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## Screening of onion genotypes against purple blotch under cold arid conditions of Ladakh

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**Abstract**

An experiment was conducted to identify promising varieties of onion suited for cultivation under cold arid conditions of Leh, Ladakh. Five varieties were evaluated at High Mountain Arid Agriculture Research Institute Leh, Ladakh SKUAST-K during the year 2017. The study revealed that under natural epiphytotic conditions only one genotype i.e., red coral exhibited resistant reaction. Local genotype of Ladakh showed moderately resistant reaction. Three genotypes, viz., yellow globe, brown Spanish and liberty were moderately susceptible to purple blotch of onion.

**Keywords:** Purple blotch, genotypes, resistant, screening, onion.

**Introduction**

Onion (*Allium cepa* L.) is one of the important spice and vegetable crop grown in temperate (Brewster, 1990) [1], sub-tropical (Corgan and Kedar, 1990) [3] and tropical climate (Currah and Proctor, 1990) [5] throughout the world. It is cultivated year round but maximum during *Rabi* season in our country. In cold arid region where topography has considerable variation, onion cultivation is possible only in lower and central agricultural zones but it may be grown in upper agricultural zone on small scale under protected conditions inside the trenches or polyhouses for vegetable purposes. The crop is grown for variety of purposes from kitchen to factory made products/food and also for dehydration. It is valued for its distinct pungent flavour and its essential ingredients cuisine. It is consumed round the year by all the section of people throughout the world due to healing properties of onion in case of cardiac diseases, rheumatism, cancer, digestive disorders, blood sugar and prolong cough. It is a photo sensitive crop and on the basis varieties are divided into short day and long day types. Long day types are high yielder but have poor shelf life whereas short day types have better shelf life with low yielding capacity. Though India produces a significant quantity of onion is not regular and sufficient enough to meet the demands of both domestic requirement and export. Amongst the onion producing countries in the world India ranks second in area and production, the first being China. Even though India ranks second in area under onion in the world and third in production but its productivity is low as compared to world's productivity. Among several factors, diseases are the most important factor associated with low productivity in onion. Onion is susceptible to numerous foliar, bulb and root pathogens that reduce yield and quality (Cramer, 2000) [4]. Onion occupies an important place in the economy of cold arid region owing to the fact that high onion productivity is possible and farmers can earn a lot of money by supplying the produce to the market over a long period of time either green as vegetable or mature bulbs after storing for sometimes. In winter when no fresh vegetables are available in Ladakh, onion can be taken out of store houses for regular consumption or supply to the market. Purple blotch disease of onion is a serious menace in onion-producing countries of the world (Pandotra, 1965) [10]. Purple blotch is prevalent on leaves and seed stalk of onion and cause serious damage throughout the onion producing area in the country every year and due to this onion production is reduced which adversely affects exports and also results price hike within the country. Purple blotch of onion caused by *Alternaria porri* (Ellis) Cif. is one among the serious fungal diseases that affect onion, causing heavy yield loss ranging from 2.5 to 87.8 per cent during kharif season (Srivastava *et al.*, 1994). Keeping in view of the above reason an experiment was carried out to identify the resistant genotypes against purple blotch of onion.

**Materials and Methods**

The experiment for screening the resistant genotypes was conducted at experimental farm of High Mountain Arid Agriculture Research Institute Leh, Ladakh SKUAT-K during *kharif* season 2017.

A total of five onion genotypes were grown in randomized block design with three replications. The net plot size of 3x2m and spacing of 15x10cm was followed. The observations on disease intensity were recorded using 0-5 scale (Table 1) of (Sharma,1986) at four and half months after transplanting when the disease was developed to its maximum extent and percent disease index was calculated by the following formula given by (Wheeler, 1969) [17]. Further, the varieties were placed in different categories of resistance and susceptibility on the basis of method given by (Pathak *et al.*, 1986) [11].

$$PDI = \frac{\text{Total sum of numerical ratings}}{\text{Number of observations}} \times \frac{100}{\text{Maximum disease rating}}$$

The details of 0-5 scale (Sharma, 1986)

0 = No disease symptom

1 = A few spots towards tip covering 10 percent leaf area.

2 = Several purplish brown patches covering upto 20 percent of leaf area.

3 = Several patches with paler outer zone covering upto 40 percent leaf area.

4 = Leaf streaks covering upto 75 percent leaf area or breaking of the leaves from center and

5 = Complete drying of the leaves or breaking of leaves from center

**Table 1:** Scale adopted to indicate degree of resistance against purple blotch of onion

S. no	Disease severity	Category	Reaction
1	<5	0	Immune
2	5-10	I	Resistant
3	11-20	II	Moderately resistant
4	21-40	III	Moderately susceptible
5	41-60	IV	Susceptible
6	>61	V	Highly susceptible

## Results and Discussion

The evaluation study of 5 onion genotypes conducted in the year 2017 under natural epiphytotic conditions against *Purple blotch* indicated that disease occurred on all the test cultivars (Tables 2 &3). However, analysis of data showed a differential response among the cultivars with regard to disease intensity.

**Table 2:** Reaction of onion genotypes against purple blotch of onion under field condition.

Rating	Reaction	Genotypes/Varieties
0	Immune	-
1	Resistant (1-10%)	Red Coral
2	Moderately Resistant (11-20)	Local
3	Moderately Susceptible (21-40%)	Liberty, Brown Spanish, Yellow Globe
4	Susceptible (41-60%)	-
5	Highly Susceptible (>60%)	-

**Table 3:** Screening of onion varieties for disease resistance under field conditions

S. No.	Varieties	PDI (%)	Scale	Reaction
1	Local	10.383	2	Moderately Resistant
2	Yellow Globe	20.400	3	Moderately Susceptible
3	Liberty	29.66	3	Moderately Susceptible
4	Red Coral	8.90	1	Resistant
5	Brown Spanish	24.50	3	Moderately Susceptible

CD 2.72

SE (d) 1.16

SE (m) 0.82

CV 7.59

## Disease intensity

The disease intensity among the varieties ranged between 8.90 to 29.66 per cent during the year 2017 (Table 3). The analysis of data indicated that most of the varieties evaluated were susceptible to the disease but there existed a significant difference in disease intensity among different varieties. Maximum disease intensity was recorded in the genotype Liberty (29.66 %), followed by Brown Spanish with disease intensity of 24.50 %. The least disease intensity was recorded in Red Coral (8.90%). The development of purple blotch resistance genotypes can be expected to increase profitability by reducing the amount of fungicides used to produce a crop. Dhiman *et al.*, (1986) [6] studied reaction of onion genotypes against purple blotch disease and found that off the 18 genotypes raised for bulb crop none was found to be resistant. Pathak *et al.*, (1986) [11] found only one line IR-56-1 as resistant and five lines viz., IHR-25, IHR-44, IHR-499, IHR-500 and Arka kalyan as moderately resistant. These results were in conformity with the results obtained by Chethana *et*.

*al.*, (2011) [2] who screened different onion genotypes against purple blotch and revealed that the genotype Arka Kalyan was found moderately resistant while genotypes viz., Rampur Rose, Agrifound Rose, Arka Pragati, Arka Niketan, Arka Pitamber and Arka Bindu was found moderately susceptible to the disease. Hence the moderately resistant and moderately susceptible varieties identified during the present investigation (Table 3) can be screened at different stages over locations and years to confirm their reaction to purple blotch so that promising genotypes/resistant donors can be identified and used in future breeding programs for the development purple blotch resistant varieties.

## Conclusion

Among five genotypes screened against purple blotch disease, only coral red was having least disease. Therefore coral red variety could be included in the category I. However, local variety of Ladakh showed moderately resistant reaction. Other varieties viz., yellow globe, liberty and brown Spanish showed moderately susceptible reaction and were included in category 3.

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