

Role of Mutation in *Trichoderma* spp.

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The etymology of *Trichoderma* is taken from thrix= hair and derma = skin. *Trichoderma* is free living, asexually reproducing and filamentous fungi, is present in nearly all temperate and tropical soils. The strains of *Trichoderma* spp. are strong opportunistic invaders, fast growing, prolific producers of spores and powerful antibiotic producers. They show a high level of genetic diversity, and can be used to produce a wide range of products of commercial and ecological interest. Fungal species belonging to the genus *Trichoderma* are worldwide in occurrence and easily isolated from soil, decaying wood and other forms of plant organic matter. The genus *Trichoderma* was first proposed as a genus more than two hundred years ago by Persoon in 1794 at Germany.

Mechanism by *Trichoderma*:

Hyperparasitism: *Trichoderma* reduces plant disease by parasitizing. Parasites extend hyphal branches towards the target host, coils around and attaches to it with appressorium like bodies and puncture mycelium. Digestion occurs by β -1,3-glucanases, chitinase and proteases.

Competition: *Trichoderma* is an excellent and potential bioagents to compete for space and nutritional sources because of its omnipresence in agricultural and natural soil e.g. biocontrol of *Botrytis cinerea* by *T. harzianum* strain T-39, *B. cinerea* requires external nutrients for germination and infection but T-39 inhibit germination of the pathogen by competition.

Antibiosis: Antibiosis occurs during interaction involving low molecular weight compounds or antibiotics produced by *Trichoderma* that inhibit the growth of microorganisms.

Induced resistance: *Trichoderma* strains are potent inducers of induced resistance like responses. Xylanase of *Trichoderma* spp. is responsible for induction of systemic resistance in cotton, tobacco etc.

What is mutation: A mutation is more or less abrupt change in the genetic material of an organism, which is then transmitted in hereditary fashion to the progeny. Mutations represent changes in the sequence of bases in the DNA either through substitution of one base for another or through addition or deletion of one or many base pairs. Mutations occur spontaneously in nature in all living organisms those that produce only sexually or asexually and those that reproduce both sexually and asexually.

Type of mutation:

- *Point mutation* : Altering the genetic code
- *Nonsense mutation*: Change the genetic code and destroy the information it contains.
- *Spontaneous mutation*: Changes in frame shift.

- *Induced mutation*: Artificial intervention.

Types of mutagens: Physical and chemical agents capable of bringing about mutations are called mutagens.

Chemical mutagens:

- Include nitrous acid.
- This substance converts adenine to hypoxanthine, a molecule that will not pair with thymine and thus interrupts the genetic code.
- A base analog is a chemical mutagen that resembles a nitrogenous base and is incorporated by error.
- A DNA molecule cannot function in protein synthesis. Certain dyes and fungal toxins (for example aflatoxin) are known to be mutagens.

Physical mutagens :

- Include X rays, gamma rays and ultraviolet light.
- They are bringing about genetic manipulation and their by improving biocontrol efficacy

Developing mutant of *Trichoderma* spp. by using UV light:

- Take five days old culture of *Trichoderma* spp. and prepared conidial suspension.
- Take 1ml suspension and spread on PDA media containing Petri plates.
- These Petri plates placed under UV light source for different times (10,20,30min etc), quartz lamp (30,35,40 w) and distance (10,20,30 cm).
- Incubate 25° C in normal condition.
- Then comparison of changes with its parents.

Effect of mutation on *Trichoderma* spp.: In recent years, genetic improvement of *Trichoderma* by induction of mutation using mutagens has successfully been attempted for improvement of potential ability of biocontrol agent. Mutation in *Trichoderma* results in beneficial and harmful effect on morphological like colony diameter, sporulation, dry mycelial weight etc. physiological, biochemical like Trichodermine, gliotoxin and virindin and molecular properties.

Benefits of mutation : Mutation on *Trichoderma* sp. by UV and gamma radiation brought about changes in morphological features like colony diameter, sporulation, dry mycelial weight and enzymes like β -1,3-glucanase, β -1,4-glucanase, cellulase and antibiotics like trichodermine, gliotoxin and virindin. There was a potential increase in antifungal metabolites of the selected mutants as compared to wild parents. Mutants of *Trichoderma* sp. were found to be a better biocontrol agent against phytopathogens. Selection of beneficial mutant of biocontrol agent becomes a better option for management of plant pathogens.

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