

Screening of Marigold Germplasm against Leaf Spot and Flower Blight Disease under Field conditions in North Western Himalayas

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ABSTRACT: Leaf spot and flower blight disease in marigold caused by *Alternaria* sp. is the most destructive disease, causing losses in all the marigold growing areas of India. Planting resistant and moderately disease resistant cultivars is one of the most sustainable disease management strategies to alleviate economic losses. Field screening of marigold germplasm was taken up in 2017 & 2018. The leaf spot severity as well as flower blight incidence was found to be the highest in cv. Pusa Narangi (78.03 per cent and 66.66 per cent respectively) and the lowest in cultivar Marigold Red (16.07 per cent and 9.50 per cent respectively). Among the eight genotypes, cv. Marigold Red was found moderately resistant; Jaffery Lal was moderately susceptible; Kesariya was susceptible and five genotypes viz., Pusa Narangi, Pusa Bahar, Pusa Basanti, Jaffery Orange, Jaffery Yellow were found to be highly susceptible.

Keywords: *Alternaria* sp., flower blight, germplasm screening, leaf spot.

INTRODUCTION

Marigold is one of the most popular and commercial cultivated annual ornamental flowers in India. After China, India is the second-largest producer of flowers. It belongs to the *Compositae* family and is India's third most popular flower after the rose and chrysanthemum. With its simple planting and flexibility, wide range of attractive colours, texture, size, and attractiveness - to retain quality - marigolds are a significant single-crop blooming plant that is extensively produced for its beauty, profitability, religion, and society. Typically, two varieties of marigolds— *Tagetes erecta*, an African marigold, and *Tagetes patula*, a French marigold—are produced (Dhube *et al.*, 2022). Leaf spot and flower blight caused by *Alternaria* sp., has been observed in causing heavy losses in common cultivars of both African and French marigold in the areas. With a view to find out some resistant cultivars, the screening trial was conducted at the University Farms, Division of Plant Pathology, SKUAST, Jammu (J&K) during the two consecutive years 2017-18.

MATERIAL AND METHODS

The marigold genotypes collected from CSKHPKV, Palampur were grown during the month of November 2017 and 2018 at University Farms, Chatha under field conditions. A total of eight cultivars of marigold viz., Pusa Bahar, Pusa Narangi, Pusa Basanti, Marigold Red, Jaffery Lal, Jaffery Orange, Jaffery Yellow and Kesariya were collected and sown in well prepared nursery beds. One-month old seedlings were transplanted into the field. Eight marigold cultivars were screened under natural epiphytotic conditions against leaf spot and flower blight disease. Each cultivar was sown in single plot measuring 3m × 4m at the distance of 45 cm × 10 cm. Three plants were randomly selected and the observation were recorded on ten leaves in each plant of each cultivar. The average of these observations was used for calculating the per cent leaf spot severity using the formula given by McKinney.

Table 1: Disease Scoring Scale (Hotchkiss and Baxter 1983).

Disease rating	Disease Reactions	Symptoms/ Disease severity
0	Highly Resistant	No symptoms on leaf
1	Resistant	Spots covering 1-10% of the leaf area
2	Moderately resistant	Spots covering 11-20% of the leaf area
3	Moderately susceptible	Spots covering 21-30% of the leaf area
4	Susceptible	Spots covering 31-40% of the leaf area
5	Highly susceptible	Spots covering >40% of the leaf area

$$\text{Flower blight incidence (\%)} = \frac{\text{Number of infected flowers}}{\text{Total number of flowers observed}} \times 100$$

$$\text{Disease severity (\%)} = \frac{\text{Number of infected flowers}}{\text{Number of leaves assessed} \times \text{Maximum disease rating}} \times 100$$

These observation on the leaf spot severity and flower blight incidence, were recorded at interval of 15 days which continued throughout the crop season. All the recommended practices were adopted for crop growth. Severity of the disease and varietal reaction was characterized by using 0-5 disease grade scale (Hotchkiss and Baxter 1983). Plants were selected randomly and severity on foliage and incidence on flowers were recorded using the formula given by (McKinney, 1923).

RESULTS AND DISCUSSION

The observations on percent severity of leaf spot, incidence of flower blight and reaction of different marigold cvs. are presented in Table 2 which indicate that of all eight cultivars screened under natural epiphytotic conditions during the year 2017-18 against *Alternaria* sp., only cultivars viz., Pusa Narangi recorded maximum disease severity of 78.03 per cent, followed by Pusa Bahar (77.33%), Jaffery Yellow

(67.00%), Jaffery Orange (61.83%), Kesariya (37.83%), Jaffery Lal (25.83%) and Marigold Red (16.07%), whereas, maximum flower blight incidence (66.39%) was recorded on Pusa Narangi, followed by Pusa Bahar (63.50%), Jaffery Orange (55.44%), Jaffery Yellow (50.24%), Kesariya (33.83%), Jaffery Lal (20.58%) and Marigold Red (10.33%). Similar observations were recorded during the following year 2018-19, i.e., the maximum disease severity of 77.65 percent was recorded on Pusa Narangi, followed by Pusa Bahar (76.33%), Jaffery Yellow (65.50%), Jaffery Orange (60%), Kesariya (37.50%), Jaffery Lal (25.50%) and Marigold Red (15.20%), whereas, maximum flower blight incidence (66.66%) was recorded on Pusa Narangi, followed by Pusa Bahar (63.49%), Jaffery Orange (55.33%), Jaffery Yellow (49.72%), Kesariya (32.54%), Jaffery Lal (20%) and Marigold Red (09.50%).

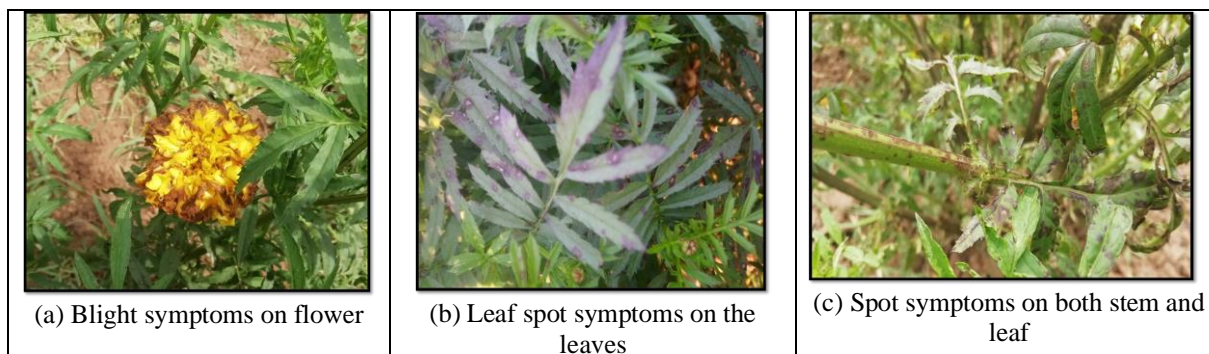
Table 2: Reaction of different cultivars of marigold against *Alternaria* sp. causing leaf spot and flower blight of marigold in natural epiphytotic conditions.

Variety	Leaf spot severity (%)		Flower blight incidence (%)		Disease reaction
	2017-18	2018-19	2017-18	2018-19	
Pusa Narangi	78.03 ^a (62.03)	77.65 (54.55)	66.39 (61.77)	66.66 (54.71)	Highly susceptible (HS)
Pusa Bahar	77.33 ^a (61.55)	76.33 (52.81)	63.50 (60.87)	63.49 (52.81)	Highly susceptible (HS)
Pusa Basanti	58.33 ^b (49.78)	58.00 (41.08)	43.20 (49.58)	43.60 (41.31)	Highly susceptible (HS)
Marigold Red	16.07 ^c (23.60)	15.20 (18.74)	10.33 (22.93)	09.50 (17.93)	Moderately resistant (MR)
Jaffery Lal	25.83 ^d (30.53)	25.50 (26.96)	20.58 (30.32)	20.00 (26.55)	Moderately susceptible (MS)
Jaffery Orange	61.83 ^c (51.83)	60.00 (48.11)	55.44 (50.75)	55.33 (48.04)	Highly susceptible (HS)
Jaffery Yellow	67.00 ^f (54.92)	65.50 (45.12)	50.24 (54.01)	49.72 (44.82)	Highly susceptible (HS)
Kesariya	37.83 ^e (37.94)	37.50 (35.55)	33.83 (37.75)	32.54 (35.37)	Susceptible (S)
C.D.	1.69	1.25	1.23	0.88	
SE(m)	0.55	0.41	0.40	0.29	

*Figures in the parenthesis are arc sine transformed values.

It was observed during the study that Pusa Narangi, Pusa Bahar, Pusa Basanti, Jaffery Orange, Jaffery Yellow was found highly susceptible to disease, whereas Kesariya and Jaffery Lal exhibited susceptible and moderately susceptible reaction towards the disease, respectively. One cultivar, Marigold Red was found to be moderately resistant to the disease. However, none of the marigold cultivars were discovered to be resistant to the marigold's leaf spot and bloom blight. Pusa Narangi and Pusa Bahar were statistically at par with each other whereas all other varieties were different amongst each other.

The present study also revealed that leaf spot severity was more pronounced than flower blight. These results were in conformity with the earlier results of many workers (Hotchkiss and Baxter 1983; Sohi, 1983; Akoijam and Chandel (2010). According to Sohi (1983) the varieties of *Tagetes erecta* were more susceptible compared to *T. patula* which were found either resistant or immune to leaf spot disease. Akoijam and Chandel (2010) findings revealed that Pusa Narangi and Pusa Basanti were extremely susceptible to marigold leaf spot and flower blight.



CONCLUSIONS

Eight marigold cultivars were screened under field conditions against leaf spot and flower blight disease, and it was found that no cultivar was resistant to the disease. Pusa Narangi, Pusa Bahar, Pusa Basanti, Jaffery yellow and Jaffery Orange were found highly susceptible, Kesariya was susceptible and Jaffery Lal was moderately susceptible whereas Marigold Red was moderately resistant.

FUTURE SCOPE

By growing slightly resistant cultivars, the production and productivity of a particular area enhances hence, flourish and generate tremendous money and employment.

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Conflict of Interest. None.

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