EVALUATION OF FUNGICIDES AND PHYTO-EXTRACTS ON *ALTERNARIA* BLIGHT OF CUMIN

CHAUHAN, S.P.; PATEL, N. R.; ALIYA, V. N. AND THAKKAR, R. V.

DEPARTMENT OF PLANT PATHOLOGY
S. D. AGRICULTURAL UNIVERSITY
SARDARKRUSHINAGAR – 385 506, GUJARAT, INDIA

EMAIL: ronakpath@gmail.com

ABSTRACT

All the fungicides significantly reduced Alternaria blight intensity ranging from 22.00 to 67.90 per cent in cumin crop with increasing seed yield, seed weight and volatile oil content as compared to untreated control (67.90 %). Among the all fungicides, kresoxym methyl (0.044%) was significantly superior over rest of the fungicides, which was recorded the minimum disease intensity (22.00 %), maximum seed yield (428 kg/ha), highest 1000-seed weight (4.51 g) and volatile oil content (4.43 %) followed by mancozeb and difenoconazole.

KEY WORDS: Alternaria blight, Cumin, Cuminum cyminum, Phyto-extract

INTRODUCTION

Cumin (*Cuminum cyminum* L.) popularly known as "Zeera," is one of the most important seed spices crop of India. It has many synonyms corresponding to regions *viz*., Jeeru (Gujarati), Jirakam (Malayalum), Jiregire (Marathi), Jiragum (Tamil), Kumin (Japanese), Kuming (Chinese) and Sugandhum, Jiraka (Sanskrit). It belongs to the family *Apiaceae*. The cultivation of cumin is confined to the tropical and sub-tropical region of the world and India is one of the principal countries engaged in its cultivation. It is also considered to be the native of Egypt, Turkey and East Mediterranean region. It is mainly cultivated in India, Pakistan, Iran, Turkey, China, Egypt and Israel, *etc*. In India, it is mainly cultivated in Gujarat, Rajasthan and in some parts of Madhya Pradesh as well as Uttar Pradesh. The main cumin growing districts in Gujarat are Patan, Banaskantha and Mehsana of North Gujarat region and Surendranagar, Rajkot, Junagadh, Jamnagar and Amreli of Saurashtra region. Cumin seeds are largely used as a condiment and form an essential ingredient in all mixed spices and curry powder for flavouring soups, pickles and for seasoning breads and cakes. Cumin seeds are considered as stimulant, carminative, stomachic, astringent and useful in diarrhea and dyspepsia. It is good medicine against digestive and intestinal upsets and used in veterinary medicine (Aiyer and Narayan, 1950). Cumin seed contains 2.5 to 4.5 per cent of volatile oil. The oil is extensively used in perfumery and for flavouring liquors and cordials. The seed also contains cumin aldehyde or cuminol which attributes the aroma and special medicinal properties. In addition to this, the seed also contains 6.2 per cent moisture, 17.7 per cent protein, 23.8 per cent fat, 9.1 per cent crude fiber, 35.5 per cent carbohydrate, 7.7 per cent mineral matter, 0.09 per cent calcium, 0.45 per cent phosphorous, 0.048 per cent iron, 1.6 per cent sodium, 2.1 per cent potassium and

also vitamins B_1, B_2, vitamin 'C' and vitamin 'A' *etc*. (Shankaracharya and Natrajan, 1971). Cumin is a "*rabi"* season crop, generally grown on sandy to loamy sand soil. Healthy crop under natural conditions matures in 110 to 115 days. Seed quality and crop production are badly affected with little alteration in sowing, irrigation, fungicidal spraying and other cultural practices. The market value of cumin depends much on its quality and therefore, the farmers are very much concerned with the quality of the produce, besides the yield.

MATERIALS AND METHODS

For management of *Alternaria* blight disease of cumin under field condition, a field trial was conducted at Seed Spices Research Station, S. D. Agricultural University, Jagudan during *Rabi* 2017-18. With a view to test the efficacy of fungicides and phyto-extracts against Alternaria blight disease of cumin, eleven different fungicides and phyto-extracts *viz.*, mancozeb, Kresoxym methyl, difenoconazole, tebuconazole + trifloxystrobin, tebuconazole, chlorothalonil, captan + hexaconazole, propiconazole, neem leaf extract and Neem seed kernel extract were selected and evaluated with untreated control. These plants were sown in natural conditions and were regularly observed for the development of the disease till harvest, without adding any inoculum. The observation on Per cent Disease Intensity (PDI) (as per the formula given by Datar and Mayee, 1981), Seed yield, Volatile oil per cent (as epr the methods described in (AOAC, 2000) and 1000-seed weight (g) were recorded.

RESULTS AND DICUSSION

Data recorded on the disease intensity (%), seed yield (kg/ha), 1000 seed weight (g) and volatile oil content (%) of cumin are presented in Table 1 and 2.

The data presented in Table 1 revealed that all the fungicides and phyto-extracts treatments were effectively superior over control in checking the *Alternaria* blight disease. Among the fungicides, Kresoxym methyl (0.044 %) was significantly superior over rest of the fungicides, which was recorded the minimum disease intensity of 22.00 per cent. Mancozeb (0.25 %) found second better fungicide for controlling the disease with 27.51 per cent disease intensity, followed by difenoconazole (0.025 %) and propiconazole (0.04 %) in controlling the disease with 37.44 and 39.02 per cent disease intensity, respectively and were found statistically at par with each other. NSKE (5 %), chlorothalonil (0.2 %), captan + hexaconazole (0.09 %), neem leaf extract (10 %), tebuconazole + trifloxystrobin (0.045 %) and tebuconazole (0.1 %) were recorded 44.04, 50.24, 52.08, 52.45, 55.71 and 56.57 per cent disease intensity, respectively. The maximum per cent disease intensity (67.90) was recorded in untreated control.

All fungicides recorded higher yield as compared to control. The maximum seed yield (428 kg/ha) was obtained with the spraying of Kresoxym methyl (0.044 %) followed by mancozeb at 0.25 per cent (404 kg/ha) and difenoconazole (388 kg/ha) and they were statistically at par with each other (Table 1).

It is evident from the Table 2 that the 1000 seed weight volatile oil content of cumin invariably increased in all the plots which was sprayed with fungicides and phyto-extracts as compared to untreated plot. The maximum 1000 seed weight of 4.51 g was obtained with the spraying of Kresoxym methyl (0.044 %) followed by mancozeb (4.40 g) and difenoconazole (4.34 g) and they were statistically at par with each other. The other effective fungicides and phyto-extracts *viz.*, propiconazole (0.04 %), chlorothalonil (0.2 %), tebuconazole + trifloxystrobin (0.045 %), captan + hexaconazole (0.09 %), tebuconazole (0.1 %), neem leaf extract (10 %), and NSKE (5 %) were recorded 4.28, 3.88, 3.86, 3.84, 3.83, 3.79 and 3.76 g,

respectively. The maximum volatile oil content of 4.43 per cent was obtained with the spraying of Kresoxym methyl (0.044 %) followed by mancozeb (0.25 %) 4.35 per cent and difenoconazole (0.025 %) 4.23 per cent and they were found statistically at par with each other.

Dange *et al*. (1992) evaluated six different schedules of 0.25 per cent mancozeb and compared with control. Results revealed that four sprays given at 35, 50, 65 and 80 days after cumin crop sowing were found effective and economical followed by the five sprays given at 30, 40, 50, 60 and 70 days after sowing. Akbari and Dhruj (1995) evaluated nine fungicides against *Alternaria* blight of *Cuminum cyminum* L. caused by *Alternaria burnsii*. They reported effectiveness of three sprays of mancozeb (0.2%) or propiconazole (0.025 %) at twelve days interval for the best control and higher grain yield. Sunder (2005) reported that seed treatment with Bavistin (2.5 g/kg) + foliar sprays of Indofil M-45 (0.2%) were found most effective fungicide in controlling the *Alternaria* blight of cumin. Pipaliya and Jadeja (2008) evaluated five fungicides against cumin blight caused by *A. burnsii* and reported that, five sprays of mancozeb (0.25%) were most effective in reducing disease with the maximum grain yield of 1561 kg/ha followed by Curzat (0.1%) with the yield of (1424 kg/ha). The minimum intensity of blight was found with spraying of Kresoxym-methyl 44.3 SC @ 0.044 % at 35, 45 and 55 DAG (27.39 %) and the maximum seed yield of cumin (421 kg/ha) (Anon., 2017). The described results are found in harmony with above researchers.

CONCLUSION

Among the all fungicides, kresoxym methyl (0.044%) was significantly superior over rest of the fungicides, which was recorded the minimum disease intensity (22.00 %), maximum seed yield (428 kg/ha), highest 1000-seed weight (4.51 g) and volatile oil content (4.43 %) followed by mancozeb and difenoconazole.

REFERENCES

A.O.A.C. (2000). *Official Method of Analysis*, Association of Official Agricultural Chemist, 11thEdn., Washington, D.C.

Aiyer, A. K. and Narayan, Y. (1950). *Field Crops of India*. The Bangalore Printing and Publishing Co. Ltd. p. 385.

Akbari, L. F. and Dhruj, I. U. (1995). Chemical control of *Alternaria* blight of cumin (*Cuminum cyminum* L.). *J. Spices and Aromatic Crops*, **4**(1) : 82-83.

Anonymous (2017). AGRESCO Report, Seed Spices Research, S. D. Agricultural University, Jagudan. pp. 11-12.

Dange, S. R. S.; Pandey, R. N. and Savaliya, R. L. (1992). Disease of cumin and their management. Agril. Revol., **13**(4) : 219-224.

Datar, V. V. and Mayee, C. D. (1981). Assessment of loss in tomato yield due to early blight. *Indian Phytopatho*., **34**(2) : 191-195.

Pipaliya, B. H. and Jadeja, K. B. (2008). Cultural variability and mancozeb sensitivity of different isolates of *A. burnsii*. *J. Mycol. Plant Patho.*, **38**(1): 121 - 112.

Shankaracharya, N. B. and Natrajan, C. P. (1971). Chemical composition and use of cumin. *Indian Food Packer*. **25:** 22-28.

Sunder, S. (2005). *Studies on cumin blight caused by Alternaria burnsii* (Uppal, Patel and Kamat). Doctoral dissertation, CCSHAU, Hisar.

Table 1: Effect of different fungicides and phyto-extracts on disease intensity of *Alternaria* blight and seed yield of cumin

Treatments	Conc. (%)	Disease Intensity (%)	Seed Yield (kg/ha)
T_1 :Mancozeb 75WP	0.25	31.83 (27.51)*	404
T_2 :Kresoxym methyl 44.3 SC	0.044	28.17 (22.00)	428
T_3 :Difenoconazole 25 EC	0.025	38.00 (37.44)	388
T_4 :Tebuconazole 50 WG + Trifloxystrobin 25 WG	0.045	48.56 (55.71)	290
T_5 :Tebuconazole 25 EC	0.1	49.05 (56.57)	282
T_6 :Chlorothalonil 75 WP	0.2	45.41 (50.24)	317
T_7 :Captan 70 WP + Hexaconazole 5 WP	0.09	46.47 (52.08)	302
T_8 :Propiconazole 25 EC	0.04	38.89 (39.02)	359
T_9 :Neem leaf Extract	10	46.68 (52.45)	263
T_{10} : NSKE (Neem seed kernel extract)	5	41.84 (44.04)	239
T_{11} : Untreated control	-	55.82 (67.90)	219
S.Em. ±	-	1.49	13.77
C.D. at 5 %	-	4.40	40.65
C.V. %	-	6.03	7.52

**** Figures in parentheses are retransformed values and outside the parenthesis are arcsine transformed values***

Table 2: Effect of different fungicides and phyto-extracts on 1000-seed weight and volatile oil of cumin

Treatments	**Conc. (%)**	**1000 Seed Weight (g)**	**Volatile Oil (%)**
T_1 :Mancozeb 75WP	0.25	4.40	4.35
T_2 :Kresoxym methyl 44.3 SC	0.044	4.51	4.43
T_3 :Difenoconazole 25 EC	0.025	4.34	4.23
T_4 :Tebuconazole 50 WG + Trifloxystrobin 25 WG	0.045	3.86	3.89
T_5 :Tebuconazole 25 EC	0.1	3.83	3.75
T_6 :Chlorothalonil 75 WP	0.2	3.88	4.07
T_7 :Captan 70 WP + Hexaconazole 5 WP	0.09	3.84	3.95
T_8 :Propiconazole 25 EC	0.04	4.28	4.13
T_9 :Neem leaf Extract	10	3.79	3.64
T_{10} : NSKE (Neem seed kernel extract)	5	3.76	3.45
T_{11} : Untreated control	-	3.72	3.34
S.Em. ±	-	0.04	0.04
C.D. at 5 %	-	0.12	0.12
C.V. %	-	1.82	1.83

[MS received : February 25 , 2019] *[MS accepted :March 18, 2019]*