

Varietal screening for resistance to wilt of cowpea

K.R. JOSHI, N.N. PATEL, P.M. PATEL, M.R. PATEL AND R.M. PATEL



International Journal of Plant Protection, Vol. 4 No. 1 (April, 2011) : 14-16

See end of the article for authors' affiliations

Correspondence to :
N.N. PATEL
Department of Plant
Pathology, Main
Forage Research
Station, Anand
Agricultural University,
ANAND (GUJARAT)
INDIA

SUMMARY

A study was carried out to screen different varieties/ cultures for their resistance against wilt of cowpea (*Fusarium solani*) in pot at Main Forage Research Station, Anand Agricultural University, Anand during 2007. Pathogenicity was proved by soil inoculation and hydroponics method. The data revealed that out of twelve varieties, Gujarat Forage Cowpea-4 was found resistant while Gujarat Forage Cowpea-2 was found to be moderately resistant. Six varieties/ cultures viz., Gujarat Cowpea-3, Gujarat Cowpea-4, Gujarat Forage Cowpea-1, Gujarat Forage Cowpea-3, C-43 and ACS-17 showed moderate susceptible reaction where as, remaining cowpea varieties/ cultures viz., C-58, Gujarat Cowpea-1, Pusa Falguni and EC-4216 were found to be susceptible against wilt disease.

Joshi, K.R., Patel, N.N., Patel, P.M., Patel, M.R. and Patel, R.M. (2011). Varietal screening for resistance to wilt of cowpea. *Internat. J. Pl. Protec.*, 4(1): 14-16.

Key words :

Varietal
screening,
Resistance,
Cowpea

Cowpea [*Vigna unguiculata* (L.) Walp.] is an important food and fodder legume of the tropics and sub-tropics and is grown for diversified usage. Nutritive value of cowpea fodder can be compared very well with other forage legumes. It has higher crude protein, digestibility and mineral contents with low fibre. Therefore, cowpea fodder contains sufficient protein and minerals to meet the needs of ruminant for relatively higher levels of production. Yield, both grain and forage, are complex and quantitatively inherited characters and highly influenced by environmental fluctuation. There may not be individual genes but various minor genes and genes as wilt (*F. solani*) was responsible for yield. The diseases are very important factors as they cause heavy loss (15 to 75 %) in yield of fodder as well as grain (Howare, 1993 and Florini, 1997). Looking to the seriousness of disease, economic importance of the crop, an experiment was conducted to overcome the loss due to the disease by varietal screening for resistance to wilt.

MATERIALS AND METHODS

Twelve cowpea varieties / cultures were screened for their resistance against *Fusarium*

solani in pots. The fungal inoculum was multiplied on sterilized Sand maize meal medium (10 g maize meal + 90 g washed sand + 15 ml distilled water) in a 250 ml flask, after inoculation with two discs of 5mm diameters of mycelial plug of four days old culture grown on PDA plate. Inoculated flasks were incubated at room temperature ($27 \pm 2^\circ\text{C}$). After seven days of incubation, the inoculum was mixed with sterilized soil @ 60 g kg⁻¹ (Biswas and Sen, 2000). On 6th day of soil inoculation, the seeds of different varieties / cultures were surface sterilized with 0.1 per cent mercuric chloride solution and 10 seeds were sown in each pot and four pots were maintained which served as replication of a treatment. The seeds sown in a pot containing sterilized uninoculated soil served as control. The seeds, which did not germinate, were considered under pre-emergence mortality. The ungerminated seeds were subjected to examined under microscope and isolation to confirm the presence of *Fusarium solani*. The seedlings, which wilted after emergence were considered under post-emergence mortality. The post emergence mortality was recorded at 7th day after sowing till 35 days keeping an interval of 7 days. The pre-and post-emergence

Received :
August, 2010
Accepted :
October, 2010

seedling mortality were calculated as per the formulae described earlier. The varieties were grouped under different degrees of resistance on the basis of disease grades described by Agrawal and Kothasane (1971) as given below:

Degree of resistance	Disease grade
Resistant	0-10 per cent mortality
Moderately resistant	11-30 per cent mortality
Moderately susceptible	31-70 per cent mortality
Susceptible	71-100 per cent mortality

RESULTS AND DISCUSSION

Twelve cowpea varieties/ cultures were screened in pot for their resistance against wilt under glass house condition. The observations on wilt incidence were recorded upto 8 weeks. These varieties were grouped under different degrees of resistance on the basis of plant mortality per cent. The results pertaining to different degrees of resistance are presented in Table 1.

Pre-emergence mortality per cent was obtained significantly minimum in Gujarat Forage Cowpea-4 (3.41) which was at par with Gujarat Forage Cowpea-2 (6.30). The next best in order of merit was Gujarat Cowpea-3 (19.47) followed by C-43 (22.35), Pusa Falguni (27.37), Gujarat Cowpea-4 (27.37), C-58 (31.82), Gujarat Forage Cowpea-3 (34.91), Gujarat Forage

Cowpea-1 (37.44), ACS-17 (37.44), while significantly maximum pre-emergence mortality per cent was observed in EC-4216 (50.00) which was at par with Gujarat Cowpea-1 (44.98).

The post-emergence seedling mortality was recorded significantly minimum in Gujarat Forage Cowpea-4 (1.38) which was at par with Gujarat Forage Cowpea-2 (3.41). The next best in order of merit was Gujarat Forage Cowpea-1 (12.21) followed by C-43 (17.23). Gujarat Forage Cowpea-3 (17.23), EC-4216 (22.35), ACS-17 (24.83), Gujarat Cowpea-4 (27.39), Gujarat Cowpea-1 (32.44). Gujarat Cowpea-3 (37.36) and Pusa Falguni (44.98) while significantly maximum mortality per cent was observed in C-58 (60.20).

The total seedlings mortality per cent as observed significantly minimum in Gujarat Forage Cowpea-4 (6.29) which was at par with Gujarat Forage Cowpea-2 (12.21). The next best in order of merit was C-43 (39.89) followed by Gujarat Forage Cowpea-1 (50.00), Gujarat Forage Cowpea-3 (52.51), Gujarat Cowpea-4 (55.01), Gujarat Cowpea-3 (57.63), ACS-17 (67.8) Pusa falguni (72.85), EC-4216 (72.85), Gujarat Cowpea-1 (77.62) while significantly maximum seedling mortality per cent was observed in C-58 (94.28).

The final plant stand per cent was significantly observed maximum in Gujarat Forage Cowpea-4 (94.28) which was at par with Gujarat Forage Cowpea-2 (87.76). The next best in order of merit was C-43 (61.10) followed by Gujarat Forage Cowpea-1 (50.00), Gujarat

Table 1: Response of different cowpea varieties / cultures against *Fusarium solani* under pot condition

Sr. No.	variety / culture	Mortality (%)				Degree of resistance
		Pre- emergence	Post- emergence	Total	Final plant stand	
1.	Gujarat Cowpea 1	42.12* (44.98)**	34.72 (32.44)	61.77 (77.62)	28.22 (22.35)	S
2.	Gujarat Cowpea-3	26.19 (19.47)	37.68 (37.36)	49.39 (57.63)	40.61 (42.36)	MS
3.	Gujarat Cowpea-4	31.55 (27.37)	31.56 (27.39)	47.88 (55.01)	42.12 (44.98)	MS
4.	Gujarat Forage Cowpea-1	37.73 (37.44)	20.46 (12.21)	45.00 (50.00)	45.00 (50.00)	MS
5.	Gujarat Forage Cowpea-2	14.54 (6.30)	10.65 (3.41)	20.46 (12.21)	69.53 (87.76)	MR
6.	Gujarat Forge Cowpea-3	36.22 (34.91)	24.53 (17.23)	46.44 (52.51)	43.56 (47.48)	MS
7.	Gujarat Forge Cowpea-4	10.65 (3.41)	6.75 (1.38)	14.53 (6.29)	76.17 (94.28)	R
8.	Pusa falguni	31.55 (27.37)	42.12 (44.98)	58.60 (72.85)	31.39 (27.12)	S
9.	C-43	28.22 (22.35)	24.53 (17.23)	39.17 (39.89)	50.83 (61.10)	MS
10.	C-58	34.34 (31.82)	50.89 (60.20)	76.17 (94.28)	14.54 (6.30)	S
11.	ACS 17	37.73 (37.44)	29.89 (24.83)	55.43 (67.8)	37.73 (37.44)	MS
12.	EC-4216	45.00 (50.00)	28.22 (22.35)	58.60 (72.85)	31.39 (27.12)	S
	S.E.±	2.74	2.61	2.89	2.71	
	C.D. (P=0.05)	7.60	7.23	8.01	7.52	
	CV%	17.51	18.29	12.17	12.73	

* Values indicate arc sine transformed value

** Values in parenthesis are retransformed values

Cowpea-4 (44.98), Gujarat Forage Cowpea-3 (47.48), Gujarat Cowpea-3 (42.36), ACS-17 (37.44). Significantly minimum plant stand was observed in C-58 (6.30) followed by Gujarat Cowpea-1 (22.35), EC-4216 (27.12) and Pusa Falguni (27.12).

From the result it is evident that out of 12 varieties / cultures screened against pathogen, except Gujarat Forage Cowpea-4, none was found resistant while C-58, Gujarat Cowpea, EC-4216 and Pusa Falguni were found to be susceptible. All other varieties were moderately susceptible against *F. solani*.

Out of twelve varieties/cultures of cowpea screened under glass house condition against *Fusarium solani*, only Gujarat Forage Cowpea-4 showed resistant reaction. Four varieties viz., C-58, Gujarat Cowpea-1, Pusa Falguni and EC-4216 showed susceptible reaction. Similar studies were conducted by Sajise (1988), Shihata and Gad (1989) and Shihata *et al.* (1988) where they found cowpea cultivar CES 42-2 and TVu 1560 as resistant cultivar, respectively against *F. solani*. In present studies Pusa Falguni was found as susceptible to Fusarium wilt and these observations are also in harmony with Ramchandran *et al.* (1982) who reported Pusa Falguni as susceptible cowpea variety against cowpea top necrosis caused by *F. equiseti* while Pandav (2002) also reported Pusa Falguni as a susceptible variety against cowpea wilt (*F. solani*) under pot condition.

Authors' affiliations:

K.R. JOSHI, Department of Plant Pathology, Bidi Tobacco Research Station, Anand Agricultural University, ANAND (GUJARAT) INDIA

P.M. PATEL AND M.R. PATEL, Department of Agronomy, Main Forage Research Station, Anand Agricultural University, ANAND (GUJARAT) INDIA

R.M. PATEL, Department of Biochemistry, Main Forage Research Station, Anand Agricultural University, ANAND (GUJARAT) INDIA

REFERENCES

- Agarwal, S.C. and Kothasane, S.R. (1971).** Resistance in some soybean varieties against *Sclerotium rolfsii* Sacc. *Indian Phytopath.*, **24** (2) : 401-403.
- Biswas, K.K. and Sen, C. (2000).** Management of stem rot of groundnut caused by *Sclerotium rolfsii* through *Trichoderma harzianum*. *Indian Phytopath.*, **53** (3): 290-295.
- Florini, D.A. (1997).** Nematodes and other soil borne pathogens of cowpea. In Sing, B.B.; Mohanraj, K.E. and Jackai, L.E.N. (Ed). *Advance in cowpea research*. International Institute of Tropical Agriculture, Ibadan, Nigeria and Japan. U.K. Publication. 193pp.
- Haware, M.P.(1993).** Fusarium disease of crops in India *Indian Phytopath.*, **46**(2):101-109.
- Pandav, F.J. (2002).** Studies on cowpea wilt (*Fusarium solani*) under South Gujarat condition. M.Sc. (Ag.) Thesis, Gujarat Agriculture University, Navsari, Gujarat (India).
- Ramchandran, P., Summanwar, A.S. and Lal, S.P. (1982).** Cowpea top necrosis caused by *Fusarium equiseti* (Corda) Sacc. *Curr. Sci.*, **51** (9) : 475-477.
- Sajise, C.E. (1988).** Influence of cultivar, inoculums density and plant age on the incidence of Fusarium root and stem rot in cowpea. *Ann. Trop. Res.*, **10** (1): 9-15
- Shihata, Z.A., Abdel Latif, M.R., Metry, S.W. and Ghazy, M.A. (1988).** Reaction of some cowpea varieties to fusarium wilt and differences in chemical composition of susceptible and resistant cowpea cultivars. *Assuit. J. Agril. Sci.*, **19** (3): 327-342.
- Shihata, Z.A. and Gad El Hak, S.H. (1989).** Cowpea wilt and root rot disease in El-Mina Egypt. *Assuit. J. Agril. Sci.*, **20** (3) :159-171.
