

**Course – M. Sc. Botany Part 1 Paper III**

**Topic – Plant Quarantine**

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## **Quarantine:**

A quarantine is a restriction on movement of people or goods so that spread of disease can be prevented. so a period of time when a person, plant or animal that has or may have an infectious disease must be kept away in isolation from other.

## **Plant Quarantine:**

- ❖ A legal restriction on movement of agricultural commodities for the purpose of exclusion, prevention or delay in the establishment of plants, disease or parasites in the area where they are not present.
- ❖ Plant quarantine is a technique for insuring disease and pest-free plants by isolating them until they are confirmed healthy. Thus plant quarantine is designed as a safe guard against harmful pests or pathogens exotic to a country or a region and the newly imported plants are isolated to ensure that they are not introducing any foreign parasites.
- ❖ The term quarantine may refer to the quarantine station itself, or to the process of testing and purifying the plant material.
- ❖ A 40 days quarantine period is in rule for isolating the plant material.

## **Need of Plant Quarantine:**

- ❖ A new pest, after arrival and establishment, can rapidly develop into destructive proportions.
- ❖ Because of the absence of natural enemies in the new environment.
- ❖ Plant pest epidemics could result in the loss of agricultural produce.
- ❖ This may adversely affects the food production or an existing export trade.
- ❖ Therefore, the main aim of plant quarantine is to prevent the entry of exotic pests into the country by enforcing laws without which it is hard to obtain compliance.

## **Plant Quarantine is equipped into 3 divisions:**

### **1. Domestic quarantine**

- ❖ Restriction to entry of plant and plant related material from one state to another state, which is associated with state machinery production.
- ❖ There are many infected materials which are prohibited to transport to other state for trade and export, like;
- ❖ Banana bunchy top virus (Assam, W.B., Kerala)
- ❖ Potato cyst nematodes (Nilgiri dist. of TN)
- ❖ Apple scab (JK and HP).

### **2. International quarantine;**

- ❖ Legal restriction on plant and plant related products between one country to country to ensure pest and diseases free materials.

### **3. Embargo:**

- ❖ Official ban on trade or other commercial activity with a particular country
- ❖ When the pest risk is very high and the safe guards available in the country is not adequate and, therefore, import is prohibited.

### **Quarantine Regulation:**

- ❖ Whatever the type of introduced plant are, i.e. seeds, vegetables, fruits etc. bulk introductions are always risky as thorough examination and treatment in such cases is very difficult and planting area is far too large to prevent the establishment and spread of the introduced pest/disease.
- ❖ Based on these factors, plant quarantine regulates the introductions as follows:
  1. Complete embargo/prohibition: When the pest risk is very high, the safeguards available in the country are not adequate and, therefore, import is prohibited.
  2. Post-entry quarantine: The risk is very high but adequate safeguards in the form of post-entry isolation growing facilities are available.
  3. Restricted: Pest risk is not high and import permit is required stipulating conditions for entry, inspection and treatment.
  4. Unrestricted: Import permit is not required, and material may enter without restriction.

### **Objectives of the Scheme:**

1. To prevent the introduction and spread of exotic pests that are destructive to crops by regulating/restricting the import of plants/plant products
2. To facilitate safe global trade in agriculture by assisting the producers and exporters by providing a technically competent and reliable phytosanitary certificate system to meet the requirements of trading partners.

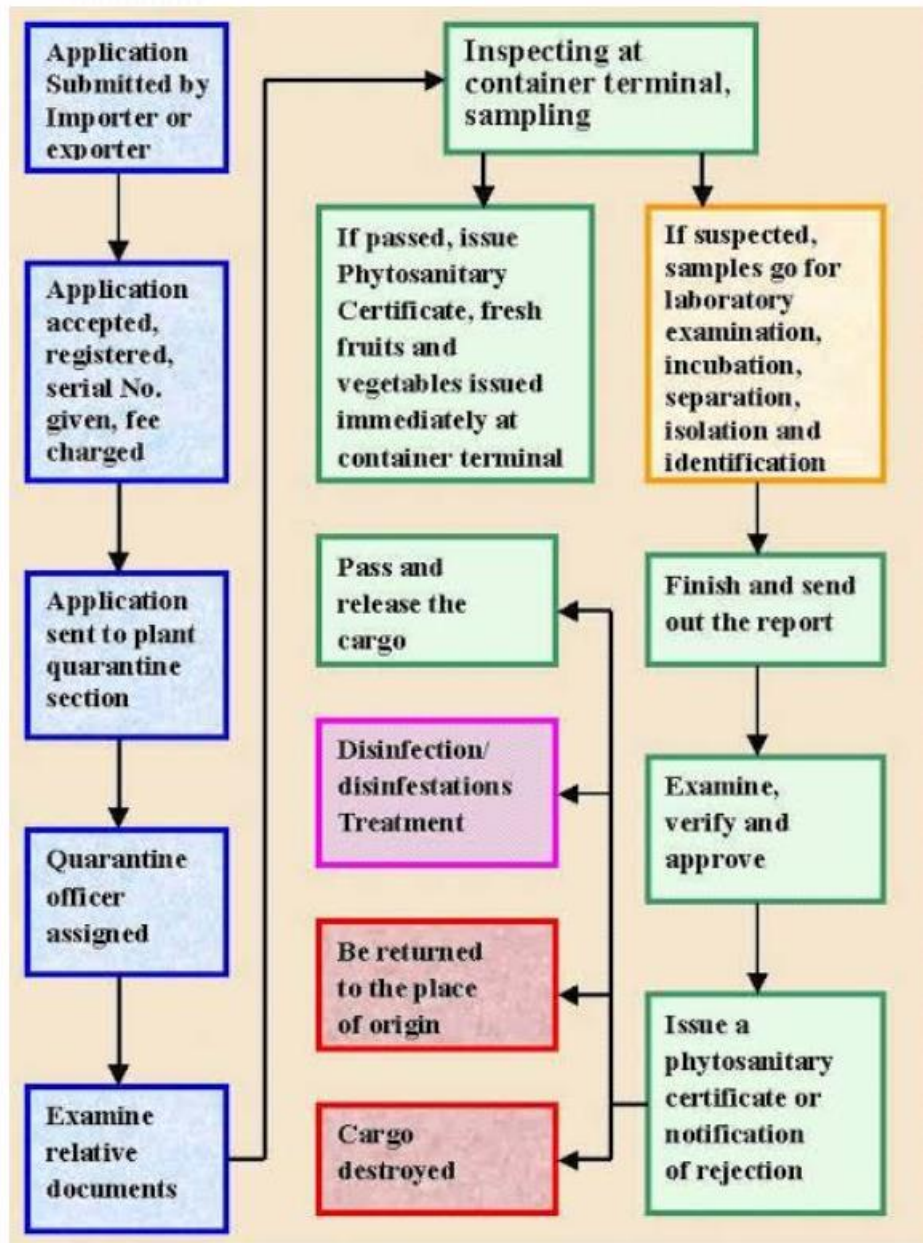
### **The major activities under the scheme include:**

- ❖ Inspection of imported agricultural commodities for preventing the introduction of exotic pests and diseases inimical to Indian Fauna and Flora
- ❖ Inspection of agricultural commodities meant for export as per the requirements of importing countries under International Plant Protection Convention (IPPC)
- ❖ Detection of exotic pests and diseases already introduced for containing/ controlling them by adopting domestic quarantine regulations.
- ❖ Undertaking Post Entry Quarantine Inspection in respect of identified planting materials.
- ❖ Conducting the Pest Risk Analysis (PRA) to finalize phytosanitary requirements for import of plant/plant material.

### **Inspection Procedures followed in quarantine station:**

- ❖ Visual inspection - To detect sclerotia, nematode galls, bunt galls, smuts, insect infestations, weed seeds, insect eggs, inert mater etc.
- ❖ X-ray test - Insect infestation
- ❖ Washing test - Spores of fungus eggs of insect adhering to seeds, nematode galls
- ❖ Sedimentation test - Stem eelworm (*Ditylenchus dipsaci*) (Baerman Funnel Test)
- ❖ Incubation test - Seed borne fungi/ bacteria (Blotter/agar test)
- ❖ Grow out test - Seed borne bacteria/viruses/downy mildews
- ❖ Electron microscopy - Potentially used for identification and characterization of all plant viruses.

- ❖ Serological methods: ELISA, DIBA, ISEM, Agglutination test. Nucleic acid hybridization • Polymerized Chain Reaction (PCR)



## Plant Quarantine Treatments:

### 1. Fumigation:

- ❖ Under atmospheric or under reduced pressure methyl bromide for fruits, vegetables, plants, nuts, railroad cars, ships, wood products, etc.
- ❖ Other fumigants like HCN, phosphine and EDCT (ethylene dichloride + carbon tetrachloride mixture) are commonly used.

## **2. Heat treatment:**

- ❖ Hot water treatment or hot air treatment are also used in quarantine for eradication of insects, mites, nematodes, fungi, bacteria and viruses.
- ❖ The basic principle treatment temperature should be sufficiently high to kill the associated pest/pathogen but not the host.
- ❖ Against nematodes: Flower buds, 44° C for 240 min; chrysanthemum, 48° C for 25 min; potato tubers, 45° C for 5 min;
- ❖ Against insects and mites: strawberry runners, 46° C for 10 min;

## **3. Cold treatment:**

- ❖ Atmospheric cold plasma jet is capable of disinfecting fungus infected plant leaves and controlling the spread of infection.

## **4. Chemical treatment:**

- ❖ Chemicals may be applied as dust, slurry, spray or as dip.
- ❖ Dosages of chemicals should be enough to eradicate the inoculums but should not kill the host.
- ❖ Chemical should not be hazardous to personal handling the treated seeds.

## **5. Tissue culture:**

- ❖ Tissue culture technique reduces the pest/pathogen introduction risk in two ways:
  - (i) Since the introductions are represented by meristem tips, excised buds or embryos the size of infection is very much reduced.
  - (ii) the aseptic plantlet system has built-in pest/pathogen detection capability.

## **Agencies involved in Plant Quarantine:**

- ❖ Directorate of Plant Protection, Quarantine and Storage, Faridabad.
- ❖ National Bureau of Plant Genetic Resources (NBPGR), New Delhi.
- ❖ Crop specific Research Institutes of Indian Council of Agricultural Research (ICAR).
- ❖ Head of Plant Pathology Division of State Agricultural Universities (SAU).
- ❖ State Agricultural and Horticultural Departments.

## **Plant Quarantine Stations in India:**

- ❖ National Plant Quarantine Station (NPQS), Rangpuri, New Delhi
- ❖ Regional Plant Quarantine Stations: Amritsar, Chennai, Kolkata, Mumbai
- ❖ 75 Notified points of entry at various
  - Seaports (42)-Bhavnagar, Kandla, Mumbai, Vishakhapatnam etc.
  - Airports (19)- Amritsar, Delhi, Mumbai, Kolkata, Chennai etc.
  - Land frontiers (14)-Hussainwala, kalingpong, Bangaon, Attari wagha etc.
- ❖ 65 Inland Container Depots.
- ❖ 11 Foreign Post Offices.

## **Plant Quarantine organizations in India:**

- ❖ Central Directorate of Plant Protection, Quarantine & Storage was established in 1946.

- Head quarter- Faridabad.
- ❖ Plant Quarantine related laws –
  - 1914 – DIP Act; Destructive Insects and Pests Act.
  - 1951 - UP Locust Destruction Act - by UP Govt.
  - 1954 – UP Agricultural Disease and Pest Bill by UP Govt.
  - 1961-Plant introduction Division established in IARI.
  - 2003-Plant Quarantine (Regulation of Import into India) Order.

#### **Disease Controlled by Plant Quarantine:**

- ❖ Bunchy Top of Banana – Kerala
- ❖ Mosaic of Banana – Kerala
- ❖ Apple Scab – H. P.
- ❖ Wart of Potato - W. B.

#### **International Quarantine:**

- ❖ International Plant Protection Convention: International Standards for Phytosanitary Measures are prepared by the Secretariat of the International Plant Protection Convention as part of the United Nations Food and Agriculture Organization's global programme of policy and technical assistance in plant quarantine.
- ❖ The standards, guidelines and recommendations are made to achieve international harmonization of phytosanitary measures, with the aim to facilitate trade and avoid the use of unjustifiable measures as barriers to trade.

#### **The International Plant Protection Convention (IPPC):**

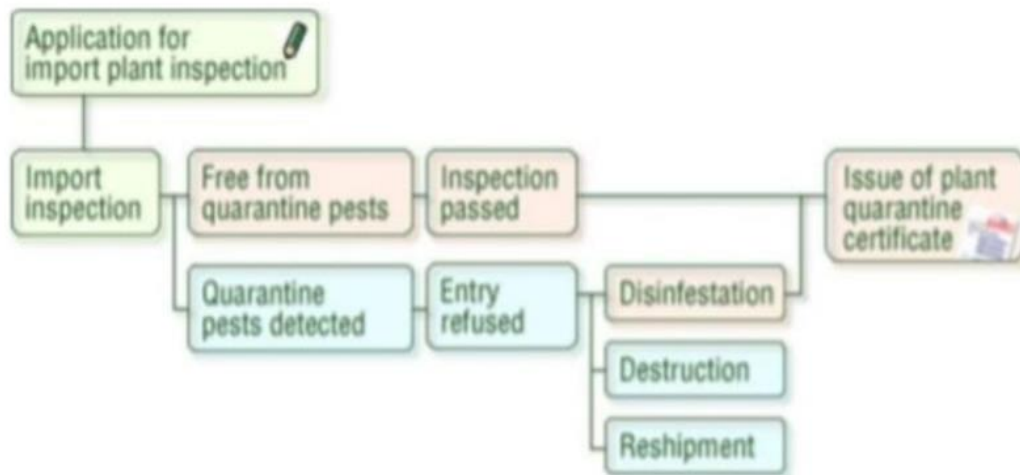
- ❖ IPPC is a multilateral treaty for international cooperation in plant protection.
- ❖ It was formed in 1952.
- ❖ Headquarters: Rome, Italy.
- ❖ 182 countries of the world are its member.
- ❖ IPPC work: It works on,
  - standards on pest risk analysis.
  - requirements for the establishment of pest-free areas.
  - And others which give specific guidance on topics related to the SPS Agreement.

#### **Import control:**

- ❖ Regulations of importing country
  - Embargoes.
  - Inspection of seed lots.

- Post Entry Quarantine (PEQ).

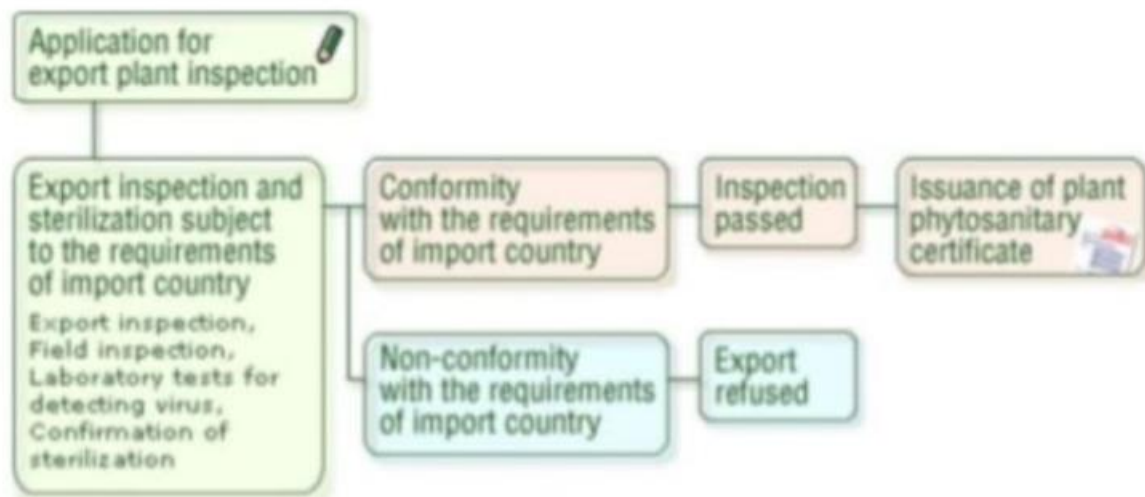
## Import flowchart



### Export control:

- ❖ Regulations of the exporting country.
  - Field inspection of field crops.
  - Inspection of seed lots.
  - Seed treatment.
  - Phytosanitary certificate.

# Export flowchart



## Importance of plant quarantine:

- ❖ Presently plant quarantine is essentially a legally based defense system against new arrivals of exotic organisms called pests or pathogens that compete with human beings for food, shelter, and health or otherwise threaten human comfort and welfare.
- ❖ A number of foreign pests entered subcontinent in the early twenties because of inadequate quarantine control.
- ❖ The significance of Plant Quarantine has increased in view of Globalization and liberalization in International trade of plants and plant material in the wake of Sanitary and Phytosanitary (SPS) Agreement under WTO (World Trade Organization).
- ❖ By regulating/restricting the import of plants/plant products Plant quarantine process prevent the introduction and spread of exotic pests that are destructive to crops.



- ❖ It facilitate safe global trade in agriculture by assisting the producers and exporters by providing a technically competent and reliable phytosanitary certificate system to meet the requirements of trading partners.
- ❖ Pathogens of minor consequence in their native environments may be destructive in a new environment so by isolating the plant for a certain period fresh disease free plants are ready.
- ❖ Plant Quarantine is vital to prevent the introduction of non-indigenous pests and diseases into a country, or to intercept and eradicate them before they can be widespread and well-f established.

**Conclusion:**

The Plant Quarantine acts as an important tool in excluding pests and disease from crop. Effective implementation of quarantine process is highly recommended for management of pests and diseases, which in turn helps in maintaining crops productivity.