

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 T₄ (Tebuconazole 50% + 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 hexaconazole 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).

Comment [Ma1]: Need more elaboration according to the objectives of trials

Comment [Ma2]: Introduction I too short ..extend it about disease and differ methodologies used for combat disease

Comment [Ma3]: ???

Comment [Ma4]: In India onion is cultivated in 3 seasons (*rabi*, *kharif* and late *kharif*) while about 65 % of the maximum area is being cultivated in *rabi* season.

Kindly give reference????

Comment [Ma5]: Write one para about disease (*Stemphylium blight*)

Comment [Ma6]: Give latest references plz

Comment [Ma7]: Give latest references plz

Pandey *et al.*, (2023) reported that alternative spray of bio- pesticides and fungicides for more effective against stemphylium 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.

Comment [Ma8]: From this reference please make one paragraph with meaningful words..

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

Comment [Ma9]: management, methodology, stemphylium blight, fungicides and onion

MATERIAL AND METHODS

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

Comment [Ma10]: Consequences of altered transplanting dates on 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.

Comment [Ma11]: Experiment was conducted on highly infested field at NHRDF, Regional Research Station, Nashik Maharashtra, India. Seven onion varieties were examined including ??? as a check variety with a plot size of 3 x 1.2m using ??? design and software used in statistical analysis.

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

Comment [Ma12]: The transplanting was carryout in three replications after weekly interval under seven different dates starting from 1st week of December to 3rd week of January 2023-24

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.

Comment [Ma13]: ?????? Rearrange statement in meaningful manner please

Comment [Ma14]: Is it a different trial??? It does not make a sense for studying the impact of fungicide on another trial.. Please verify...

Comment [Ma15]: The design used is not appropriate for field trial

Comment [Ma16]: Rearrange in meaningful words plz..

Comment [Ma17]: Describe scale of disease recording

Details of Treatments

Comment [Ma18]: Arrange the treatments in table form

T₁: Spray of Carbendazim 12% + Mancozeb 63% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₂: Spray of Metalaxyl 4% + Mancozeb 64% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₃: Spray of Captan 70% + Hexaconazole 5% WP @2.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₄: Spray of Tebuconazole 50% + Trifloxystrobin 25% WG @1.5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₅: Spray of Metiram 55% + Pyraclostrobin 5% WG @1.5g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₆: Spray of *T. viride* @ 5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₇: spray of *Ps. fluorescens* @ 5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₈: *Bacillus subtilis* @5.0g/litre at first appearance of disease and 15 days intervals starting from first appearance

T₉: Control (Unsprayed)

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

Comment [Ma19]: Screening of resistance varieties against disease infestation

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 attaining 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

V₁- Agrifound Light Red

V₂-NHRDF Red

V₃- NHRDF Red-2

V₄- NHRDF Red-4

V₅-NHRDF Fursungi

V₆- Agrifound White

V₇- Agrifound Rose

Comment [Ma20]: Is it a different trial??? It does not make a sense for studying the screening on another trial.. Please verify...

Comment [Ma21]: Combine varietal information with treatment table

RESULTS AND DISCUSSION

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

Experiments were conducted in the field during the *rab* 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 1st week of December to 3rd week of January at weekly intervals (table-1). The disease intensity was recorded after 75 days after transplanting and the results are summarized in table-1

Comment [Ma22]: 1- Consequences of altered transplanting dates on disease development

Comment [Ma23]: Avoid Repetition

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	1 st week of December	11.27 (3.43)	324.50
2	2 nd week of December	12.47 (3.60)	320.17
3	3 rd week of December	9.83 (3.22)	391.83
4	4 th week of December	10.33 (3.29)	371.83
5	1 st week of January	14.87 (3.92)	312.50
6	2 nd week of January	16.20 (4.09)	283.0
7	3 rd week of January	17.60 (4.25)	242.83

Comment [Ma24]: Kindly write intensity measurement procedure and scale used

	S.Em±	0.05	2.93
	CD@ 5%	0.11	6.05

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 3rd week of January recorded highest disease intensity (17.60%) with lowest yield (242.83q/ha).

Comment [Ma25]: Improve discussion on results with references

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.

Comment [Ma26]: Repetition..no need of it

Comment [Ma27]: poor discussion on results. No references coated ..

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

Treatme nts	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
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 rabiseason (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.

Comment [Ma28]: unsatisfactory results and discussion over it

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

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 + Metiram was 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-Ureba *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 *Stemphylium vesicarium* is one of the major destructive diseases of onion crop grown in the state of Maharashtra. Bio-efficacy of eight fungicides was evaluated *in vitro* against *Stemphylium vesicarium*. All the fungicides tested were found fungicidal against the pathogen and inhibited mycelial growth of the pathogen 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 effective management of Stemphylium leaf blight of garlic. Jakhare *et. al.* (1996) reported that

Comment [Ma29]: too old

fungicide Mancozeb and Copper oxychloride have been most effective and economical fungicides against 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 by Kamal *et al.* (2017) was found alternative application of bio-pesticide (*Trichoderma harzianum*) and fungicide Metaxyl 4.0% + Mancozeb 64.0% most effective for controlling of Stemphylium blight of onion. Ureba *et al.* (1998) found Tebuconazole effective in controlling garlic leaf spots. Bhatia and Chahal (2014) reported that Tebuconazole 25.9EC, Propiconazole 25EC etc are effective in managing stemphylium blight in onion. Results of field trials by Gupta *et al.* (2021) showed that alternative spray of Paraclostrobin + Metiram, Trifloxystrobin + 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 findings are also supported with our study that fungicide and bio-pesticides application for the management of stemphylium blight disease.

Comment [Ma30]: include discussion over each results systematically

CONCLUSION

The combined data of two years trial conducted during *rabi*, 2022-23 and 2023-24 on onion 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 control the lowest intensity (7.27%) with highest yield (399.17 q/ha) was recorded in foliar spray of Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.15% at 45, 60 and 75 DAT while, in case of varietal screening the

Comment [Ma31]: results are repeated in conclusion. No output mentioned in conclusion regarding methodologies and its management

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.

Pictures/figures

Comment [Ma32]: Incorporate figures/pictorial view of susceptible and resistant plants

REFERENCES

Comment [Ma33]: Recheck references as per author guidelines

Majority of the references are too old

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