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Legislative and Cultural Methods Employed in IPM

(*Praveen Khan[1], Manoj Kumar Jangid[2], Rinku Fageriya[1] and Arun Rajoriya[3])
[1]Department of Soil Science, Bundelkhand University, Jhansi, Uttar Pradesh
[2]Department of Horticulture, Doon Group of Colleges, Saharanpur, Uttar Pradesh
[3]Department of Agronomy, Aligarh Muslim University (AMU), Aligarh, Uttar Pradesh
*Corresponding Author's email: parveenkhan0711@gmail.com

In early days there were no restrictions on the transport of plants and animals from one country to another, because the danger involved in it was neither realized nor appreciated. This resulted in introduction of many insect, mite and nematode pests into the countries where they were not known to occur earlier from the ones where they were known to be present. In many countries many of the dangerous pests have frequently been found to be foreign pests and they inflict greater damage than the indigenous ones. Cottony cushion scale, woolly aphis, San Jose scale, golden cyst nematode of potatoes and the giant African snail are some of the exotic pests which have been introduced into our country. Legislation is also required for stopping the accidental entry, from outside the country, of certain pests, which may not be present in that country. The importance of imposing restrictions on the movement of pest-infested plants or plant infested material from one country to another was realized when the grape Phylloxera got introduced into France from America and the San Jose scale spread into U.S.A. in the later part of the 19th century and caused severe damage.

Categories of Legislative Control

The first quarantine act in U.S.A. came into operation in 1905. The legislative measures in force now in different countries can be grouped into the following five categories: (i) Legislation to prevent the introduction of foreign pests, diseases and weeds. (ii) Legislation to prevent the spread of already established pests, diseases and pests within the country or within a particular State. (iii) Legislation for notified campaigns of control against pests i.e. legislation to enforce upon farmers the application of effective control measures to prevent damage by already established pests, diseases and weeds. (iv) Legislation to prevent the adulteration, misbranding and mishandling of insecticides or other devices used for the control of pests and to determine their permissible residue tolerance in food stuffs. (v) Legislation to regulate the activities of men engaged in pest control operations and the application of hazardous insecticides.

Legislative Control in India

The first Act in this country was passed in 1906 under the Sea Customs Act of 1878 and regulations) can limit the spread of pests into to stop the entry of the Mexican Cotton boll weevil. It was followed by the present areas not currently infested. Destructive Insects and Pests Act passed on 3rd February 1914 at the instigation of the Bombay Chamber of Commerce. Thus, provisions were made for preventing the entry of foreign insect pests, like the American boll weevil and others that might be harbored in agricultural products. According to various amendments of the Government of India Act, 1914, provisions were made for adopting control measures against local and exotic pests in centrally administered

territories and States. Before control measures could be adopted by the State, it was considered necessary to:

(1) Declare the organism to be injurious,
(2) Place the infested area under quarantine,
(3) Ensure that preventive and remedial measures were prescribed.

Under this act, provisions were also made for the state governments to pass their own legislation for adopting remedial measures. Thus, the Madras Agricultural Pests and Diseases Act was passed in 1919 and perhaps this was the first state to enact such an act in the country. The East Punjab Agricultural Pests, Diseases and Noxious Weeds Act was passed in 1949. Other States have also passed similar legislation.

In India, at present two categories of regulatory measures are in operation for control of pests, diseases and weeds. They are:

(1) Legislative measures through Plant Quarantine, and
(2) Legislative measures through State Agricultural Pests and Diseases Act.

In the first category, regulatory measures are aimed at preventing the introduction of exotic pests and diseases into the country from abroad or their spread from one State or Union Territory to another; while the second one pertains to suppression or prevention of spread of pests (including weeds) and diseases in localized areas within a State union Territory.

Plant Quarantine programs in most countries usually have three components:

(1) Exclusion of pests and pathogens of quarantine and economic importance or the reduction of the risk to an acceptable level in moving such hazardous organisms,
(2) Containment, suppression, and/or eradication of pests and pathogens,
(3) Assistance to exporters of plant products to meet the regulatory requirements of the importing countries.

International Regulations

International laws regulating transport of non-indigenous species are weak because pest regulation must take place in several countries simultaneously. The International Plant Protection Convention (IPPC) was established in 1951 to foster the necessary cooperation. A major function of the IPPC is to establish international phytosanitary principles that are acceptable to the participating countries. In 1995, World Trade Organization (WTO) enacted an agreement on the Application of Sanitary and Phytosanitary measures. Many neighboring countries with similar interests and needs in relation to plant quarantine and phytosanitary procedures are organized into regional commissions.

Regional Plant Protection Organizations

Asia and Pacific Plant Protection Commission (APPPC),
Caribbean Plant Protection Commission (CPPC),
European and Mediterranean Plant Protection Organization (EPPO),
Inter-African Phytosanitary council (IAPSC),
North American Plant Protection Organization (NAPPO),
Pacific Plant Protection Organization (PPPO).

Culture method: Cultural control in integrated management decreases infestations through suitable agronomic practice**s.** Cultural IPM methods are more effective when crops are healthy. This is why regular EOSDA Crop Monitoring in integrated management helps address the problem early and mitigate the upcoming negative consequences.

There are four main strategies for cultural control of pest insects:

1. Reduce and/or disrupt pest habitat in and around crop
2. Adjust crop planting to disrupt pest habitat and nutrition requirements
3. Divert pest population away from crop

4. Reduce yield loss from insect injury

Among others, IPM cultural methods include the following field management techniques:

- soil treatment;
- selection of suitable plants;
- crop rotation;
- interplanting or strip cropping;
- choice of planting dates;
- weed control;
- Use of trap plants.

Soil Treatment: Favourable soil conditions speed up plant growth, and vigorous crops are more resistant to infestations. In integrated pest management, soil testing helps understand if the field is suitable for the production of this or that crop, and then apply the lacking nutrients to ensure plant healthy growth. Adding organic matter and mulching encourages soil organisms' activity and boosts nutrient release. No-till practices help prevent soil erosion, contributing to sustainable farming. However, when tilling is necessary, it is recommended to conduct it in the fall to expose them to natural enemies and severe weather.

Selection of Suitable Plants: Healthy seedlings and seeds predetermine successful crop development, so it is important to choose pest-free planting material with strong roots. Certified seeds, visual inspection, and pre-sowing seed treatment help avoid the problem in the future. As part of an integrated pest management program, planting resistant or tolerant cultivars helps farmers to reduce yield losses. For example, a study attests to the resistance of White Satin F1, Samba F1, Afro F1, Nipomo F1, and Yellowstone cultivars to the hawthorn-carrot aphid. Stronger cultivars are bred traditionally or through genetic engineering.

Crop Rotation: Non-host crop sequences are not suitable for specific pest species. For example, rodents reduce grain yields, while birds and snails damage strawberries. If the habitat is not suitable and there are no required crops, pests will leave for more lucrative places. Thus, among other applications, crop rotation can be effectively used as an integrated pest management method.

Interplanting or Strip Cropping: Pests spread slower if rows of different crop types separate their host plants in intercropping or strip cropping, which is also used in the integrated pest management system. Conversely, infestations increase when plants of the same crop type or family grow together. Thus, cabbage pests may migrate to mustard, broccoli, and other brassicas, while potato beetles can harm growing potatoes, as well as tomatoes.

Use of Trap Plants: Planting trap plants in patches is another option for IPM intercropping. This integrated pest management method suggests attracting pests to specific plants and then controlling them with chemical or mechanical techniques. In particular, you can grow soyabean as trap crops for Japanese beetles. Radishes are also attractive for cabbage root maggots.

Choice of Planting Dates: In integrated pest management, favourable dates for sowing or planting make the crops the least subjected to pests or already strong enough to withstand infestations. For example, it is better to sow squash early (provided the soil temperature is warm enough) so that it can mature before pickleworm returns from the southern areas. At the same time, too early plantings may result in root rots due to excessive soil moisture after winter.

Weed Management: Weeds don't only reduce crops' access to nutrients but hamper their healthy development making them vulnerable to infestations. Furthermore, undesired vegetation may host pests. This is why weed control methods of IPM play a significant role in the integrated approach.

Nonetheless, flowering weeds can attract pollinators and other beneficial insects, so cutting them just after blooming but prior to seed formation will increase yields and prevent new generations of weeds.

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