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PP-402

Practical: 7-8

BIOCONTROL OF PLANT PATHOGENS - DUALCULTURE TECHNIQUE

Biological control is the total and partial destruction of pathogen populations by other organisms. Baker and Cook (1974) defined biological control "as the reduction of inoculums density or disease producing activities of a pathogen or parasite in its active or dormant state, by one or more organisms, accomplished naturally or through manipulation of the environmental, host or antagonist, or by mass introduction of one or more antagonists".

Fungal antagonists

* *Trichoderma viride*
* *T harzianum*
* *Gliocladium virens (Trichoderma virens)*

Commonly studied antagonists

Bacterial antagonists

* *Bacillus subtulis*
* *Agrobacterium radiobacter*
* *Pseudomonas fluorescens*
* *P. putida*
* *P. cepacia*
* *P. aurieofaciens*

Actinomycetes antagonists

* *Streptomyces griseous*
* S. *lavendulae*
* *S .praecox*

Dual culture technique

This method is used to study the efficacy of bio control agent, against plant pathogens under laboratory conditions.

- Prepare PDA and sterilise the medium in an autoclave at 121.6°C for 15 minutes
- Pour the medium (20 ml) into sterilised Petri-plate (90 mm diameter) when the medium is in lukewarm state and allow it to solidify at room temperature.
- Cut the culture discs (7 day old) of the bio agents and pathogen separately with the help of sterilized cork bores (5 mm).
- Transfer the culture discs of pathogen and bio agent aseptically and place them at periphery of the Petri plate containing the medium (Care should be taken to place the both discs of pathogen and bio agent at equidistance i.e. 2 to 3 cm apart from the periphery of the Petri plate in opposite direction).
- Inoculate with culture disc of the pathogen alone in the Petri plates containing PDA, which serves as control.
- Transfer the inoculated Petri-plates to an incubator and incubate at 25 ± 1°C.
- Observe periodically for growth of the pathogen and antagonist in Petri plates and measure the colony growth (diameter) in each Petri plate.

- Calculate the per cent inhibition of the pathogen by the bio agent when the growth of the pathogen is full in the control plates.
- Per cent inhibition of growth of the pathogen can be calculated by using the following formula.

$$\text{Per cent inhibition} = \frac{\text{Radial growth in the Control (C)} - \text{Radial growth in the treatment (T)}}{\text{Radial growth in control (C)}}$$

Inference

The antagonistic nature of the given bio control agent is determined by the following criteria.

1. Competition (Antagonist overgrowing on pathogen)
2. Antibiotics (A clear zone of inhibition is formed between pathogen and bio control agent

Commercial formulations of biocontrol agents and diseases controlled

S.NO.	Biocontrol agent	Trade name	Pathogens controlled
i.	***Trichoderma viride***	**Ecofit* Basderma* Bioderma***	**Soil borne pathogens such as *Pythium, Macrophomina, Phytophthora, Sclerotium***
2.	***T. harzianum***	**F-Stop**	**Soil borne pathogens such as *Pythium, Macrophomina, Phytophthora, Sclerotium***
3.	***Gliocladium virens***	**Gliocard**	**Seedling diseases of ornamental plants**
4.	***T. polysporum***	**Binab-T**	**Wood decay fungi**
5.	***Bacillus subtilis***	**Kodiak**	**Post harvest diseases of fruits and brown rot of fruits**
6.	***Pseudomonas fluorescence***	**Dagger G**	***Rhizoctonia* and *Pythium***

7.	***Agrobacterium radiobacter* (K-84)**	**Gallex, Galltrol**	***Agrobacterium tumifaceans***

*** Talc based formulations available in India**

Note: List of commercial products of various biocontrol agents is furnished in Appendix III