E-ISSN: 2618-0618
P-ISSN: 2618-060X

NAAS Rating (2025): 5.20
www.agronomyjournals.com
2025; 8(10): 928-930
Received: 13-07-2025
Accepted: 17-08-2025

R Preetham Goud
Senior Scientist (Agronomy), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Veera Suresh
Scientist (Plant Pathology), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Anitha Kumari
Principal Scientist (Entomology), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Nikhil
Scientist (Genetics and Plant Breeding), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Bhaghyashali
Scientist (Plant Pathology), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Corresponding Author:
R Preetham Goud
Senior Scientist (Agronomy), Vegetable Research Station, Rajendranagar, Hyderabad (SKLTGHU), Telangana, India

Effect of weather parameters on incidence of purple blotch in onion

R Preetham Goud, Veera Suresh, Anitha Kumari, Nikhil and Bhaghyashali

DOI: https://www.doi.org/10.33545/2618060X.2025.v8.i10m.4085

Abstract
Red onion entries Bhima Red, Bhima Super, Bhima Shakthi and White Onion entries Bhima Shwetha and Bhima Safed were tested for the incidence of purple blotch in onion at Vegetable Research Station, Rajendranagar. Bhima Red, Bhima Super, Bhima Shwetha and Bhima Safed were tested during kharif, 2023 Bhima Red, Bhima Super, Bhima Shwetha and Bhima Safed and Bhima Shakhi during late kharif 2023-24, Bhima Shwetha and Bhima Shakthi during *rabi* 2023-24 as part of All India Network Research Project on Onion and Garlic. The incidence of purple blotch (PDI) was recorded on a scale of 0-5 (0: No incidence, 1:1-10%, 2:11-20%, 3:21-30%, 4:31-50% and 5:51-100%). All the tested entries showed purple blotch incidence during all the seasons. All the entries tested during *kharif* recorded a rating of 2 on a scale of 0-5, during late *kharif* conditions Bhima Red and Bhima Safed recorded a rating of 1 (1-10% PDI) and Bhima super, Bhima Shakthi and Bhima Shwetha recorded a rating of 2 (11-20% PDI) and during *rabi* season both the entries tested Bhima Shakti and Bhima Shweta recorded low incidence of purple blotch a rating of 1 (1-10% PDI) on a scale of 0-5. High amount of precipitation, higher relative humidity coupled with warm temperatures during *kharif* and late *kharif* seasons might have resulted in the greater incidence of purple blotch and promotion of higher disease development than in *rabi* with lower relative humidity.

Keywords: Purple blotch, onion, weather parameters

Introduction
Onion is susceptible to numerous foliar diseases those reduces bulb yield and quality (Cramer 2000) [3] and purple blotch is an important disease of onion across the world (Chaput 1995; Schwartz *et al*. 2005) [2, 8] especially in warm and humid environments (Suheri and Price 2001) [10]. The fungus infestation cause on both leaves and flower stalks (Bock 1964) [1] and reduce onion tops production by 62-92% (Suheri and Price 2001) [10], cause bulb yield loss of 30% (Everts and Lacy 1990) [5] and 10% losses in seed crop under congenial environmental conditions (Daljeet *et al*. 1992; Schwartz 2004) [4, 7]. Purple blotch disease could cause heavy yield losses ranging from 2.5 to 87.8 per cent during *kharif* season (Srivastava *et al*. 1994) [9].
As part of the All India Net Work Research Project on Onion and Garlic (AINRPOG) trials have been conducted at Vegetable Research station, Rajendranagar to identify the promising entries for Telangana state with high production potential, high tolerance to purple blotch and also to study the effect of weather conditions on the incidence and spread of purple blotch in onion cultivars.

Materials and Methods
Bhima Red, Bhima Super, Bhima Shwetha and Bhima Safed were evaluated during *Kharif*, 2023 Bhima Red, Bhima Super, Bhima Shakthi, Bhima Shwetha and Bhima Safed were evaluated during late *Kharif*, 2023-24 and Bhima Shakthi and Bhima Shwetha were evaluated during *Rabi*, 2023-24. The seeds of the cultivars were procured from ICAR-Directorate of Onion and Garlic (DOGR), Pune. The cultivars were evaluated at Vegetable Research Station (SKLTGHU), Rajendranagar, Hyderabad at an altitude of 545m above mean sea level and at $78^{0}39'93"$ E longitude and 17^{0} 32'27" N latitude. The experimental soil's were clay loam in texture, neutral in reaction, low in available nitrogen and phosphorous, high in potassium and belongs to the order Alfisol of shallow to medium depth. The seedlings were transplanted on to a raised bed i.e.

broad bed and furrow with a plot size of 4.8 sq. m (4.0m x 1.2m). A plant spacing of 15cm x 10cm was adopted. The crop was fertilized with recommended dose of 100:50:50:40 kg NPKS and 5 kg zinc per hectare as recommended by ICAR-Directorate of Onion and Garlic Research, Rajgurunagar, Pune. 50% N and 100% P2O5, K2O, S and ZnSO4 were added as basal dose and remaining 50% N in two equal splits at an interval of 30 and 45 days after transplanting. The crop was sown during 34th, 42nd and 47th standard weeks and harvested during 52nd, 8th and 13th Std. weeks during *kharif*, late *Kharif* and *Rabi* seasons.

Recommended cultural practices were followed to raise the crops successfully. Meteorological data of weather parameters (precipitation, maximum and minimum temperatures, relative humidity (RH-I &II) were taken during crop growth stage (transplanting to harvest) standard week wise was from Meteorological Observatory, ARI farm, Rajendranagar, Hyderabad. The disease incidence and Percent Disease Index was calculated using the below formulae

$$\text{Disease incidence (\%)} = \frac{\text{Number of leaves infected/plant}}{\text{Total number of leaves/plant}} \times 100$$

$$\text{Percent Disease Index (PDI)} = \frac{\text{Sum of all disease ratings}}{\text{Observed plants x Maximum rating value}}$$

The incidence of purple blotch (PDI) was recorded on a scale of 0-5 (0: No incidence, 1:1-10%, 2:11-20%, 3:21-30%, 4:31-50% and 5:51-100%).

Results

Effect of Precipitation on incidence and spread of Purple blotch

Good amount of precipitation (11.2, 162, 36, 27 and 45.8 mm) during 35th-39th standard weeks i.e from 2nd-6th week after transplanting of onion in *kharif* was received (Fig-1). A meager amount of precipitation less than 10 mm in a week was received during late *kharif* and *rabi* seasons. All the tested entries showed purple blotch incidence during all the seasons. The red onion entries Bhima Red, Bhima Super and white onion entries Bhima Shwetha and Bhima Safed tested during *kharif*, 2023 showed incidence of purple blotch and its severity was moderate a PDI rating of 2 on a scale of 0-5 (Table-1). The infection occurs after 16 hours of leaf wetness at 15^{0}C and 8 hours of leaf wetness at 10-25 ^{0}C and severity of infection increases with increasing leaf wetness over 24 hours at all temperatures and causes lesions (Suheri and Price 2000) [10], the number of lesions increases with increasing leaf wetness duration and temperature, similar conditions were noticed in *kharif*, 2023 due to good amount of precipitation during 35th-39th standard weeks (2nd-6th week after transplanting). The moist weather conditions have caused the lesions to cover with brown mold sporangia. This suitable period of rain and favourable environmental condition promoted the disease development (Muimba-Kankolongo, 2018) [6]. The infestation leads to reduction in plant growth, bulb yield and seed yield (Verma and Sharma, 1999) [11].

Kharif: 34th -52ndStd. Week, Late *Kharif*: 42nd-8th Std. Week, *Rabi*: 47th-13th Std. Week

Table 1: Incidence of Purple blotch in Onion crop during different crop seasons

	Purple Blotch Percent Disease Index (PDI) rating on a scale of 0-5		
	Kharif	Late *Kharif*	*Rabi*
Bhima Red	2	1	-
Bhima Super	2	2	-
Bhima Shwetha	2	2	1
Bhima Shakthi	-	2	1
Bhima Safed	2	1	-

Note: 0: No incidence, 1:1-10%, 2:11-20%, 3:21-30%, 4:31-50% and 5:51-100%.

Table 2: Yield performance of onion varieties during *kharif*, late *kharif* and *rabi* seasons at Vegetable Research Station, Hyderabad.

	Yield (q/ha)		
	Kharif	**Late Kharif**	**Rabi**
Bhima Red	274.1	227.6	--
Bhima Super	256.7	202.1	--
Bhima Shwetha	--	229.2	382.7
Bhima Shakthi	250.1	292.5	385.8
Bhima Safed	223.2	227.0	--

Effect of Relative Humidity (RH-I &II) on incidence and spread of purple blotch

The relative humidity (RH-I) ranged between 76.0-93.0% during *Kharif*, 76.0-89.7% during late *Kharif* and 65.0-89.7% during *Rabi* season (Fig.2). The relative humidity (RH-II) ranged between 30-80% during *kharif*, 30-62 during late *kharif* and 21.1-62% during *rabi* season (Fig.3). During *kharif* all the entries tested (Red onion entries Bhima Red and Bhima Super, white onion entries Bhima Shwetha and Bhima Safed) recorded a PDI of 2 on a rating scale of 0-5. Under late *Kharif* conditions Bhima Red and Bhima Safed recorded a rating of 1 (1-10% disease incidence), Bhima Super, Bhima Shakthi and Bhima Shwetha recorded a rating of 2 (11-20% disease incidence). Under *Rabi* conditions Bhima Shakti and Bhima Shweta recorded low incidence of purple blotch a rating of 1 (1-10% disease incidence) on a scale of 0-5. Higher values of relative humdities (RH-I &II) during *kharif* and late *kharif* conditions might be responsible for more severity of purple blotch than in *rabi*. Red onion variety Bhima Red and white onion variety Bhima Safed owing to have high tolerance under high humid conditions might have shown low rating of 1 on a scale of 0-5.

Effect of Maximum and Minimum Temperatures on incidence and spread of purple blotch

The Maximum temperatures ranged between 27.6-33.1 ^{0}C during different standard weeks during *Kharif*, 27.6-34.3^{0}C during late *Kharif* and 27.6-38.6 ^{0}C in *Rabi* season (Fig.4). The Minimum temperatures ranged between 13.2-23.1^{0}C during different standard weeks during *Kharif*, 13.2-21.1^{0}C during late *Kharif* and 13.2-22.5 ^{0}C in *Rabi* season (Fig.5). Warm temperatures were observed during all the seasons. There is no much variation in maximum temperatures during *kharif*, late *kharif* and during *rabi* season except during last six weeks of *rabi* season the maximum temperatures were very high.

Yield performance of Onion varieties during *kharif*, late *kharif* and *rabi* seasons

Among the four varieties tested during *kharif*, Bhima Red

recorded the maximum marketable bulb yield (274.1 q/ha) with moderate incidence of purple blotch. Under late *kharif* conditions Bhima Shakthi (292.5 q/ha) followed by Bhima Red (227.2 q/ha) recorded higher yields with moderate and low incidence of purple blotch respectively. In *rabi* both the entries tested (Bhima Safed, Bhima Shwetha) recorded good marketable bulb yields (385.8 and 382.7 q/ha) and also recorded low incidence of purple blotch.

Conclusion

Purple blotch disease severity in onion is more during *Kharif* and late *Kharif* than in *Rabi*. High amount of precipitation, higher relative humidity coupled with warm temperatures during *Kharif* and late *Kharif* seasons might have resulted in the greater incidence with more severity of purple blotch than in *Rabi* season. Bhima Red and Bhima Safed are more tolerant to purple blotch than other tested varieties.

Acknowledgement

We gratefully acknowledge to AII India Network Research Project on Onion and Garlic for funding the experiment and Director of Research, Sri Konda Laxman Telangana Horticultural University, Telangana, India for the research facilities provided to carry out the trials.

References

1. Bock KR. Purple blotch (*Alternaria porri*) of onion in Kenya. Ann Appl Biol. 1964;54:303-11.
2. Chaput J. Identification of diseases and disorders of onions. Ontario, Canada: Queens Printers for Ontario; 1995. p. 1-9.
3. Cramer CS. Breeding and genetics of Fusarium basal rot resistance in onion. Euphytica. 2000;115:159-66.
4. Daljeet S, Dhiman JS, Sidhu AS, Singh H. Current status of onions in India: Strategies for disease resistance breeding for sustained production. Onion Newsletter Trop. 1992;4:43-4.
5. Everts KL, Lacy ML. Influence of environment on conidial concentration of Alternaria porri in air and on purple blotch incidence on onion. Phytopathology. 1990;80:1387-91.
6. Muimba-Kankolongo A. Vegetable production. In: Food crop production by smallholder farmers in Southern Africa. London: Academic Press; 2018. p. 205-74.
7. Schwartz HF. Botrytis, downy mildew and purple blotch of onion. Crop Series. Diseases. 2004. Available from: http://www.ext.colostate.edu
8. Schwartz HF, Gent DH, Bartolo ME. Purple blotch. 2005. http://www.highplainsipm.org/HpIPMSearch/Docs/Purple BlotchOnion.htm
9. Srivastava PK, Bharadwaj BS, Gupta PP. Status of field disease and selected pest of onion in India. Natl Hortic Res Dev Found Newsletter. 1994;14:11-4. https://www.researchgate.net/publication/265781973_Performance_of_Parents_and_Hybrids_of_Onion_Allium_cepa_L_for_Purple_Blotch_Disease_and_Yield
10. Suheri H, Price TV. The epidemiology of purple leaf blotch on leeks in Victoria, Australia. Eur J Plant Pathol. 2001;107:503-10.
11. Verma LR, Sharma RC. Diseases of horticultural crops: Vegetables, ornamentals and mushrooms. New Delhi, India: Indices Publishing Company; 1999. p. 353-6.