

**STUDY OF BIOLOGICAL CONTROL OF SEPTORIA LEAF SPOT  
(SEPTORIA LYCOPERSICI) DISEASE ON TOMATO BY USING  
TRICHODERMA HARZIANUM IN IN VITRO CONDITION**

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# Introduction

- ▶ The **tomato** is the edible berry of the plant *Solanum lycopersicum*, [1][2].<sup>1</sup> commonly known as the tomato plant. The species originated in western South America, Mexico and Central America[2][3].
- ▶ Tomatoes are a significant source of umami flavor. They are consumed in diverse ways: raw or cooked, and in many dishes, sauces, salads, and drinks. While tomatoes are fruits —botanically classified as berries—they are commonly used culinarily as a vegetable ingredient or side dish[3].
- ▶ Numerous varieties of the tomato plant are widely grown in temperate climates and across the world, with greenhouses allowing for the production of tomatoes throughout all seasons of the year. Tomato plants typically grow to 1-3 meters (3-10 ft) in height.
- ▶ In Guyana growing the three tomatoes varieties such as Calypso, Heat mater and Mongol.

# Introduction cont.

- ▶ Septoria leaf spot is caused by a fungus, *Septoria lycopersici*. It is one of the most destructive diseases of tomato foliage and is particularly severe in areas where wet, humid weather persists for extended periods.
- ▶ This fungus can attack tomatoes at any stage of development, but symptoms usually first appear on the older, lower leaves and stems when plants are setting fruit. Symptoms usually appear on leaves, but can occur on petioles, stems, and the calyx. Since 1962, a government sponsored plan has been in operation in British Guyana for the control of pests and diseases (Google).
- ▶ Septoria leaf spot usually appears on the lower leaves after the first fruit sets. Spots are circular, about 1/16 to 1/4 inch in diameter with dark brown margins and tan to gray centers with small black fruiting structures.
- ▶ Characteristically, there are many spots per leaf. This disease spreads upwards from oldest to youngest growth.
- ▶ If leaf lesions are numerous, the leaves turn slightly yellow, then brown, and then wither. Fruit infection is rare.

# Introduction cont.



Septoria leaf spot early stage



Septoria leaf spot advanced stage

# Material and Methods

- ▶ To evaluate the biocontrol efficacy of, using the following test fungi as microbial insecticides
- ▶ Culture medium for screening micro - organisms such as biological control agent *T. harzianum* and pathogen *Septoria lycopersici*.
- ▶ Screening, isolation and characterization of *Septoria lycopersici* from infected tomatoes leaves.
- ▶ Selection of bio control agent.
- ▶ Antagonistic effect of biological control agent against pathogen.

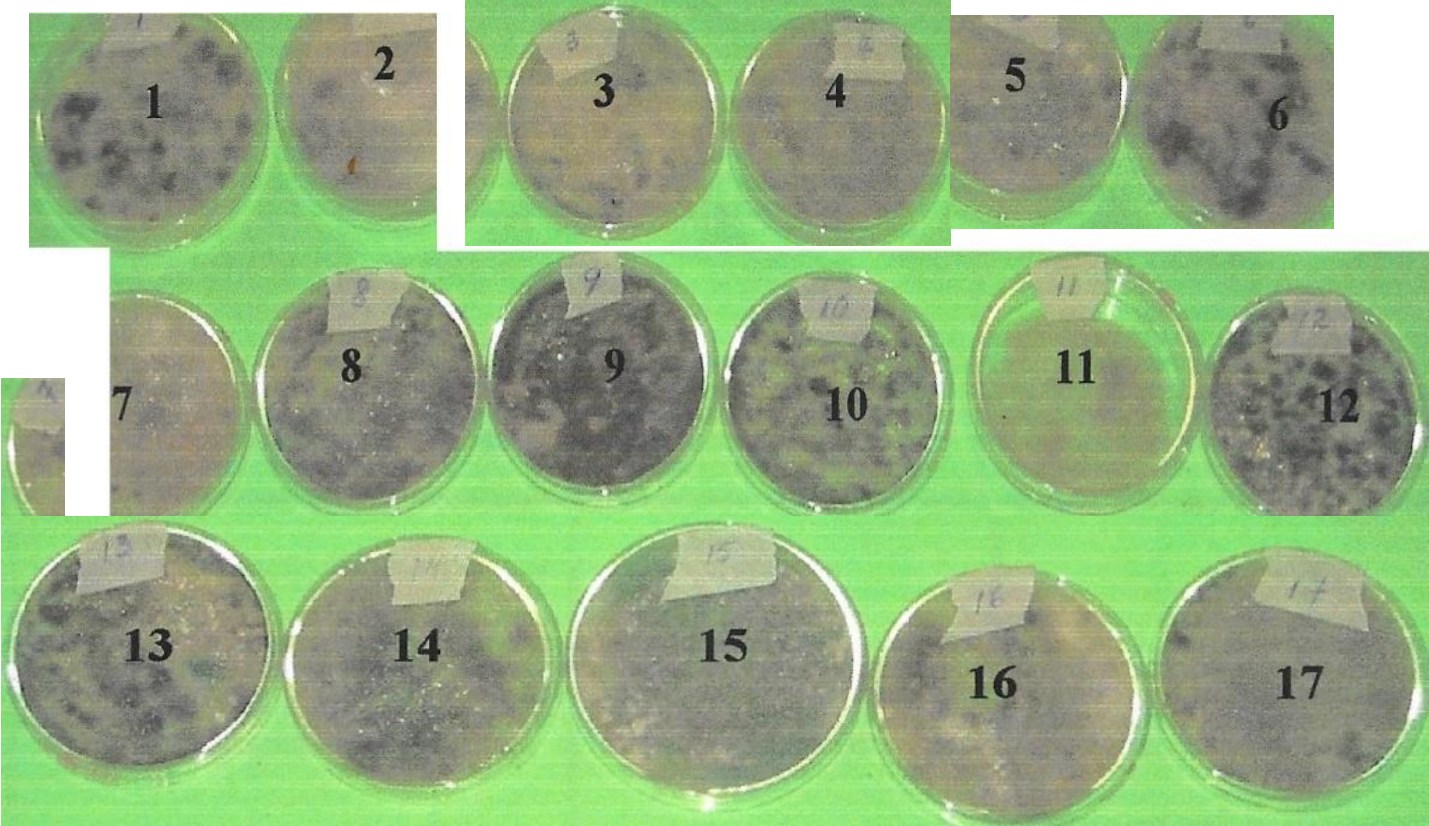
# RESULTS AND DISCUSSION

- ▶ *Septoria lycopersici* is the most significant pathogen in the sector and causes economic losses ranging from five to twenty percent of the national production from tomatoes.
- ▶ There are several reports on the excellent performance of microbial pesticides (White and Ali 1999).
- ▶ This form of control is particularly very important and the present research trials using *T. harzianum* biological control agent from Guyana soils is an excellent and outstanding indication to proceed with biological control of the highly damaging *Septoria* leaf spot.
- ▶ Through serial dilution of seventeen different soil samples, two separate observations were made for bacterial and fungal colonies. The results are presented in Table 1, plates 1 and 2.

# Table 1: Total fungal population (No. of colonies in different soil)

Soil samples	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
R1	105	75	43	52	192	93	365	201	152	63	82	76	33	121	87	123	203
R2	85	36	51	61	296	82	329	137	180	54	76	64	41	136	91	156	395
R3	96	83	63	45	163	101	305	165	173	72	93	69	57	145	99	193	245
R4	117	98	52	57	209	97	343	183	129	83	62	83	61	131	80	119	315
Total Population	403	266	209	216	860	373	1345	692	634	272	313	292	92	533	357	541	1158
Mean Population	101	71	52	54	215	93	336	117	158	68	78	73	23	133	89	135	289

# Plate 1: Fungal colonies of 17 soil samples





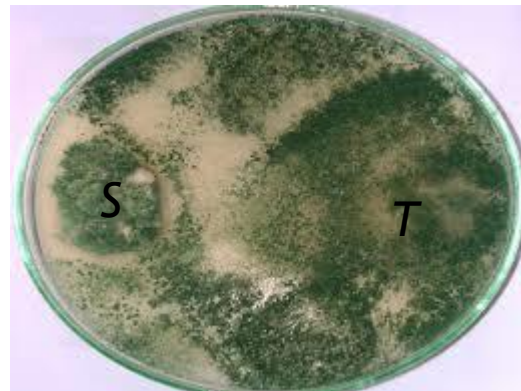
# Plate 2: Mother cultures of biological control agent and pathogen



*Trichoderma harzianum*



*Septoria lycopersici*



*Antagonistic effect*

## Table 2: Name and number of fungal colonies identified in different soil samples

Fungal colonies forming units(%)	Soil sample numbers																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
<i>Aspergillus niger</i>	40	30	10	15	04	80	60	60	40	10	30	30	10	08	10	10	0
<i>Aspergillus flavus</i>	05	05	10	13	14	0	0	05	10	10	10	03	0	05	18	05	20
<i>Aspergillus terreus</i>	0	0	0	0	10	0	0	0	10	10	0	0	0	10	20	05	18
<i>Pencilium sp.</i>	0	05	10	13	13	0	0	0	10	10	0	20	0	30	0	10	08
<i>Trichoderma harzianum</i>	05	05	60	25	08	0	0	0	0	05	80	0	50	40	13	0	13
<i>Trichoderma viride</i>	0	05	0	05	18	0	0	0	0	0	0	0	05	0	14	0	0
<i>Trichoderma roseum</i>	20	10	0	10	20	0	0	05	0	10	0	0	0	05	04	20	0
<i>Rhizopus sp</i>	0	10	0	09	05	0	0	05	20	11	0	05	0	0	08	20	15
Unknown	30	30	10	10	08	20	40	25	10	04	0	42	15	0	15	30	26

## Table 3: Radial growth of mycelium of test fungi

Selected fungi	Radial growth (cm) of mycelium						
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
<i>Aspergillus flavus</i>	0	7.1	8.3	8.5	8.7	8.9	8.9
<i>Aspergillus niger</i>	0	7.3	8.5	8.6	8.7	8.9	9.0
<i>Trichoderma harzianum</i>	0	7.1	8.2	8.4	8.7	8.9	9.0
<i>Trichothecium roseum</i>	0	5.7	5.9	6.8	7.3	7.9	8.8

# Conclusion

I have conclude that biological control agent *T. harzianum* controlled the Septoria leaf spot pathogen *Septoria lycopersici* in laboratory condition.

# References

1. *Molecular phylogenetic analyses have established that the formerly segregate genera Lycopersicon, Cyphomandra, Normania, and Triguera are nested within Solanum, and all species of these four genera have been transferred to Solanum.*
2. *Garden Tomato, Solanum lycopersicum L., Encyclopedia of Life. Retrieved 1 January 2014.*
3. *Tomato, Encyclopaedia Britannica. 4 January 2018. Retrieved 15 January 2018.*

Thanks for listening

The background features abstract, overlapping geometric shapes in various shades of green, ranging from light lime to dark forest green. These shapes are primarily located on the right side of the slide, creating a modern, layered effect. The rest of the slide is a plain white background.