Frontiers in Crop Improvement, Vol. 7 (2) : 155-156 (2019)
Print ISSN : 2393-8234, Online ISSN : 2454-6011
ASTHA FOUNDATION
Meerut (U.P.) INDIA

EVALUATION OF BIOCONTROL AGENTS AGAINST *FUSARIUM* SP. CAUSING WILT IN OKRA UNDER *IN-VITRO*

T.P. Deasai, M.K. Chudasama and K.B. Rakholiya
Pulses Research Station, Junagadh Agricultural University, Junagadh

Okra [*Abelmoschus esculentus* (Linnaeus) Moench] is an important vegetable crop belonging to *Malvaceae* family, grown for its immature green and non fibrous edible fruits in the tropical and sub tropical regions of the world. In India, it was cultivated in the area of 0.53 million hectare with a production of 6.35 million tones and a productivity of 12.00 tones/ha. In Gujarat, it is extensively cultivated in the area 0.065 million hectares with production of 0.72 million tones of fruits and productivity of 11.00 tones/ha. The okra plant is affected by a number of diseases caused by fungi, nematodes and virus. Fungal diseases *viz,* wilt (*Fusarium oxysporum* f. sp. *vasinfectum)* (Alk.) Snyder, Cercospora leaf spot (*Cercospora abelmoschi* Ell and Ev or *Cercospora hibiscina* Ell and Ev or *Cercospora malayensis* Stevens), damping off (*Pythium* spp.), fruit rot (*Pythium aphanidermalum* and *Phytophthora palmivora),* Phyllosticta leaf spot (*Phyllosticta hibiscini* Ell and Ev.), alternaria leaf spots (*Alternaria hibiscinum),* rust (*Uromyces heterogenus)*, anthracnose (*Collectotrichum capsci* and *Collectotrichum hibisci)*, yellow vein mosaic (*Yellow vein mosaic virus*) and root-knot (*Meloidogyne incognita*). These diseases have been observed in moderate to severe forms in fields of different major okra growing area of south Gujarat. Considering importance of crop and seriousness of disease in south Gujarat region, the present research work was undertaken to screen various biocontrol agents *in vitro* condition to manage the wilt.

Screening of different bio control agent *in vitro* condition : To determine the antagonistic action of various known species of fungal and bacterial bioagents, the dual culture test was carried out. Twenty ml of media poured aseptically in each of the Petri plates and allowed to solidify. Mycelia disc of four mm diameter of both *i.e.* each antagonist and test fungus was placed on solid media in the same Petri plates approximately 4 cm away from each other. All the inoculated plates were incubated at 27 ± 2^0 C and observed after 7 days for the growth of antagonist and test pathogen. Index of antagonism was determined in each treatment by following standard formula as

$$I = \frac{C - T}{C} \quad 100$$

Where,

I = Antagonism index

C = Area of test fungus in control (mm^2)

T = Area of test fungus in respective treatment (mm^2)

The results are expressed in Table-2 and depicted in Plate-1 with figure-1. It revealed that all the isolates showed different results. All the isolates inhibited above 47 per cent growth of the test fungus except *Pseudomonas* sp. Maximum reduction of pathogen (77.78 %) was observed in the presences of *Trichoderma harzianum* followed by *Trichoderma viride* (72.22 %). The *T. facicutum* was also found better with 60.00 per cent reduction in growth of pathogen. *Pseudomonas aeurogenosa* gave minimum growth inhibition.

Similar results were recorded by they reported that *T. harzianum* showed strong antagonistic activity toward *F. solani* under *in vitro* condition.

Six different biocontrol agents were screened *in vitro* for linear growth inhibition of *F. oxysporum* schlecht. by dual culture method. The entire biocontrol agents were

Table-1 : List of fungal and bacterial bioagents.

Sr. No.	Biocontrol agent
1.	*Trichoderma harzianum,* Navsari isolate
2.	*Trichoderma viride,* Navsari isolate
3.	*Trichoderma facicutum,* Navsari isolate
4.	*Pseudomonas flueroscence,* Navsari isolate
5.	*Pseudomonas aeurogenosa,* Navsari isolate
6.	*Bacillus substillis,* Navsari isolate.
7.	Control

Table-2 : Per cent growth inhibition of *Fusarium oxysporum* schlecht by different bioagents *in vitro.*

Sr. No.	Bioagents	Per cent Mean inhibition *	Antagonism index**
1.	*Trichoderma harzianum*	77.78	++++
2.	*Trichoderma viride*	72.22	+++
3.	*Trichoderma facicutum*	60.00	+++
4.	*Pseudomonas flueroscence*	37.78	+
5.	*Pseudomonas aeurogenosa*	31.11	+
6.	*Bacillus substillis*	47.78	++
7.	Control	00	-
S.Em. ±		0.78	
C.D. at 5%		2.31	

*Average of four replications, **Antagonism index (Watanabe, 1984)
++++ = Severe antagonism, +++ = Moderate antagonism, ++ = Weak antagonism, - = No antagonism

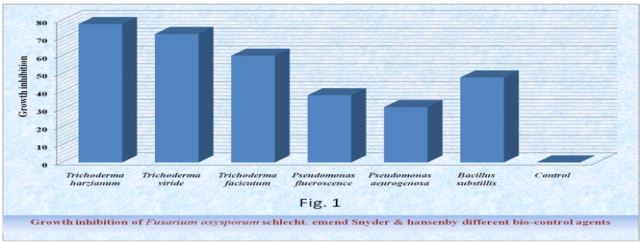

Fig. 1

Growth inhibition of *Fusarium oxysporum* schlecht. emend Snyder & hansenby different bio-control agents

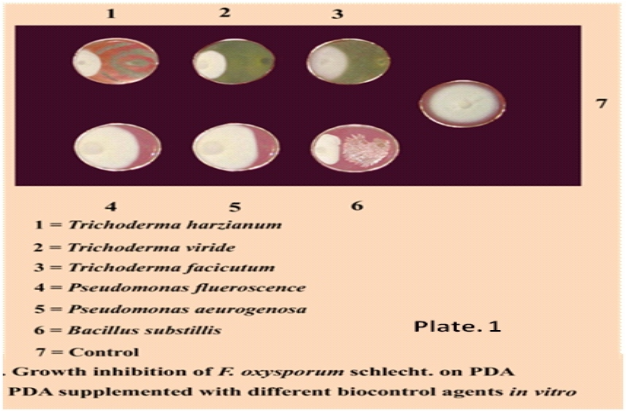

Plate. 1

Growth inhibition of *F. oxysporum* schlecht. on PDA PDA supplemented with different biocontrol agents *in vitro*

effective against the test fungus except *Pseudomonas* sp. Among them antagonists *Trichoderma harzianum* (77.78%) was most effective in growth inhibition of test fungus. Next best was *T. viride* followed by *T. facicutum* and *Bacillus substillis*.

CONCLUSIONS

Wilt of okra caused by *Fusarium oxysporum* schlecht is important disease. Different biocontrol agents were evaluated against this disease. Antagonism studies revealed that among the different biocontrol agents viz., *Trichoderma harzianum* (77.78%) was most effective in growth inhibition of test fungus which was followed by, *Trichoderma viride* (72.22%) and *Trichoderma facicutum* (60.00%) were found promising during their bioassays against the pathogen.

REFERENCES

1. Anonymous (2013). http://www.nhb.gov.in/indian horticulture database 2013.
2. Bell D.K., Wells H.D. and Markham C.R. (1982). *In vitro* antagonism of *Trichoderma* species against six fungal plant pathogens. *Phytopathology, 72:* 379-382
3. Chakraborty M.R. and Chatterjee N. C. (2008). Control of Fusarium wilt of *Solanum melongena* by *Trichoderma* spp. *Biologia plantarum, 52 (3):* 582-586.
4. Gurjar K.L., Singh S.D. and Raval P. (2004). Management of seed borne pathogen of okra with bio-agents. *Pl. Dis. Res., 19 (1):* 44-46.
5. Joshi V. and Raut S.P. (2005). Promising bio-agents in management of *Fusarium solani* causing seedling wilt of cashew hybrid. *Annals of Pl. Prot. Sci., 13 (1) :* 95-98.
6. Watanabe N. (1984). *Bulletin of the faculty of Agriculture*, Meiji University, *66:* 45-50.

Received : June-2019; Revised : July-2019; Accepted : July-2019