The Andhra Agric. J 63 (1): 150-154, 2016

Management of Corynespora Leaf Spot of Blackgram

Sandeep Naik G, M Adinarayana, V Manoj Kumar and T Madhumathi
Department of Plant Pathology, Agricultural College, Bapatla- 522101, Andhra Pradesh

ABSTRACT

Twelve fungicides were evaluated for their efficacy against corynespora leaf spot of blackgram caused by *Corynespora cassiicola* both *in vitro* and *in vivo*. Hexaconazole 0.2%, hexaconazole + captan 0.15% and propiconazole 0.1% inhibited 92.20, 90.86 and 87.2% of radial growth respectively over control *in vitro*. Hexaconazole 0.2%, hexaconazole + captan 0.15% and mancozeb 0.25% completely inhibited sporulation and spore germination while 0.3% copper oxychloride has recorded 99.48% inhibition on spore germination over control. Among the chemicals evaluated, lowest per cent disease index (PDI) was recorded with 0.25% mancozeb during *kharif* (14.07) and *rabi* (13.33) followed by 0.15% hexaconazole + captan which has recorded 16.30 during *kharif* and 14.81 during *rabi*. Highest yield of 10.95 and 10.49 q ha^{-1} with B: C ratio of 2.11 and 2.06 were obtained in 0.15% hexaconazole + captan combination treatment during *kharif* and *rabi* 2012-13, respectively.

Key words : Blackgram , Corynespora leaf spot, Fungicides.

Blackgram or *urdbean* (*Vigna mungo* (L.) Hepper) is an important pulse crop of Andhra Pradesh (A.P) grown in an area of 4.29 lakh ha producing 2.51 lakh t with a productivity of 585 kg ha^{-1} (Department of Agriculture and Cooperation, Government of A.P, 2010). Leaf spot incited by *Corynespora cassiicola* (Berk. and Curt.) is a serious threat in A.P. and caused yield loss ranging between 15 to 60 per cent Wei (1950). The loss may be extended to the tune of 60 per cent in blackgram (Reddy, 1998; Singh *et al.,* 2010). The disease has recently assumed from endemic to epidemic status which is mainly due to lack of coordinated approach to control the disease.

MATERIAL AND METHODS

Effect of fungicides on mycelial growth and sporulation of *C. cassiicola*

Selected fungicides *viz*., copper oxychloride (0.3%), mancozeb (0.25%), carbendazim (0.1%), hexaconazole (0.2%), tridemorph (0.1%), hexaconazole + captan (0.15%), propiconazole (0.1), difenconazole (0.05%), azoxystrobin (0.05%), trifloxystrobin+ tebuconazole (0.05%), kresoxim methyl (0.05%) and chlorothalonil (0.15%) were evaluated *in vitro* against *C. cassiicola* by employing poisoned food technique (Nene and Thapliyal, 1993). Each treatment was replicated thrice by adopting completely randomized design (Gomez and Gomez, 1984). Radial growth of the *C. cassiicola* was recorded after its the full growth in check and sporulation was observed for each treatment by using haemocytometer. Per cent inhibition of growth over check was calculated using the formula given by Vincent (1927).

Effect of fungicides on spore germination of *C. cassiicola*

In order to study the effect of fungicides on the spore germination of *C. cassiicola*, the spore suspension of *C. cassiicola* was prepared with sterile distilled water and the concentration of spores was estimated as 10^6 conidia/ml using a haemocytometer. In one of the wells of a bicavity slide, 0.5 ml of each fungicide solution was placed by using a sterilized pipette and was allowed to dry at room temperature. To the same equal volume of spore suspension of *C. cassiicola* was later placed on the dried film of fungicide solution using a sterilized pipette. Cavity slide having only spore suspension without fungicide solution was used as control in the other cavity and the slides were incubated in the moist chambers at 25±1^{0}C for 24 h. Each treatment was replicated thrice by adopting completely randomized design (CRD). At the end of the

incubation period, on spore germination of *C. cassiicola* was observed in five microscopic fields per replication and per cent inhibition of spore germination was calculated using the formula given by Vincent (1927).

$$I = \frac{C-T}{C} X100$$

Effect of fungicides on corynespora leaf spot of blackgram *in vivo*

Field experiment was conducted during *kharif* and *rabi* 2012-13 at the Regional Agricultural Research Station, Lam, Guntur, Andhra Pradesh. The experiment was laid out in a Randomized Block Design with thirteen treatments as mentioned in *in vitro*. Susceptible variety LBG 752 was sown at a spacing of 30 x 10 cm, the chemical treatments were imposed as three sprays to run off at ten days interval starting from 30 Days After Sowing. Corynespora leaf spot disease severity was recorded using 1-9 scale (Alice and Nadarajan, 2007) four days after the third spray and PDI was calculated using the formula given by Wheeler (1969).

$$PDI = \frac{\text{Sum of all the numerical ratings}}{\text{Number of observations} \times \text{maximum disease grade}} \times 100$$

RESULTS AND DISCUSSION

Effect of fungicides on mycelial growth and sporulation of *C. cassiicola*

All fungicidal treatments significantly reduced mycelial growth of *C. cassiicola* compared to control. Among the chemical treatments, hexaconazole @ 0.2% (0.70 cm) and combinations of hexaconazole + captan @ 0.15% (0.82 cm) have significantly reduced the radial growth of *C. cassicola* and showed highest per cent inhibition of radial growth over control (92.20 and 90.86%, respectively) and was followed by 0.1% propiconazole, 0.25% mancozeb with 87.2 and 83.12% inhibition over control respectively. Mancozeb (0.25%), copper oxychloride (0.3%), hexaconazole (0.2%) and hexaconazole + captan (0.15%) have completely inhibited the sporulation (Table 1).

Effect of fungicides on spore germination of *C. cassiicola*

All the tested fungicides inhibited spore germination of *C. cassiicola*. Among the treatments, mancozeb @ 0.25%, hexaconazole @ 0.2% and hexaconazole + captan @ 0.15% showed complete inhibition of spore germination. The fungicides copper oxychloride @ 0.3% (99.48%), propiconazole @ 0.1% (96.11%), trifloxystrobin + tebuconazole @ 0.05% (95.08%) and difenconazole @ 0.05% (89.64%) have registered significantly superior per cent inhibition of spore germination over control (Table 1).

Nagalakshmi and Rao (1995) reported that 0.25% mancozeb and 0.3% copper oxychloride effectively inhibited the growth of *C. cassiicola* and Prasad (1999) reported complete inhibition by 0.25% mancozeb, 0.3% copper oxychloride, 0.1% tridemorph, 0.2% captan and 0.1% chlorothalonil. While Sporulation was reported to completely inhibit by 0.25% mancozeb, 0.3% copper oxychloride, 0.1% hexaconazole, 0.1% propiconazole and 0.1% difenconazole.

Field evaluation of fungicides

During *kharif* 2012-13, all the fiungicides evaluated were effective in reducing the corynespora leaf spot disease on blackgram. The lowest PDI was recorded with 0.25% mancozeb (14.07) followed by 0.15% hexaconazole + captan (16.30) and 0.2% hexaconazole (17.78) and were statistically on a par. Seed yield in 0.15% hexaconazole + captan (10.95 q ha^{-1}) was found to be on a par with 0.05% trifloxystrobin + tebuconazole (10.90 q ha^{-1}), 0.25% mancozeb (10.41 q ha^{-1}) and hexaconazole @ 0.2% (9.30 q ha^{-1}) treatments and have recorded significantly higher yield than in unsprayed check (6.72 q ha^{-1}) and was 63.02% more than control. Highest B: C ratio was obtained with hexaconazole + captan (2.11) (Table 2).

During *rabi* 2012-13, all the chemicals evaluated were significantly effective in reducing the corynespora leaf spot disease on blackgram. The lowest PDI of 13.33 was recorded with 0.25% mancozeb followed by 0.15% hexaconazole + captan (14.81) and 0.2% hexaconazole (18.52) and were statistically on a par. Significant highest seed yield was obtained

Table 1. Efficacy of fungicides against *Corynespora cassiicola in vitro.*

Treatment	Conc. (%)	Mycelial growth (cm)*		Sporulation*		Spore germination**	
		12 DAI	% Inhibition over control	No. of spores (x 10^4/ml)	% Inhibition over control	% germination	% inhibition over control
T1-Copper oxychloride	0.3	4.13 (2.15)^{h}	53.99	0.00 (0.71)^{a}	100.00	0.53 (3.41)^{ab}	99.4
T2-Mancozeb	0.25	1.52 (1.42)^{d}	83.12	0.00 (0.71)^{a}	100.00	0.00 (0.00)^{a}	100.0
T3-Carbendazim	0.1	6.53 (2.65)^{j}	27.27	19.73 (4.50)^{h}	21.69	76.66 (61.14)^{i}	19.0
T4-Hexaconazole	0.2	0.70 (1.09)^{a}	92.20	0.00 (0.71)^{a}	100.00	0.00 (0.00)^{a}	100.0
T5- Tridemorph	0.1	3.32 (1.95)^{f}	63.08	5.47 (2.44)^{e}	78.31	21.23 (27.43)^{f}	78.2
T6-Hexaconazole+captan	0.15	0.82 (1.14)^{ab}	90.86	0.00 (0.71)^{a}	100.00	0.00 (0.00)^{a}	100.0
T7-Propiconazole	0.1	1.15 (1.28)^{c}	87.20	0.27 (0.87)^{b}	98.94	3.89 (11.28)^{c}	96.0
T8-Difenconazole	0.05	3.75 (2.06)^{g}	58.26	2.47 (1.72)^{cd}	90.21	10.36 (18.78)^{e}	89.4
T9-Azoxystrobin	0.05	7.58 (2.84)^{kl}	15.58	22.60 (4.81)^{i}	10.32	86.29 (68.28)^{j}	13.2
T10- Trifloxystrobin+ Tebuconazole	0.05	1.93 (1.55)^{e}	78.48	2.27 (1.66)^{c}	91.01	4.92 (12.79)^{cd}	95.1
T11-Kresoxim methyl	0.05	7.27 (2.78)^{k}	19.11	17.07 (4.19)^{g}	32.28	68.96 (56.14)^{h}	27.9
T12-Chlorothalonil	0.15	5.15 (2.37)^{i}	42.67	15.60 (4.01)^{f}	38.10	59.60 (50.54)^{g}	37.6
T13-Check	-	8.98 (3.07)^{m}	-	25.20 (5.07)^{j}	-	97.74 (81.49)^{k}	-
SEm±		0.02		0.03		0.78	
CD (P d" 0.05)		0.08		0.09		2.40	
CV (%)		2.21		2.05		4.49	

*Square root transformed values **Arc sine transformed values
Figures with the same alphabet do not differ significantly

with hexaconazole + captan @ 0.15% (10.49 q ha^{-1}) which was 62.53% more than unsprayed check (6.37 q ha^{-1}) (Table 2). Singh *et al.* (2010) reported that mancozeb @ 0.25% and copper oxychloride @ 0.3% were effective in controlling the corynespora leaf spot of blackgram and is widely adopted by the farmers of Krishna Godavari Zone of Andhra Pradesh in rice fallow blackgram.

Nagalakshmi and Rao (1995) reported that 0.3% copper oxychloride and by 0.25% mancozeb were significantly superior in reducing the corynespora leaf spot disease incidence and increased seed yield of blackgram under field conditions. Srinivasulu *et al.* (1996) reported that mancozeb @ 0.3% significantly superior in reducing the corynespora leaf spot disease and increasing the seed yield of blackgram. Similar

Table 2. Effect of fungicides on corynespora leaf spot disease severity and yield of blackgram during 2012-13.

Treatment	Conc. (%)	Kharif 2012-13					Rabi 2012-13				
		PDI*	% Decrease over control	Yield (q ha^{-1})*	% increase over control	BCR	PDI*	% decrease over control	Yield (q ha^{-1})*	% increase over control	BCR
T1-Copper oxychloride	0.3	25.93 (30.51)^{ef}	48.53 72.06	8.30 10.41	23.60 54.99	1.40 2.05	27.41 (31.56)^{cd}	51.95 76.63	7.84 9.89	21.52 53.16	1.36 2.03
T2-Mancozeb	0.25	14.07 (21.94)^{a}	22.06 64.71	7.04 9.30	4.87 38.44	1.08 1.75	13.33 (21.36)^{a}	27.28 67.53	6.80 8.12	5.32 25.82	1.10 1.51
T3-Carbendazim	0.1	39.26 (38.79)^{hi}	41.18 67.65	8.51 10.95	26.76 63.02	1.45 2.11	41.48 (40.08)^{g}	40.27 74.04	7.81 10.33	21.01 60.00	1.34 2.06
T4-Hexaconazole	0.2	17.78 (24.91)^{bc}	55.88 36.76	8.82 7.79	31.39 16.06	1.59 1.23	18.52 (25.43)^{b}	51.95 42.86	7.97 7.45	23.54 15.44	1.44 1.22
T5- Tridemorph	0.1	29.63 (32.97)^{fg}	11.76 57.35	7.70 10.90	14.60 62.29	1.11 1.98	34.07 (35.69)^{ef}	20.77 57.15	7.25 9.56	12.41 48.10	1.07 1.73
T6-Hexaconazole+ captan	0.15	16.30 (23.79)^{ab}	19.12 25.00	7.71 8.45	14.84 25.79	1.14 1.42	14.81 (22.54)^{ab}	25.98 38.97	7.16 8.17	10.89 26.58	1.08 1.44
T7-Propiconazole	0.1	22.22 (28.10)^{de}	-	6.72 0.68	-	1.04	27.41 (31.49)^{cd}	-	6.37 0.42	-	1.02
T8-Difenconazole	0.05	31.85 (34.33)^{g}		2.10 13.68			32.59 (34.77)^{de}		1.32 9.22		
T9-Azoxystrobin	0.05	44.44 (41.80)^{j}					45.19 (42.22)^{gh}				
T10- Trifloxystrobin+ Tebuconazole	0.05	21.48 (27.56)^{cd}					24.44 (29.60)^{c}				
T11-Kresoxim methyl	0.05	40.74 (39.65)^{hij}					42.22 (40.52)^{gh}				
T12-Chlorothalonil	0.15	37.78 (37.92)^{h}					34.81 (36.15)^{ef}				
T13-Check	-	50.37 (45.21)^{k}					57.04 (49.05)^{i}				
SEm±		0.92					1.27				
CD (P d" 0.05)		2.83					3.91				
CV (%)		6.03					6.49				

* Mean of three replications
Figures in parentheses are arc sine transformed values
Treatment means with same alphabet do not differ significantly

results in efficacy of 0.3% mancozeb on *C. cassiicola* were made by Mukherjee and Dasgupta (1981); Jones and Jones (1984) and Manju *et al*. (2002) on papaya, tomato and rubber, respectively.

LITERATURE CITED

Alice D and Nadarajan N 2007 Pulses: Screening techniques and assessment for disease resistance. *All India Coordinated Research Project on MULLaRP* – Tamil Nadu Agricultural University. Kasturi Graphics and Printers, Coimbattore. 24.

Department of Agriculture and Cooperation, Government of A.P. 2010. Area and production of agricultural crops in Andhra Pradesh. www.agri.ap.nic.in.

Gomez K A and Gomez A A 1984 *Statistical Procedures for Agricultural Research*. Second edition, John Wiley and Sons Ltd., Singapore. 683.

Jones J P and Jones J B 1984 Target spot of tomato: epidemiology and control. *Proceedings of the Florida State Horticultural Society*, 97: 216-218.

Manju M J Kuruvilla J C Idicula P S and Vinod K K 2002 Corynespora leaf fall disease management in *Hevea* using oil dispersible and dust fungicide formulations. *Indian Journal of Natural Rubber Research,* 15 (1): 44-48.

Mukherjee N and Dasgupta M K 1981 Leaf blight and decline disease of papaya. *Indian Agriculturist*. 26(2): 147-149.

Nagalakshmi T and Rao M S 1995 Evaluation of fungicides against *Corynespora cassiicola* (Berk. and Curt.) Wei. *The Andhra Agricultural Journal*, 42 (1-4): 54-56.

Nene Y L and Thapliyal P N 1993 Poisoned food technique. *Fungicides in Plant Disease Control* (2nd Edition). Oxford and IBH publication, New Delhi, India. 413-415.

Prasad Y V 1999 Investigation into Corynespora leaf spot of blackgram. *Ph.D. (Ag.) Thesis,* Acharya N.G. Ranga Agricultural University, Hyderabad.

Reddy M V 1998 Diseases of pulse crops in Andhra Pradesh. *Short course on Rice fallow pulses lecture notes*, 102-108.

Singh B B Dixit G P and Katiyar P K 2010 Vigna Research in India (25 Years of Research Achievements). *All India Coordinated Research Project on MULLaRP*, IIPR, Kanpur. 118-127.

Srinivasulu B Rao M P P and Satyanarayana A 1996 Research note changing disease scenario and research priorities on *Rabi* Urd in Andhra Pradesh. *The Andhra Agricultural Journal*, 43(2-4): 179-184.

Vincent J M 1927 Distortion of fungal hyphae in the presence of certain inhibitors. *Nature,*59: 850.

Wei C T 1950 Notes on *Corynespora*. *Mycological Papers*, 34: 1-9.

Wheeler B E J 1969 *An Introduction to Plant Diseases*. John Wiley publication, London. 301.

(Received on 29.04.2014 and revised on 19.10.2014)