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Short Comminucation

Influence of epidemiological parameters on the development and spread of leaf spot and dry fruit rot *(Coniella granati)* of pomegranate

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Pomegranates are susceptible to leaf spot and dry fruit rot caused by *Coniella granati* (Sacc.) Petrak and Sydow and the disease is assuming importance in Himachal Pradesh due to its severity. This fungus requires a good rainfall, high humidity around 80 per cent and a temperature range of 22-32ÚC for its initial spread and development. Under optimum conditions, *C. granati* can cause complete rotting of the fruits.

To study the role of epidemiological factors on the disease development of leaf spot and dry fruit rot of pomegranate, cultivar 'Kandhari Kabuli' was selected. The data on disease severity on leaves and fruits was recorded at weekly interval from June to August at the farm of Department of Fruit Science, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan during 2012 and 2013 cropping season. The data on weather parameters (i.e. temperature, relative humidity and rainfall) was taken from Department of Environment Science Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan. The data was subjected to statistical analysis to find out simple, partial and multiple correlations by using statistical analysis procedures (Gomez and Gomez, 1986).

Data on disease severity (on leaves and fruits) was recorded at weekly intervals commencing from 1st June to 30th August and was correlated with epidemiological parameters (average temperature, relative humidity and rainfall) (Table 1). The data revealed that the disease appeared in the last week of June – first week of July with the prevalence of 24.27ÚC mean temperature; 70 per cent mean relative humidity and 46.65 mm cumulative rainfall in 2012 and 2013 crop seasons, respectively. There was a progressive increase in the disease severity up to first week of August and was recorded maximum in the second week of August during both the years of study. Thereafter disease started declining, may be due to heavy drop of infected leaves and fruits during the second half of August.

Lukose and Singh (1997) studied the climatic factors affecting the severity of pomegranate fruit rot caused by *Coniella granati*. Results revealed that the fungus required a good rainfall, high relative humidity of around 80 per cent and temperature range of 22-32ÚC for its initial spread and development. Sharma and Tegta (2011) reported maximum incidence of fruit rot of pomegranate during first week of August after an extended period of warm and foggy weather.

Correlation and regression analysis

Simple, partial and multiple correlations were worked out between disease severity and epidemiological parameters (mean temperature, mean relative humidity and cumulative rainfall) pooled for the years 2012 and 2013.

Simple correlation

It is evident from the correlation matrix presented in Table 2 that simple correlation coefficients of disease severity with mean temperature was highly significant and negative. Simple correlation coefficients of disease severity and relative humidity were positive and significant in both seasons and their pooled correlation coefficient was also significantly positive exhibiting its effect on the disease development. Rainfall was positively correlated with the disease severity.

Regression equation

The multiple regression equations were developed between meteorological factors and disease severity on leaves and fruits results are presented in Table 3. It is evident from multiple regression equation that a rise in temperature by 1 degree resulted in 2.3 per cent increase in disease severity on leaves whereas 0.11 per cent on fruits. The equation further signifies that 1 per cent increase in relative humidity caused 0.7 per cent increase in disease severity on leaves whereas 1.5 per cent on fruits. An increase in rainfall by 1 mm resulted in 0.02 per cent increase in disease severity on leaves whereas 0.08 per cent on fruits.

Combined analysis of multiple coefficient of determination between disease severity and group of

Table 1: Effect of different epidemiological parameters on disease development during 2012-2013

Period of observation	Average temperature (°C)	Relative humidity (%)	Rainfall (mm)	Disease severity (%) Leaves	Fruits
01 June-07 July	24.4	49	5.4	0.00	0.00
08 July-14 June	26.0	58	5.8	0.00	0.00
15 June- 21 June	24.1	63	5.4	0.00	0.00
22 June- 28 June	25.4	63	10.2	0.00	0.00
29 June- 05 July	24.2	70	46.6	6.71	3.76
06 July- 12 July	23.5	74	71.8	10.55	8.25
13 July- 19 July	24.4	73	34.2	13.27	15.49
20 July- 26 July	24.0	76	9.9	15.05	17.66
27 July- 02 Aug	23.3	80	25.2	18.24	21.46
03 Aug- 09 Aug	23.4	84	26.4	21.76	24.58
10 Aug- 16 Aug	23.3	81	46.8	27.02	31.27
17 Aug- 23 Aug	22.7	84	31.9	21.50	30.29
24 Aug- 30 Aug	23.5	81	20.0	18.39	28.06

*Average of two years

Table 2: Correlation coefficients between disease severity on leaf and fruit with epidemiological parameters (pooled of two year 2012-2013)

Weather parameter	Disease severity on leaves	Disease severity on fruits
Temperature	-0.7984**	0.7772**
Relative humidity	0.9206**	-0.9195**
Rainfall	0.4494	0.4729

* Significant at 5% level of significance

Table 3: Regression equation between disease severity on leaves and on fruit with epidemiological parameters

Year	Regression equation	R^2
disease on leaves	$Y= 20.523\pm-2.386X_1 +0.679X_2^{*}\pm-0.019X_3$	0.8681
disease on fruits	$Y= -54.091+0.113X_1 +1.497X_2^{*}+-0.083X_3$	0.8625

*Significant at 5% level of significance

** Significant at 1% level of significance

independent variables was found to be 0.8681 on leaves and 0.8625 on fruits, which indicated that 86.8 and 86.2 per cent change in disease severity was attributed to all the meteorological factors included in the study collectively, whereas rest of the variation was due to the unexplained factors (error variation) and the factors not included in the investigation.

Where,

Y = Disease severity on leaves or fruits (%), X_1 = Mean temperature (°C), X_2 = Mean relative humidity (%), X_3 = Cumulative rainfall (mm)

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