

Screening of Pea Cultivars for Yield and Resistance towards Powdery Mildew in Dry Temperate Zone, Kaghan Valley

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Abstract: Field studies were conducted at Potato Research Farm, Battakundi (upper Kaghan valley) to evaluate eight Pea cultivars for yield potential against Powdery mildew during summer 2011. The disease severely infected the cultivars “Spring and Strike” up to the maximum at each side. Six cultivars were found resistant and two susceptible to the disease. Among the resistant cultivars, cultivar “Misty” out yielded with fresh Pod yield of 10.55 tons/ha followed by cultivars Legacy, Climax, Tops, Green cross Advinta giving fresh Pod yield of 10, 8.89, 7.09 and 6.48 tons/ha, respectively.

Keywords: Cultivars, powdery mildew, resistant, susceptible

INTRODUCTION

Pea *Pisum sativum* (L) belongs to family Papilionaceae and is an important leguminous crop. In Pakistan it is an important vegetable crop and is cultivated in Khyber Pakhtunkhwa both as a summer and winter crop with higher yield than Sindh and Balochistan. In Kaghan valley of Pakistan, Pea is grown in off season as a rotational crop for potato since 1989. About 99% of the local farmers sell out fresh Pea pods because of high market value as compared to Pea seed as, at this period of time, pea is not cultivated in any region of the country. However, owing to favorable weather conditions and use of susceptible pea cultivars crop is damaged by powdery mildew in Kaghan valley (Jan, 1996, 1999).

A white powdery coating on surface of leaves stems and pods of mycelium of the fungus *Erysiphe polygoni* DC (Singh, 1978; Bilgrami and Dube, 1982; Agrios, 1988; Kazmi *et al.*, 2002) characterize this disease. Late planted and maturing peas are most susceptible to powdery mildew (Gritton and Ebert, 1975; Tariq *et al.*, 1983). The pathogen causes upto 50% yield losses and reduces pod quality (Singh, 1987; Dixon, 1978). The fungus is spreads by air currents; however, rain can controls the disease by washing spores and making it burst (Hargedorn, 1991).

The disease can be controlled by fungicides but these fungicides are too expensive for the poor farmers of the valley. Considering the economic problem of farmers the present study was carried out to make a comparison of pea varieties against powdery mildew resistance and quantitative traits under agro-climatic conditions of Battakundi, Kaghan valley, KPK, Pakistan.

MATERIALS AND METHODS

A total of eight pea varieties were planted in May 27, 2011 at Seed Potato Research and Multiplication Farm Battakundi in upper Kaghan valley of Pakistan. Eight rows of each entry were planted on 3×3 m² beds with row to row and plant to plant distance 37 and 10 cm respectively. Disease was rated by 1-9 scale according to Jan (1999) with slight modification. Where score 1-4 was considered as resistant, score 4-6 as tolerant and score 7-9 as susceptible.

Picking of the pods started from 1st week August and completed on 15th of August, 2011. Data were collected in respect of Days to germination, Days to flowering, Plant height (cm), Powdery mildew score, Days to pod formation, No. of pods/plant, No. of grains/pod and Fresh pod yield (Tons/ha).

RESULTS

Days to germination: The number of days to germination (Table 1) showed significant difference among the cultivars means. The cultivars Misty and Legacy took minimum days of 14.66 to germinate, followed by Climax and spring (15.33 days), while Advinta took maximum days of 18.66 to germinate.

Days to flowering: The number of days to flowering (Table 1) revealed significant difference in the varietal means. The pea cultivar Spring took minimum days of 34.66 to express flowering followed by Green Cross (35.33 days). The cultivar Climax took maximum days of 54.33 for flowering.

Table 1: Screening of pea cultivars for yield and resistance towards powdery mildew under agro climatic conditions of upper Kaghan valley (Battakundi), Pakistan

Varieties planted	Days to germination	Days to flowering	Pod formation	Pods/plant	Grains/pod	Plant height	Yield (tons/ha)	Powdery mildew score**
Misty	14.66b	39.33c	48.00c	5.66bc	6.33cd	35.33c	10.557a	1.66
Legacy	14.66b	48.33b	52.33b	7.33ab	7.00bc	57.00a	10ab	0.00
Climax	15.33b	54.33a	58.66a	6.00bc	8.33a	54.66a	8.890abc	3.66
Topps	15.66b	41.00c	49.33c	5.00cd	6.66bcd	41.00bc	7.037abcd	3.66
Green cross	16.00ab	35.33de	45.33d	5.00cd	6.66bcd	40.33bc	7.037abcd	4.00
Advinta	18.66a	49.33b	57.66a	8.00a	7.66ab	50.33ab	6.483bcd	0.00
Spring	15.33b	34.66e	45.00d	3.66d	5.66d	34.66c	5.560cd	6.66
Strike	16.33ab	37.0d	44.33d	3.66d	5.66d	30.00c	3.703d	5.33

*: Means followed by the same letters are not significantly different from one another, according to Fisher's LSD test at $p = 0.05$; **: 0 = No lesions and 9 = Plant parts with highly susceptible reaction

Days to pod formation: The data in Table 1 revealed that pea cultivar Spring expressed minimum days to pod formation i.e., 44.33, followed by Green cross spring (45 days), where as the maximum days to pod formation were observed in cultivar Climax (58.66), followed by Advinta (57.66 days).

Number of pods/plant: The data in (Table 1) revealed that pea cultivar Advinta expressed the highest number of pods/plant (8.00), followed by Legacy (7.33), while the minimum number of pods per plant were observed in cultivar strike and spring (3.66).

Number of grains/pod: The data showed (Table 1) that cultivar Climax gave significantly higher grains (8.33), followed by Advinta (7.66) and Legacy (7.00) while the minimum grains/pod were found in Spring (5.66) and Strike (5.66).

Reaction to powdery mildew: Powdery mildew appeared uniformly during the season and severely affected the cultivar spring. The cultivars Climax, Topps, Misty, Advinta Green cross and Legacy were found resistant, while Strike and Green cross showed tolerance towards powdery mildew (Table 1).

Fresh pod yield (tones/ha): Data regarding fresh pod yield (Table 1) showed that the highest yield was recorded in Misty (10.557) followed by Legacy (10.00) while minimum yield was obtained in Strike (3.703). The high yielding varieties being resistant to powdery mildew, gave significantly higher yield as compared to other cultivars which were highly susceptible to the disease.

Plant height (cm): A significant difference was found in plant height between the varieties (Table 1). The varieties lowest in heights were Strike (30.00) followed by spring (34.66) as compared with the tallest varieties Legacy (57.00) and Climax (54.66), respectively.

DISCUSSION

Perusal of Table 1 indicates that there is significant difference for all the parameters studied. The highest number of pods/plant (8.00) was recorded in cultivars Advinta, followed by (7.33) pods/plant of cultivar Legacy. It is evident that higher pod number can be attributed to high green pod yield. These results are compatible with the findings of Jan *et al.* (2007). The (Table 1) also indicates that the cultivars Misty, Legacy and Climax shows maximum yield of 10.55, 10.00 and 8.99 tons/ha respectively because of resistance to Powdery mildew, while susceptible cultivar i.e., Spring shows comparatively low yield i.e., 5.56 tons/ha. These results revealed that Powdery mildew resistant cultivars are high yielding as compared to the susceptible cultivars. The results of this study are in agreement with (Gritton and Ebert, 1975; Srivastava *et al.*, 1973; Tariq *et al.*, 1983) who reported reduction of yield in Pea due to Powdery mildew.

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