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Asian Journal of Plant Science and Research, 2022, 12(10)

ISSN : 2249-7412
CODEN (USA): AJPSKY

Effective Method for Eradicating Soil-Borne Plant Pathogens

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Received date: September 14, 2022, Manuscript No. AJPSKY-22-15327; **Editor assigned date:** September 16, 2022, PreQC No. AJPSKY-22-15327 (PQ); **Reviewed date:** September 28, 2022, QC No. AJPSKY-22-15327; **Revised date:** October 10, 2022, Manuscript No. AJPSKY-22-15327 (R); **Published date:** October 17, 2022, DOI: 10.36648/2249-7412.12.10.024

Citation: Martin L (2022) Effective Method for Eradicating Soil-Borne Plant Pathogens. Asian J Plant Sci Res Vol.12 No.10:024

Description

Tuber rot organisms produce a variety of extracellular enzymes and a host of metabolites that degrade cell wall polymers, resulting in maceration of parenchymatous tissues. This rotting is a major factor limiting the yams' postharvest life. According to research carried out in a number of different regions of the nation, diseases and pests in storage account for an annual loss of over 25% of the yield. According to between 20% and 39.5% of stored tubers may be lost to rot-causing organisms, while Bonire estimated microbial postharvest losses in yam at 40%. Because of these, yam production is significantly restricted by microbial tuber rot. The majority of these decays of sweet potato tubers are brought about by pathogenic growths organic entities have provoked examinations on taking advantage of pesticides of plant beginning for control of parasitic microorganisms. These plant-based pesticides are specific, biodegradable, inexpensive, readily available and safe for the environment. In light of this, the study focuses on the antimicrobial efficacy of a few specific plants.

Control of Parasitic Micro-organisms

To obtain pure pathogen cultures, fungal colonies that developed on the incubated plates were subcultured into brand-new, sterile, acidified PDA plates and incubated. For the purpose of characterization and pathogenicity testing, the purified isolates were stored in slants. The morphological characteristics and microscopic examination were noted and compared to previous research. Healthy yam tubers were washed four times with sterile distilled water before being rinsed in running tap water. After being rinsed once more with clean distilled water, the tubers were disinfected for 30 seconds with a solution of 5% sodium hypochlorite. It was allowed for the tubers to air dry. The healthy white yam tubers were drilled into with a flamed 5 mm cork borer. A similar system was utilized for the control with the exception of that sterile agar circles were utilized rather than the inoculum in the openings made in the tubers. The holes were sealed completely with petroleum jelly. Three replications of inoculated yam tubers were grown in a sterile environment at room temperature. After 14 days of incubation, the tubers were examined for signs of infection and disease development. The decayed tubers at first were compared to the infected tubers.

In the control experiments, 5 milliliters of sterile distilled water were substituted for the chemical fungicide and plant extracts in PDA. Masking tape was used to cover the inoculated Petri dishes before incubating them for 120 hours at room temperature. By measuring mycelia growth diameters along two diagonal lines previously drawn on the reverse side of each Petri dish to serve as a reference using a transparent ruler, radial growth of A. Flavours was then recorded every 24 hours for up to 120 hours after inoculation. The effectiveness of the chemical fungicide and the extract against the test fungus was demonstrated by the lack of growth on any of the plates. Before putting PDA into each plate, these were done. After that, sterilized Petri dishes containing 15 milliliters of the prepared medium and 5 milliliters each of plant extracts and chemical fungicide at varying concentrations were poured into Petri dishes containing the media separately, thoroughly mixed and allowed to solidify, the solidified medium was inoculated in the center at the intersection of the two parallel lines drawn at the plate's bottom. The inoculum consisted of five-millimeter-diameter mycelia discs taken from one-week-old fresh cultures of the test fungus grown on PDA plates.

Increased Crop Parameters

Adding certain abiotic factors (inducers) appears to boost disease resistance by indirectly encouraging indigenous populations of microorganisms that are good for plant growth and bad for pathogens. Adding chitin to the soil, for instance, has been shown to increase bio-control activity, stimulate the expression of plant defense proteins and be antagonistic to microorganisms. Plant protection might improve as a result of all of these effects. Bio-control agents were also tested in conjunction with SA and H_2O_2 amendment. After adjusting the required concentrations of the fungicides, autoclaved PDA medium was poured into sterilized 9 cm-diameter petri dishes gently rotated. Plates were then vaccinated at the middle by equivalent circle taken from seven-day-old pathogenic fungi cultures. Under greenhouse conditions, the effects of using fungicides on the incidence of lupine rotor and damping-off: In the greenhouse, this experiment was carried out in pots with sterilized clay soil and a diameter of 25 centimeters. A 5% formalin solution was used to sterilize the soil and the pots.

Chemical inducers tested in vitro effectively stopped pathogenic fungi from growing in mycelia. Our research in the greenhouse and the field demonstrated that lupine seed treatment with chemical inducers decreased pre- and post-emergence damping-off, root rot and healthy plant survival. The greatest increase in crop parameters was observed following seed treatment with chemical inducers. In conclusion, the application of the inducers that were tested as seed treatments resulted in a rise in crop parameters compared to control plants. By increasing their concentrations, the fungicides had a greater impact on the growth of the mycelia. Our research in the greenhouse and the field showed that treating lupine seeds with fungicides reduced the amount of pre- and post-emergence damping-off and root rot and increased the number of healthy plants that survived. Most of the time, seed treatment increased crop parameters. According to the findings of this study, using alternative bio-agents, chemical inducers and fungicides could be used as a safe and effective method for eradicating soil-borne plant pathogens, reducing environmental pollution and significantly increasing yield, protein and oil. Additionally, the emergence of pathogens that are resistant to fungicides, their high cost and the accumulation of these chemicals in the environment have rekindled interest in alternative methods. New compounds derived from plant sources have been the focus of research into alternative methods of disease control. It has been reported that foliar pathogens, soil-borne pathogens and food and grain storage fungi can be effectively treated with plant extracts and essential oils.