Importance of Plant Parasitic Nematodes in International Trade and Quarantine

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ABSTRACT

Plant-parasitic nematodes are microscopic roundworms that cause significant damage to agricultural and horticultural crops worldwide. These covert pests cause significant financial losses by lowering crop quality, yield, and market value. With the rapid growth of international trade in plants, seeds, bulbs, and other planting materials, the risk of spreading harmful nematode species across borders has increased considerably, Invasive nematodes can spread quickly, endanger local crops, and become challenging and expensive to control once they are introduced into a new area. As a result, plant quarantine is essential to stopping their introduction and spread. Prior to import or export, plant materials must be inspected, tested, certified and treated in accordance with quarantine rules. Effective quarantine policies support safe international trade, preserve biodiversity, and safeguard domestic agriculture. Increased awareness, advanced diagnostic techniques, and strong international cooperation are essential for managing nematode risks and ensuring global food security, and sustainable agricultural development all depend on increased awareness, sophisticated diagnostic methods, and robust international cooperation.

INTRODUCTION

Numerous economically significant crops have been found to be attacked by insect pests and other microbes. These diseases and pests significantly lower both the quantity and quality of the food production. Among these, one of the damaging

pests that significantly reduces yield is plant-parasitic nematodes. There are more than 4100 known species of plant-parasitic nematodes that are widely distributed and seriously reduce crop yields (Hockland *et al*. 2006). The total amount of nematode damage is probably underestimated because many growers, especially in developing nation, are ignorant of the existence of PPNs. Damage from PPNs has been estimated to be between $80 billion and $157 billion annually. In addition, PPN management practices differ between countries, depending on availability of nematicides, resistant varieties, and expertise in PPN management (Sasser *et al*. 1998).

The majority of nations are currently paying more attention to quarantine examination of imported material for nematode infestation detection than they did in the past due to the identification of multiple plant parasitic nematodes as damaging crop pests. The European union has harmonised its phytosanitary laws, which currently govern about 300 plant pests (Schrader *et al*. 2003). Given the vast amounts and diversity of plants and planting materials (seeds, bulbs, corms, suckers, tubers, rhizomes, rooted plants, nursery stock etc.) that have been imported into India in recent years, it is now essential to evaluate the country's plant quarantine practices with regard to nematodes.

Importance of Plant quarantine measures:

PPN quarantine measures are crucial because alternative management strategies, like chemical control, might be more expensive and challenging to execute without causing other negative consequences.

- Even if there is a nematode species in our nation, there is always a risk that new races or pathotypes will be introduced. Therefore, the introduction of a new species could undo years of effort on the part of plant breeders to create varieties that are resistant to local groups. This finding clearly implies that entry and spread of certain nematode species and races can be prevented by implementing stringent quarantine.
- There are several different ways that plant parasitic nematodes can survive and spread.
- During quarantine inspections, the occurrence of PPN might also serve as a bio-indicator for shipments that may contain other diseases and does not coincide with the phytosanitary standards of plants produced in sterile settings.

International cooperation in plant quarantine:

More than 50 signatory nations including India, are required by the 1951 International Plant Protection Convention (IPPC) to set up a quarantine organisation and to publish and report to the FAO any pest issues that have global ramifications. FAO sponsored the 1956 Plant Protection Agreement for South-east Asia and the Pacific. The Asia and Pacific Plant Protection Commission (APPC) is the name of the organisation.

The members are bond to:

(i) A formal examination of the nurseries and developing plants

(ii) Examining abroad shipments

(iii) Disinfecting and destroying them

(iv) Issuing phytosanitary certificates

(v) Forming of a National Quarantine Organization

According to the International Plant Pest Convention, a quarantine pest is one that is either present but not widely disseminated and under government control, or it is a pest of potential economic value to the region

endangered thus and not yet present there (IPPC 1997). It is possible to regulate organisms that fit this description.

List of plant parasitic nematodes of quarantine significance:

The IPPC's guildlines are used by nations to create their lists of regulated pests. Each country had a different list of PPN species under quarantine. There are regulations carried out in 129 countries, 46 nematode species have been cited, out of which the ten most commonly reported plant parasitic nematode species are: *Globodera rostochiensis, Ditylenchus dipsaci, Heterodera schachtii, Ditylenchus angustus, Aphelenchoides fragariae, Ditylenchus destructor, Radopholus similis, Meloidogyne javanica, Aphelenchoides ritzemabosi and Aphelenchoides besseyi.* (Kahn *et al*. 1983).

Domestic quarantine law in India:

The first law in India, known as the Destructive Insects and Pests Act (DIPA), 1914, was passed to control the release and introduction of any materials that might harbour pathogens or pests. Nematodes are covered by the legislation, which gives the PPA the authority to take appropriate action to prevent the import of potentially dangerous foreign nematodes. In order to comply with the FAO Plant Protection Convention of 1951, DPPQ&S operates a network of 26 quarantine stations across the nation, including seven on land borders with adjacent nations, ten at airports, and nine at key seaports.

Under the Madras Agricultural Pests and Disease Act, 1919, domestic quarantine was put in place to prevent the transportation of seed potatoes to other regions of the nation following the first reliable report on the potato cyst nematode, *Globodera rostochiensis*, from the Nilgiris by FGW Jones in 1961. The DIP Act mentions the name golden nematode (*Globodera rostochiensis) and red ring nematode (Rhadinaphelenchus cocophilus).* The Government of India's main concerns with plant quarantine are reflected in the creation of the new Plant Quarantine Order, 2003.

CONCLUSION:

Crop losses can be efficiently and economically avoided by implementing quarantine measures against known destructive plant parasitic nematodes. One of the biggest obstacles to adding races to the list of regulated pests is racial differentiation. By stopping the introduction and spread of exotic nematodes and increasing crop productivity, plant quarantine performs a national service. However, only by the consistent support of all administrators, the public, farm workers, Research scientists, communication media, customs, and others could such endeavours be successful.

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