Management of stemphylium blight disease caused by *Stemphylium vesicarium*in onion through different methodology

ABSTRACT

A field experiments was conducted at NHRDF, Regional Research Station, Nashik in two consecutive years during *rabi* 2022-23 and 2023-24 on onion for the management of stemphylium blight disease through different methodology like alteration in transplanting dates, chemical and bio-pesticides management as well as screening of stemphylium tolerant variety. In case of alteration in transplanting dates that the lowest intensity (99.6%) of stemphylium blight and highest yield (391.0q/ha) was recorded in 3rd week of December.In case of chemical fungicides with bio pesticides the lowest stemphylium blight disease intensity (0.66%) as well as highest yield (400.0q/ha) was recorded in treatment T_4 (Tebuconazole50% + Trifloxystrobin 25% WG @ 0.15% at 45, 60 and 75 DAT while, in case of varietal screening the lowest intensity (10.93%)of stemphylium blight as well as highest gross yield (397.33q/ha) with marketable (384.66q/ha) was recorded in variety NHRDF Red-4.

INTRODUCTION

Onion (*Allium cepa* L.) is an important vegetable or spices crop cultivated in almost all the states of the country. In India onion is cultivated in 3 seasons *viz*. *rabi*, *kharif* and late *kharif* seasons and maximum area under cultivation is being covered in *rabi* season (about 65%).Many fungicides have been tested for the management of Stemphylium blight of onion. The date of transplanting plays a major role in onion bulb production as well as reduced the load of stemphylium blight disease of onion. Mancozeb 75 WP (@ 0.2%) was found effective against Stemphylium blight (Pandey *et al*., 2008). Carbendazim, copper oxychloride, difenoconazole, chlorothalonil and hexaconozole have been reported, in the order of their merit as effective in the management of the Stemphylium blight of onion, potato, mustard and other crops by Gorawar and Hegde (2005). Pandey *et al*., (2023) reported that alternative spray of bio- pesticides and fungicides for more effective aginststemphylium blight and increase the yield. Pandey *et al*,. (2022) found triazole fungicides most effective in reducing the stemphylium blight incidence and intensity and the increase the bulb yield. Pandey *et al*. (2023) tested some fungicides and bio-agents and found effective against purple blotch of onion during kharif season.

Key words: Onion,Disease, Stemphylium blight, Incidence, Intensity, Variety, Fungicides, Pesticides, Bio-agents.

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2.It should be within 300 words in length.
3.It should briefly describe the purpose of the work, techniques and methods(**Missing**) used, major findings with important data and conclusions.

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Comment [BS4]: 1.Immediately after the Keywords, introduction should be given(Follow Authors guidelines)
2.Provide a factual background, clearly defined problem, proposed solution, a brief literature survey and **the scope and justification of the work done (Missing).**
3.Introduction is very diminutive, Kindly Elaborate with much more references with 10-15 latest references, within 550-650 words limit.

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MATERIAL AND METHODS

1- Effect of cultural practice like alteration in transplanting dates on the disease development

Experiment was conducted at the research farm of Regional Research Station, National Horticulture Research and Development Foundation, Nashik, Maharashtra on onion variety NHRDF Red - 4. Highly infested field was selected for this experiment with 3 x 1.2m plot size. Onion seedlings were transplanted in different dates viz. first, second, third and fourth weeks of December, and first, second and third weeks of January. Each treatment was replicated in three replications and irrigated as and when required. Data was recorded a disease intensity and subsequently calculated at 75 days after transplanting.

2 - Impact of different fungicides and bio agents against the stemphylium blight

For evaluating of efficacy of various fungicides and bio- agents as spray against the stemphylium blight disease, an experiment was conducted at research farm of Regional Research Station, National Horticulture Research and Development Foundation, Nashik, Maharashtra during the *Rabi* season (2022-2023 and 2023-24). The onion seedlings were transplanted with plot size (1.2x3m) in a randomized block design (RBD) with three replications. The first spraying was given 45 days after transplanting and three sprays were given at 15 days of intervals. The controlled plots were sprayed with water only. The observation on disease intensity was recorded after 5 days of each spray and yield data was recorded after the harvest of the crop. The average yield was calculated in q/ha.

Details of Treatments

T_1: Spray of Carbendazim12% + Mancozeb 63% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_2*:* Spray of Metalaxyl 4% + Mancozeb 64% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_3*:* Spray of Captan 70% + Hexaconazole 5% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

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T_4: Spray of Tebuconazole50% + Trifloxystrobin 25% WG @1.5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_5: Spray of Metiram55% + Pyraclostrobin 5% WG @1.5g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_6: Spray of *T.viride* @ 5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_7: spray of *Ps. fluorocence* @ 5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_8: *Bacillus subtillis* @5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T_9: Control (Unsprayed)

3- Screening of available variety for the resistance of disease.

Experiment was conducted during the *Rabi* season 2022-2023 and 2023-24 at Regional Research Station, National Horticulture Research and Development Foundation, Nashik, Maharashtra. The onion seedlings were transplanted with plot size (1.2x3m) in a randomized block design (RBD) with three replications. The standard agronomical practices were followed uniformly in all the varieties. The crop was harvested after attending the maturity. The data recorded on intensity of stemphylium blight disease after 75 days after transplanting and also recorded the gross and marketable yield of onion.

Details of variety

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V_1- Agrifound Light Red

V_2-NHRDF Red

V_3- NHRDF Red-2

V_4- NHRDF Red-4

V_5-NHRDF Fursungi

V_6- Agrifound White

V_7- Agrifound Rose

RESULTS AND DISCUSTION

Effect of cultural practice like alteration in transplanting dates on the disease development

Experiments were conducted in the field during the *rabi* season 2022-2023 and 2023-24 on onion variety NHRDF Red-4 to observe the impact of different dates of transplanting on disease intensity according to the procedure mentioned under "Materials and Method" Different dates of transplanting were arranged between 1stweek of Decemberto 3rd week of Januaryas weekly intervals (table-1). The disease intensity was recorded after 75 days after transplanting and the results are summarized in table-1

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Table-1 Effect of alterations in dates of transplanting on the disease intensity and yield (Combined data 2022-23 and 2023-24)

S.N.	Date of transplanting	Av. Disease Intensity%	Yield of bulb in (q/ha)
1	1st week of December	11.27 (3.43)	324.50
2	2nd week of December	12.47 (3.60)	320.17
3	3rd week of December	9.83 (3.22)	391.83
4	4th week of December	10.33 (3.29)	371.83
5	1st week of January	14.87 (3.92)	312.50
6	2nd week of January	16.20 (4.09)	283.0
7	3rd week of January	17.60 (4.25)	242.83
	S.Em±	**0.05**	**2.93**
	CD@ 5%	**0.11**	**6.05**

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Note: The data shows parenthesis square root transformed value

The combined data of two yearstrial are presented in Table-1 revealed that the significantly lowest intensity 9.83% and highest yield 391.83 q/ha was recorded in 3rd week of December and

the intensity it was found at par with 3rd week of December. The crop transplanted in 3rdweek of January recorded highest disease intensity (17.60%) with lowest yield (242.83q/ha).

Impact of different fungicides and bio agents against the stemphylium blight

Experiments were conducted in the field during the *rabi* season 2022-2023 and 2023-24 on onion variety NHRDF Red-4 to observe the impact of different fungicides and bio- agent for the control of stemphylium blight disease procedure mentioned under "Materials and Method". The combined data of two yearstrial are presented in Table-2 revealed that the disease intensity recorded after five days of first spray ranged from 0.60 to 3.0 %. The significantly lowest intensity 0.60% was recorded in treatment T4 (Tebuconazole50% + Trifloxystrobin 25% WG @ 0.15% at 45, 60 and 75 DAT). At after five days of second and third spray thesignificantly lowest intensity (2.87% and 7.27) as well as highest yield (399.17 q/ha) was recorded in treatment T4.

Table-2 Fungicidal and bio agents control of the disease in field(Combined Data 2022-23 and 2023-24)

Treatments	Stemphylium blight intensity %			Yield q/ha
	Intensity % after five days of first spray	Intensity %after five days of second spray	Intensity % after five days of third spray	
T1	1.67 (1.47)	4.33 (2.19)	11.40 (3.45)	366.33
T2	1.27 (1.32)	3.53 (2.0)	9.40 (3.15)	381.67
T3	1.40 (1.38)	3.93 (2.10)	9.80 (3.21)	373.17
T4	0.60 (1.04)	2.87 (1.82)	7.27 (2.78)	399.17
T5	0.93 (1.18)	3.13 (1.90)	8.20 (2.94)	394.17
T6	2.07 (1.60)	4.87 (2.31)	14.07 (3.82)	319.67
T7	2.33 (1.68)	5.13 (2.37)	14.67 (3.89)	314.67
T8	2.73 (1.79)	5.13 (2.37)	15.13 (3.95)	310.67
T9	3.0 (1.87)	6.33 (2.61)	18.67 (4.38)	290.67

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S.Em±	**0.07**	**0.08**	**0.07**	**2.99**
CD@ 5%	**0.14**	**0.16**	**0.14**	**6.09**

Note: The data shows parenthesis square root transformed value

Screening of available variety for the resistance of disease.

Experiment was conducted during the *rabi* season (2022-2023 and 2023-24). The combined data of two yearstrial are presented in Table-3 revealed that lowest stemphylium blight intensity (10.93%) and gross yield (397.0 q/ha) with marketable (383.83 q/ha) was recorded in variety NHRDF Red-4, while highest stemphylium blight intensity (15.60%) as well as lowest gross yield (240.0q/ha) was recorded in varieyAgrifound White. The lowest marketable yield (234.17 q/ha) was recorded in variety Agrifound Rose.

Table3 Screening of available variety for the resistance of disease(Combined data 2022-23 and 2023-24)

Variety	Stemphylium blight intensity % at 75 DAT	Gross yield	Marketable yield
Agrifound Light Red	12.80 (3.64)	330.0	321.67
NHRDF Red	13.87 (3.79)	278.17	266.0
NHRDF Red-2	12.13 (3.56)	355.50	347.83
NHRDF Red-4	10.93 (3.38)	397.0	383.83
NHRDF Fursungi	11.47 (3.46)	387.17	376.83
Agrifound white	15.60 (4.01)	240.0	234.17
Agrifound Rose	11.67 (3.49)	240.67	231.83
S.Em±	**0.07**	**3.40**	**2.63**
CD@ 5%	**0.14**	**7.02**	**5.42**

Note: The data shows parenthesis square root transformed value

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Similar study has been done by Chaurasia*et. al.* (2007) who reported that two to three spray of Dithane M-45 @ 0.3% and Bavistin @ 0.3% was effective against purple blotch disease of garlic as well as increased yield. According to Gupta and Sharma (2017) soil application of *Ps. fluorescens* and foliar spray of Pyraclostrobin + Metiramwas most effective for control of stemphylium blight in garlic.Tebuconazole and procymidone have been reported to provide effective control of stemphylium leaf blight in garlic (Basallote-Urba*et al*., 1971).Singh *et. al.* (2021) reported that some bio agents and botanicals were found most effective against foliar diseases of garlic. Gupta *et. al.* (1996) reported that *Stemphyliumvesicarium*is one of the major destructive diseases of onion crop grownin the state of Maharashtra. Bio-efficacy of eight fungicideswas evaluated *in vitro* against *Stemphyliumvesicarium*. Allthe fungicides tested were found fungicidal against thepathogen and inhibited mycelial growth of thepathogen over untreated control. Srivastava *et. al*., (1996) reported that Chlorothalonil 75 WP, Difenconazole 25 EC, Thiophanate methyl 70 WP,Penconazole 10 EC and Hexaconazole 5 EC were promising for effectivemanagement of Stemphylium leaf blight of garlic.Jakhar*et. al.* (1996) reported that fungicide Mancozeb and Copper oxychloride have been most effective and economical fungicidesagainst stemphylium blight and purple blotch disease *in vitro* as well as under *in vivo* conditions. Pandey *et. al.* (2022,2023a and 2023b) reported that combined fungicides and alternative spray of bio agents as well as fungicides are more effective against stemphylium blight of onion and increased the bulb yield.The present study is in accordance with the reports bykamal et al. (2017) was found alternative application of bio- pesticide (*Trichoderma harzianum)* and fungicide Metallaxyl 4.0% + Mancozeb 64.0% most effective for controlling of Stemphylium blight of onion.Urba*et al*. (1998) found Tebuconazole effective in controlling garlic leaf spots. Bhatia and Chahal (2014) reported that Tebuconazole 25.9EC, Propiconazole 25ECetc are effective in managing stemphylium blight in onion. Results of field trials by Gupta *et al.* (2021) showed that alternative spray of Paraclostrobin+ Metiram, Trifloxistrobin + Tebuconazole, Zineb+ Hexaconazole and Carbendazim + Mancozeb were most effective in reducing stemphylium leaf blight, purple blotch as well as increased yield. Mishra *et. al*. (2018) reported that 5 spray of difenaconazole as most effective for control of stemphylium blight as well as increased yield which is supporting the finding of the present study that 3 alternative sprays of different fungicides are providing the better stemphylium blight disease control.Gupta and Gupta (2014) have also observed Propiconazole, Tebuconazole and Mancozeb as effective

against *S.vesicarium* by increasing bulb yield in onion. Similar findings have been reported in case of Mancozeb against *S.vesicarium* in garlic (Kumar *et al*., 2011). Jhala, and Mali. (2017) reported that use of fungicides and botanicals and bio- pesticides can be best control of purple blotch disease in onion.These finding are also supported with our study that fungicide and bio-pesticides application for the management of stemphylium blight disease.

CONCLUSION

The combined data of two years trial conducted during *rabi*, 2022-23 and 2023-24 ononion revealed that in case of alterations in transplanting dates the best transplanting date of onion was recorded during 3rd week of December with lowest stemphylium blight intensity (9.83%) and highest yield (391.83 q/ha). In case of Fungicidal and bio agents controlthe lowest intensity (7.27%) with highest yield (399.17 q/ha) was reocorded in foliar spray of Tebuconazole50% + Trifloxystrobin 25% WG @ 0.15% at 45, 60 and 75 DAT while, in case of varietal screening the lowest stemphylium blight intensity (10.93%) as well as gross yield (397.0 q/ha) with marketable (383.83 q/ha) was recorded in variety NHRDF Red-4.

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