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RECENT ADVANCES IN INTEGRATED MANAGEMENT OF VEGETABLE DISEASES

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Vegetables are a significant source of vitamins, minerals, and other nutrients. Due to their therapeutic and nutritional benefits for human health, vegetables are recognised in both developed and developing nations as a vital part of a balanced diet. Vegetable output is steadily increasing. China presently produces 237 million tonnes of veggies, placing it #1 in the world. Vegetable output in India has increased dramatically, placing it second in the world. More than 91 million tonnes of vegetables are produced nationwide. Despite this, vegetable productivity per unit area is quite poor. As a result, the current crop yields only meet about half of the dietary standard's 250–300 gm/day/adult requirement. Since vegetables are more succulent and nutrient-rich, they are more likely to get diseases, which results in substantial yield losses throughout the pre- and post-production phases. The primary causes of low output in vegetable crops are the high disease pressure from seedling through harvest, which is mostly brought on by fungus, bacteria, and viruses.

Management of Vegetable Diseases-An Over View

According to a review of the literature, vegetables produced either directly or through transplanted seedlings have a range of biotic, mesobiotic, and abiotic problems. Cultural practises, host resistance, chemical control, physical control, and biological control procedures are always advised as control measures. Different approaches have been suggested for managing various diseases, but a lot of them call for the use of pesticides, which raises concerns about economic hardship, insect resistance, and residual toxicity. Application of integrated disease management (IDM) seems to be the best course of action given the current situation's projected increases in output and decreases in pesticides' adverse effects.

Integrated Disease Management (IDM)

A desired approach to the selection, integration, and application of techniques on the basis of their predicted economic, ecological, and social effects is stated in the philosophy, principles, and purpose of IDM. The following parameters must be taken into account when establishing IDM schedules in order to reduce losses caused by disease to vegetables.

- Create a timetable that is cost-effective. Application costs and disease-related crop losses must be appropriately balanced in favour of growers.
- The schedule development was in line with the growers' production protection schedules.
- The established schedules must aim to control the majority of pest and disease problems in the targeted crop concurrently.
- In order to be effective, the IDM timetable for vegetables must be implemented as a community programme and/or cooperative programme.

Management of Vegetable Diseases: The Existing Technology

Prophylactic measures or host resistance may be used as control measures depending on the kind of vegetable diseases. Applying the exclusion, eradication, and protection principles would enable the application of the prophylaxis concept. Quarantine, inspection, certification, and seed treatment have all been suggested as exclusion strategies. It has been advised to utilise biological control, crop rotation, agricultural waste destruction, sanitation, and the removal of collateral and alternate hosts in order to achieve the eradication of inoculum. Those precautionary measures that operate as a barrier between the host and infections (no contact). Cultural procedures such planting techniques, sowing or transplanting times, balanced fertilisers, regulated irrigation, spraying of micronutrients, and the use of pesticides, fungicides, antibiotics, and nematicides, among others, are advised.The best technique for managing illnesses, in general, appears to be the utilisation of resistant genotypes. Introduction, selection, hybridization, mutation, biotechnological, and molecular techniques are employed to generate resistant genotypes. Due to the evaluation of novel biotypes, pathotypes, and races, the development and usage of resistant genotypes is a continual and never-ending process. As a matter of fact, the development of disease resistance in vegetables has not yet taken place, and grains and pulses have received attention in their stead.

Guide lines for Developing IDM

- Vegetables are distinct from cereals in that there is more time to implement management techniques because grains are only harvested once after seeding. However, because most vegetables are harvested several times at various phases of crop development, the application of control methods, particularly fungicide, is hampered by a lack of time and regard for safe periods.
- Vegetables are continually grown using intensive gardening techniques. Because of these activities, primary inoculum is more likely to survive, infect crops, and transmit secondary inoculum. The influence and impact of intensive farming on diseases must be the primary input in establishing any IDM programme to assure success.
- Vegetables are still raised on a limited basis in India. Beans and cucumbers are perennially cultivated close to the home, and because no preventative precaution is always taken, the crops represent a reservoir of disease inoculum. When creating the timetable, the main sources of inoculum must also be taken into account.
- The timetable developed must be simple to use and successful at the cooperative or community level.

Development of IDM Schedule for Diseases of Brinjal-An Example

The illness that affects brinjal is brought on by fungi, bacteria, viruses, phytoplasma, and nematodes. The most significant diseases, however, are Bacterial wilt, Root-knot, Phomopsisblight and fruit rot, Sclerotinia blight and fruit rot, Phomopsis blight and fruit rot, Alternaria leaf spot, and Cercospora leaf spot. The main inoculum of the diseases mentioned above can be found in/on seeds, soil, diseased crop debris, or both as facultative saprophytes. Schedule development must target both first and secondary inoculums since secondary inoculums created after infection spread by air, water, insect, and during cross-cultural interactions.

The Schedule

i. Raised nursery, with a raised solarized bed that preserves soil moisture and plant density.

ii. Refrain from applying a lot of nitrogen and frequent watering.

iii. Use healthy and certified seeds.

iv. Treat seed by physical and chemical means using heat or fungicide. Among fungicide, thiram, captan@ 0.25%, Carbendazim @ 0.1%, Apron @ 0.4%.

v. Destruction of crop debris, deep summer ploughing, organic amendment, crop rotation, date of sowing/transplanting to be used as per recommendation.

vi. While transplanting root treatment either with fungicide or bio-agent.

vii. Application of nematicide /fungicide/ for the control of inoculum existing in soil.

viii. Foliar application of required pesticides.

ix. Use of resistant/to tolerant varieties/ cultivars.

Conclusion

The disease affects plants through both biotic and abiotic ways and results in a considerable loss for the agricultural sector. The development of locally relevant techniques and solutions that are suitable for their particular farming systems and the integration of control elements that are both ecologically sound and easily accessible by them are crucial for the success and sustainability of IDM strategy, especially with resource-poor farmers. The successful implementation of IDM techniques continues to depend on the training and awareness-raising of farmers, disease survey teams, agricultural development officers, extension agents, and policymakers. All direct stakeholders, such as farmers, extension agents, and regional crop protection specialists, have to be conversant with the ecology, aetiology, and epidemiology of the major crop diseases. Farmers should get intensive training utilising participatory methods so they may gain the information they need to manage their own fields more effectively. This knowledge can then be translated into useful decision-making tools and effective control strategies.

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