23 | 9 | 14 | 8 | 1 | 3 | 11 |
|  | Paddy Thresher | 18 | 18 | 0 | 3 | 15 | 12 | 3 |
| West Bengal | Seed Grader | 19 | 0 | 19 | 0 | 0 | 0 | 19 |
|  | Sun Flower thresher | 12 | 12 | 0 | 12 | 0 | 0 | 0 |
| Overall |  | 301 | 143 | 158 | 83 | 60 | 96 | 109 |

An attempt has been made to assess the adoption potential of the above listed equipment in future. The assessment has been made based on the willingness of more than 60% of the total respondents to purchase the equipment. The equipment which are used for the purpose of threshing and washing such as millet thresher, paddy thresher, carrot washer, pepper thresher, paddy parboiling units, etc. are given priority. The least preferred equipments by the respondents were ginger peeler cum polisher, aloevera gel extractor, tomato seed extractor, dal mills, potato chip cutter and seed grader, sunflower thresher, etc. These machines perform very specific functions and hence, are not very useful to a common farmer.

### 4.2.6 Adequateness of demonstration conducted under PHTM Scheme

The participants of the PHTM demonstration were asked to give their views on adequacy of demonstration time, i.e., hours for which the demonstration was organized, and rate the demonstration as perceived by them on a 3 point scale. Overall 60% of the total respondents opined that the time of demonstration was adequate while 40% felt that the time of demonstration was not adequate. Among the participants from seven sample states, 91% of the participants from Rajasthan and 86% from Tamil Nadu, felt that the time of demonstration was not sufficient and may be increased. All the participants from Haryana and West Bengal felt that the demonstration was adequate.

Table Adequateness of demonstration time and rating of demonstration

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| State | Total Sample | Demonstration Time | | | | Rating of Demonstration | | | | | |
| Adequate | % | In adequate | % | Very Well Organized | % | Well Organized | % | Not so well organized | % |
| Haryana | 20 | 20 | 100% | 0 | 0% | 0 | 0% | 20 | 100% | 0 | 0% |
| Manipur | 35 | 23 | 66% | 12 | 34% | 9 | 26% | 23 | 66% | 2 | 6% |
| Madhya Pradesh | 22 | 18 | 82% | 4 | 18% | 5 | 23% | 12 | 55% | 5 | 23% |
| Rajasthan | 33 | 3 | 9% | 30 | 91% | 20 | 61% | 13 | 39% | 0 | 0% |
| Tamil Nadu | 37 | 5 | 14% | 32 | 86% | 13 | 35% | 14 | 38% | 10 | 27% |
| Uttarakhand | 43 | 38 | 88% | 5 | 12% | 35 | 81% | 8 | 19% | 0 | 0% |
| West Bengal | 19 | 19 | 100% | 0 | 0% | 0 | 0% | 19 | 100% | 0 | 0% |
| Total | **209** | **126** | **60%** | **83** | **40%** | **82** | **39%** | **109** | **52%** | **17** | **8%** |

With regard to organization of demonstration, 39% of the participants rated the demonstration to be very well organized, 52% rated the demonstration to be well organized and the rest 8% said that the demonstration was not so well organized and that there is scope for improvement in the future. A high percentage of the participants (27%) from Tamil Nadu felt that the demonstration was not organized well, while 23% from Madhya Pradesh also felt the same. Hence overall the organization of demonstration was satisfactory.

### 4.2.7 Entrepreneurs Response on the Units established under the PHTM Scheme

A total of 25 entrepreneurs from four states West Bengal, Karnataka, Haryana and West Bengal were interviewed to get their opinion on units established under the PHTM Scheme. The highest number of entrepreneurs has been found in the Karnataka. The units installed by the entrepreneurs in Karnataka are sugarcane crusher, chilly pounding machines, mini oil mill, noodle makers, flour mills and mini rice mills. Out of the 25 units visited, only one unit in Uttarakhand was installed by a cooperative society while the rest 25 are being operated by individual entrepreneurs. Subsidy, to an extent of 25 % to 50%, has been provided to the beneficiaries who have installed the units depending on the type of machinery set up. Out of 25 cases, it was observed, that in about 75% of the cases, the beneficiaries have availed the finance locally and not from any formal financial institution. Only in 6 out of 26 cases, the participants had availed finance from Banks and other formal sources such as NABARD Financial Services Limited (NABFINS). It has also been reflected by the beneficiaries opined that though the equipments were useful, the high cost was coming in the way of adoption as sourcing finance from formal sources is difficult.

In more than 90% of the cases the units are operating successfully and major reason behind this success other than the efforts of the entrepreneurs is the availability of raw material in the area of operations. The major success has been observed among the chilly pounding units, oil mills and rice mills where supply of raw material has supported the viability of the units. A lesser success rate has been observed in units such as sugar cane crusher and flour mills. The entrepreneurs also felt the need for training towards better operations of machineries as well as on repair and maintenance and linkages with financial sources for obtaining loan for setting up units.

### 4.2.8 Opinion on Demonstration Component of the Scheme

Response of the farmers who attended the demonstration of Post Harvest machineries was mixed. A significant number of beneficiaries were not satisfied with the way the demonstration was carried out and felt that there is scope for improvement in the future. They felt a need for increase in the duration of demonstration on the field. Additionally, a demand driven approach on demonstration of equipment based on the crop would be more effective towards increasing the adoption rate which will ultimately result in reduction in Post Harvest Losses.

Demonstration is an important activity and its continuation is vital in order to educate farmers on the use of post harvest machines to reduce the losses at the farm level.

# 5. Insights and Recommendations

Based on the interactions with and feedback received from various stakeholders comprising mainly of the officials of the implementing agencies, State Agriculture Universities, Directorate of Agriculture, CIPHET Centres, participants of training & demonstration and entrepreneurs who have set up units under the PHTM Scheme the insights and recommendations for appropriate policy changes and improvements in the Scheme are as under.

1. **Recommendations on Better Fund Allocation And Utilization**
2. It has been observed that the fund allocation under the PHTM Scheme remained skewed over the entire XIth Five Year Plan. Nearly, 73% of the total fund was allocated during the last two years (2010-11 & 2011-12) of XI Five Year Plan with only 27% being allocated during the first three years (2007-08 to 2009-10). Such skewed allocation affected the implementation of the scheme in terms of its slow progress as many projects are still under the gestation period at the time of evaluation. It was observed that implementation of a part of the scheme spilled over the XI Five Year Plan.
3. Only 19 out of 27 states received funds under the scheme. Gujarat, Jharkhand, Maharashtra, Meghalaya, Punjab, Tripura and Uttar Pradesh did not receive any funding support. Although, agriculturally less developed states do deserve larger support, states with high production potential too need to be supported for improved post harvest management practices and technologies to improve efficiency in post harvest operations and reduce post harvest crop losses. Therefore, in addition to giving priority to less developed agriculture states, it is also recommended that states which are relatively better developed should also be supported under the Scheme.
4. Region wise disparity in fund allocation was observed, with North Eastern States receiving 46% and Western Zone receiving only 1% of the total allocated funds. Even within the region, all the states have did not receive funding support nor were the funds allocated uniformly across the years of XIth FYP.
5. The overall utilization of fund was only 53%, as major part of it was allocated during the last two years of the XIth Five Year Plan that too at the end of the financial years which impeded the utilization within the same year leading to curtailment of budget allocated for the next year. Since the agriculture is a seasonal activity, it is recommended that funds should be allocated in a timely manner to ensure that activities are implemented effectively.
6. **Recommendations for more Effective & Efficient Implementation Of Training And Demonstration**
7. Demonstration and training activities were organized on an adhoc basis and lacked continuity as regular activity in the scheme. This appeared to be related to the pattern of funding for conducting the programs and meet the targets but this defeats the very purpose of demonstration towards popularising the equipment and technology and improving the adoption rate among the end users.
8. In some cases the beneficiaries opined that, the training under PHTM covered topics on agriculture and cultivation practices did not serve the objectives of Post Harvest Technology and Management Practices. This defeated the very purpose of training. It is recommended that structure of training should be appropriately designed with relevant contents supplemented by demonstration of equipments and incorporation of practical sessions.
9. A large number of post harvest equipments demonstrated were on regular field crops with hardly any coverage of horticulture/ plantations crops. Farmers from Tamil Nadu and Karnataka opined that additional technology demonstrations on Horticulture Crops such as Banana, Orange, Guava, Coffee, Aonla, Mango, Coconut, etc., need to be covered.
10. Certain equipments such as tomato seed extractors, aloevera gel extractor seed graders were not found to be appropriate for all farmers and could not be adopted universally. Such equipments should either be demonstrated to entrepreneurs engaged in seed production program or those engaged in processing who can further provide them to farmers participating in the value chain.
11. Selection of participants for training and demonstration showed a bias in favour of large farmers. It is therefore recommended that small farmers from the project locations should also be included and given opportunity to participate in the program.
12. As envisaged in the guidelines, units for Post Harvest processing, value addition, low cost scientific storage, packaging, etc., may be established in the project catchment under tripartite agreement of State Government, ICAR/CSIR and SHGs/UGs, etc. However, very few such interventions have been done under the Scheme. Most of the units/ enterprise established are individually operated and mostly by the large farmers who either have existing production units to handle the post harvest processing or capable of running the units on their own without much external support. The adoption rate among the small and marginal farmers was not found to be encouraging. Hence, group based interventions need to be focussed on for increasing the adoption rate. Linkages with NGOs working in the area of social and agriculture development would prove to be a better to scale up the interventions and meet the desired objectives of increasing the adoption rate among the less privileged farmers.
13. The demonstration of low cost PHT can be scaled up through convergence with the existing schemes of MoA implemented by Small Farmers Agribusiness Consortium (SFAC) particularly in their vegetable clusters. The SFAC is implementing the Farmers Producer Organization Initiative Project, organizing farmers growing vegetables and pulses through Resource Institutions. The CIPHET Centres can work in collaborations with Resource Institutions which are promoting the FPOs to demonstrate Post Harvest Technology.
14. The CIPHET Centres established in the State Agriculture Universities have assigned responsibilities of Post Harvest Technology and Management Scheme. As the professors are burdened with regular day to day activities on the academic front, it is difficult for them to give the required attention for the activities. It is therefore recommended that additional staff dedicated exclusively for the scheme in each CIPHET Centres may be recruited to take up the responsibilities for effective implementation of scheme.
15. It was observed that certain demonstrations required supplementary equipments/ technology as a full package, without which the benefits could not be harnessed. For example, the demonstration of ginger peeler cum polisher in Rajasthan would not be sufficient unless it is packaged with additional washer and drier to make it a complete unit. Hence, the demonstration of complete unit needs to be ensured to be more effective instead of being a stand alone demonstration.
16. The participants indicated that they were unaware of availability of subsidy on the equipments and, sources of procurement of machineries demonstrated. They also indicated that the demonstrated machines are not readily available in the market.
17. It was observed that the demonstration organized were supply driven and not demand driven. Machineries not relevant to a particular region were demonstrated. Demonstration of ginger peeler cum polisher and aloevera gel extractor are typical examples which the farmers found them to be useful but could not adopt them as the area was not growing ginger and aloevera. Therefore, a preliminary survey to assess the demand of Post Harvest Equipment/ technology has to be conducted and accordingly the demonstration should be organized. Such need assessment would enhance technology adoption rate.
18. Last but not the least, is the absence of a system of maintaining information relating to scheme and its coverage. During the study it was difficult not only to identify beneficiaries to solicit their opinion or obtain feedback but also prevented the Institutes from assessing post training and demonstration impact and adoption. Such valuable feedback may be useful to analyse the scope for replication of training, adoption of technology and assessing the need for incorporating midterm course correction in the training modules. It is therefore suggested that a system of monitoring all the components, particularly information of trainees, may be instituted forthwith.

# 6. Conclusions

Scheme for Post Harvest Technology and Management, introduced during the XI FYP, has been able to showcase a satisfactory performance in terms of physical and financial achievements. A discrepancy in the financial utilization was observed due to lag in sanction and disbursement process. However, its utilization was found to be satisfactory. The scheme had a good spread covering a large number of beneficiaries. A positive response of the beneficiaries further supports the effectiveness of the scheme.

It is thus recommended that the scheme should continue for the betterment of larger number of beneficiaries considering appropriate policy recommendations indicated in the report.