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Research Notes

Variability among the isolates of *Fusarium* spp. causing chickpea wilt in Maharashtra

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Chickpea *(Cicer arietinum* L.) is one of the major pulse crops grown in India and other semi-arid regions of the world. Chickpea is reported to be affected by more than 52 pathogens (Nene *et al.,* 1984). Among these, *Fusarium oxysporum* Schl. emend Snyd. Hans. f. sp. *ciceri* (Padwick) Snyd. and Hans, is a wide spread soil borne disease and is reported from many parts of India with intensity ranging from 10 to 100 per cent (Singh *et al.,* 1986). The chickpea varieties resistant to *Fusarium* wilt is now becoming susceptible. It is, therefore, necessary to see the pathogenic variability so as to find out strategies for management of *Fusarium* wilt. Chickpea plants infected with *Fusarium* wilt were collected from 66 locations in 19 districts of Maharashtra at flowering to pod formation stage. Isolations from infected roots were made on potato dextrose agar. The isolates of *Fusarium* spp. were identified (Booth, 1971; Padwick, 1940). The isolates were categorized into different groups based on morphological, cultural characters and pathogenecity. Variations in the growth of mycelium, colour / pigmentation of mycelium and sporulation among the isolates were recorded by growing on agar medium (Om Gupta *et al.,* 1986). The size of micro and macro conidia were measured with the help of binocular. Pathogenecity test on chickpea cultivar JG 62 a highly susceptible to *Fusarium* wilt was conducted by adapting pot culture technique (Hawre and Nene, 1982). For this purpose, the *Fusarium* isolates were mass multiplied on sterilized crushed cotton seed separately which was then mixed in the sterilized soil (soil + FYM, 3:1) at the rate of 1 kg *Fusarium* inoculum per 10 kg of sterilized soil. It was kept for 15 days so as to multiply. Water was given as and when required. The earthen pots of 10 cm diameter were filled with this wilt sick soil as per the isolates. The seeds of highly susceptible variety of chickpea i.e. JG 62 was sown in the pots. Pot as well as water culture technique (Nene *et al.,* 1981, Cabrera, 1985) were adopted for identification of highly pathogenic isolates of *Fusarium oxysporum* f. sp. *ciceri.* The experiment was undertaken in completely randomized block design with five replications. The observation on wilt incidence was recorded at 30, 45 and 60 days after sowing in pot. The soil temperature and soil moisture prevailed during experimentation were in the range of 22-27 C ånd 12.5-20% respectively.

A total of 53 isolates of *Fusarium* spp. were detected from 66 samples. The isolates were categorized into 6 groups (Table 1) based on variation in the morphological, cultural characters and pathogenecity. The isolates of groups 1,2,3,4 were of wilt producing *(F. oxysporum* f. sp. *ciceri)* type while, isolate of group 5 was of seed rotting type *(F. solani)* and isolate of group 6 was non-pathogenic. The isolate among the group differed in them by morphology, growth pattern, pigmentation, sporulation and pathogenecity. The mean wilt incidence / seed infection recorded with the isolates of groups 1,2,3,4 and 5 was 64, 82,

Table 1. Pathogenic and cultural characteristics of isolates of *Fusarium* spp. from chickpea.

Group No.	Fungi identified	Cultural charcters of isolates	Pathogenecity	Septation / size		Wilt/seed
				Micro conidia	Macro conidia	
1.	*F. oxysporum f.* sp. *ciceri*	Mycelium dull white, abundant growth of mycelium and sporulation, micro-conidia more than macro-conidia, mycelium aerial, loose with concentric rings.	Wilt producing type	0-1 10.7-3.5 x 3.0-1.2	2-3 15.0-7.0 x 3.0-1.5	64 (58-72)
2.	*F. oxysporum f.* sp. *ciceri*	Mycelium cottony white, compact, slow grower, abundant sporulation, macro-conidia more than micro-conidia	Wilt producing type	0-3 10.7-3.5 x 3.0 - 1.2	1-3 15.0 -7.0 x 3.0 - 1.5	82 (76-89)
3.	*F.oxysporum f.*sp. *ciceri*	Mycelium white, with pink pigmentation, profuse growth and sporulation, micro-conidia more than macro-conidia	Wilt producing type	0-1 5.0-2.7 x 1.7-1.0	2-3 11.9-7.0 x 2.5-1.7	70 (66-75)
4.	*F. oxysporum f.* sp. *ciceri*	Mycelium cottony white, pink pigmentation, profuse mycelium and sporulation, micro-conidia more than macro-conidia	Wilt producing type	0-1 7.0-3.0 x 3.0 -1.0	2-3 16.0 - 7.0 x 3.0 -2.0	52 (32-70)
5.	*F. solani*	Mycelium dull white, submerged, scanty growth, sporulation moderate	Seed rotting type	0-0 6.4-2.0 x 2.0 - 1.3	1-3 9.2 - 4.6 x 2.7 - 1.2	38 (33-34)
6.	*Fusarium* spp.	Mycelium white, moderate growth, no sporulation	Non-pathogenic	No sporulation	No sporulation	---

Table 2. Pathogenic variation in isolates of *F. oxysporum* f. sp. *ciceri* in chickpea cv. JG-62.

Isolates	Place of collection (Taluk / District)	Pot culture wilt incident* (%)	Water culture Time for wilt symptoms (days)
1.	Rahuri, Ahmednagar	91.0	9
2.	Pandharpur, Solapur	87.0	11
3.	Walwa, Sangali	69.0	13
4.	Akola	64.0	10
5.	Kolhapur, Gadhinglaj	31.0	17
6.	Latur	Non-pathogenic	Non-pathogenic
7.	Control		

* Mean of 5 replications.

70, 52 and 38 per cent, respectively. Among the isolates in group 1 and 2 *(F. oxysporum* f. sp. *ciceri)* collected from Rahuri (Ahmednagar) and Pantharpur (Solapur) recorded high wilt incidence *i.e.* 91 and 87 per cent respectively and was found highly pathogenic in water culture technique (Table 2). Variation in *Fusarium* isolates associated with chickpea in other parts of the country was also reported by other workers; (Padwick, 1940, Om Gupta, *et al.*, 1986, Krishna Rao and Krishnappa, 1997).

The observation clearly indicated that variations did exist in isolates of *F. oxysporum* f. sp. *ciceri* collected from different districts of Maharashtra State.

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