

STANDARD OPERATING PROCEDURES (SOPs)

FOR

**PROGENY CUM DEMONSTRATION ORCHARDS AND FRUIT
NURSERIES**



GOVERNMENT OF HIMACHAL PRADESH

DEPARTMENT OF HORTICULTURE

Table of contents

| S.N. | Section | Contents | Page No. |
|------|---------|---|----------|
| 1 | | Section -1 | |
| | 1.1 | Introduction | 1 |
| | 1.2 | Mandate of PCDOs | 1 |
| | 1.3 | Objective of the SOPs | 2 |
| | 1.4 | General instructions for the upkeep and maintenance of the PCDOs & Fruit Nurseries. | 2 |
| | 1.5 | Horticulture activities undertaken at the Progeny cum Demonstration Orchards and Fruit Nurseries of the Department. | 2 |
| 2 | | Section-2 | |
| | 2 | Establishment of mother block of progeny trees of outstanding merit for the supply of bud wood to the departmental fruit nurseries and the orchardists. | 3 |
| | 2.1. | Criteria for selection of mother tree | 3 |
| | 2.2 | Establishment of Mother Plant | 3 |
| | 2.3 | Maintenance of progeny orchards | 4 |
| | 2.4 | Supply of bud wood | 4 |
| 3 | | Section-3 | |
| | 3 | Multiplication and supply of disease free quality planting material to the farmers at reasonable rates. | 5 |
| | 3.1 | Quality planting material for higher productivity | 5 |
| | 3.2 | Nursery Production Work | 5 |
| | 3.2.1 | Selection of suitable land for nursery production in the PCDO | 5 |
| | 3.2.2 | Procurement of seed for Nursery | 5 |
| | 3.2.3 | Raising of nursery | 6 |
| | 3.3 | Establishment of clonal rootstock mother block | 6 |
| | 3.4 | Enforcement of H.P. Fruit Plant Nursery Registration Act,1973 | 6 |
| | 3.5 | Accreditation of Fruit Nurseries | 7 |
| 4 | | Section-4 | |
| | 4 | Lay out of adaptive trials to test the suitability of various varieties introduced. | 7 |
| | 4.1 | Post Entry Quarantine Observation of imported plant material | 7 |
| | 4.2 | Evaluation of newly introduced plant material under Different Agro climatic zones. | 8 |
| 5 | | Section-5 | |
| | 5 | Demonstration of modern horticulture related technologies to the farmers in the surrounding areas. | 8 |
| 6 | | Section-6 | |
| | 6 | Providing extension services within a zone of impact of the PCDOs | 9 |
| 7 | | Section-7 | |
| | 7 | Inspection and Monitoring of PCDOs activities | 9 |
| 8 | | Section-8 | |
| | 8 | Maintenance of Records | 9,10 |
| | | Annexure (I to VIII) | 12 to 18 |

Abbreviations

| | |
|-------------|--|
| DIA | Designated Inspection Authority |
| FYM | Farm Yard Manure |
| NHB | National Horticulture Board |
| PCDO | Progeny- Cum -Demonstration Orchards |
| PEQ | Post Entry Quarantine |
| SMS | Subject Matter Specialist |
| SOP | Standard Operating Procedures |
| TOM | Tree of Outstanding Merit |
| UHF | University of Horticulture and Forestry |

The Standard Operating Procedures (SOP) for PCDOs and Fruit Nurseries of Horticulture Department

Section- 1

1.1 Introduction

The scheme of Progeny-cum Demonstration Orchards was started in the State during early fifties. This scheme was initiated at a time when horticulture activities in the State were almost negligible and the farming community required necessary technology and guidance for the adoption of horticulture based farming system for the development of Horticulture in the State. Hence, a concept of Progeny-cum-Demonstration Orchards PCDOs was considered for the economic uplift of the farming community. Keeping in view the above, these units were established in different agro climatic zones of the State in order to adopt a holistic approach for the development of horticulture in all regions of the State.

1.2 Mandate of PCDOs:

These units have served as a nucleus for the development and played yeoman's role in the proliferation of orchard in the state as is evident from the expansion in area and production of fruits during the last six decades. Besides, being a source of technical knowhow to the growers, these units have also helped in the production and supply of fruit plants which are the basic and most vital input for the development of Horticulture. It is worth mentioning that 46% of the total area under fruits in Himachal Pradesh is the result of plant material supplied from these units. In addition, these orchards also helped in the selection of most suitable varieties of the fruits for commercial cultivation from amongst the various varieties that were available during the last 30-40 years. These units have been assigned the following mandate:-

- *To stock progeny trees of outstanding merit for the supply of bud wood to the orchardists.*
- *To multiply and supply Pedigree and disease free plants at reasonable rates.*
- *To conduct adaptive trials to test the suitability of various varieties/fruits/new introductions as also the university recommendations on various packages of practices on micro area basis.*
- *To serve as modal and demonstration orchards and nucleus for the proliferation of the orchards in the surrounding areas.*
- *To serve as the extension centre within a zone of impact in the radius of eight kilometers.*

1.3 Objective of the SOP

1. To follow the guidelines on the operational activities of the PCDOs and Fruit Nurseries to produce high quality plant material in order to achieve the desired results as outlined in the mandate.
2. To ensure consistency amongst all the officers for managing the Progeny cum Demonstration Orchards and Fruit Nurseries of the Department on scientific lines for the benefit of farming community.

1.4 General instructions for the upkeep and maintenance of the PCDOs & Fruit Nurseries:

It is essential to take all possible measure for the upkeep and maintenance of PCDOs and Fruit Nurseries of the Department. For this purpose following actions are to be taken:

1. The Incharge of all the PCDOs and Fruit Nurseries must display the sign board at vantage points preferably on the gate, mentioning name of the PCDO and Fruit Nursery, year of establishment, area under Progeny Trees, Fruit Nursery and other area etc. A sample Copy of the same is enclosed vide **Annexure-I**.
2. Map of the every PCDO and Fruit Nursery indicating outer boundary, important features and infrastructure must be prepared and should be displayed in the office at appropriate place.
3. The paths and avenue in the PCDO should be levelled, metalled and kept clean in all respect.
4. The land and other immovable property of the PCDO and Fruit Nursery should be well protected by providing permanent angle iron fencing on the boundary.

1.5 Horticulture activities undertaken at the Progeny cum Demonstration Orchards and Fruit Nurseries of the Department.

- Establishment of mother block of progeny trees of outstanding merit for the supply of bud wood to the departmental fruit nurseries and the farmers.
- Multiplication and supply of disease free quality planting material to the farmers at reasonable rates.
- Lay out of adaptive trials to test the suitability of various varieties/fruits/new introductions and the university recommendations on various packages of practices on micro area basis for the benefit of farming community.
- Demonstration of modern horticulture related technologies to the farmers
- Providing extension services within a zone of impact of the PCDOs.

The SOPs for undertaking these activities in the PCDOs and Fruit Nurseries are outlined in the following sections one by one.

Section-2

2. Establishment of mother block of progeny trees of outstanding merit for the supply of bud wood to the departmental fruit nurseries and the orchardists.

Fruit crops, mostly being perennial in nature, call for utmost care in selection of varieties, quality planting material and adoption of right technology for mass multiplication of planting material. Mistakes committed during the initial establishment of orchards cannot be corrected and will cause serious damage to production and productivity. The progeny trees are the basic component for the multiplication of fruit plants and ultimately deciding the quality and productivity of the fruit crops. Hence, it is necessary to stock the true to type and best quality progeny trees in the PCDOs.

2.1. Criteria for Selection of Mother Plant:

The Incharge of the Fruit Nursery will ensure to give top priority for the selection of mother plant, as it decides the fate of the production efficiency in fruit crops. The performance will depend on the source of scion wood material which should be taken from the trees fulfilling all the scientific criteria for the best performance. These are:

- i) The mother plant must have been tested for its performance over a number of years.
- ii) It must be free from transmittable diseases and be in a healthy Condition.
- iii) The fruit shape, size and quality must conform to the typical specification of the variety.

2.2 Establishment of Progeny Trees

The detailed recommendations as given in the package of practices for the establishment of orchards shall be adopted for the plantation of progeny trees in the PCDOs.

- The progeny trees should be planted by proper lay out, keeping in view the geographical conditions of the area.
- The high yielding clones of recommended varieties should be selected for developing new mother block of the progeny trees.
- The selected plants should be planted in a closer spacing in separate block in order to get continuous supply of scions.
- These plants should be severely pruned to keep them in vegetative phase and to produce enough shoots for propagation purposes.
- The marked trees of outstanding merit for taking bud wood should be kept for bud wood only and no fruit crop be taken from these trees.
- A map of the PCDO or Fruit Nursery should be maintained indicating the layout of the promising varieties planted.

- The plants to be procured for progeny trees should be of proven pedigree and free from any type of disease of visible or invisible symptoms.
- In case the progeny trees are raised through in situ technique, the bud wood should be taken from the trees which are free from any disease and has good record of producing crop of high quality fruits over a number of years.
- The fruit plants to be used for progeny trees should be of standard size and girth.
- The plants should have well developed root system.
- The grafting point should be at the appropriate level or height.
- The appropriate doses of FYM should be used while planting of progeny trees.

2.3 Maintenance of Progeny Orchards:

The maintenance of mother plants should be done rigorously, so that plants are healthy and free of diseases and insect pests. The orchard management practices as given in package of practices for fruit crops are to be followed by the Incharge of the PCDO/ Fruit Nursery for the maintenance of progeny trees as per detail given below:

- The maintenance of mother plants, right from the time of planting to the stage of bearing and subsequent years involves application of manures and fertilizers, weeding and intercultural operations, training and pruning and effective plant protection measures.
- The trees may be got indexed for the possible presence of virus by sending the twigs along with 10-15 leaves to the Prof & Head, Department of Mycology and Plant Pathology, University of Horticulture and Forestry, Nauni and report can be obtained within a week.

2.4 Supply of Bud wood to the farmers:

The PCDOs are the repositories of the elite planting material because the best available varieties in the State or introduced from other States or countries are first introduced in these units and then evaluated, tested, if found suitable is recommended for adoption. The following actions shall be taken for the supply of bud wood to the farmers.

1. The scion wood should be taken from the best performing mother plant.
2. The Incharge of the farm will ensure to supply the bud wood with zinc labels to the farmers indicating therein name of the variety.
3. A record of the bud wood shall be maintained on the Performa as given vide **Annexure-V.**

Section-3

3. Multiplication and supply of disease free quality planting material to the farmers at reasonable rates

3.1 Quality planting material for higher productivity:

Improvement of technology base and other strategies being recommended will not have desired impact unless quality planting material is made available. In most of the cases quality planting material being supplied is poor both in respect of genetic purity and health standard, besides high variations within the cultivar. There is also a degeneration of varieties in certain cases. Variations are also observed in productivity and quality amongst the trees of a selected variety. It is therefore, necessary that the best tree or Tree of Outstanding Merit (TOM) within each variety be selected, earmarked and used as mother tree for future multiplication.

3.2 Nursery Production Work:

Sufficient area shall be earmarked for raising of nursery in the PCDOs and Fruit Nurseries of the Department. Although every PCDO may not be suitable for undertaking nursery production work, however, efforts should be made to undertake nursery production work, where adequate irrigation facilities are available. The following actions shall be taken for raising of nursery.

3.2.1 Selection of suitable land for nursery production in the PCDO:

- The area selected for nursery production work should be free from hard rock strata and the soil should be deep, fertile and well drained.
- Sufficient area be earmarked for nursery production in order to rotate the area for nursery raising in the alternate years. Growing of nursery on the same portion of the land year after year may increase the incidence of soil borne pathogens and other diseases. Hence a portion of the land be kept fallow at least for two to three years and nursery production can be undertaken in another portion of the land. The area may be rotated subsequently.

3.2.2 Procurement of seed for nursery:

Following action shall be taken for ensuring procurement of best quality seed for the Departmental nurseries.

- The seed should be procured from reliable source.
- It should be viable, plump and free from any inert material.
- In case of apple, the seed of crab apple or self pollinising varieties viz Golden Delicious, Tydeman's Early Worcester, McIntosh, Yellow Newton and Northern Spy having good seed viability, better germination and seedling growth should be preferred than the seeds of commercial varieties from the Fruit Canning Units.

- The apple seedling plants of unknown origin, pedigree should not be used for raising grafted fruit plants in the Departmental Fruit nurseries.
- The mango stones from the wild seedling stock should be used within a week of its extraction from the fruit for raising nursery to ensure good germination.

3.2.3 Raising of Nursery

The methodology and precautions as given in the package of practices for fruit crops will be adopted for raising nursery plants. However, the following steps shall be taken for raising quality nursery plants.

- The seed sowing is to be done at the recommended depth and the transplantation of seedling to be carried out at proper spacing for each kind of fruit plants.
- Periodical rouging of weak and diseased nursery plants.
- Weeding and hoeing to be done regularly to avoid the competition for the nutrients by the weeds with the nursery plants.
- Protective sprays to be carried out to avoid infection of serious diseases, keeping in view the prevailing climate in the area.

3.3 Establishment of clonal rootstock mother blocks.

Clonal rootstocks are widely used today to overcome adaptability problems. Clonal rootstocks are genetically identical clones of parent rootstock. These rootstocks are special because they have certain desirable traits including tolerance to winter cold, high temperature, poorly drained soils, heavy clay or salty very dry soils or pests and diseases. The ultimate tree size can be controlled by the rootstock. It is therefore; necessary to select the right rootstock for the condition in the area, so that growers can greatly enhance productivity with quality production. The clonal rootstock mother stools shall be established in the PCDOs/ fruit nurseries, wherever suitable land and irrigation facilities are available. The following action shall be taken in this regard:

- Separate mother stool beds shall be established for mass multiplication of virus and disease free promising rootstocks by stooling and cutting.
- The Incharge of the Fruit Nurseries will ensure to erect metal label in front of the nursery beds indicating a particular rootstock planted in the bed to ensure identification and the supply of the requisite true to type rootstock to the farmers.
- The Incharge will ensure to supply the rootstocks of standard size and

3.4 Enforcement of H.P. Fruit Nurseries Registration Act, 1973:

Each fruit nursery of the Department shall be got registered under the **H.P. Fruit Nurseries Registration Act, 1973** for which the license shall be issued and the same to be renewed periodically.

The suggestions to be given by the officers inspecting the nursery shall be implemented and followed in letter and spirit. The Incharge of the PCDO/Fruit Nursery shall maintain the necessary record in the form of Register as prescribed under the Act vide Rule No.8(5), 9(1) (a), (b) and (c) in the Form No. VII to XIII.

3.5 Accreditation of Fruit Nurseries:

Existing rules framed under the H.P. Fruit Nurseries Registration Act 1973 provide for record keeping of the Departmental Fruit Nurseries. However, each one of them individually does not completely define a Model Horticulture Nursery. Therefore, it is imperative to define a Model Nursery in all the three aspects of Nursery Infrastructure, Production system and Quality parameters of planting material and Good Nursery Management Practices in a comprehensive manner and put a nursery recognition regime in place. A model Horticulture Nursery should function as a reliable source of supply of quality planting material for horticulture crops. With a view to ensure availability of good quality planting material as outlined above, the National Horticulture Board (NHB) has started a system of Recognition of Horticulture Nurseries on voluntary basis. Hence, the departmental fruit nurseries shall be accredited with the NHB to establish a network of quality nurseries across the State for the purpose of propagation and distribution of quality planting material of specified horticulture crops to the farmers. The following action shall be taken in this regard by the Incharge of PCDO/Fruit Nursery.

1. The Incharge of the PCDO shall apply to the NHB for the accreditation of the Fruit Nursery on the prescribed Performa as given on the website of NHB i.e. www.nhb.gov.in.
2. Necessary data with regard to management of Fruit Nursery shall be provided to the team visiting for inspection and accreditation of fruit nursery.

Section -4

4. Lay out of adaptive trials to test the suitability of various varieties introduced.

Various varieties of fruit crops are introduced in the State from within and outside the country by the Department from time to time and the same are planted in the PCDOs to test its suitability in the particular regions of the State. The trials shall be laid out on following aspects:

4.1 Post Entry Quarantine Observation of imported plant material:

- The plant material introduced or imported from outside the country is initially to be kept under the Post Entry Quarantine (PEQ) observation of Designated Inspection Authority DIA for the period of one or two years to ascertain the possible introduction or infection of pest and diseases from the country of origin.
- The Prof and Head, Department of Mycology and Plant Pathology, UHF Nauni has been declared as the (DIA) for import of fruit plant material

introduced in Himachal Pradesh and he will get the plant material inspected from team of scientist from time to time to monitor the possible introduction of harmful insect pest and will suggest the control measure for the same.

4.2 Evaluation of newly introduced plant material under Different Agro climatic zones:

- The plants are to be planted with proper lay out by digging pits of suitable size at appropriate spacing as given in the package of practices for fruit crops.
- The plants shall be labelled by giving tree number.
- The data with respect to performance of the newly introduced plant material shall be maintained in the performance register on the Performa as given vide **Annexure-IV**.
- The data shall be maintained till the desired results w.r.t its performance are obtained and evaluated and found suitable for cultivation.
- The progress report on the performance of these varieties shall be submitted to the Director of Horticulture on the Performa given vide **Annexure-IV** regularly.

Section -5

5. Demonstration of modern horticulture related technologies to the farmers.

The demonstration of latest technology to the farmers is one of the major objectives of the establishment of PCDOs in the State. The funds available under various schemes shall be utilised for creation of necessary infrastructure.

The following horticulture activities shall be demonstrated to the farmers:-

1. Demonstration of modern orchard management practices.
2. Practical demonstration of training and pruning of fruit trees.
3. Demonstration on benefits of micro irrigation techniques for increasing production and productivity of fruit crops.
4. Demonstration on cultivation of medicinal and aromatic plants.
5. Demonstration on anti frost control techniques especially in sub tropical zones.
6. Demonstration on control of insect pest by release of bio- agents.
7. Demonstration on use and benefit of bio fertiliser products.
7. Demonstration on high density plantation.
8. Weather observatories for generating data for future crop planning.
9. Demonstrations on water conservation techniques

Section-6

6. Providing extension services within a zone of impact of the PCDOs.

Training cum exposure visits of the farmers of the adjoining area shall be undertaken to the nearest PCDO's to show and demonstrate horticulture activities to them.

The following action shall be taken in this regard:-

1. The emphasis shall be given for organising farmers training camps in the PCDOs and Fruit Nurseries of the department.
2. A record of the farmers attending the camps shall be maintained on the register.
3. All the activities of the farm shall be shown and demonstrated to the farmers attending these training camps.
4. A separate register should be maintained for the farmers other than attending the training camps visiting the PCDO for seeking guidance and information with respect to horticulture activities.

Section-7

7.1 Inspection and monitoring of PCDOs activities:-

The activities of the PCDO's shall be monitored not only by the Deputy Director of Horticulture of the District, SMS (Horticulture) of the Sub division or area but also by the Director of Horticulture and other officers of the Directorate of Horticulture regularly. The visiting officers shall give their suggestions for maintenance of these units if found wanting by recording their observation on the visitors register. The instructions or suggestions as given in the visitors register shall be implemented by the Incharge in time bound manner.

The inspection register shall be maintained on the Performa as mentioned in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (c) vide Performa No. XI and the compliance report shall be submitted to the inspecting officer accordingly.

Section-8

8.1 Maintenance of records

The Incharge of the PCDO will ensure that all documents, registers and accounts are maintained properly. These records would be subject to inspection by the designated officials of the department from time to time. Records with respect to following shall be maintained at each PCDO and Fruit Nursery.

1. Register of the Progeny trees:

The data with regard to production and general health conditions of the progeny trees shall be maintained at each PCDO. The data shall be maintained on the Performa as given in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (c) vide Performa No. XI enclosed at **Annexure- II**.

2. Record of source of plant material:

The record of source of plant material shall be maintained at each PCDO as per Performa given in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (c) vide Performa No. XI. The Performa is given at **Annexure- III**.

3. Newly imported/ introduced Progeny trees Performance Register:

Plant material imported or introduced for the first time from outside the State or country is planted in the PCDO to test its suitability in different agro climatic regions of the State. It is imperative to maintain basic data with regard to its performance. The detail of performance of such newly imported/introduced progeny trees shall be maintained at each PCDO on the Performa is given at **Annexure-IV**.

4. Bud wood sale Register:

The data with regard to bud wood sold to the farmers and issued to Departmental Nurseries shall be maintained at each PCDO on the Performa as given vide **Annexure- V**

5. Nursery raising register:

This register shall be maintained to record data with regard to seed sown, kind and numbers of nursery fruit plants raised during the year. The data shall be maintained on the Performa given vide **Annexure-VII**

6. Nursery sale register :

The data with regard to sale of fruit plants to the farmers shall be maintained at each PCDO and Fruit Nursery as per performa given in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (b) vide Performa No. IX. The Performa is given at **Annexure- VI**

7. Plant Protection Register:

The plant protection operation shall be carried out for the control of insect pest and disease in the Nursery area as well as on Progeny trees. The record of this operation shall be maintained on the Performa as prescribed in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (d). The Performa is given at **Annexure- VIII**.

7. Inspection /Visitor register:

The inspection register shall be maintained on the Performa as mentioned in the H.P. Fruit Plant Nursery Registration Act, 1973 vide rule No. 9 (1) (c) vide Performa No. XI and the compliance report shall be submitted to the inspecting officer accordingly. This will record the observations and recommendations of the visiting dignitaries /departmental officers visiting PCDOs. The Performa is given at **Annexure- IX.**

8. Property registers:

This register shall record and maintain the detail of infrastructure created on the PCDO along with office building and other structure with its dimension Qty/size/number and expenditure incurred or book value. The Performa is given at **Annexure- X.**

Annexure-I

Format of the sign board to be displayed

Name of PCDO/Fruit Nursery:

Year of Establishment:

Area under Progeny Trees

Area under Nursery

Other area

Total area:

FORM-VII**[See rule 8(5)]**

Register of the progeny trees of.....

Licence No.....

| Year | Tree No. of progeny trees | Kind and variety | Yield (kg) | General health Conditions of the progeny tree | General observation about quality and grade of fruits |
|-------------|----------------------------------|-------------------------|--------------------|--|--|
| | | | | | |
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Annexure-III**FORM-VIII****[See rule 9(1) (a)]**

Name of nursery.....Licence No..... Kind of fruit plants.....,
Variety.....

RECORD OF SOURCE OF PLANT MATERIAL

| Date | Source of root stock | Source of scion variety | No. of plants raised | Remarks |
|-------------|-----------------------------|--------------------------------|-----------------------------|----------------|
| | | | | |
| | | | | |
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Annexure-IV

Performance Register for newly imported/ introduced Progeny trees

Tree No. Name of Cultivar Date of Plantation Source (From where received)

| Year | Date | Tree girth (cm) | Height (mt) | Date of vegetative bud burst | Date of complete sprouting | Date on which first flower opened | Date of full bloom | Date of petal fall | June and other drop |
|------|------|-----------------|-------------|------------------------------|----------------------------|-----------------------------------|--------------------|--------------------|---------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | | | | | |
| | | | | | | | | | |

| Extent of fruit set | Date on which fruit colour start | Date on which full colour appear | Total fruit harvest grade wise(Kgs) | Date of complete leaf fall | Date of insect pest & disease observation | Remarks |
|---------------------|----------------------------------|----------------------------------|-------------------------------------|----------------------------|---|---------|
| 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | | | | | | |

Annexure-V

Bud wood store/stock register

| S.N. | Kind of fruit trees | Tree No. | Variety | Numbers issued | Issued to | Receipt No. |
|------|---------------------|----------|---------|----------------|-----------|-------------|
| 1 | 2 | 3 | 4 | 5 | | 6 |
| | | | | | | |
| | | | | | | |
| | | | | | | |

Annexure-VI

FORM-IX See rule 9 (1) (b)]

Name of Nursery.....Licence No.....

SALE REGISTER OF NURSERY PLANTS

| S.No. | Name and address of the purchaser | | Kind and variety of plants sold | | Root- Stock used |
|--------------------|-----------------------------------|---------------------|---------------------------------|--|------------------|
| 1 | 2 | | 3 | | 4 |
| | | | | | |
| | | | | | |
| | | | | | |
| No. of plants sold | Rate per plant | Total price charged | No. and date of receipt issued | | Remarks |
| 5 | 6 | 7 | 8 | | 9 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Annexure-VII

Register of Nursery Plants

| S.N o. | Name of Plant with variety | Area Sown | Date of Sowing | Quantity of Seed Sown | No. of plant planted | Plants produced/ germinated | | No. of plants Died | | No. of plants running | | No. of plants fit for sale | | Reference to the page on Store book of disposal Register |
|-----------|-------------------------------------|--------------|-------------------|-----------------------------|----------------------------|-----------------------------------|-----|-----------------------|-----|--------------------------|----|-------------------------------|----|---|
| | | | | | | Date | No. | Date | No. | Date | No | Date | No | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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FORM XII

[See rule 9(1)(d)]

REGISTER OF PLANT PROTECTION OPERATIONS

| S.No. | Date | Name of the insects, pests or diseases | Control measures taken (mention pesticides used and their formulation) |
|--------------|-------------|---|---|
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FORM-XI

[See rule 9 (1)(c)]

INSPECTION REGISTER

| S.No. | Date of Visit | Name of the Inspecting Officer | Instruction of the officer | Compliance report by the nursery-man |
|--------------|----------------------|---|---------------------------------------|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Annexure-X**PROPERTY REGISTER**

| S.N. | Kind of the Infrastructure created | Dimension/Size | Year of Construction | Name of scheme | Expenditure incurred (Rs.) |
|-------------|---|-----------------------|-----------------------------|-----------------------|-----------------------------------|
| 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | | | | | |
| 2 | | | | | |