

Original Research Article

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## Severity of Purple Blotch of Onion Caused by *Alternaria porri* in Northern Karnataka, India

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### ABSTRACT

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Successful cultivation of onion in recent years has met with different problems such as pests and diseases. Among the various fungal diseases, purple blotch caused by *Alternaria porri* (Ellis) Cif. is one of the most serious disease of onion which causes extensive damage to bulbs as well as seed crop. The study was carried out in northern Karnataka. Survey on the disease in the field showed the extent of purple blotch disease affecting the crop and quality of the bulbs in different locations which was widespread particularly in rainy season / high moisture conditions and incidence and severity of disease was more in Uttara Kannada district of Honnali village (69.33 PDI). While the lowest (17.33 PDI) was recorded in Annigere village in Dharwad district.

### Introduction

Onion (*Allium cepa* L.) is one of the major bulb crops of India. Several factors have been identified for the low productivity of onion in India. The most important factors responsible are the diseases like purple blotch, downy mildew, Stemphylium blight, basal rot and storage rots and non-availability of varieties resistant to biotic and abiotic stresses. Among the foliar diseases, purple blotch is one of the most destructive diseases, commonly prevailing in almost all onion growing pockets of the world, which causes heavy loss in onions under field conditions. For the first

time the purple blotch of onion caused by *Alternaria cepulae* was observed by Ponnappa (1970) in Karnataka. This was not recognized as a major foliar and inflorescence disease until recently, however now a day it is one of the important diseases. The name "Purple blotch" for this disease was proposed by Nolla (1927). He named the causal organism as *Alternaria alli* which was later amended as *Alternaria porri*.

*A. porri* destructs the leaf tissue which destroys the stimulus for bulb initiation and

delays bulbing and maturation. Severe attack on flowering alliums can completely girdle flower stalks with necrotic tissue, causing their collapse and total loss of seed production capacity. Further, seed infection causes more severe economic loss in seed production. Sudarshanrao (1975) stated that survey and surveillance form the basis for any successful plant protection that depends on early detection of the disease followed by timely adoption of control measures. Hence, in the present investigation various aspects on Purple blotch was undertaken during the period 2011 to 2012 with reference to survey and surveillance of purple blotch disease in major onion growing areas of the northern Karnataka.

### Materials and Methods

Roving survey was conducted during 2011-12 in major onion growing areas of Dharwad, Gadag, Haveri, Uttar Kannada and Belagavi districts of northern Karnataka in *kharif* and *rabi* seasons and observations of disease severity (PDI) was recorded on leaf different varieties and also observations recorded in two to three months old crop growth by following 0 to 5 scale given by Sharma (1986).

Percent disease index was calculated by using the following formula (Wheeler, 1969).

$$\text{PDI} = \frac{\text{Sum of disease ratings}}{\text{Total number of observations} \times \text{Highest disease grade}} \times 100$$

### Results and Discussion

The disease appeared in an epiphytotic form in *kharif* 2011, damaging the major photosynthetic area of leaves on onion. It caused a heavy destruction in the yield of onion. It is possible that due to continuous

growing of onion throughout the year, which is the main host of the pathogen, the disease might have appeared in epiphytotic form because of inoculum build-up. In recent years, this disease has become menace to onion growers in India.

The yield loss of onion in India due to this disease under favourable conditions varies from 25-50 per cent (Pandotra, 1964) more so in Karnataka.

A detailed roving survey was undertaken during *kharif* 2011 in parts of northern Karnataka to gather information on the symptomatology, severity, distribution and spread of Purple blotch of onion from different localities.

This information is highly useful to identify the hot spots of this disease in Dharwad, Belagavi, Gadag, Haveri and Uttar Kannada districts where onion is extensively grown as commercial crop.

From the survey it is revealed that the severity of this disease varied from locality to locality (Table 1). The severity of disease was also dependent on inoculum load, environmental conditions prevailing in different localities.

Among the districts surveyed, the highest severity (69.33%) of Purple blotch of onion was noticed in fields of Vonnali village in Uttar Kannada district, whereas least (17.33%) per cent disease index of the disease were recorded at Annigeri village in Dharwad district.

The highest district average disease incidence was recorded in Uttar Kannda (61.21%) followed by Belagavi (52.86%), Haveri (43.32%), Dharwad (41.48%) and least incidence was noticed in Gadag (39.90%) district indicating that this disease was not consistent in all localities.

**Table.1** Per cent disease index of purple blotch of onion in northern parts of Karnataka during 2011-2012

District	Taluk	Village	Variety	Stage of crop (DAS)	Type of soil	Average no. of Thrips /Plant	PDI
Dharwad	Dharwad	Amminabhavi	Double Red	80	Black	7	26.00
		Harobelavadi	N-53	85	Black	5	34.66
		Shivalli	Nasik Red	85	Black	6	54.60
		Hebballi	Double Red	75	Black	4	36.66
		Kabbenuru	Double Red	90	Black	3	57.40
		Somapura	Local variety	75	Black	6	34.13
	Hubli	Bhadrapoora	Nasik Red	85	Black	6	42.66
		Hebsur	Nasik Red	80	Black	7	40.00
		Hubli	N-53	75	Black	8	34.66
		Nalavadi	Bellary local	70	Black	9	28.30
		Shiraguppi	Nasik Red	80	Black	6	26.33
	Kundagol	Devanuru	Double Red	85	Black	6	24.50
		Elivara	Local variety	80	Black	8	26.00
		Hanchinala	Nasik Red	90	Black	5	28.55
		Hosakatti	Local variety	95	Black	6	38.30
		Kambadhalli	Nasik Red	90	Black	8	49.33
		Kundagol	N-53	70	Black	10	35.60
	Navalgund	Alagawadi	Local variety	95	Black	9	54.66
		Amargol	Bellary Red	80	Black	8	39.50
		Aarekuratti	Double Red	95	Black	10	45.60
		Arratti	Double Red	110	Black	7	66.60
		Annigeri	Nasik Red	80	Black	5	17.33
		Belavatagi	Nasik Red	85	Black	7	49.33
		Halakusagol	Local variety	95	Black	8	54.33
		Jagapur	Nasik Red	95	Black	8	51.50
		Kadadalli	Nasik Red	105	Black	9	66.66
		Karalawada	Bellary Red	95	Black	9	49.33
		Karalgund	Nasik Red	80	Black	11	56.00
		Padesur	Local variety	80	Black	6	47.22
		Shanawad	Double Red	90	Black	8	58.44
		Sotakanala	Double Red	110	Black	11	66.66
	Thirlapura	Double Red	80	Black	8	26.66	
<b>Mean</b>						<b>41.48</b>	
Belagavi	Savadatti	Hireulligere	Nasik Red	95	Black	6	47.22
		Inamahongala	Nasik Red	90	Black	6	51.40
		Karikatte	Nasik Red	95	Black	10	58.44
		Kallekabburu	Local variety	105	Black	16	64.54
		Yadalli	Nasik Red	110	Black	14	60.57
	Gokak	Musaguppi	Local variety	105	Black	13	63.33
		Nallanatti	Nasik Red	95	Black	14	49.13
		Tigadi	Double Red	90	Black	9	47.22
Vannur	Double Red	90	Black	10	34.13		
<b>Mean</b>						<b>52.86</b>	
Gadag	Gadag	Adavisomapura	Bellary local	85	Black	8	45.00
		Binkadakatti	Bellary local	80	Black	6	34.64
		Hasundi	N-53	90	Black	8	50.50
		Hulkoti	Bellary local	90	Black	9	46.00

	Mundargi	Kandapura	Bellary local	80	Black	10	39.60
		Lakkundi	Local variety	80	Black	8	38.56
		Attikatti	Nasik Red	85	Black	9	39.00
		Doni	Local variety	85	Black	10	20.58
		Doni thandya	Local variety	80	Black	11	23.27
	Naragund	Kelakeri	Local variety	80	Black	10	35.60
		Konnura	Nasik Red	86	Black	9	45.55
		Naragund	N-53	85	Black	12	40.52
	Shiratti	Gojanuru	Bijapur local	90	Black	10	48.77
		Lakshmeshwar	N-53	95	Black	14	51.11
	<b>Mean</b>						<b>39.90</b>
Haveri	Ranebennur	Halageri	Nasik Red	90	Black	6	40.12
		Itagi	Local variety	95	Black	7	53.33
		Lingandahalli	Nasik Red	105	Black	8	60.33
		Ranebennur	Nasik Red	85	Black	7	40.80
	Savanur	Taredahalli	Local variety	80	Black	7	47.22
		Mannoor	Local variety	95	Black	6	34.66
		Savanur	Double Red	90	Black	5	28.55
		Shirabedagi	Double Red	95	Black	6	45.60
		Guttala	Local variety	90	Black	6	39.33
<b>Mean</b>						<b>43.32</b>	
Uttar Kannada	Ankola	Devanahalli	Local variety	110	Sandy	13	58.40
		Mirjan	Local variety	110	Sandy	14	59.33
	Bhatkala	Shirali	Local variety	115	Sandy	16	60.33
		Tenginagundi	Local variety	98	Sandy	12	58.43
		Nagabana	Local variety	105	Sandy	15	60.33
	Honnar	Mavinagundi	Local variety	105	Sandy	16	60.66
	Kumuta	Adekodi	Local variety	110	Sandy	9	58.40
		Alvekodi	Local variety	110	Sandy	14	64.53
		Vonnali	Local variety	105	Sandy	15	69.33
		Handigona	Local variety	108	Sandy	13	62.40
<b>Mean</b>						<b>61.21</b>	

Observations recorded in two to three months old crop growth by following 0 to 5 scale given by Sharma (1986)

Grade	Percent area of infection
0	No disease symptoms
1	A few spots towards tip covering 10 per cent leaf area
2	Several dark purplish brown patch covering upto 20 per cent leaf area
3	Several patches with paler outer zone covering upto 40 per cent leaf area
4	Leaf streaks covering upto 75 per cent leaf area or breaking of the leaves from centre
5	Complete drying of the leaves or breaking of the leaves from centre

Onion was cultivated mostly in black soils, but in Uttar Kannada district onion is cultivated in sandy soils in irrigated condition. Disease was more with the age of crop. Thrips population was more in the Uttar Kannada district. Disease increased with increase in thrips population.

During survey various symptoms of the disease were noticed on leaves, flowering stalk, inflorescence and also on bulbs. At initial stages, leaves were with circular to oval water-soaked areas which later on, as the disease progressed, became oblong and a fresh zone of

discoloured tissue was formed around the spots. Initially spots were white, but later turned pinkish or purple. The change in colour started from the centre and gradually progressed towards the periphery, where it changed into light purplish.

The transition of colour was marked by concentric rings clearly visible to the naked eye. The older leaves were more susceptible than younger leaves and were relatively more susceptible when they reach close to bulb maturity. Similar lesions formed on seed stalks of the inflorescence axes caused girdling and in most cases resulted in the destruction of the stalk. As a result of this, seeds either did not develop or if developed, they were shrivelled.

The leaf blight of onion was severe in Uttar Kannada district compared to Gadag district. This could be because of favourable environmental conditions and initial inoculum prevailed. This might have helped in the rapid development of the disease in *kharif* when favourable environmental conditions prevailed.

Working on survey of *Alternaria* leaf blight and other diseases of onion, Patil and Patil (1991) concluded that it is the most predominant and severe disease in the onion growing centers of Maharashtra. Srivastava *et al.*, (1994) in their report on status of field diseases and insect pest of onion in India also indicated that purple blotch incidence was high in both rainy and post-rainy seasons when high humidity prevailed. Chethana (2000), who conducted survey in northern parts of Karnataka during *kharif* 1999 also revealed that incidence of purple blotch of onion was found in all districts of Northern Karnataka and noticed highest per cent disease incidence in Ronihal village

(Basavanabagewadi taluk) of Bijapur district and lowest in Wadullur village of Raichur taluk.

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