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DEVELOPMENT OF MICROBIAL CONSORTIA AS A BIOCONTROL AGENT FOR EFFECTIVE MANAGEMENT OF FUNGAL DISEASE: NOVEL APPROACH.

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Abstract: greenhouse studies were embraced to evaluate the viability of chosen biocontrol specialists in blend with fungal disease against damping-off and shrink microbes of various crops. Pythiumsp and Fusariumsp were found in infected plants and soil samples to be the wilt pathogens that caused various plants crops to wilt. They were found to cause 50-85% seedling loss in plants crops in a pathogen city test carried out in a greenhouse. The biocontrol agents were tested for their ability to promote growth and prevent disease in a greenhouse setting. Seedling vigor, total biomass, disease incidence, and biocontrol efficiency were all higher when Azotobacter chroococcum, Bacillus megaterium, Pseudomonas fluorescens, Bacillus subtilis, and Trichoderma harzianum were utilized in combination.

Index Terms—: ***Index Terms*: microbial consortia, biocontrol agent, management, fungal disease, etc.**

I INTRODUCTION:

A microbial consortium or microbial community, is two or more bacterial or microbial groups living symbiotically. Consortiums can be endosymbiotic or ectosymbiotic, or occasionally may be both. Microbial co-cultures (consortia) are two or more interacting microbial populations that can be found in many diverse environmental niches.

Microbial consortia play a vital role in soil management and nutrient mobilization, in disease prevention and plant defense, in management of stress tolerance, in postharvest fruit management, and in overall ecosystem management. The National Cancer Institute's (NCI) Epidemiology and Genomics

Research Program (EGRP) defines a consortium as a group of scientists from multiple institutions who have agreed to participate in cooperative research efforts involving activities such as methods development and validation, pooling of information from.

Soil Drenching: AMC can be mixed with water @ 20 g/ lit and then applied near to the root zone on the 10th day after transplanting. Main field application; For the main field application of one acre of land, five kg of AMC can be mixed with 500 kg of FYM and applied near the root zone of standing crop.

The major forms used in microbial control are (a) liquid and gaseous chlorine and (b) hypochlorite. Treatment of water with chlorine destroys many pathogenic vegetative microorganisms without unduly affecting its taste.

Biological Control Agent (BCA) can be defined as the use of natural efficient strains of any microorganisms or modified organisms that reduce the incidence or severity of diseases caused by plant pathogens. It exhibits an antagonistic activity toward a particular phytopathogen (Beneduzi et al., 2012). The biocontrol agents protect plants from their natural enemies like parasites from predation, etc. They help in controlling the infestation of plant pests such as weeds, nematodes, insects, and mites. The biological control agents are specific to harmful organisms and do not kill useful organisms present in the soil. Microbial biological control agents (MBCAs) are applied to crops for biological control of plant pathogens where they act via a range of modes of action. Some MBCAs interact with plants by inducing resistance or priming plants without any direct interaction with the targeted pathogen.

The four major ways are by what has been called Augmentive Biological Control, Classical Biological Control (otherwise known as Inoculative Biological Control), Inundative Biological Control, and Manipulative Biological Control.

2. RELATED WORK:

They are Alternaria, Aspergillus, Candida, Fusarium, Penicillium, Pichia, Talaromyces, Trichoderma, and Verticillium. Trichoderma is the most prominent genus comprising 25 BCAs and they are widely used in controlling plant diseases caused by fungi. Most frequently species of Bacillus, Pseudomonas and Trichoderma are used for biological control of fungal pathogens. Among them, one of the fungal biocontrol agents used in this study is Trichoderma species. They are common saprophytic fungi found in almost any soil and rhizospheric microflora.

Fungicides are pesticides that kill or prevent the growth of fungi and their spores. They can be used to control fungi that damage plants, including rusts, mildews and blights. They might also be used to control mold and mildew in other settings.

Fungal biocontrol agents (BCAs) do not cause any harm to the environment, and they generally do not develop resistance in various types of insects, pests, weeds, and pathogens due to their complex mode of action. They have been proved to be an alternative against the undesirable use of chemical pesticides.

The principal attributes of an effective biological control agent are: efficient searching ability, high parasitism or predation rate, high reproductive potential, minimal handling time, ability to survive at low prey densities and ability to adapt to a wide range of environmental conditions.

3. MICROBIAL CONSORTIA AS A BIOCONTROL AGENT FOR EFFECTIVE MANAGEMENT OF FUNGAL DISEASES IN *GLYCINE MAX* L.

In vitro, thirty bacteria and six Trichoderma isolates were isolated from fertile agricultural soil and tested for their antagonistic activity against phytopathogens like Sclerotinia sclerotiorum and Macrophomina phaseolina. There were varying degrees of animosity between the various isolates. As biocontrol agents, the three most antagonistic bacteria, Pseudomonas aeruginosa (MBAA1), Bacillus cereus (MBAA2), and Bacillus amyloliquefaciens (MBAA3), as well as one fungus, Trichoderma citrinoviride (MBAAT), were chosen. The current review was embraced to foster a plant development elevating microbial consortium to decrease the sickness occurrence in Glycine max both under in vitro and in vivo conditions. Biocontrol properties like siderophore, ammonia, and enzymes like -1,3 glucanase, chitinase, and cellulase were more useful in consortia than in isolated strains. Plants treated with consortia and pathogen had a lower disease incidence ($p < 0.05$) than plants treated with a single antagonist and pathogen or a pathogen-infested control. When compared to Sclerotinia-infested control plants, which had a disease incidence of 97%, potted plants treated with S. sclerotiorum + MBAA1 + MBAAT had the greatest disease control, with a disease incidence of only 15.8%. Seed bacterised with MBAA1

+ MBAAT displayed improved seed germination of G. max up to 68% alongside resulting expansion in other plant development boundaries. In plants infected with M. phaseolina, seeds treated with MBAA1 + MBAAT showed a significant increase in the seedling vigour index (1863.2) and chlorophyll content (13.518 mg/g).

4. Identification and characterization of the fungal isolates

The isolates that were showing high incidence of disease from the pathogen city test were selected and were identified based on the growth pattern and the morphological characteristics on PDA plates and the structure of the conidiophores under light microscope (Singh and Srivastava, 1953; Nethravathi, 2001a).

5. Collection and maintenance of biocontrol agents and PGPR›s

The biocontrol agents collected from National Bureau of Agriculturally Important Insects (NBAII), Bangalore were as follows:

- Bacterial biocontrol agents: Bacillus subtilis and Pseudomonas fluorescens,
- Fungal biocontrol agents: Trichodermaviride, T. virens and T. harzianum.

The beneficial microorganisms: Azotobacter chroococcum and Bacillus megaterium collected from Department of Agricultural Microbiology.

6. Mass multiplication of *Trichoderma harzianum*

Five mm disc of the Tricoderma harziaum grown on PDA plates and was transferred to sterile potato dextrose broth aseptically and incubated at 27 ± 1ºC potato dextrose broth as a stationary culture at room temperature for eight days. After eight days. After incubation the mycelial mat

was separated, macerated using homogenizer and the fungal mass was obtained. The inoculum containing 7 x 105cfu/ml was added at the rate of 10 ml/kg of substrate.

7. CONCLUSION WORK:

In the present study, by combining well-characterized and compatible microorganisms, including bacteria and fungi, we demonstrated the potential of microbial consortia to effectively control fungal pathogens with different lifestyles through direct and plant-mediated disease suppression and using different application methods. Our findings pinpoint the design of synthetic microbial consortia for biocontrol of plant pathogens as a potential strategy to extend the functionality and versatility of microbial biological control.

The use of beneficial microorganisms for the biological control of plant diseases and pests has emerged as a viable alternative to chemical pesticides in agriculture. Traditionally, microbe-based biocontrol strategies for crop protection relied on the application of single microorganisms. However, the design of microbial consortia for improving the reliability of current biological control practices is now a major trend in biotechnology, and it is already being exploited commercially in the context of sustainable agriculture.

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