Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/13107
DOI URL: http://dx.doi.org/10.21474/IJAR01/13107

RESEARCH ARTICLE

TRICHODERMAVIRIDE CRUCIAL ROLE IN PLANTDEFENCE AND REPLACE THE CHEMICAL FUNGICIDE THAT HIGH HEALTH RISK TO FARMER LIFE

Yashpal

Manuscript Info

Manuscript History
Received: 05 May 2021
Final Accepted: 10 June 2021
Published: July 2021

Abstract

The plant-Trichoderma-pathogen triangle is a complexnet of several techniques. Trichoderma spp. are avirulent opportunistic plant symbionts. In addition to being a hitplant Symbioticorganisms. Trichoderma spp. additionally behave as a low cost, powerful and ecofriendly biocontrol agent. They can set themselves up in numerouspatho-systems, have minimum effectat the soil equilibrium and do now no longer impair beneficial organisms that make contributions to the manipulate of pathogens. This symbiotic affiliation in plant life results in the purchase of plant resistance to pathogens, improves developmental techniques and yields and promotes absorption of nutrient and fertilizer use efficiency. Among different biocontrol mechanisms, antibiosis, opposition and mycoparasitism are a number of the major capabilities through which microorganisms, including Thrichoderma, react to the presence of different aggressive pathogenic organisms, thereby stopping or obstructing their development. Stimulation of each systementails the biosynthesis of centered metabolites like plant increase regulators, enzymes, siderophores, antibiotics, etc. This evaluation summarizes the organic manipulate past time exerted by Trichoderma spp. and sheds mildat thecurrentdevelopment in pinpointing the ecological importance of Trichoderma on the biochemical and molecular stagewithinside the rhizosphere in addition to the blessings of symbiosis to the plant host in phrases of physiological and biochemical mechanisms. From an applicative factor of view, the prooffurnished herein strongly helps the opportunity to use Trichoderma as a safe, ecofriendly and powerful biocontrol agent for one-of-a-kind crop species.

Introduction:-

T. viride is a mold which produces spores asexually, by mitosis. It is the anamorph of Hypocrearufa, its teleomorph, which is the sexual reproductive stage of the fungus and produces a typical fungal fruiting body.The mycelium of T. viride can produce a variety of enzymes, including cellulases and chitinases which can degrade cellulose and chitin respectively. The mould can grow directly on wood, which is mostly composed of cellulose, and on fungi, the cell walls of which are mainly composed of chitin. It parasitizes the mycelia and fruiting bodies of other fungi, including cultivated mushrooms, and it has been called the "green mould disease of mushrooms". The affected mushrooms are distorted and unattractive in appearance and the crop is reduced.Trichodermaviride is the causal agent of green mold rot of onion.[1] A strain of Trichodermaviride is a known cause of dieback of Pinusnigra seedlings.

Corresponding Author:- Yashpal

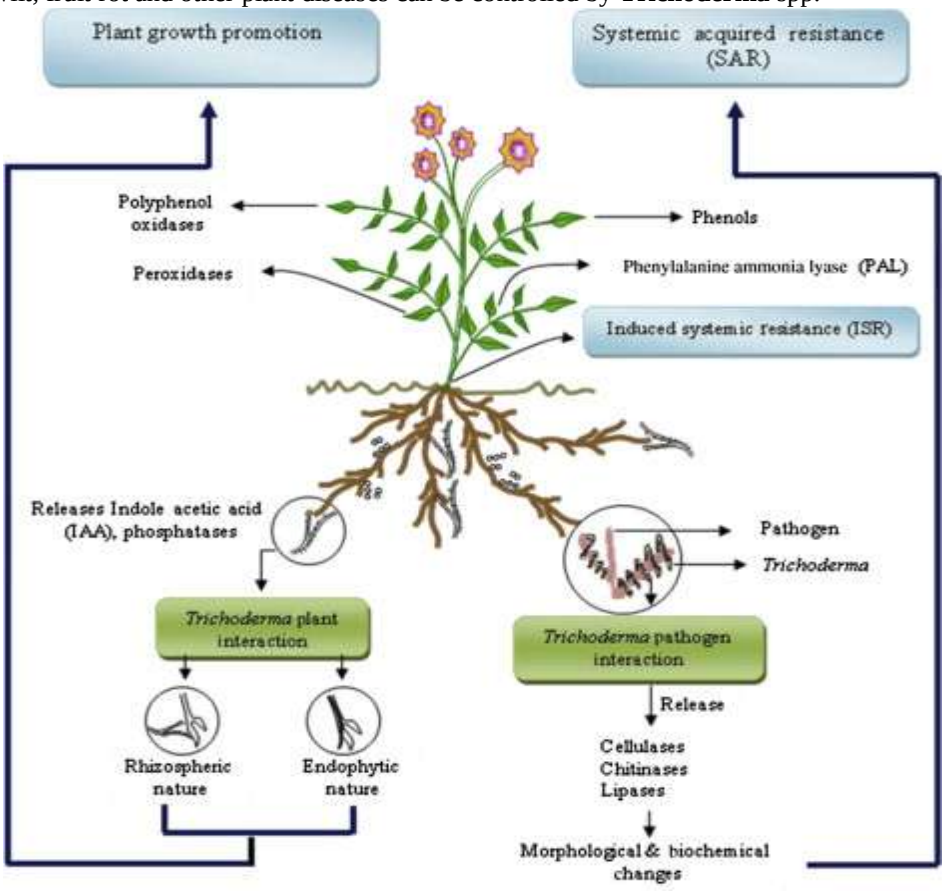
T. viride useful as a biological control against plant pathogenic fungi:
It has been shown to provide protection against such pathogens as Rhizoctonia, Pythium and even Armillaria.[2] It is found naturally in soil and is effective as a seed dressing in the control of seed and soil-borne diseases including Rhizoctoniasolani, Macrophominaphaseolina and Fusarium species. When it is applied at the same time as the seed, it colonizes the seed surface and kills not only the pathogens present on the cuticle, but also provides protection against soil-borne pathogens.

A closely related species, Trichodermareesei, is used in the creation of stonewashed jeans. The cellulase produced by the fungus partially degrade the cotton material in places, making it soft and causing the jeans to look as if they had been washed using stones

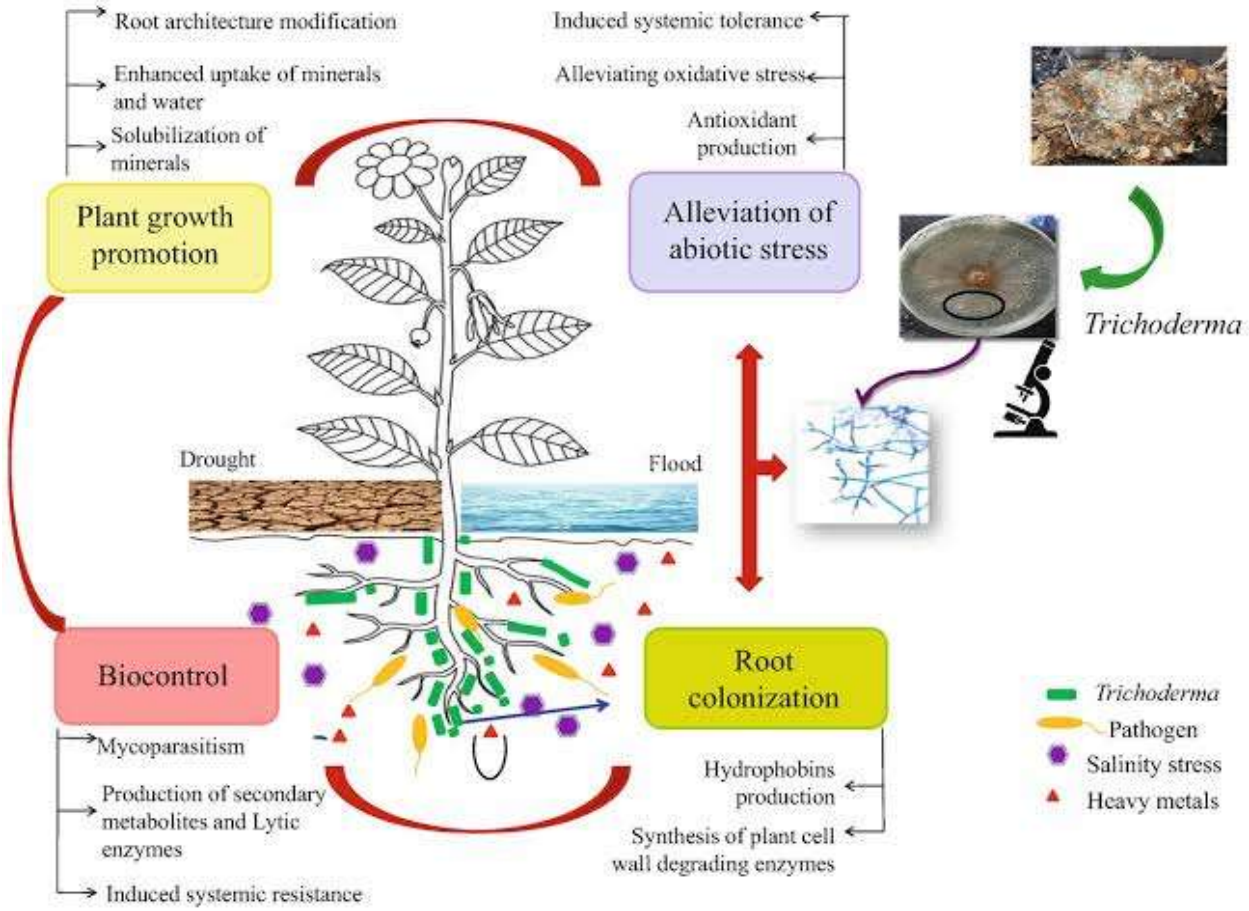
Scientific classification	
Kingdom:	Fungi
Division:	Ascomycota
Class:	Sordariomycetes
Order:	Hypocreales
Family:	Hypocreaceae
Genus:	Trichoderma
Species:	**T. viride**

Trichoderma spp. are the most widely used fungal **biocontrol agents** against fungal diseases of pulses, grapes, cotton, onion, carrot, peas, plums, maize, apple, etc. **Trichoderma** spp. grow very fast and can produce polysaccharide-degrading enzymes, so it can be grown on a large number of substrates.

In agricultural products. **Trichoderma** spp. significantly suppress the growth of plant pathogenic microorganisms and regulate the rate of plant growth. Recent works have shown that common plant disease such as root rot disease, damping off, wilt, fruit rot and other plant diseases can be controlled by **Trichoderma** spp.



Trichoderma may suppress the growth of the pathogen population in the rhizosphere:
The **Trichoderma** may suppress the growth of the pathogen population in the rhizosphere through competition and thus reduce disease development. It produces antibiotics and toxins such as trichothecin and a sesquiterpine, Trichodermin, which have a direct effect on other organisms.



Largest group of fungal secondary metabolites:
Polketides is the largest group of fungal secondary metabolites. These originate from the repetitive connections of short chain fatty acids ex. acetate or propionate, by pathways very similar to those of fatty acid biosynthesis Terpenes are the most abundant and widely distributed secondary metabolites in nature. Trichoderma spp.form volatile terpenes.

These are grouped as monoterpenes, sesquiterpene, diterpene, triterpene and tetra terpene. Mycoparasitism There are four stages in direct interaction between Trichodermaspp. and other fungi. These are:

1. Chemotropic growth - A chemical stimulus produced by the target fungus attracts the antagonist.
2. Specific recognition - Lectins present on cell surfaces of both pathogens and antagonist are responsible for this process.
3. Attachment and coiling of Trichoderma around its host.
4. Secretion of lytic enzymes.

Competition:
The antagonistic organism when applied to the field, itcompete withthe pathogen and other fungi for food. This competition leads to control of disease. Trichodermaspp. are aggressive in nature and can even survive as chlamydospores and conidia in the absence of sufficient nutrients. Ecologicalconcepts of exploitation, competition and interference, competition to inter-actions between fungal populations. Exploitation competition is depletion of a resource by any organism without directly limiting theresources for other organisms. In interference competition either chemicals orbehavioural mechanisms by which one organism directly limits the activity ofanother organism.

a) Competition for necrotic tissue. Trichoderma sp. when applied to the aerial parts of plants viz. leavesknown to control pathogens that invade the dead tissues as base and from this base they enter into the healthy tissues.

Botrytisspp. andSclerotinia spp. are best controlled by this method. Trichodermais reported to control Botrytisand Sclerotiniaon Strawberry and Apple. Environmental factors play an importantrole in successful control of pathogen by this method. Trichodermaspp. when sprayed on grape flowers at the time of blossoming are able to colonize tissues as itsenesces, thereby delaying colonisation byBotrytis, and later disease level in the fruit. He laid emphasis on the importance of timing of applications and importance of repeated applications of the antagonist during flowering. The most important spray according to him is during late flowering.

Competition for plant exudates:
Sometimes, the pathogen respond to the plant exudates is very rapidthereby causing disease. Damping off of cereals and vegetable seedling is initiated by the rapid response of the pathogen to the seed exudates. The response is so rapid, that within a short periodhour. Sporangia in Pythium infested soil germinate and cause infection. Seeds treated with Trichoderma sp. Inhibits germination of sporangia. Trichoderma sp. compete for germination stimulants. Tharzianum (T-35) is reported to control Fusariumoxysporum in the rhizosphere of cotton and melon by the method of nutrient competition. For this type of competition process, bio-control agents should be able tocolonise or establish in the root zone first and utilize root exudates and other substrate/ nutrients efficiently Competition on wound sites. The most vulnerable site for pathogen attack is wound site in a plant. Bio-control agents when introduced to such sites can be very helpful in controlling a list of pathogens causing disease. successfully controlled silver leaf pathogen (Chondrostereumpurpurum) by using T. viride in spray or via pruning shears. Armillarialuteobubalina (a root pathogen) entry in the freshly cut stumps can be pre-vented by Trichoderma application.

Tharzictnum strain T3 is reported to colonize wound site in cucumber roots and the phenomenaof control of Pythium is competition for nutrients discharged from wound. Integrated control According to the integrated approach in controlling plant diseases. Rmru-misation of chemicals is advocated. As the wide range of chemicals use have long residual effects and the pathogens become resistant or develop resistance after a period of time, these (bio-control) when combine with othercultural methods of control can be of much use. Use of bio-control agents may result in improved disease control the low doses of fungicide combined with antagonist application can prove to be more effective as the pathogen initially gets weakened and then subjected subsequent attack by the antagonist. Two to three sprays with an antagonist and one spray of benzimidazole or dicarboximide fungicide is more effective than antagonists alone. Thus, it is concluded that Trichoderma is a very potential fungus for thecontrol of many plant diseases, specially soil and seed borne diseases, and should be used to save our environment from pollution by hazardous chemicals which have long residual effect.

Casual agent:
Trichoderma viride is the causal agent of inexperiencedmould rot of onion. A stress of Trichoderma viride is a acknowledgedpurpose of dieback of Pinusnigra seedlings.

How do you operateTrichodermaviride?
Soil treatment: Apply five Kg of Trichoderma powder according to hector after turning of solar hemp or dhainch into the soil for inexperienced manuring. Or Mix 1kg of Trichoderma system in a hundred kg of farmyard manure and cowl it for 7 days with polythene. Sprinkle the heap with water intermittently.

What is the significance of Trichoderma species?
Trichoderma species promotes the boom of plant lifeand boundaries the boom of plant pathogens. Trichoderma species are powerful bio-fungicides, enzymatically degrading different fungi, generating anti-microbial compounds that kill pathogenic fungi, and outcompeting pathogenic fungi for area and nutrients.

Conclusion:-

Trichoderma spp. is one of theregularlyremoted fungal genera from soil and plant roots which have beenappreciably studied for his or herhuge metabolites with numerous applications (agricultural, industrial, health, etc.). In the sector of agriculture, Trichoderma are appropriate antimicrobial marketersin opposition to pathogenic bacteria, fungi, and yeast. Similarly, they play a criticalfunction in enhancing the vegetative boom of vegetation and nutrient content

material of soil via decomposition and biodegradation. It is a safe, cost-effective, and environmentally benign era to acquire a sustainable agriculture

Reference:-

1. Akhtar M.S., Siddiqui Z.A. 2008. Biocontrol of a root-rot disease complex of chickpea by Glomus intraradices, Rhizobium sp., and Pseudomonas straita. Crop Prot. 27 (3–5): 410−417.
2. Alanio A., Brethon B., Feuihade de Chauvin M., Kerviler E., Leblanc T., Lacroix C., Baruchel A., Menotti J. 2008. Invasive pulmonary infection due to Trichodermalongibrachiatum mimicking invasive Aspergillosis in a neutropenic patient successfully treated with voriconazole combined with caspofungin. Clin. Infect. Dis. 46 (10): 116−118.
3. Arthe R., Rajesh R., Rajesh E.M., Rajendran R., Jeyachandran S. 2008. Production of bio-ethanol from cellulosic cotton waste through microbial extracellular enzymatic hydrolysis and fermentation. Electron. J. Environ., Agric. Food Chem. 7 (6): 2984−2992.
4. Batta Y.A. 2004. Effect of treatment with TrichodermaharzianumRifai formulated in invert emulsion on postharvest decay of apple blue mold. Int. J. Food Microbiol. 96 (3): 281−288.
5. Benitez T., Rincon A.M., Limon M.C., Codon A.C. 2004. Biocontrol mechanisms of Trichoderma strains. Int. Microbiol. 7 (4): 249−260.
6. Bettiol W., Morandi M.A.B. 2008. Trichoderma in Brazil, history, research, commercialization and perspectives. p. 235–237. In: "Molecular Tools for Understanding and Improving Biocontrol" (B. Duffy, M. Maurhoffer, C. Keel, C. Gessler, Y. Elad, S. Klewnick, eds.). 10th meeting of the working group "Biological Control of Fungal and Bacterial Plant Pathogens", Interlaken, Switzerland, 9–12 September 2008, 389 pp.
7. Bisby G.R. 1939. Trichodermaviride Pers. ex Fries and notes on Hypocrea. Trans. Br. Mycol. Soc. 23 (2): 149−168.
8. Bissett J. 1991a. A revision of the genus Trichoderma. II. Infrageneric classification. Can J. Bot. 69 (11): 2357−2372.
9. Bissett J. 1991b. A revision of the genus Trichoderma. III. Sect. Pachybasium. Can. J. Bot. 69 (11): 2373−2417.
10. Bissett J. 1991c. A revision of the genus Trichoderma. IV. Additional notes on section Longibrachiatum. Can. J. Bot. 69 (11): 2418−2420.