SIGNIFICANCE OF DIFFERENT FUNGICIDES FOR THE CONTROL OF POWDERY MILDEW DISEASE (*SPHAEROTHECA* SP.) OF NIGER (*GUIZOTIA ABYSSINICA* CASS) A TRADITIONAL TRIBAL CROP

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Abstract: A field experiment with the four replications was conducted at the Niger Research Station (NRS) in *Rabi*, 2013-14 season at Navsari Agricultural University (NAU), Vanarasi, Navsari, Gujarat on the Powdery mildew disease of Niger cultivar. In this experiment, eight different fungicides have been evaluated for the control of Powdery mildew disease out of which, all the fungicidal treatments were significantly superior over the control. All the fungicidal treatments were significantly superior over the control to reduce the Powdery mildew disease. The least incidence of Powdery mildew disease (12.42 PDI) observed in T5 treatment containing Wettable Sulphur (0.2%) which, was followed by the T-2 Hexaconazole (0.1%) for (15.50 PDI) respectively. With respect to seed yield, Wettable Sulphur (0.2%) treatment recorded the highest seed yield (699 Kg/ha) followed by T-2 Hexaconazole (0.1%) 598 Kg/ha. This study concludes that foliar efficacy is an important step in controlling the above diseases.

Keywords: Niger, Powdery mildew, Fungicides, Crop

INTRODUCTION

Niger (*Guizotia abyssinica* Cass) is one of the important minor oilseed crops of India. In India, it is mainly cultivated in tribal pockets of Gujarat, M.P., Orissa, Maharashtra, Bihar, Karnataka and Andhara Pradesh. Niger is a crop of dry areas grown mostly by tribal and interior places as life line of tribal segment. It is also know by various names such as Ramtil or Kalatil in India and Noog in Ethiopia. The Niger crop is found infested by number of diseases & pests, which causes harsh damage to the crop. Further, the accidental rain at flowering stage leads the expansion of *Alternaria, Cercospora* leaf spot and Powdery mildew disease incidence and results in the poor seed set and seed yield. The crop is affected by number of fungal diseases. The important diseases of Niger are Alternaria blight (*Alternaria porii* & *A. alternata*), leaf spot (*Cercospora guizoticola*), Seedling blight (*Alternaria tenuis*), seed rot (*Rhizotonia bataticola*), rust (*Puccinia guizotiae*), powdery mildew (*Sphaerotheca* sp.), root rot (*Macrophomina phaseolina*) and cuscuta as *Phanerogamic* parasite (Rajpurohit, 2004 and Rajpurohit & Dubal, 2009). Due to Powdery mildew disease in Niger crop, the yield loses are due to early defoliation as a result of the disease. All the aerial parts develop symptoms. Small cottony spot develops on the leaves which gradually cover the whole lamine (Vyas *etal*., 1981). Powdery mildew first appears as white, powdery spots that may form on both surfaces of leaves, on shoots, and seed capsules. These spots gradually spread over a large area of the leaves and stems. An exception is one of the powdery mildews that affect artichokes, onions, peppers, and tomatoes, it produces yellow patches on leaves but little powdery growth. Leaves infected with powdery mildew may gradually turn completely yellow, die, and fall off, which may expose fruit to sunburn. On some plants, powdery mildew may cause the leaves to twist, buckle, or otherwise distort. Powdery mildew fungal growth does not usually grow on vegetable fruits, although pea pods may get brownish spots. Severely infected plants may have reduced yields, shortened production times, and fruit that has little flavor. The pathogen is known to survive through some unknown collateral hosts. Currently studies pertaining to the use of fungicides in management of disease is highly emphasized (Rajpurohit *etal*. 2005).Considering the economic losses in this present investigation attempts were therefore made to ascertain the spectrum of fungal diseases of Niger crop.

MATERIAL AND METHOD

The experiment was laid out in RBD with the four replications at Niger Research Station (Vanarasi farm), Navsari Agricultural University (NAU), Navsari (Gujarat). In the *Rabi*, 2013-14 season against the Powdery mildew disease. The incidence results in poor seed set and seed yield. In such cases there is need to protect the crop through suitable fungicidal sprays at this stage. Hence, keeping in view all above parameters and facts, the study on fungicidal application on crop growth in Niger was initiated. In this experiment below, eight different fungicides was incorporated along with the control.

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Objective	**:**	**To find out the efficacy of fungicides against the Powdery mildew disease**
Location	**:**	**Niger Research Station (NRS)**
Year of commencement	**:**	***Rabi*, 2013-14**
Experimental details		
Treatment	**:**	**08**
Design	**:**	**R.B.D.**
Replication	**:**	**Four**
Plot size in meter	**:**	**Gross: 4.0 x 3.0 m** **Net: 3.6 x 2.4 m**
H.F.		**1157.40**
Spacing	**:**	**30 x 10 cm**
Fertilizer NPK kg/ha	**:**	**20:20:00**
Date of sowing	**:**	**12.12.2013**
Date of harvesting	**:**	**21.03.2014**
Date of Weeding	**:**	**18.01.2014 & 06.02.2014**
Previous crop	**:**	**-**
Plant Protection measures adopted	**:**	**First spray at the initial appearance of the disease (07.02.2014)** **Second spray at the interval of 15 days (22.02.2014)**
Result	**:**	**Table: 2 & Table: 3**

Treatment details as follows

T_1- Carbendazim 50 WP (0.1%)
T_2- Hexaconazole (0.1%)
T_3- Mancozeb (0.2%)
T_4- Propiconazole (0.1%)
T_5- Wettable Sulphur (0.2%)
T_6- Carbendazim + Mancozeb (0.2%)
T_7- Chlorothalonil 75 WP (0.1 %)
T_8- Control

Application of required dose of fungicides was sprayed at the initial appearance of the disease and second at the interval of 15 days. Observation on foliar disease infection was calculated on Niger plant by observing top, middle and bottom leaves of the plant were chosen and scored as per the scale given below. Percent Disease Incidence (PDI) was recorded as per the disease intensity at field condition prior to spray and at the time of harvest by using Disease Rating scale of (0 to 5) as developed by Mayee and Datar, 1986, Townsend and Heuberger, 1943 (Table: 1).

Table: 1 Disease rating scale

Score	Description	Reaction
0	No infection	Immune
1	1-10 % lead area infected	Resistant
2	11-25 % lead area infected	Moderately Resistant
3	26-50 % lead area infected	Moderately Susceptible
4	51-70 % lead area infected	Susceptible
5	71-100 % lead area infected	Highly Susceptible

The average intensity in each plot was calculated by the formula as employed by Wheeler, 1969.

$$\textbf{PDI} = \frac{\text{Summation of infected plants}}{\text{No. of leaves observed x Max. Disease score}} \times 100$$

RESULT AND DISCUSSION

In this experiment, different fungicides have been evaluated to control the powdery mildew disease, small cottony spot develops on the leaves which gradually cover the whole lamine (Vyas *etal*., 1981). All of the powdery mildew fungi are obligate biotrophs, meaning that they require living host tissue on which to grow. As mentioned previously, most of the fungal growth is on the surface of the leaf or other plant part. The mildew penetrates the plant cuticle at regular intervals and produces specialized feeding structures called haustoria, which set up an intimate association with the epidermal cells. Nutrients produced by the plant for its own growth are instead diverted via the haustoria into the fungus. A few species of powdery mildew penetrate more deeply into the leaf, but still obtain their nutrients *via* haustoria. The asexual spores or conidia of powdery mildews are often produced in huge numbers (many thousands on a single leaf) and are readily dispersed by air currents and water splash etc. Powdery mildew attacks can therefore occur during spells of dry weather, when the progress of many other fungal diseases is checked. Powdery mildews overwinter in a number of ways depending on the mildew species and the host plant. Here, all the fungicidal treatment was significantly superior over control. All the fungicidal treatments were significantly superior over control to reduce the Powdery mildew disease. The least incidence of Powdery mildew disease (12.42 PDI) observed in T5 treatment containing Wettable Sulphur (0.2%) which, was followed by the T-2 Hexaconazole (0.1%) for (15.50 PDI) respectively (Table: 2). With respect to seed yield, Wettable Sulphur (0.2%) treatment recorded the highest seed yield (699 Kg/ha) followed by T-2 Hexaconazole (0.1%) 598 Kg/ha (Table: 3). The diseased can also be effectively controlled by spraying with sulfex at the rate of 0.3 percent as the disease starts appearing. Another spray can be after 10-15 days intervals depending upon the disease intensity (Sharma, 1982 and Sharma, 1989).

Table 1. Efficacy of foliar sprays on incidence of Powdery mildew disease of Niger crop

Sr. No.	Treatment	Replication				Mean
		I	II	III	IV	
T-1	Carbendazim 50 WP (0.1 %)	24.00 (29.33)	23.33 (28.88)	26.66 (31.08)	24.66 (29.77)	24.66 (29.76)
T-2	Hexaconazole (0.1%)	13.33 (21.41)	12.00 (20.26)	16.66 (24.08)	20.00 (20.56)	15.50 (23.07)
T-3	Mancozeb (0.2%)	22.00 (27.97)	24.66 (29.77)	19.33 (26.08)	26.00 (30.65)	23.00 (28.61)
T-4	Propiconazole (0.1%)	18.00 (25.10)	16.66 (24.08)	20.00 (26.56)	22.00 (27.97)	19.17 (25.92)
T-5	**Wettable Sulphur (0.2%)**	**13.33 (21.41)**	**10.00 (18.43)**	**14.00 (21.97)**	**12.33 (20.55)**	**12.42 (20.58)**
T-6	Carbendazim + Mancozeb (0.2%)	24.66 (29.77)	28.00 (31.94)	26.66 (31.08)	28.66 (32.36)	27.00 (31.28)
T-7	Chlorothalonil 75 WP (0.1 %)	28.66 (32.36)	30.66 (33.62)	26.66 (31.08)	31.33 (3403)	29.33 (32.76)

T-8	Control	33.33 (35.26)	32.00 (34.44)	28.00 (31.94)	32.66 (34.85)	31.50 (34.11)
SEm ±						**0.78**
CD at 5 %						**2.30**
CV %						**5.55**

Figure in the parenthesis are retransformed values

Table 2. Effect on seed yield of Niger crop

Sr. No.	**Treatment**	**Replication**				**Mean Yield (Kg/ha)**
		I	**II**	**III**	**IV**	
T-1	Carbendazim 50 WP (0.1 %)	450.00	421.00	490.00	511.00	468
T-2	Hexaconazole (0.1%)	600.00	649.00	588.00	556.00	598
T-3	Mancozeb (0.2%)	510.00	490.00	529.00	468.00	499
T-4	Propiconazole (0.1%)	500.00	552.00	589.00	481.00	531
T-5	**Wettable Sulphur (0.2%)**	**720.00**	**630.00**	**689.00**	**757.00**	**699**
T-6	Carbendazim + Mancozeb (0.2%)	400.00	348.00	421.00	399.00	392
T-7	Chlorothalonil 75 WP (0.1 %)	354.00	389.00	311.00	389.00	361
T-8	Control	300.00	280.00	245.00	221.00	262
SEm ±						**21.06**
CD at 5 %						**61.94**
CV %						**8.84**

REFERENCES

Mayee, C. D. and Datar, V. V. (1986). Phytopathometry Technical Bull-I, MAU, Parbhani. 88-89.

Rajpurohit T. S. (2004). *Ramtil ke rog avam unki roktham*. Narmada Krishi Parivar 2004.16 (1):3.

Rajpurohit, T.S, Sushma Nema and Khare, M. N. (2005). Current status of diseases of sesame and Niger and their management. Paper presented in National seminar on Strategies for enhancing production and export of sesame and Niger April 7-8, 2005 Abstract page 44-45.

Rajpurohit, T.S. and Shraddha Dubal, (2009). *Ramtil ki fasal ko rogon se bacheyen*. Modern Kheti Vol.7 (13): 17-19.

Rajpurohit, T.S. (2011). Diseases of Niger Their Management. *Plant Science Feed*.1 (2): 19-22.

Sharma, S.M. (1982). Improved technology for Sesamum and Niger. Indian Fmg.32:72-77.

Sharma, S. M. (1989). Niger seed in India. Three Meetings, Oilseeds held at Pantnagar and Hyderabad, India. IDRC/CRDI/CIID, 159-165.

Townsend, G. R. and Heuberger, J. W. (1943). Methods for estimating losses caused by diseases in fungicide experiments. *Plant Dis. Rep*., 27: 340-343.

Vyas, S.C., Prasad, K.V.V. and Khare, M.N. (1981). Diseases of Sesame and Niger and Their Contorl. Bull Directorete of Research, J.N.K.V.V., Jabalpur pp.16.

Wheeler, B. E. J. (1969). An Introduction to Plant Disease. John Willey and Sons, London, pages: 374.