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## Screening of Pea Germplasm for Yield and Resistance Towards Powdery Mildew

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**Abstract:** Eleven advanced lines/cultivars of pea were tested for yield and resistance against powdery mildew under natural conditions over an area of 10478 hectares (Anonymous, 2000). Several diseases attack this crop but powdery mildew is the most serious. A white powdery, dust like coating of the leaves, stem and pod of mycelium of the fungus *Erysiphe polygoni* DC characterize this disease. This disease is more prevalent in late planted or late maturing peas, where it can reduce yields by 50% or more and lower the pod quality (Gritton and Ebert, 1975). Srivastava *et al.* (1973) reported a reduction of 21-31 percent in pod number and 24-47 percent in pod weight. Dizon (1975) found that the numbers of pickings were reduced drastically from seven pickings in the healthy crop to one in that affected by the disease. Tariq *et al.* (1983) while estimating yield losses of the local as well as exotic cultivars of peas observed a yield reduction of 10-18%.

**Key word:** Germplasm, powdery mildew, resistance

### Introduction

Pea (*Pisum sativum* L.) is an important vegetable crop in Pakistan cultivated over an area of 10478 hectares (Anonymous, 2000). Several diseases attack this crop but powdery mildew is the most serious. A white powdery, dust like coating of the leaves, stem and pod of mycelium of the fungus *Erysiphe polygoni* DC characterize this disease. This disease is more prevalent in late planted or late maturing peas, where it can reduce yields by 50% or more and lower the pod quality (Gritton and Ebert, 1975). Srivastava *et al.* (1973) reported a reduction of 21-31 percent in pod number and 24-47 percent in pod weight. Dizon (1975) found that the numbers of pickings were reduced drastically from seven pickings in the healthy crop to one in that affected by the disease. Tariq *et al.* (1983) while estimating yield losses of the local as well as exotic cultivars of peas observed a yield reduction of 10-18%.

The disease can be controlled by fungicides but is expensive for the poor farmers. The other option lies in breeding resistant varieties. Considering the importance of the problem a project was initiated at National Agricultural Research Centre, (NARC), Islamabad to breed powdery mildew resistant varieties. Out comes of the project are the lines included in this study. This study was designed to make a comparison of the advanced lines selected at NARC and local cultivars to screen high yielding and powdery mildew resistant genotypes under natural conditions of powdery mildew infection.

### Materials and Methods

Nine advanced lines selected at NARC for powdery mildew resistance and high yielding capacity were compared with two local cultivars Climax and PF-400. Seeds were planted on 5 meter long beds, with row to row and plant to plant distance 75 and 8 cm, respectively. Each entry was planted in three beds replicated thrice in a Randomized Completed Block Design (RCBD). Crop was sown on the 20th of October, 1993. Picking of the pods started from the 1st week of March and was complete at the end of March. Data were collected in respect of pod length, number of grains pod<sup>-1</sup>, weight of grain/50 pods, weight of peel/50 pods and yield ha<sup>-1</sup> and analyzed treatments were compared by using Duncan's multiple range (DMR) test

(Steel and Torrie, 1980). Disease assessment was made fortnightly from mid February onwards till the end of March.

### Results and Discussion

**Disease assessment:** Powdery mildew symptoms started to appear in the last week of February and reached its peak by the end of March when all the plant parts of the local cultivars were severely infected. The appearance of powdery mildew symptoms during February and its peak incidence by the end of March has also been reported by Iqbal *et al.* (1998). On the basis of the symptoms two classes were observed, one resistant and the other highly susceptible. Local cultivars Climax and PF-400 were highly susceptible with pronounced symptoms on the leaves, stem and fruit. Because of the high degree of infection, what ever the pod yield was recorded in local the cultivars, was not saleable. Advanced lines selected at NARC were resistant and no symptoms were recorded on them.

**Agronomic characters:** Perusal of the Table 1 would indicated the significant differences for all the parameters studied. Line 91-7 had smaller pods as compared to rest of the entries except 91-8 which was at par with 91-7. PF-400 had minimum number of grains pod<sup>-1</sup> whereas the maximum were attained by 91-1 and 91-2. Data regarding the grain weight/50 pods showed the superiority of 91-4, PF-400 and 91-3 over rest of the entries except 91-1 and Climax which were statistically at par with the above mentioned entries. Heaviest peel was exhibited by the local cultivars while the lightest peel was observed in 91-6. Yield data also reveal highly significant results. Both the local cultivars included in the trial gave a very poor response under the natural conditions of powdery mildew infestation. Local cultivars Climax and PF-400 gave very poor pod yield because of their susceptibility to powdery mildew which resulted in lowest yields of 1.87 and 4.06 t ha<sup>-1</sup>, respectively compared with line 91-1 (23 t ha<sup>-1</sup>) showing resistance against powdery mildew. The results of these studies are in agreement with Gritton and Ebert (1975), Srivastava *et al.* (1973) and Tariq *et al.* (1983) who reported reduction of pod yield in pea from 10 to 50% due to powdery mildew. All the lines out yielded the local cultivars. Among the advanced lines 91-1, 91-2 and 91-3 were outstanding with an average yield of 23.0, 19.67 and

Table 1: Performance of pea germplasm under natural conditions of powdery mildew infestation

Genotype	Pod length	Grains pod <sup>-1</sup>	Wt. of grains/ 50 pods (g)	Wt. of peel/50 pods (g)	Yield ha <sup>-1</sup> (tones)
91-1	7.67A	7.13A	106.70AB	144.3CDE	23.00A
91-2	7.53A	7.13A	78.67CDE	166.3BCDE	19.67B
91-3	7.80A	6.27CD	113.70A	135.7DE	22.33A
91-4	7.90A	6.37BCD	116.50A	156.7BCDE	10.67C
91-5	8.30A	6.90ABC	92.67BCD	179.7BC	13.33C
91-6	7.93A	6.90ABC	60.33E	129.7E	10.67C
91-7	6.57B	6.57ABCD	66.67E	136.0DE	14.00C
91-8	7.33AB	7.03AB	75.00DE	143.7CDE	12.00C
91-9	8.03A	6.90ABC	66.67E	170.0BCD	14.67C
Climax	8.17A	6.80ABC	97.33ABC	193.3AB	1.87B
PF-400	7.70A	6.07D	115.00A	224.0A	4.06D

Values followed by the same letters do not differ significantly at 5% level of significance.

## Hussain *et al.*: Screening of pea germplasm

22.33 t ha<sup>-1</sup>, respectively. Attainment of the high yielding lines resistant to powdery mildew is of great significance because none of the local pea cultivars is resistant to the pathogen. However, screening of the most promising lines (91-1, 91-2 and 91-3) under different agro-ecological zones of the country is desirable which is the next move we are planning to carry out.

The advanced pea lines, 91-1, 91-2, and 91-3, have shown promise with regard to pod yield and resistance against powdery mildew. The powdery mildew resistance found in the lines could be incorporated in the local cultivars through breeding.

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