
UNIT 11 PLANT AND ANIMAL QUARANTINE

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11.0 OBJECTIVES

After reading this unit, you should be able to:

- explain what is Quarantine and why Quarantine is needed;
- acquire a knowledge on Plant Quarantine Regulations in India;
- understand the role of Customs in implementation of Plant Quarantine Regulations;
- assess the globalization of WTO-SPS measures ;
- state the various agencies involved in implementation of PQ Regulations;
- describe basic requirements of Import procedures;
- understand the need to promote safe agricultural trade; and
- explain the animal quarantine system in India.

11.1 INTRODUCTION

We know that man even in nomadic period carried with him the required seeds, plants and domestic livestock, wherever he moved. This practice is still continuing in the civilized settlements of mankind. As a consequence, many plant/animal types have moved from their centers of origin, to an entirely new regions / continents, where they got well established and naturalized. The pests and diseases associated with plants, seeds and animals also moved along unnoticed into a new region, where they caused severe damage, not only to the plants/animals with which they associated but started to infect / infests many other plant/animal types in the introduced region. The realization of the economic,

social consequences happened due to indiscriminate and unscientific movement or trade of plants, seeds and plant/animal materials, necessitated the countries or provinces to start regulating the movement of plants and plant material.

The word “**Quarantine**” is derived from the Latin word “*quarantum*” meaning forty; that is to say a forty days period of detention. The term Quarantine remain associated with the procedure of detention and inspection inter alia of animal disease field and later adopted to cover protective efforts for the exclusion of pests and diseases of farm and horticultural crops, as well as forest and fruit trees. Thus the **plant and animal quarantine** came into existence and became acknowledged as a positive means of control for plant pests and disease of animals through control of the international movement of plants and plant materials and animals. Economic losses caused due to the introduced pests in the world are listed in **Table-1**.

11.1.1 History of Plant Quarantine

The very interesting story in the history of Plant Quarantine (PQ) is the introduction of grapevine Powdery mildew (*Oidium tuckeri*) pathogen into Europe, which came along with grapevines from America. Its pathogenecity on European grape vine was unknown at that time and the disease spread like wild fire on European grape vines. To control powdery mildew, resistant varieties were again imported from America. However, these grape vines carried *Phylloxera vastatrix*, a root inhabiting aphid of grape vines. To combat this pest, more American vines resistant to Phylloxera were introduced, but these additional introductions brought with them the downy mildew (*Plasmopara viticola*), and black rot (*Guignardia bidwellii*). The grape production in France greatly declined due to these introduced pests, especially with the downy mildew infection, and this gave rise to the chemical pesticides in the world history with the formulation of Bordeaux mix (George H. Berg, 1991).

11.1.2 International Evolution of Regulations

The very first regulation to ban the import of plants was passed by the French Government in 1913 banning import of planting materials from America, due to the aftermath of serious losses caused by infected grapevines imported from America. The Evaluation of international Regulations in Chronological order is listed below.

1906 – Indian Government ordered Compulsory fumigation of imported cotton bales to prevent introduction of Mexican cotton boll weevil (*Anthonomus grandis*).

1914 - International agreement on Plant Protection was made under the auspices of the International Institute of Agriculture in Rome.

1919 - International Convention on Plant Protection by over 50 member countries and certain Agreement regarding the issue and acceptance of Phytosanitary Certificate were finalized.

1951 - FAO sponsored an *International Plant Protection*

1956 - India became a member and agreed to adopt legislative measures specified in the Convention for the purpose of securing common and effective action to prevent the introduction and spread of pests and diseases of plants and plant materials and to promote measures for their control.

11.2 PLANT QUARANTINE REGULATIONS IN INDIA

In order to protect the agricultural, horticultural and forest plants of our country, the Government of India has taken legislative steps as far back as 1914 and passed an Act called, "***The Destructive Insects and Pests Act, 1914*** (hereafter referred as *DIP Act*) for regulation of import of plants and plant products. Prior to the establishment of the Directorate of Plant Protection, Quarantine and Storage (DPPQS) in May 1946 under the Ministry of Food and Agriculture, the various rules and regulations of the *DIP Act* were enforced by the Customs Department since as if the rules were issued under Section 11 (K) of **The Customs Act, 1962** (replacing Section 19 of Sea Customs Act, 1878). The result was that many new pests and diseases entered into India due to unscientific method of inspection and clearance. **The Great Bengal Famine** that wiped out 3 million people of India in 1942-43 acted as precursor for the establishment of Plant Protection Directorate in 1946 and the Government of India decided to establish Plant Quarantine Stations at various international airports, seaports and land frontier check posts for effective implementation of plant quarantine regulations. The DPPQS was formed to take care of import of plants and plant materials to avoid inadvertent entry of pests into India.

11.2.1 The Destructive Insects and Pests Act 1914 (DIP ACT)

(i) Objective of the Act:

This Act was enacted to make provision for preventing the introduction into India of any insect, fungus or other pest, which is or may be destructive to crops inclusive of agricultural crops, horticultural crops and forest plants.

The salient features of the *DIP Act* are as under :

- ii) Important Definitions (i.e.) crops, import and infection:
 - (a) "***Crops***" includes all agricultural or horticultural crops and all trees, bushes or plants;
 - (b) "***Import***" means the bringing or taking by sea, land or air, across any customs frontier defined by the Central Government;
 - (c) "***Infection***" means infection by any insect, fungus or other pest injurious to a crop
- ii) The Central Government is empowered to notify for regulation or prohibit import of articles likely to infect, into India.
- iii) The Customs part is empowered to implement the operation of Notifications issued under Section 3 as if the same is issued under section 19 of the Sea Customs Act, 1878 (VIII of 1878).

- iv) The Central Government is empowered to issue Gazette Notification to regulate or prohibit movement of articles likely to infect from State to State (Domestic Quarantine).
- v) The Central Government is empowered to levy restrictions on movement of prohibited items within India
- vi) The Central Government is empowered to make rules by notification in the Official Gazette, prescribing the nature of documents to accompany and other special conditions for regulating the movement of articles notified.
- vii) The State Government is empowered to make rules for detention, inspection, disinfection, or destruction of articles in respect of which a notification has been issued under Section 3 and 4 (a) by the Central Government
- viii) The State Government is empowered to levy penalty for breach of notifications issued.
- ix) The Act extend protection to persons acting in good faith under the Act i.e. no suit, prosecution or other legal proceedings shall lie against any person for anything done in good faith or intended to be done in good faith under this Act.

11.2.2 Plant Quarantine (Regulation of Import into India) Order, 2003 (PQ Order)

DIP Act empowers Central Government to notify orders, regulations or rules to regulate the import of plant materials into India. The first regulation i.e. "*The Import Regulation of cotton into India*" was passed in the year 1972 to prevent the entry of cotton boll weevil into India. In order to regulate seeds and plants and plant materials, another order called "*The Plants, Fruits and Seeds (Regulation of Import into India) Order, 1984*" was passed. But the liberalization of commercial trade took an upsurge after the *New Policy on Seed Development in 1988*. This New Seed Policy was formulated with an aim to help Indian farmers to obtain the best planting materials available in the world. Keeping in view the importance of bulk commercial trade of planting materials, the *The Plant Foods and Seeds (PFS) Order was revised in 1989* and special conditions were laid out for specific crops and a list of crops prohibited to enter into India was also notified.

The genesis of WTO in 1995 (superseding the GATT) and the harmonization of Sanitary and Phytosanitary (SPS) measures have opened a new perspective in world trade. Under SPS measures, International Plant Protection Convention (IPPC) is the nodal agency for harmonizing the plant quarantine activities. As India is a signatory member of IPPC the rules and regulations with regard to plant quarantine need to be formulated on the basis of international standards set forth by the IPPC. In line with this, an order, *The Plant Quarantine (Regulation of Import into India) Order, 2003* (PQ Order) was framed and came into force from 1st January 2004, superseding the PFS Order, 1989.

A. Salient Features of PQ Order:

The PQ Order has 15 Clauses, 12 Schedules and 22 Forms, to regulate the import of plants and plant materials into India. The salient features of the PQ Order are as follows:

- Schedule-I notifies points of entry at Seaport/ Airport/ Land Frontiers. Import of plant propagative materials such as seeds, plants, cuttings, bulbs etc for sowing and planting are permitted only through Regional Plant Quarantine Stations at Amritsar, Chennai, Kolkata, Mumbai and New Delhi. Commodities for consumption can be imported through all the notified ports.
- Schedule-II notifies points of entry at Inland Container Depots and Container Freight Stations.
- Schedule-III notifies points of entry at Foreign Post Offices
- Schedule-IV notifies commodities prohibited to import into India with justification
- Schedule-V notifies commodities which are restricted to import into India for research purposes and to be grown under the supervision of Crop Specific Research Institutes of Indian Agricultural Research Institute (IARI).
- Schedule-VI notifies commodities, which are regulated to import into India for propagation and consumption by general public for commercial purpose, with specific additional declarations for freedom from quarantine pests and with special treatment conditions to be followed prior to import. A phytosanitary certificate issued by the country of export should accompany the consignment.
- Schedule-VII notifies commodities that are least risk category for consumption purpose without any condition except that a phytosanitary certificate issued by the country of export should accompany all the consignments.
- Schedule-VIII prohibits the entry of 31 Quarantine Weeds of great invasive potential which can come as contaminant in import commodities
- Schedule-IX notifies the fee structure for import of commodities and fumigation or treatment supervision charges
- Schedule-X notifies authorities to issue Import Permit for the commodities covered in Schedule-V and VI.
- Schedule-XI authorizes Inspection Authorities (IAs) to carry out post-entry quarantine inspection of imported propagative materials
- Schedule-XII stipulates the minimum quantity of seeds to be permitted for trial purpose including submission to gene bank at Natural Bureau of Plant Genetic Resources (NBPGR), New Delhi.
- All consignments of timber logs shall be inspected on board prior to unloading at the port of arrival
- All wood/ timber logs should be treated as stipulated in Clause 9 of PQ Order, 2003 at the country of origin and the same should be endorsed in the PSC
- Bulk consignment of food grains shall be inspected on board prior to unloading at the port of arrival
- Solid Wood Packing Materials (SWPMs) are regulated in accordance with ISPM-15 (International Standards for Phytosanitary Measures) of IPPC, hence, import of SWPM require PSC/ should be marked with approved marking as per ISPM-15
- Import can be made only for the commodities, which are covered in Schedule-V, VI and VII.
- Commodities are notified only after carrying out Pest Risk Analysis (PRA). For import commodities which are not covered in any Schedules - PRA form to be submitted to PPA

- The relaxation shall be accorded only by Joint Secretary, Department of Agriculture and Cooperation, Ministry of Agriculture, for Import of commodities which are not covered in Schedule-V, VI & VII
- One time relaxation of Import Permit (IP) and Phytosanitary Certificate (PSC) shall be granted by the Officer-in-charge, after fumigation (if mandatory) and 5 time inspection fee and 5 times IP fee to be collected in such cases for the commodities covered in Schedule-VI & VII. Subsequent relaxation shall be granted only by the Joint Secretary, Department of Agriculture and Cooperating , Ministry of Agriculture, for Import of commodities
- Import of live insects, bio-control agents, microbial cultures are permitted for research work with an IP issued by Plant Protection Adviser to Government of India (PPA)
- Import of soil, peat, sphagnum, compost is prohibited. The same are permitted for specific research work only with an IP issued by PPA to Government of India.
- Import of Germplasm/ Transgenics/ GMOs (Generally Modified Organisms permitted only with an IP issued by Director, National Bureau of Plant Genetic Resources (NBPGR), New Delhi

The PQ Order is based on scientific analysis of pest risk and the quarantine pests are notified after carrying out **Pest Risk Analysis** (PRA). More than 700 quarantine pests have been notified so far after carrying out PRA for import of around 1000 commodities. Quarantine weeds have been notified in this order. The requirement of additional declarations for freedom from quarantine pests in the phytosanitary certificate issued by the exporting country and specific quarantine treatments are specified for each commodity. The PQ Order in its entirety notifies, points of entry, list of plants prohibited, restricted, regulated and permitted to enter into India. The PQ order is dynamic and amendments are issued to append the PQ Order from time to time.

The innocent looking **solid wood packing materials** (SWPM) are known to be carriers of wood boring insects traveling all over the world as they are used for packing all kind of material in international trade (Murphy, 1996). As it is very difficult to know the exact origin of any SWPM, a global awareness is geared by the IPPC to regulate the movement of SWPM and an International Standard – ISPM-15 was brought out by the FAO for this purpose. For the first time the import of solid wood packing materials have been brought under this PQ Order and specific conditions have been laid to prevent the introduction of timber pests into India.

11.2.3 Implementation of Plant Quarantine

The National Plant Protection Organization (NPPO) established by the Government of each member country has the responsibility to discharge the functions specified by IPPC. The Directorate of Plant Protection, Quarantine and Storage (DPPQS), headed by the Plant Protection Adviser to the Government of India, under the administrative control of the Department of Agriculture and Cooperation (DAC), Ministry of Agriculture, Krishi Bhavan, New Delhi is the NPPO contact person in India and is responsible for:

- Issuance of Phytosanitary Certificates confirming that exporters have met the importing countries requirements
- Manage surveillance for pest out breaks and control of pests
- Conduct inspection and if necessary disinfestations of treated consignments of plants and plant products
- Ensure Phytosanitary security of consignments from certification until export
- Establish and protect pest free areas/ Areas of Low Pest Prevalence
- Undertake Pest Risk Analysis (PRA) for development of import Phytosanitary measures

For the purpose of implementing the Plant Quarantine Regulations, the DPPQS has established Plant Quarantine Stations at all the notified entry points all over India at International Airports, Seaports and Land Frontiers. So far there are 5 major Regional Plant Quarantine Stations, 53 minor Plant Quarantine Stations and 60 Inland Container Depots are manned to prevent the entry of exotic plant pests into India.

Since the inception of Plant Quarantine activities in India, many exotic and economically important pests have been intercepted from time to time, to cite a few Poty virus in Oil Palm (Reddy et al., 1996), *Xanthomonas campestris* pv. *dieffenbachiae* on Anthurium (Sathyanaryana et al., 1998), Crown gall (*Agrobacterium tumefaciens*) pathogen in Rose (Sathyanaryana et al., 2002), Palm seed weevil (*Caryobruchus gleditsiae*) on Sabal palm seeds (Kumarasamy et al., 2002), Cymbidium mosaic virus on Dendrobium (Sathyanarayana et al., 2003), Garlic bulb canker (*Embellisia allii*) on garlic bulbs (Latha et al., 2006) and Scores of nematodes on various ornamental and fruit plants (Latha et al., 1997 & 1999).

Appropriate treatment measures/ actions have been employed to mitigate the entry and establishment of such pests. The details of such major interceptions made are available in the official website: www.plantquarantineindia.org.

A. Implementation of Domestic Quarantine

Section 4A of the DIP Act empowers Central Government to implement **Domestic Quarantine Regulations**. The domestic quarantine activities are being implemented by the state governments to avoid the spread of pests across the states and from the areas of restricted distribution. A list of domestic quarantine rules passed so far has been reflected in **Table-3**.

B. Import Quarantine Inspection and Clearance Procedures

The importer may verify the PQ import conditions made available in the web site. Import permit is required for commodities covered in Schedule-VI for which the importer must obtain an import permit prior to import. The importer or his authorized agent is required to file an application in prescribed format in duplicate with the plant quarantine authority of the concerned port immediately upon arrival of the consignment at the designated port or just prior to the arrival in case of perishable consignment. The application shall accompany with the following documents viz.,

- (i) Import Permit (original importer's copy),

- (ii) Phytosanitary Certificate (original),
- (iii) Certificate of origin, if any,
- (iv) Customs Bill of Entry,
- (v) Shipping or Airway bill (as the case may be),
- (vi) Invoice and packing list and
- (vii) Fumigation Certificate, if any.

In case of re-export consignments, the Phytosanitary Certificate in re-export format along with attested copy of Phytosanitary Certificate issued from the country of origin is required. The importer shall remit the inspection fee as per the prescribed rates under Schedule-IX of the Plant Quarantine Order, 2003 and amendments issued there under, by a bank draft drawn in favour of concerned Pay and Accounts Officer, Department of Agriculture and Cooperation. The application will be registered and after securitization,? the imported consignment shall be inspected either at the port or container freight station or at Plant Quarantine Station, as the case may be, by drawing suitable samples for detailed testing. Sampling of seed is usually carried out as per the provisions of ISTA Rules, 1962. In case of propagation plant material such as cuttings/ saplings/ bud wood/ bulbs/ tubers etc., at least a minimum of 0.1% propagative units are sampled and examined in detail to ascertain freedom from quarantine pests. The initial examination of the samples are carried out with the help of illuminated magnifier to record any stages of live insect infestation, soil contamination, weed seeds, nematode galls and signs and symptoms of fungal/ bacterial and viral infection and are further subjected to detailed laboratory testing such as X-ray test, washing and sedimentation test, incubation test and grow-out test. Sometimes special diagnostic tests such as Enzyme linked Immuno Sorbent Assay (ELISA), Electron Microscopy (EM) and Molecular Diagnosis is used to characterize virus infection. If any live insect infestation is noticed, the entire consignment will be appropriately fumigated or treated before the clearance is granted. A minimum period of 8-10 days is required for quarantine clearance seeds for propagation and perishable plant material such as cuttings, saplings, bud wood, bulbs, tubers etc., and tissue cultures are cleared within a maximum period of 24 hours. In case of consignments of consumption materials, initially visual inspection is carried out and sample is drawn as per the sampling regime prepared by the Directorate of PPQS. The samples are subjected to re-inspection in the laboratories and appropriate lab testing is carried out before according clearance. The consumption materials are cleared within two working days, except in case of treatment. The consignments that are found infected/ infested with a quarantine pest or imported in contravention of plant quarantine regulations will be detained for deportation failing which the same shall be destroyed by incineration at the port in the presence of customs and port authorities under intimation to importer.

C. Other Organizations Involved in Implementation of Plant Quarantine Regulations

The other organizations involved in the implementation of Plant Quarantine Regulations other than DPPQS are as under:

- National Bureau of Plant Genetic Resources, New Delhi for import of Germplasm/ Transgenic/ Genetically Modified Organisms and crops covered in Schedule-V and VI meant for research purpose

- Crop specific Research Institutes of Indian Council of Agricultural Research (ICAR)
- State Agricultural and Horticultural Departments (SAHD)
- Head of Plant Pathology Division of State Agricultural Universities (SAU)

11.3 WTO-SPS REGULATIONS

The **World Trade Organization** (WTO) in brief, is the only international organization dealing with the global rules and trade between nations. The main function of WTO is to ensure that trade flows as smoothly, predictably and freely as possible. The goal is to improve the welfare of the people of the member countries. The WTO came into being in 1995. It is the successor of the **General Agreement on Tariffs and Trade** (GATT). WTO has helped to create a strong and prosperous trading system contributing to unprecedented growth in world trade. The WTO agreements cover goods, services and intellectual property. The agreements spell out the principles of liberalization and the permitted exceptions. They include individual countries' commitments to lower customs tariffs and other trade barriers and to keep open service markets. The agreement sets procedures for settling disputes. It prescribes special treatment for developing countries. It requires governments to make their trade policies transparent by notifying the WTO about laws/ regulations in force and measures adopted and through regular reports by the secretariat on countries' trade policies. Among the various agreements of WTO, the Agreement on Agriculture (AoA), Agreement on Trade Related Intellectual Property Rights (TRIPS), Agreement on Technical Barriers to Trade (TBT) and **Agreement on Sanitary and Phytosanitary Measures** (SPS) are having a direct bearing on agricultural trade. Among these agreements, the SPS agreement has a major implication on international trade of plants and plant materials.

11.3.1 Sanitary and Phytosanitary Measures (SPS)

Sanitary and Phytosanitary Measures Agreement (SPS) sets out the basic rules on food safety and animal and plant health standards. It allows countries to set their own standards. Member countries are encouraged to use international standards, guidelines and recommendations wherever they exist. The Agreement includes provisions on control, inspection and approval procedures. The Government concerned must provide advance notice of new or changed sanitary and phytosanitary regulations and establish a national enquiry point to provide information. The agreement complements the same on technical barriers to trade.

SPS Measures are defined as any measure applied:

- (a) to protect animal or plant life or health within the territory of the Member country from risks arising from the entry, establishment, or spread of pests, diseases, disease-carrying organisms or disease-causing organisms;
- (b) to protect human or animal life or health within the territory of the Member Country from risks arising from additives, contaminants, toxins or disease-causing organisms in food, beverages or feedstuffs;

- (c) to protect human life or health within the territory of the Member Country from risks arising from diseases carried by animals, plants or products thereof, or from the entry, establishment or spread of pests; or
- (d) to prevent or limit other damage within the territory of the Member from the entry, establishment or spread of pests.

In order to achieve the targets, international standards need to be developed for which WTO has assigned responsibilities to three major inter-governmental mechanisms, which are as follows:

- a) **For food safety:** The *Codex Alimentarius Commission* (CAC), Vienna, a subsidiary organ of the Food and Agricultural Organization (FAO) of the United Nations and the World Health Organization (WHO) has been authorized for all matters related to food safety evaluation and harmonization.
- b) **For animal health and zoonosis:** The *International Office of Epizootics* (IOE), Paris develops the standards, guidelines and recommendations related to animal health.
- c) **For plant health:** The *International Plant Protection Convention* (IPPC) at FAO, Rome is the source for International Standards for the Phytosanitary Measures (ISPM) affecting trade.

The WTO-SPS Agreement recognizes the IPPC as the relevant international standard setting organization for the elaboration of international standards to help and ensure that phytosanitary measures are not used as unjustified barriers to trade.

11.3.2 International Plant Protection Convention (IPPC)

The International Plant Protection Convention is an international treaty relating to plant health, to which 166 Members Countries (as of 24 October, 2007) currently adhere to. The Convention has been deposited with the Director-General of the Food and Agriculture Organization of the United Nations (FAO) since its initial adoption by the Conference of FAO at its Sixth Session in 1951.

IPPC and International Trade

The (IPPC) has always played an important role in international trade. The Convention has encouraged countries to ensure through phytosanitary certification that their exports are not the means for introducing new pests to their trading partners. Likewise, importing countries strive to ensure that measures they have in place for protection are technically justified. The WTO seeks harmonization of Phytosanitary measures by its members, the SPS Agreement states that WTO members must base their Phytosanitary measures on international standards developed by the International Plant Protection Convention. However, the IPPC and the SPS Agreement are distinct in their scope, purpose and membership. The IPPC makes provision for trade in a protection agreement; the SPS Agreement makes provision for plant protection in a trade agreement. The IPPC complements the SPS Agreement by providing international standards that help to ensure that Phytosanitary measures have a scientific basis for their imposition and operation and are not used as unjustified barriers to international trade.

11.4 ROLES AND IMPLEMENTATION OF PLANT QUARANTINE (PQ)

The stringent Phytosanitary regulations on movement of plants and plant materials have come into force only after experiencing the devastations caused by the pests in epidemic form in an introduced area. Sometimes the invasion is so high that it has completely wiped out the local varieties and forced those countries to import resistant varieties from elsewhere. India is NOT AN EXCEPTION to these dangerous pests and has experienced devastations and destructions caused by these intruders which have become the natives now. A few such pests, which have changed India's economy and export potential and made the produce even dearer to the native, due to increased expenditure on control measures, which have enabled the farmers' to switch over to some alternative crops are:

- Insects such as, Diamond back moth, Codling moth, Coffee berry borer, Serpentine leaf miner, Spiraling whitefly, Coconut eriophid mite, Silver leaf whitefly;
- Fungi such as, Coffee rust, Late blight of potato, Flag smut of wheat, Downy mildew of grape, Powdery mildew of rubber, Potato wart, Downy mildew of sunflower;
- Bacteria such as, Crown gall, Leaf blight of Anthurium; Virus such as, Bunchy top of banana,
- Nematodes such as, Cyst nematode of potato;
- Weeds such as, *Eichhornia crassipes* (Water hyacinth), *Parthenium hysterophorus* (Parthenium / Congress grass) *Argemone mexicana* (Mexican poppy), *Lantana camara*, *Phalaris minor*, *Salvinia molesta* etc.

A list of such introduced pests into India and their present status of establishment are listed in **Table-2**.

11.5 ANIMAL QUARANTINE

The Livestock Importation Act, 1898 as amended from time to time is the legislative frame work under which **Animal Quarantine and Certification Service (AQCS)** operate. All live-stock products shall be imported into India subject to the following conditions, namely:-

- (1) No live-stock product shall be imported into India without a valid sanitary import permit issued under the provisions of government notification.
- (2) All applications for a permit to import consignments by land, air or sea shall be made in the prescribed forms to the government.
- (3) (i) The sanitary import permit shall be issued for import of livestock products if, after a detailed import risk analysis, the concerned authorities are satisfied that the import of the consignment will not adversely affect the health of the animal and human population of this country.
(ii) The import risk analysis shall be conducted by the concerned officers of the Department on the basis of internationally recognised scientific principles of

risk analysis and the analysis shall be conducted with reference to the specific product and the disease situation prevailing in the exporting country vis-a-vis the disease situation in India.

- (iii) The issue of permits shall be refused if the results of the import risk analysis show that there is a risk of the specific product bringing in one or more specific diseases, which are not prevalent in the country and which could adversely affect the health and safety of the human and animal population of this country.
 - (iv) The import permit shall lay down the specific conditions that will have to be fulfilled in respect of the consignment, including pre-shipment certifications and quarantine checks.
 - (v) The permit shall also specify the post-import requirements with regard to quarantine inspections, sampling and testing.
 - (vi) The import permit issued under this clause shall be valid for a period of six months, but can be extended by the concerned authority for a further period of six months, on request from the importer and for reasons to be recorded in writing.
- (4) All livestock products shall be imported into India through the seaports or airports located at Delhi, Mumbai, Kolkata and Chennai, where the Animal Quarantine and Certification Services Stations are located.
- (5) (i) On arrival at the entry point, the livestock product shall be inspected by the Officer-in-charge of the Animal Quarantine & Certification Services Station or any other veterinary officer duly authorized by the Department of Animal Husbandry and Dairying, wherever required, in accordance with the specific conditions laid down in the sanitary import permit and with general guidelines issued by the Department of Animal Husbandry and Dairying from time to time.
- (ii) After inspection and testing, wherever required, the concerned quarantine or veterinary authority shall accord quarantine clearance for the entry of the livestock product into India or, if required in public interest, order its destruction or its return to the country of origin.
- (iii) Wherever disinfection or any other treatment is considered necessary in respect of any livestock product, the importer shall, on his own or at his cost through an agency approved by the Department of Animal Husbandry and Dairying, arrange for disinfection or other treatment of the consignment, under the supervision of a duly authorised quarantine or veterinary officer.
- (6) It shall be the responsibility of the importer -
- (a) to bring the livestock product to the concerned Animal Quarantine & Certification Services Station (AQCSS), or to the place of inspection, disinfection or treatment or testing as directed by the Quarantine or veterinary officer duly authorized in this regard.
 - (b) to open, repack and load into or unload from the Animal Quarantine Station and seal the consignment; and

- (c) to remove them after inspection and treatment or testing, according to the directions of the Quarantine or veterinary officer duly authorized by the Department.
- (7) The Central Government may, in public interest, relax any of the conditions specified under this Schedule relating to the permit in relation to the import of any live-stock product.

At present four AQCS are functioning at Delhi, Mumbai, Chennai and Kolkata. The Department is contemplating for setting up two more Quarantine Stations at Bangalore and Hyderabad.

11.6 LET US SUM UP

Plant and Animal Quarantine acts as a filter and not as a barrier to international agricultural trade. Vigilant Quarantine activities safeguard the agricultural resources of India from ingress of exotic invasive plant pests and animal diseases. The rules and regulations are based on sound scientific knowledge, transparent and trade friendly and postulated on international standards. The Ministry of Agriculture, Government of India has major role in the implementation of rules and regulations and works with Customs Department to implement and facilitate safe agricultural trade. The Plant and Animal Quarantine Stations are situated at all most of the entry points to filter the inadvertent entry of pests and diseases into India. Import procedures are simple and well laid out to cater to the needs of industry and public. Import cannot be avoided but can be managed. Prevention is better than cure holds good with agricultural trade as well. So let us be cautious and save the environment for the future.

11.7 TABLES

TABLE 1: ECONOMIC IMPACT OF INTRODUCED PESTS IN THE WORLD

S.No.	Name of pest	Host	Country	Introduced from	Annual Economic losses
1.	Boll weevil	Cotton	USA	Mexico	\$ 200 million annually
2.	Corn borer	Corn	USA	Italy/ Hungary	\$ 349 million in 1949
3.	Phylloxera	Grape	France	USA	100,000 million Franks and 2.5 million acres destroyed
4.	Japanese Beetle	Fruit trees (250 hosts)	USA	Japan	\$10 million annually
5.	Coffee berry borer	Coffee beans	India	Sri Lanka	\$ 300 million annually
6.	Coconut Eriophid mite	Coconut	India	Sri Lanka ?	\$ 100 million annually
7.	Canker	Citrus	USA	Japan	\$ 13 million & 19,500,000 trees destroyed
8.	Dutch elm disease	Elm	USA	Holland	\$ 50,000 million
9.	Blight	Chestnut	USA	Eastern Asia	\$1,000 million
10.	Powdery mildew	Grape	France	USA	80% of wine production

11.	Downy mildew	Grape	France	USA	\$ 50,000 million
12.	Bunchy top	Banana	India	Sri Lanka	Rs. 4 Crores
13.	Golden Nematode	Potato	India	UK	1,200 acres infested
14.	Wart	Potato	India	Netherlands	2,500 acres infested
15.	South American Leaf Blight	Rubber	Dutch-Guiana North Colombia	Brazil Brazil	40,000 trees destroyed 78% trees destroyed
16.	Parthenium	Wheat	India	USA	Serious weed and causes health hazards
17.	Water hyacinth	---	India	Brazil	Chokes lakes, ponds and canals
18.	<i>Argemone mexicana</i> weed	Mustard	India	USA/ Mexico	Agricultural weed, also causes dropsy disease in human

TABLE 2: INTRODUCED PESTS IN INDIA AND ITS PRESENT STATUS

Name of Pest	Host	Year	Introduced from	Area recorded	Present Distribution
Insects:					
Fluted Scale <i>Icerya purchasi</i>	Apple cuttings	1928	Sri Lanka	Nilgiris & Madurai Dists (Tamil Nadu)	Tamil Nadu, Karnataka, Kerala, Maharashtra
San Jose Scale <i>Quadraspidiotus perniciosus</i>	Flowering plants	1922	Australia	Kashmir	Jammu & Kashmir, Himachal Pradesh, Uttar Pradesh, Tamil Nadu, Karnataka, West Bengal, Sikkim, Assam, Meghalaya
Potato tuber moth <i>Phthorimaea operculella</i>	Seed potato	1900	Italy	---	All over India
Wooly aphid <i>Eriosoma lanigerum</i>	Apple	1909	England	Simla Dist. (Himachal Pradesh)	All apple growing areas
Diamond back moth <i>Plutella xylostella</i>	Crucifers	1914	---	---	All over India
Green scale <i>Coccus viridis</i>	Coffee	1889	Sri Lanka	South India	Karnataka, Tamil Nadu, Kerala
Codling moth <i>Cydia pomonella</i>	Apple	1989	Pakistan	Ladakh (Jammu & Kashmir)	Jammu & Kashmir, Himachal Pradesh
Coffee berry borer <i>Hypothenemus hampei</i>	Coffee	1990	Sri Lanka	Nilgiris (Tamil Nadu)	Tamil Nadu, Karnataka, Kerala
Subabul psyllid <i>Heteropsylla cubana</i>	Subabul	1988	Sri Lanka	Tamil Nadu	Tamil Nadu, Karnataka, Maharashtra,

					Andhra Pradesh, Madhya Pradesh
Serpentine leaf miner <i>Liriomyza trifolii</i>	Chrysanthemum flowers	1990	---	Karnataka	Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Delhi, Tamil Nadu
Spiraling White fly <i>Aleurodicus dispersus</i>	Cassava	1993	Sri Lanka	Kerala	Kerala, Karnataka
Coconut mite <i>Aceria guerreronis</i>	Coconut	1997	---	Ernakulam (Kerala)	Kerala, Tamil Nadu, Karnataka, Andhra Pradesh
Silver leaf white fly <i>Bemisia tabaci</i> B-biotype	Rose cuttings	1999	Israel	Kolar Dist (Karnataka)	Karnataka, Tamil Nadu
Locusts <i>Schistocerca gregaria</i> <i>Nemadacris succincta</i> <i>Locusta migratoria</i>	---	1860	---	Gujarat, Rajasthan	Gujarat, Rajasthan
Fungi:					
Coffee rust <i>Hemileia vastatrix</i>	Coffee	1879	Sri Lanka	Karnataka	Karnataka, Tamil Nadu, Andhra Pradesh, South India, West ghats
Late blight of Potato <i>Phytophthora infestans</i>	Potato, Tomato	1883	Europe	...	Uttar Pradesh, West Bengal, Tamil Nadu, Meghalaya, Himachal Pradesh, Punjab, Assam, Delhi, Haryana, Eastern Hills, North plains, West plains, Orissa, Karnataka
Chrysanthemum rust <i>Puccinia carthami</i>	Chrysanthemum	1904	Japan or Europe	---	---
Flag smut of Wheat <i>Urocystis tritici</i>	Wheat	1906	Australia	---	---
Downy mildew of Grape <i>Plasmopara viticola</i>	Grapevine	1910	Europe	---	Tamil Nadu, Maharashtra, Jammu & Kashmir, Karnataka
Downy mildew of cucurbits <i>Pseudoperonospora cubensis</i>	Cucurbits	1910	Sri Lanka	---	Punjab
Downy mildew	Maize	1912	Java	---	Delhi

<i>Sclerospora philippinensis</i>					
Foot rot <i>Fusarium moniliforme</i>	Rice	1930	South East Asia	---	---
Leaf spot <i>Phyllachora sorghi</i>	Sorghum	1934	South Africa	Tamil Nadu	Tamil Nadu
Powdery mildew of Rubber <i>Oidium heveae</i>	Rubber	1938	Malaysia	Kerala	Kerala, Tamil Nadu, North East India
Black shank <i>Phytophthora parasitica</i> var. <i>nicotianae</i>	Tobacco	1938	Dutch, East Indies	---	---
Canker <i>Sphaeropsis malorum</i>	Apple	1943	Australia	Karnataka	Karnataka
Potato Wart <i>Synchytrium endobioticum</i>	Potato	1953	Netherlands	Himachal Pradesh	Himachal Pradesh, Uttar Pradesh, Sikkim, West Bengal
Downy mildew <i>Plasmopara halstedii</i>	Sunflower	1987	America		Andhra Pradesh, Maharashtra, Punjab, Madhra Pradesh, Karnataka
Bacteria:					
Crown gall <i>Agrobacterium tumefaciens</i>	Apple / Pear	1940	England	Himachal Pradesh	Himachal Pradesh, West Bengal
Hairy Root <i>Agrobacterium rhizogenes</i>	Apple	1940	England	Himachal Pradesh	Himachal Pradesh
Leaf blight <i>Xanthomonas campestris</i> pv. <i>dieffenbachiae</i>	Anthurium	1996	Netherlands	Karnataka	Karnataka
Viruses & Viroids:					
Bunchy top of Banana	Banana	1940	Sri Lanka	Tamil Nadu	Kerala, Tamil Nadu, Assam
Nematodes:					
Cyst nematodes <i>Globodera pallida</i> <i>Globodera rostochiensis</i>	Potato	1961	England	Nilgiri Dist. (Tamil Nadu)	Tamil Nadu, Kerala
Weeds:					
Water hyacinth <i>Eichhornia crassipes</i>	---	1914-1916	Brazil	---	All over India
Lantana <i>Lantana camara</i>	Potato	1809	Central America	---	All over India
Parthenium	Wheat	1951	Central &	---	All over India

<i>Parthenium hysterophorus</i>			South America		
Goat's head <i>Acanthospermum hispidum</i>	---	1946	Central America / Northern Brazil	---	Andhra Pradesh, Gujarat, Karnataka, Tamil Nadu
Mexicon Poppy <i>Argemone mexicana</i>	---	17 th or 18 th Century	Mexico & Central America	---	Andhra Pradesh, Gujarat, Madhya Pradesh, Uttar Pradesh
<i>Chromolaena odorata</i>	---	---	---	---	All over India
<i>Euphorbia odoratum</i>	---	1845	Jamaica	---	---
Mile-a-minute <i>Mikania micrantha</i>	---	---	---	---	Distribution in Kerala
<i>Phalaris minor</i>	---	1961	Mexico	---	Bihar, Delhi, J&K Punjab, Haryana, Maharashtra, Meghalaya, Uttar Pradesh, West Bengal
Kariba weed <i>Salvinia molesta</i>	---	1955 – 1958	South America	---	All over India
Others:					
Giant African Snail <i>Achatina fulica</i>	Vegetables	1847	East Africa	West Bengal	Bihar, Orissa, Assam, Madhya Pradesh, Maharashtra, Kerala, Tamil Nadu, Karnataka

TABLE 3: LIST OF PESTS COVERED UNDER DOMESTIC QUARANTINE REGULATIONS:

Pest/ Disease	Notification No. and Date	Host Plant Material	Restricted		Requirement
			From	To	
1. Fluted Scale <i>(Icerya purchasi)</i>	(i) 22-1/46-PPS Dt: 16.2.1946 (ii) 3-5(1)/46-PPS Dt: 27.2.1948 & 27.12.1948	Many host plant species	Mysore (Karnataka), Chennai (Tamil Nadu) & Kerala State	To any other State or place	Transport of the host plant material of this pest is permitted only with a certificate of freedom issued by the Director of Agriculture. Movement of propagating plant material is prohibited except by a certificate issued by

					authorized Entomologist /Plant Pathologist of State
2. San Jose Scale (<i>Aspidiotus perniciosus</i>)	6-7/52-Dte. I Dt .5.2.1953	Many host plant species	Punjab, UP, Chennai (Tamil Nadu), West Bengal, Assam, Orissa, Himachal Pradesh, Jammu & Kashmir States	Any other part of India	Movement of Plant material including packaging & wrapping material likely to carry this pest is prohibited unless accompanied by a certificate issued by authorized Entomologist/ Plant Pathologist of State
3. Banana Bunchy Top (virus)	6-5/59-PPS Dt: 25.9.1959	Banana planting material	Assam, Kerala, Orissa, Tamil Nadu & W. Bengal States	Any other State & UT	Complete prohibition of transport of banana planting material
4. Banana Mosaic virus	6-1/61-PPS Dt:11.4.1961	Banana plants and plant material	Maharashtra & Gujarat States	Any other State & UT	Complete prohibition of transport of banana plants and packing material
5. Potato Wart (<i>Synchytrium endobioticum</i>)	6-11/59-PPS Dt. 8.10.1959	Potato	West Bengal	Any other State & UT	Movement of Potato prohibited.
	6-7/62-PPS Dt.10.5.1963	Potato	Nepal	West Bengal (Transit)	Transit Permit issued by PPA.
	8-26/75-PPS Dt. 14.6.1976	Potato	Nepal	West Bengal (Transit)	Phytosanitary Certificate with additional declarations
	8-26/75-PPS Dt: 31.10.1977	Potato	Nepal	West Bengal (Transit)	Same as above
	GSR 451(E) Dt: 5.8.1997	Potato	Darjeeling District of W. Bengal	Any other State or place in India	Transport or export of potato tubers prohibited.
6. Apple Scab (<i>Venturia inaequalis</i>)	8-21/74-PPS Dt: 28.8.1978	Apple planting material	Jammu & Kashmir	Any other State	Transport of planting material prohibited.
	8-13/77-PPS Dt: 12.12.1977	Apple planting material	Himachal Pradesh	Any other State	Export of planting material prohibited.
	NIC 20/76 Dt. 28.12.1978	Apple planting material	Himachal Pradesh		Movement restricted within H.P.
7. Codling Moth (<i>Carpocapsa pomonella</i>)	SRO.666 Dt. 3.12.77	Apple & Walnut powder	Ladakh District	Any other area in J&K	Movement prohibited.

		including fruits			
8. Potato Cyst Nematodes (<i>Globodera rostochiensis</i> & <i>G. pallida</i>)	8-18/82-PPS Dt. 18.2.1983	Potato	Tamil Nadu	Any other State & UT	Movement of seed potato prohibited. Movement of table potato permitted if accompanied with Special Permit.
9. Coffee Berry Borer (<i>Hypothenemus hampei</i>)	S.O. 843 (E) Dt. 18.11.1992	Coffee seeds/plants/Powder	Nilagiri District (Tamil Nadu), Kodagu Dist. (Karna-taka) & Wyanad Dist. (Kerala)	Any other parts of the Indian Union	Movement of coffee seeds, plants and powder is prohibited.

11.8 KEY WORDS

Key-Term	Definition
Article	: Any kind of movable property including any goods and stores consigned from one party to another as a shipment and covered by a bill of entry of customs, shipping or airway bill and/ or invoice in the course of international trade.
Germplasm	: Plants intended for use in breeding or conservation programmes.
Import	: An act of bringing into any part or place of territory of Republic of India any kind of seed, plant or plant product and other regulated article from a place outside India either by sea, land, air or across any customs frontier.
Import permit	: An official document authorizing importation of a consignment in accordance with specified phytosanitary requirements.
Pathway	: Any means that allows the entry or spread of a pest.
Pest	: Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants and plant products.
Pest Risk Analysis	: The process of evaluating biological or other scientific and economic evidence to determine whether a pest should be regulated and strength of any phytosanitary measures to be taken against it.
Phytosanitary Certificate	: A certificate issued in the model format prescribed under the International Plant Protection Convention

		of the Food & Agricultural Organization and issued by an authorized officer at the country of origin of consignment or re-export.
Phytosanitary Measure	:	Any legislation, regulation or official procedure having the purpose to prevent the introduction and / or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests.
Plant	:	Living plants and parts thereof including seed and germplasm.
Plant product	:	Un-manufactured material of plant origin including grain and those manufactured products that, by their nature or that of their processing, may create risk for the introduction and spread of a pest.
Plant Quarantine	:	All activities designed to prevent the introduction and/ or spread of quarantine pests or to ensure their official control.
Point of entry	:	Airport, Seaport or land border point officially designated for the importation of consignments, and / or entrance of passengers.
Quarantine	:	Official confinement of regulated articles for observation and research or for further inspection, testing and / or treatment.
Quarantine Pest	:	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.

11.9 SOME USEFUL BOOK

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- 7) Reddy, O.R., Sathyanarayana, N., Vani, S., Babu, D.V.N. and Latha, S. 1996. Virus disease of Oil palm seedlings and its management. In: *National Seminar on Oil palm production and processing*. 13 –14 February 1996, Mysore, Karnataka, India.28 –31.
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- 10) www.dahd.nic.in and www.plantquarantineindia.org

11.9 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

- 1) Destructive Insects and Pests Act 1914 provide for legal frame work for plant quarantine and Livestock importation Act 1898 for animal quarantine
- 2) Plant and animal quarantine activities are under the administrative control of Department of Agriculture & Cooperation and Department of Animal Husbandry respectively under the Ministry of Agriculture, Government of India
- 3) Quarantine is essential to any country to prevent entry of exotic pests and diseases. The importance is growing due to increased trade in agri-commodities
- 4) Sanitary and Phytosanitary measures (SPS) under the WTO provides the basis for international standards for trade of agri-commodities through plant and animal quarantine.

Where is Question?