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Role and history of plant quarantine in India- A review

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Abstract

Plant Quarantine Unit is to prevent the introduction of destructive plant pests, soil and diseases of plants from other countries. Plant Quarantine regulations are promulgated by the national and the state governments to prevent the introduction and spread of harmful pests and pathogens. Protection of the plant and plant products by quarantine however only become the governments at the turn of this century, following a series of catastrophic pest and diseases epidemics in different parts of the world. There is considerable cooperation between various countries, so that exporting country may furnish a certificate to the importing country which clears products or the importing country may maintain inspectors to examine the product before it leaves the country of its origin. The quarantine measures are of almost relevance to a country like India whose economy is largely Agriculture based.

Keywords: Plant Quarantine, Insect, Pest, India, Pathogen

Introduction

The role of the Plant Quarantine Unit is to prevent the introduction of destructive plant pests, soil and diseases of plants from other countries. The term Quarantine as French word literally means 40 day period. Quarantine can be defined “as a legal restriction to prevent the entrance and establishment of a plant disease or insect pest in an area where the pest or disease dose not exist”. In India plant quarantine is regulated under the destructive insect and pest act, 1914 (Reddy, 2010) [12]. Plant Quarantine regulations are promulgated by the national and the state governments to prevent the introduction and spread of harmful pests and pathogens. Protection of the plant and plant products by quarantine however only become the governments at the turn of this century, following a series of catastrophic pest and diseases epidemics in different parts of the world (Rai *et al.*, 2014) [10]. In addition to endemic problems there are many crop pests which are entered India from other countries Table-1 because in earlier years India did not have an effective control measure (Plant Quarantine) system to stop the introduction of exotic pests, diseases and weeds.

There is considerable cooperation between various countries, so that exporting country may furnish a certificate to the importing country which clears products or the importing country may maintain inspectors to examine the product before it leaves the country of its origin (Kahn, 1977 and 1983) [5, 6]. Crafts and Robbins (1962) [3] emphasized the importance of regulatory control of seeds, plant parts and seed certification programme to control weeds, diseases, nematodes and insects. The internationally accepted methods require Pest Risk Analysis (PRA) as a defensive method (Rajak *et al.*, 1999) [11]. The most satisfactory control programme for all diseases and pests is the prevention of their introduction into an area where they do not exist (Van Gundy, 1972) [15]. Quarantine programmes are the first line of defence in plant protection and they should be encouraged in every way possible in every country (Webster, 1985) [16]. Some of the examples of pests and diseases introduced on articles imposed from foreign countries have been mentioned in Table 2. In a survey of pests named in quarantine regulation in 125 countries, 614 were species of insects and mites (Kahn, 1983) [6]. Cottony cushion scale, woolly aphid, San Jose scale, golden cyst nematode of potatoes, the giant African snail are some exotic pest introduced into our country and cause extensive damage. In view of increases in quantum of import and export of plant commodities during the recent years, there is a distinct possibility of moving insect pests and diseases from their original native habitation to new location. One of the methods of crop protection is to excludes

The pests from entering in to new area. The method of exclusion of the pests is enforced through certain legal measures commonly known as Quarantine. The Plant Quarantine Unit provides the first line of defence in pest surveillance that is, preventing the entry of pest into India. It protects India' borders from the invasion of pests and diseases by the issuing of import permits, inspection of import/export cargo at ports of entry, seizures of import/export cargo and the execution of post-entry inspections. Exports are inspected and certified (in accordance with the requisite conditions of entry stated on the import permit) in an effort to prevent the spread of plant pests. Import permits (outlining the conditions to be met) are granted on a case-by-case basis. This unit is also involved in the surveillance for early detection of any plant pests or disease that may have entered the island illegally. The challenge for all disciplines of agriculture is to increase production and improve quality of produce. This is applicable to the discipline of plant protection as well. Now with the liberalization in trade over the years, movement of agricultural commodities has taken place a lot. The responsibility of plant protection also includes addressing phytosanitary issues concerning trade. In the past many diseases are responsible for food scarcities including famines. In addition to endemic problems there are many crop pests which are entered India from other countries.

History of Plant Quarantine in India

The quarantine measures are of almost relevance to a country

like India whose economy is largely Agriculture based. The awareness to quarantine measures in India started in early 20th century when the Indian Government in 1906, ordered compulsory fumigation of imported cotton bales to prevent the introduction of the dreaded Mexican cotton boll weevil (*Antonymous grandis*). On February 3, 1914 Comprehensive Plant Quarantine Act, known as Destructive Insects and Pests Act, (DIP Act) become operative. Over the years the DIP Act was revised and amended several times. However it needs to be periodically reviewed and amended to meet the growing requirements of liberalized trade under the WTO.

In 1946, the Directorate of Plant Protection, Quarantine and Storage, under the ministry of Food and Agriculture were set up. In 1946, Plant quarantine activity started with the initiation of plant introduction scheme in the Botany Division at Indian Agricultural Research Institute (IARI) New Delhi. In October 1949, the Directorate started its quarantine activities at Bombay seaport. On December 25, 1951 the first plant Quarantine and Fumigation station in India was formally inaugurated. In August, 1976 the National Bureau of Plant Genetic Resource (NBPGR) was created. In 1978, the Division of Plant Quarantine was created with Entomology, Plant Pathology and Nematology sections. In October, 1988, the Plants, Fruits and seeds (Regulation of Import into India) order, 1989 popularly known as PFS order came into force.

Table 1: Examples of Pests and Diseases introduced in India from other countries

S.No.	Pests	Year of introduction	Native Place
1	Coffee rust	1879	Sri Lanka
2	Late blight of potato	1883	England
3	Flag smut of wheat (<i>Urocystis tritici</i>)	1906	Australia
4	Downey mildew of grapes	1910	Europe
5	Rust of chrysanthemum (<i>Puccinia carthami</i>)	1904	Japan/Europe
6	Downey mildew of cucurbits (<i>P. cubensis</i>)	1918	Srilanka
7	Downey mildew of maize (<i>S. philippinensis</i>)	1912	Java
8	Foot rot of Rice (<i>Fusarium moniliforme</i>)	1930	South East Asia
9	Black rot of crucifers (<i>X. campestris</i>)	1929	Java
10	Leaf spot of sorghum	1934	South Africa
11	Powdery mildew of rubber (<i>Oidium heveae</i>)	1938	Malaya
12	Blank Shank of Tobacco (<i>P. nicotianae</i>)	1938	Holland
13	Fire blight of pear	1940	England
14	Crown gall of Apple/pear (<i>A. tumefaciens</i>)	1940	England
15	Bunchy top virus	1940	Srilanka
16	Canker of apple (<i>Sphaeropsis spp.</i>)	1943	Australia
17	Wart of potato (<i>Synchytrium endobioticum</i>)	1953	Netherlands
18	Bacterial blight of paddy (<i>X. oryzae</i>)	1959	Philippine
19	Golden Nematode of potato	1961	Europe
20	San Jose scale of apple	1900	Italy
21	Woolly aphid of apple	1928	Australia
22	Sunflower downey mildew	1985	Australia

Table 2: Introduced pests and diseases

S. No.	Name of the pest/diseases	Year	From	To
1	Grape phylloxera (<i>Phylloxera vitifoliae</i>)	1860	USA	France
2	Mexican boll weevil (<i>Anthonomus grandis</i>)	1892	Mexico or central USA	America
3	Pink bollworm (<i>Pectinophora gossypiella</i>)	1892	India	World
4	European corn borer (<i>Ostrinia nubilalis</i>)	1916	Italy	North America
5	Downy mildew of grape (<i>Plasmopara viticola</i>)	-	USA	France
6	Blight disease of chestnut (<i>Endothia parasitica</i>)	1904	Europe	USA
7	Coffee rust (<i>Hemilia vastatrix</i>)	1896	Sri Lanka	World
8	Colorado potato beetle (<i>Leptinotarsa decemlineata</i>)	During 1st world war	USA	France
Pests and diseases introduced to India				
1	San Jose scale (<i>Quadraspidiotus perniciosus</i>)	1879	China	India
2	Potato tuber moth (<i>Phthorimaea operculella</i>)	1900	Italy	India
3	Woolly apple aphid (<i>Eriosoma lanigerum</i>)	1909	England	India
4	Cottony cushion scale (<i>Icerya purchasi</i>)	1920	Australia	India
5	Leaf rust of coffee (<i>Hemilia vastatrix</i>)	1876	Srilanka	India
6	Fire blight of apple and pear (<i>Erwinia amylovora</i>)	1940	England	India
7	Smut of wheat (<i>Urocystis tritici</i>)	-	Australia	India
8	Wart of potato (<i>Synchytrium endobioticum</i>)	1952	Holland	India
9	Golden nematode of potato (<i>Heterodera rostochiensis</i>)	-	Western Europe	India
10	Onion smut (<i>Urocystis cepulae</i>)	-	India	

(Kothekar, 1970; Mathys and Baker, 1980)^[7, 8]

Role of Plant Quarantine in India

Plant quarantine activities in India are carried out under the Destructive Insects and Pests Act (DIP Act) of 1914 as amended from time to time, prohibiting the import of plants and plant material, insects, fungi and weeds to India from foreign countries (Dent, 1991)^[4]. Rules and regulations have been made prohibiting the movement of certain diseased and pest infested materials from one stage to another in India. This comes under domestic quarantines. Seed was not covered under the DIP Act until 1984, when the Government of India brought forward a comprehensive Plant, Fruits and seeds order, 1984 which came into force in June 1989 (Anonymous, 1989)^[1]. With a view to provide the farmers the best planting materials available in the world for maximizing productivity per unit area and to encourage the private seed industry in India, the government of India announced a new policy on seed development in September 1988. The new policy covers the import of seeds/planting materials of wheat, paddy, coarse cereals, oilseeds, pulses, vegetables, flowers, ornamentals and fruit crops, procedures for their import and the related plant quarantine requirements in respect to the provisions of the new seed policy, the Government of India brought forward through Gazette Notification, the updated Plants, Fruits and Seeds (Regulation of Import into India) order, 1989 (Anonymous, 1989)^[1]. In this Act, provisions were also made for the state Governments to pass their own legislation for adopting remedial measures. Thus the East Punjab Agricultural Pest, Diseases and Noxious Weed Act was passed in 1949. Other states have passed similar legislations. According to the provision of the East Punjab Agricultural Pests, Diseases and Noxious Weeds Act, 1949 the state Government could enforce, when necessary, control measures for the eradication of pests, diseases or weeds, such as locust and grasshopper, hairy caterpillars, rats, Pyrilla and Gurdaspur borer of sugarcane, ergot of pearl-millet, water hyacinth (*Eichornia crassipes*) and other weeds (Atwal and Dhaliwal, 1986)^[2]. The DIP Act empowers the central Government to make rules for regulating the import of seeds/planting materials into India and also the movement of the materials from one state to another within the country. The state Governments are also empowered to enact rules/regulations to regulate the movement of materials from one region/area to another within a state.

Pesticide Legislation in India

Two important central legislations concerned with pesticides are (1) The Insecticides Act, 1968 and the Insecticides Rules of 1917 framed under the 1968 Act (2) The Prevention of Food Adulteration Act of 1954 and the Prevention of Food Adulteration Rules, 1955 framed under the 1954 Act (Atwal and Dhaliwal, 1986; Reddy and Joshi, 1992)^[13, 2]. The regulatory or legislative measures of India fall under two categories: (1) Those aiming at the prevention of introduction of exotic pests and diseases into the country from abroad or their dissemination from one State or Union Territory to another and (2) Suppression or prevention of spread of pests (including weeds) and diseases in localized areas within the State/ Union territory. The former derives its authority from the Destructive Insects and Pests Act 1914 of Central Govt. and the latter from Agricultural Pests and Diseases Acts of the various states (Mehta and Verma, 1968)^[9].

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