Int.J.Curr.Microbiol.App.Sci (2017) *6*(6): 3173-3176

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 6 Number 6 (2017) pp. 3173-3176**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2017.606.373

Screening of Cumin Varieties/Lines against Wilt Disease

J.R. Talaviya*, I.B. Kapadiya, C.M. Bhaliya and S.V. Lathiya

Department of Plant Pathology, College of Agriculture, Junagadh Agricultural University Junagadh- 360 201, India
**Corresponding author*

Keywords

Cumin, *Fusarium oxysporum* f. sp. *cumini*, Variety.

Article Info

Accepted:
29 May 2017
Available Online:
10 June 2017

A B S T R A C T

The investigation was carried out at Department of Plant Pathology, Junagadh Agricultural University, Junagadh. Wilt caused by *Fusarium oxysporum* f. sp. *cumini* is a serious disease of cumin. Considering its regular occurrence and economic loss the wilt pathogen was selected for present investigation to generate the informations to find out the resistance of cultivars/lines. Out of fifteen varieties/lines tested one line (JC-2000-9) was found free from disease. The recommended varieties of Gujarat State viz., GC-2, GC-3 and GC-4 were found highly susceptible to *F. oxysporum* f. sp. *cumini* under present investigation.

Introduction

Cumin (*Cuminum cyminum* L.) locally known as 'Jeera' or 'Jiru' belongs to the family Apiaceae. India is the leading producer (70% of world production), consumer and exporter of cumin in the world. Almost 80% of the crop cultivated is consumed in India (Annonymous, 2013). The area under cumin cultivation in India is about 5.93 lakh ha with annual production of 3.95 lakh MT. Cumin exclusively cultivated in Gujarat and Rajasthan.

Mathur and Mathur (1956) reported wilt of cumin from Rajasthan and identified the causal organism to be *Fusarium oxysporum* (Schl.) Snyder and Hansen. On the basis of host specificity it was finally named as *Fusarium oxysporum* f. sp. *cumini* by Prasad and Patel (1963). Wilt results in yield losses up to 35 per cent in cumin in some districts of Rajasthan (Vyas and Mathur, 2002). Dange *et al.*, (1992) reported 7.0 to 30.6 per cent losses in Gujarat.

Fusarium oxysporum is a widely distributed soil inhabiting fungus, which is known to be phylogenetically diverse. Most strains assigned to this species are saprotrophic. The disease manifests from the seedling stage itself and continues till the maturity of the crop. Although usually occurs near or at reproductive stages of crop growth. The pathogen is soil- borne hence difficult to eradicate as fungal chlamydospores survive in soil up to 6 years even in the absence of the host plant (Haware *et al.*, 1996). Grewel *et al.*, (1974) successfully proved pathogenicity of *Fusarium sp.* on 90 days old gram plants.

Gram plants were grown in autoclaved soil and 50 g culture of *Fusarium sp.* grown on sand maize meal medium was applied two inch deep around the plant by replacing the soil. While testing 12 lines of cumin, UC-310 showed maximum resistance to blight and UC-220 and UC-231 to wilt (Arora *et al.*, 2004). Twafik and Allam (2004) successively proved pathogenic nature of five isolates of *Fusarium oxysporum* f. sp. *cumini* isolated from wilt infected cumin plants by soil inoculation method.

Cumin is one of the important spice crops in Gujarat state. In Gujarat, Saurashtra region is most prevalent cumin growing area. Low yield of cumin is attributed to its susceptibility to wilt and blight diseases. The blight can be managed with fungicides, but the wilt being a soil borne difficult to manage with chemical mean or single factor. The wilt incidence also varies in different locations. So, present investigation is carried out to find out resistant cultivars/ lines for the wilt management.

Materials and Methods

A total of fifteen genotypes of cumin procured from Main Seed Spices Research Station, Jagudan (Sardarkrushi nagar, Dantiwada Agricultural University). Screening test was carried out using soil inoculation method using Junagadh isolate. The screening test was conducted in pot during *rabi* 2012-13.

Fungus culture was inoculated @ 50 g/pot. For each variety two sets of pots (15 cm width x 15 cm depth) were prepared comprising four pots in each one. One set of pot constituting two sterilized pots were filled with sterilized soil @ 3 kg/pot. These pots were considered as control. Similarly second set of two sterilized pots were filled with sterilized soil @ 3 kg/pot followed by inoculating 50 g of the culture of *Fusarium oxysporum* f. sp. *cumini* prepared in sand maize meal medium mixed in upper 5 cm soil layer. Twenty seeds were sown. Watering was done as and when required. The plants were observed regularly for the appearance and development of disease symptoms. As the symptoms of disease appeared, the fungus was re-isolated from the roots of diseased plant and the re-isolated fungus was brought to pure culture, which later compared with the original one. The per cent wilt incidence to be calculated by following formula.

$$\text{Per cent disease incidence} = \frac{\text{Total number of wilted plants in two pots}}{\text{Total number of plants in two pots}} \times 100$$

The cultivars/genotypes under the screening tests were GC-2, GC-3, GC-4, JC-2000-3, JC-2000-4, JC-2000-9, JC-2000-11, JC-2000-20, JC-2000-21, JC-2000-22, JC-2000-27, JC-2000-29, JC-2000-40, JC-2000-53 and JC-2000-54.

Results and Discussion

A total of fifteen genotypes of cumin including three cultivars were procured from Main Seed Spices Research Station, Jagudan (Sardarkrushi nagar, Dantiwada Agricultural University). Screening test was carried out using soil inoculation method (as described in pathogenicity test), using Junagadh isolate. The screening test was conducted during *rabi* 2012-13. Although during the year 2013-14 the pot trial was vitiated due to very poor seed germination.

The results presented in table 1 revealed that out of fifteen varieties/lines tested one line (JC-2000-9) was found free from disease. The lines *viz.*, C-2000-3, JC-2000-4, JC-2000-11, JC-2000-20, JC-2000-21, JC-2000-22, JC-2000-27, JC-2000-29, JC-2000-40, JC-2000-

53 and JC-2000-54 were found moderate to highly susceptible. The recommended varieties of Gujarat state viz., GC-2, GC-3 and GC-4 were found highly susceptible to *F. oxysporum* f. sp. *cumini* under present investigation.

Sadasivam and Kalyansundaram (1988) tested 12 cumin lines/cultivar against wilt pathogen. They reported that two lines *i.e.* UC-199 and UC-19 were highly resistant, while others observed to be highly susceptible including Gujarat cultivar GC-1. Later on Arora *et al.*, (2004) also tested 12 lines of cumin to wilt pathogen and maximum resistance was recorded in UC-220 and UC-231.

Table.1 Screening of different varieties/entries against cumin wilt (Pot trial, 2012-13)

Sr. No.	Variety/Entry	Percent Disease Incidence
1	GC-2	100
2	GC-3	100
3	GC-4	80
4	JC-2000-3	20
5	JC-2000-4	20
6	JC-2000-9	0
7	JC-2000-11	30
8	JC-2000-20	50
9	JC-2000-21	60
10	JC-2000-22	70
11	JC-2000-27	40
12	JC-2000-29	50
13	JC-2000-40	20
14	JC-2000-53	50
15	JC-2000-54	20

Deepak *et al.*, (2008) screened 25 cumin lines but, none was found totally resistant to wilt. Maximum resistance to wilt was observed in UC- 220, EC-220, EC- 232684 and UC-63 lines. The lines JC-2000-21 and JC-2000-22 were moderately susceptible.

The findings of Deepak and co-workers match with the result of present investigation. The lines JC-2000-21 and JC-2000-22 in both the experiments are reported as moderately susceptible. It is concluded that out of fifteen varieties/lines tested one line (JC-2000-9) was found free from disease. The lines *viz.*, JC-2000-3, JC-2000-4, JC-2000-11, JC-2000-20, JC-2000-21, JC-2000-22, JC-2000-27, JC-2000-29, JC-2000-40, JC-2000-53 and JC-2000-54 were found moderate to highly susceptible. The recommended varieties of Gujarat state *viz.*, GC-2, GC-3 and GC-4 were found highly susceptible to *F. oxysporum* f. sp. *cumini* under present investigation.

References

Anonymous. 2013. District wise estimates of area, production and productivity of cumin. Directorate of Agriculture, Gandhinagar.

Arora, D.K., Yadav, P., Kumar, D., and Patni

V. 2004. Evaluation of cumin varieties for resistance to blight and wilt diseases. *J. Mycol. Pl. Pathol*., 34: 622-623.

Dange, S.R.S., Pandey, R.L. and Savlaia, R.L. 1992. Diseases of cumin and their management- a review. *Agric. Rev. Karnal.* 13:219-224.

Deepak, P., Arora, D.K., Saran, P.L. and Lal, G. 2008. Evaluation of Cumin Varieties against Blight and Wilt Diseases with Time of Sowing. *Ann. Pl. Protec. Sci.* 16 (2): 441-443.

Grewel, J.S., Pal, M. and Kulshrestha, D.D. 1974. A new record of wilt of gram caused by *Fusarium solani. Curr Sci* 43:767.

Haware, M.P., Nene, Y.L., Natarajan, M. 1996. Survival of *Fusarium oxysporum* f. sp. *ciceri* in soil in the absence of chickpea. *Phytopath. Mediter*. 35: 9–12.

Mathur, B. L. and Mathur, R. L. 1956. Annual report of scheme for research in wilt disease of zeera (*Cuminum cyminum* L.) in *Rajasthan.* University of Rajasthan, Jaipur.

Sadashivan, T.S. and Kalyansundram, R. 1988. Screening of cumin varieties for resistance against wilt. *Curr. Sci.* 75(15):850.

Twafik, A.A. and Allam, D.A. 2004. Improving cumin production under soil Infestation with fusarium wilt pathogen: I-screening of biocontrol agents. *Ass. Univ. Bull. Environ. Res.*7(2):1-11.

Vyas, R.K. and Mathur, K. 2002. Distribution of *Trichoderma* spp. in cumin rhizosphere and their potential in suppression of wilt. *Indian Phytopath.*55(4):451-457.

How to cite this article:

Talaviya, J.R., I.B. Kapadiya, C.M. Bhaliya and Lathiya, S.V. 2017. Screening of Cumin Varieties/Lines against Wilt Disease. *Int.J.Curr.Microbiol.App.Sci.* 6(6): 3173-3176.
doi: https://doi.org/10.20546/ijcmas.2017.606.373