A Better Alternative for Disease Management in Agricultural Crops by Using Plant Extract

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ABSTRACT

Diseases are unavoidable evil as they are omnipresent where ever crop is grown and managing them effectively and efficiently is foremost important thing. Managing the disease in a manner that it does not affect the environment and foreguard human health is most important. In the virtue of managing plant pathogens using plant extracts and bio agents against plant pathogens is very effective. Plant extracts are made in minimal cost by following a simple process so using them instead of chemical fungicides is advisable.

INTRODUCTION

Disease: A nightmare for the farmers! Disease may be defined as a deviation from the normal functioning of a plant. Disease is a two edged sword as it causes both qualitative and quantitative loss and thus increases the burden on farmers pocket as his income reduce due to lower produce & secondly he doesn't get enough pay as the quality of the produce is deteriorated due to post-harvest losses caused

by disease. About 20-30% loss (Bhagwat and Datar, 2014) occurs due to disease every year so minimising this loss is foremost important for increasing farmer income and ensuring global food security.

Disease are caused by various biotic, abiotic and mesobiotic factors. Biotic factors include fungi, bacteria, protozoa, spiroplasma, algae etc. and abiotic factors include climatic factors or nutritional deficiency. Virus comes under mesobiotic factors. Among all the disease causing factors fungi, bacteria and virus are responsible for causing most of the disease. A large number of plant pathogens are responsible for causing disease in our crops so managing them is a cumbersome process.

As of now use of chemical fungicides is first choice for every farmer as they are very effective in managing the disease. Their efficacy against the disease causing pathogen is very high so they are readily available and used extensively without considering the adverse effect of them on health of animals, humans and soil. Bioaccumulation and biomagnifications of these harmful chemical in animal body is responsible for the extinction of various species. Human health is also affected by these chemicals as they are present on food products and after consumption causes various harmful diseases like cancer. Due to persistent nature of fungicide they deteriorate the soil fertility status over the years and during rainfall are washed away affecting the water quality of the streams along with ground water as they leach down along with infiltrating water. To save us and our environment from the adverse affect of chemical fertilizers its need of the hour to shift towards eco-friendly management of the disease.

Eco-friendly management means employing those methods which do not harm the environment (Sales *et al*., 2012). In fulfilling our short term goals i.e. production, we are forgetting about the atrocities we will suffer in the coming future if we don't shift towards the eco-friendly management of disease. Eco-friendly management means using plant extracts and bio-agents against the disease causing pathogen as they don't harm the environment neither they have any persistent affect in soil & food. Bio-agents are antagonistic fungi or bacteria used against plant pathogens *viz.*, *Pseudomonas fluorescence, Bacillus subtilis, Trichoderma harzianum* etc. Bio-formulation of this bio-agent is as effective as chemical fungicides in managing the plant disease.

Botanicals are aqueous solution of plant extract which can be made from various plant parts like leafs, roots, rhizomes, cloves etc (Mamarabadi *et al*., 2018). These plant extracts can't control the disease but manages them upto 70-75% thus ensuring that the disease is under economical threshold level (Chaudhary *et al*., 2018). They are environment and budget friendly as the leafs of plants are readily available and can be prepared easily by following the steps mentioned below-

- Selection of plant part which have antimicrobial property.
- 100 grams of leaves are taken, washed thoroughly and sterilized with 1% sodium hypochloride.
- Crush 100 grams of leaves with 100 ml of water with the help of mixer grinder.
- The mixture is left for 3 days.
- The plant extract is filtered with the help of a muslin cloth.
- The filtrate is again filtered with the help of whatman no. 1 filter paper.
- Finally the plant extract is ready and can be used for spraying over crops.

Fig. Process of making of plant extract

Disease control using plant extracts

Various disease can be conntrolled by using plant extract some of them are mentioned below-

- Application of garlic extract against *Phytophthora infestans* casuing late blight of potato suppress the disease. It can also be cntrolled by oregano and tea extract.
- Basil leaf extarct is effective to suppress *Uromyces fabae* causing rust of pea.
- Leaf extract of *Azadirachta indica* & *Cannabis sativus* suppress germination of covered smut infected seeds.
- Powdery mildew of pea can be managed by foliar application of neem, garlic, ginger & onion.
- Extract of leaves of aloe-vera helps to manage powdery mildew of cucurbits.
- White rust can be controlled by application of leaf extract of neem, garlic, ginger and dhatura.
- 10% garlic extract effectively manages *Pyhtium aphanidermatum* causing damping off of seedlings.
- Neem & bel extract helps in managing black rot of crucifers.

Active ingredients of various plant extract are shown below in Table-1.

Table-1 List of active ingredient in different plant extracts.

Common Name	Scientific name	Active Ingredient
Chilli	*Capsicum annum*	Capsacin
Ginger	*Zingiber officinalli*	Gingerols, arcurcumene
Onion	*Allium cepa*	Oleic acid, tocopherol
Bael	*Aegle marmelos*	Aegeline, coumarin
Tulsi	*Ocimum sanctum*	Juvocimene-I,II & Ocimin
Giloy	*Tinospora cordifolia*	Gilosterol, Tinosporic
Turmeric	*Curcuma longa*	Curcumol, curcumin

CONCLUSION

Eco-friendly management of plant disease is best method for managing the plant pathogens instead of chemical fungicides as there are no harmnful effect of them. Efficacy of chemical fungicides are higher than plant extract (Khanzada and Shah, 2012) but since they have greater disadvantage its better to shift towards biocontrol. Plant extracts contain certain alkaloids, tannins, phenols and terpenes which manages the plant disease in a manner that it does not affect the environment.

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