

# Incidence of Anthracnose and *Cercospora* Leaf Spot Disease on Grape Varieties

by

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In recent years grape cultivation is becoming more and more popular among the fruit growers of Punjab and Haryana. In view of the phenomenal yield potential and early bearing habit of grapevine it has attained an important place among the fruit crops in this region especially at a time when the well-established citrus industry is confronted with the decline problem. Though several diseases have been reported to occur in a serious form on grapes in other parts of the country, only two diseases namely anthracnose caused by the fungus *Elsinoe ampelina* and a leaf spot caused by *Cercospora viticola* affect grapevine to a considerable extent in this region. A detailed account of various grape diseases occurring in Punjab has been given by Chohan (1965). With the rapid increase of area under grapes it has become necessary for evolving effective control measures against these two diseases. Though fungicides are available for this purpose the easiest way of control will be the growing of resistant varieties. At present there is not sufficient information in the literature on the susceptibility or resistance of various varieties of grapes though Winkler (1965) has pointed out that the Muscadine grapes seem immune and most *Vinifera* varieties are highly susceptible to anthracnose. Prasad and Nirvan (1965) pointed out that the varieties recommended for commercial planting in U.P. were highly susceptible to anthracnose.

With a view to screen the grape varieties for their susceptibility, preliminary observations on the incidence of these two diseases on 176 varieties were recorded in the varietal collection block located at the Regional Fruit Research Station, Abohar during September-October, 1968 when both diseases had attained maximum intensity. The object was to select varieties showing little incidence of the diseases under field conditions in the first instance so that they can subsequently be subjected to artificial inoculation to confirm their resistance. The observations are presented in this paper.

**Materials and Methods:** The grape varieties were six year old and include those obtained from U.S.A., Rumania, Yugoslavia, Germany, Bulgaria, Switzerland, U.S.S.R., Italy, Newzealand and Palestine besides those from different parts of India.

The incidence of the diseases was recorded on two vines of each variety. From each vine two canes were selected at random and the incidence as well as

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intensity of anthracnose were recorded from the 20 terminal leaves and petioles and also the cane in this region. The incidence of *Cercospora* leaf spot was recorded from the terminal 15 leaves. The per cent of infected leaves and petioles was calculated from the number of infected ones. The intensity of both diseases was graded according to the following scale :-

Grade 1 = upto 15 spots per leaf

Grade 2 = 16 to 50 spots per leaf

Grade 3 = over 50 spots per leaf

The varieties were tentatively classified as resistant, moderately susceptible and highly susceptible to the diseases based on the per cent of infected leaves as shown below :

Resistant : Incidence less than 5%

Moderately susceptible : Incidence 5-50%

Highly susceptible : Incidence over 50%

**Results :** *Resistance / Susceptibility of different varieties of Grapes :* The varieties of grapes are tentatively classified according to their resistance or susceptibility to both diseases. However, the resistant varieties will be subjected to artificial inoculation to confirm their resistance.

1. *Resistant to both diseases :* Albang Surprise, Armes, Australian No. 2, Babesca Neagra, Bangalore Blue, Bangalore Purple, Barboroza, Black Cornicorn, Black Muscat, Buckland Sweet Water, Carrignane, Champa Black, Champack, Chasselas Blames, Chasselas Ciotal, Chasselas Musque, Chasselas Rose, Chasselas Tompa, Chasselas Voilet, Chi Ni No. 1, Chi Ni No. 10, Cionio, Coarna Rosia, Convent Large (Black), Convent Large (White), Country Bangalore, Cur-e-Velrot, Demiat, Fateasca Alba, Fateasca Regala, Gamsa, Ganganagar 2, Graga de Cotenei, Grimpose, Gros Colman, Hussaini, Hussaini Black, Hussaini Black Kabuli, James, Kabarnai, Kailash Pur, Karachi, Karachi Gulabi, Koeniginder, Lahore No. 33, Lomento, Large White, Madras Local, Medleine Celiac, Muscat of Alexandria, Muzaffar Nagar 1, Negru Moala, Niagra, Oval (White), Pakhodi, Perlevon Cosba, Pierce, Pirovano, Portugazaic, Prince, Red Prince, Rekasetali, Riesling, Rose of Pen, Rosea Venturia, Rosam-T-Lahore, Rubino, Seedless White Round, Shiscka Melnisekha, St-George, Tenthem Black, Trillinger, Verdia, Zinfandel, EC 27818, 27819, 27820, 27824, 27827, 27831 and hybrids - Black Prince  $\times$  Foster Seedling and Khalili  $\times$  Black Prince.

2. *Resistant to anthracnose, moderately susceptible to Cercospora :* Angur Kalan, Black Long, July Muscat, Madeleine Royal, Muscat and St. Jennet.

3. *Resistant to anthracnose, highly susceptible to Cercospora :* Bharat Early, Black Hamburg, and *Vitis candicans*.

4. *Moderately susceptible to anthracnose, resistant to Cercospora*: Anab-e-Shahi, Banquabyad, Bhokri, Black Champion, Chara, Chauhan Special, Chi Ni No. 2, Chi Ni No. 5, Coarna Neagra, Danal White, Dutch Sweet, Dutch Sweet Water, Fakhdi, Flame Muscat, Foster Seedling, Heroldrebe, Hugiola, Husaire Kudubeyi, Hais Vekktm Heffersib, July Muscat, Kata, Kata Curgon, Khalili, Kishmish, Kishmish Beli, Lahore No. 33, Lahore No. 36, Ludlienga, Malaya, Malmgra Pracosa, Margret Sport, Mawrud, Med, Angevinc, Mukchalani, Munnacca, Muscat, White, Muscato Binsia, Muscato de Amborgo, Muscato de Goloio, Negru Virtas, Bapmmine, Pearl of Caaba, President, Queen's Garden, Rabien, Regina, Ribier, Sahebi, Shadipur III, Spur Sahebi, Suarsaw, Terana, Tigrosa, Tigvoasa, Tokay, *V. parviflora*, *V. treleasei*, Wraiss Sei, EC 27821, 27822, 27826 and hybrids-Khalili  $\times$  Seedless and Muscat White  $\times$  Black Prince.

5. *Highly susceptible to anthracnose, resistant to Cercospora*: Ganganagar I and Riesling Silva.

6. *Moderately susceptible to both diseases*: Bionshirai, Cardinal, Delight, Early Muscat, Exotic, Fateasca Neagra, Gold, Gold Blanco, Janjal Khara, Kandhari and Kishmish Charni.

7. *Highly susceptible to anthracnose, moderately susceptible to Cercospora*: Beauty Seedless, Bedana, Perlette, Pusa Seedless, Seedless and Selection 7.

II. *Size of Lesions in Common Varieties*: In order to find out the type of reaction in the promising varieties to infection by these pathogenic fungi the size of lesions was recorded in ten common varieties. From each variety 25 lesions of anthracnose were measured from leaves, petioles and cane and *Cercospora* leaf spots on leaves. The results are presented in Table I.

TABLE I. Size of lesions (mm) in common grape varieties

Varieties	Cercospora	Anthracnose		
	Leaf spot	Leaf	Petiole	Cane
Anab-e-Shahi	1.7 $\times$ 1.2	3.0 $\times$ 2.5	5.0 $\times$ 2.4	5.8 $\times$ 3.0
Bedana	1.9 $\times$ 1.4	4.4 $\times$ 3.5	4.6 $\times$ 2.6	5.9 $\times$ 4.0
Beauty Seedless	1.7 $\times$ 1.3	2.4 $\times$ 1.9	4.0 $\times$ 2.4	4.4 $\times$ 3.1
Delight	1.7 $\times$ 1.3	3.2 $\times$ 2.6	2.8 $\times$ 1.6	4.0 $\times$ 2.0
Early Muscat	1.7 $\times$ 1.3	3.4 $\times$ 2.7	2.6 $\times$ 1.7	3.0 $\times$ 2.2
Khalili	1.9 $\times$ 1.3	2.7 $\times$ 2.3	2.6 $\times$ 1.6	3.0 $\times$ 2.1
Perlette	1.8 $\times$ 1.4	2.8 $\times$ 2.2	5.0 $\times$ 1.5	5.6 $\times$ 2.9
Cold	1.6 $\times$ 1.4	2.6 $\times$ 2.1	2.3 $\times$ 1.1	4.3 $\times$ 2.8
Pusa Seedless	2.5 $\times$ 1.8	3.3 $\times$ 2.9	4.4 $\times$ 2.7	6.8 $\times$ 5.0
Cardinal	3.9 $\times$ 2.5	2.4 $\times$ 1.8	4.9 $\times$ 2.6	4.5 $\times$ 2.5

The size of spots caused by *Cercospora* was greatest in Cardinal followed by Pusa Seedless and almost the same in the other varieties. Anthracnose lesions on leaf were longest in Bedana followed by Early Muscat, Pusa Seedless and Delight. In other varieties it was smaller and nearly equal. Petiole lesions were biggest in Anab-e-Shahi, Perlette and Cardinal, in Bedana, Beauty Seedless and Pusa Seedless they were intermediate in size; in other varieties they were smaller. In cane the longest lesions were observed in Pusa Seedless and smallest in Early Muscat and Khalili, the other varieties having lesions of intermediate size. Further it was also found that in most varieties the lesions attained the maximum size in canes when compared to those on leaves and petioles.

**Discussion:** Since the varieties which were free from both diseases were growing side by side with infected vines of other varieties, their freedom from the disease cannot be attributed to any lack of inoculum potential of the pathogens concerned or to any unfavourable weather conditions. The preliminary observations carried out on the natural incidence of the diseases has shown certain varieties which are resistant to the diseases. However, these varieties shall be subjected to artificial inoculations to confirm their resistance.

The size of anthracnose lesions in leaf, petiole and cane varied with varieties, but the differences in these plant parts did not follow any uniform trend in the ten varieties. The biggest lesions in leaf, petiole and cane were found in the varieties Bedana, Anab-e-Shahi and Pusa Seedless respectively. Further studies on the presence of physiologic races of the pathogen attacking different varieties are obviously necessary to throw light on this question.

**Summary:** The incidence of anthracnose and *Cercospora* leaf spot diseases was recorded on 176 varieties of grapevine and the varieties were classified according to their resistance or susceptibility to both diseases. It was observed that 82 varieties were resistant to both diseases, 6 were resistant to anthracnose and moderately susceptible to *Cercospora*, 3 were resistant to anthracnose and highly susceptible to *Cercospora*, 66 were moderately susceptible to anthracnose and resistant to *Cercospora*, 2 were highly susceptible to anthracnose but moderately susceptible to *Cercospora*, 11 were moderately susceptible to both diseases and 6 were highly susceptible to anthracnose but moderately susceptible to *Cercospora*. Further work to confirm the resistance of the varieties by subjecting them to artificial inoculation is in progress. Among the popular grape varieties, Bedana showed the highest incidence of anthracnose and Khalili, the least incidence. The size of *Cercospora* lesions was largest in Cardinal. Anthracnose lesions on leaf were longest in Bedana.

**Acknowledgement:** The authors thank Dr. J. S. Jawanda, Horticulturist for his interest and certain suggestions in the preparation of this paper.



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Polyhaploidy in *Cenchrus setigerus*

by

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*Cenchrus setigerus* is a polymorphic species comprising four chromosomal forms viz.,  $2n=34$ , 36, 37 and 54 (Darlington and Wylie, 1955; Patil *et al.* 1961; Jagannath, 1963). The 54-chromosome form is distinct from the rest in being more vigorous, taller, highly tillering with dense setting of spikelets on thick, long peduncles. Meiosis is characterised by multivalent associations and aberrations of chromosomal behaviour usually associated with apomicts. A cytological study of accessions which appeared to be on morphological grounds hexaploids, has confirmed their hexaploid status. During observations on the breeding behaviour of hexaploids in a population of plants resulting from the cross of *C. setigerus* ( $2n:54$ )  $\times$  *Pennisetum squamulatum* ( $2n:54$ ) as well as in selfed progenies, haploid plants were detected. The morphological characteristics and cytological behaviour of these polyhaploids are presented below:

**Materials and Methods:** Twenty two plants were raised from seeds obtained under bagging from a hexaploid plant, of which one was found to be reduced in height and on examination was found to be a haploid. This is referred to in the text as polyhaploid No. 1.

The second haploid plant was detected in the progenies raised from seeds gathered after dusting pollen of *Pennisetum squamulatum* ( $2n=54$ ) on a 54-chromosome plant of *C. setigerus*. This polyhaploid No. 2 was similar in characteristics to the first plant. Young panicles were fixed in Carnoy's fluid and meiosis was studied in temporary acetocarmine smears of p. m. cells.

**Observations:** Both the haploids exhibited significant reduction in height, tillering, number of internodes per tiller, length and thickness of internode and peduncle, size of leaf and panicle, percentage of fertile pollen and seed

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