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RESPONSE OF DIFFERENT LENTIL CULTIVARS AGAINST APHIDS AT DISTRICT PESHAWAR, KHYBER PAKHTUNKHWA

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Abstract

The cowpea aphid (Aphis caraccivora) is a major pest of lentil crop in Pakistan and caused significant losses each year. The study was conducted under field condition at Newly zdevelopmental Farm, The University of Agriculture, Peshawar during 2022-23. Total three cultivars were selected for the trial namely, cultivar Sanli-bey, Atacan and Masoor-93 arranged in Randomized Complete Block design (RCBD) having three replications. The aphid population was consistently observed from two leaf stage till crop maturity/aphid disappeared. The aphids first invaded the tested plants during second week of February 2023. The black pea aphid (Aphis caraccivora) was first attracted by cultivar Atcan followed by Sanli-bey and Masoor-93. The local variety Masoor-93 showed strong response against aphid followed by cultivar Sanli-bey and Atacn. The cultivar Masoor-93 was found best with lowest aphids infestation (7.52) followed by Sanli-bey (10.61) which was found no-significant to Atcan (11.22). The population density was gradually decreased due to multiple factors and disappeared at end of March 2023. It is concluded that Masoor-93 is suitable for cultivation in Peshawar region due to high potential of well growth and has high resistance against aphid infestation.

Introduction

Lentil (*Lens culinaris* Medik.) crop is one of the early domesticated plant species, as old as those of einkorn, emmer, barley and pea (Harlan, 1992). This crop is a nutrient-dense food legume, having high protein content, complex carbohydrates (consisting of slowly-digestible starch and less crude fiber), essential minerals, vitamins, and high energy value (Dhull *et al.*, 2022). Moreover, lentils also have significant content of bioactive phytochemicals, for example, antioxidants and phytoestrogens (Siva *et al.*, 2017).

Lentil's global production has tremendously increased in the last two decades, from 3.15 million metric tons (MMT) in 2001 to 6.54 MMT in 2020 (FAO, 2021). The area under global lentil cultivation has increased by 26.83% in the last two decades, from 3.95 to 5.01 million hectares during 2001–2020. Canada ranked first in lentil producing countries, with 2.87 MMT, thus accounting for about 44% of total global production in 2020 (Kaale *et al.*, 2022). Lentil is the second largest grown legume crop of *Rabi* season in Pakistan after chickpea (*Cicer arietinum* L.) both in quality and quantity (Ayub *et al.*, 2001). In 2006 lentil was grown on 434,000 ha with 259,000 tones production and average yield of 597 kg/ha (MINFAL, 2006).

The most important pests that affect lentil and cause economic losses are aphids, gram caterpillar, white ants, gram cutworm, weevil and hand bean seed beetle (Sehirali, 1988). Aphids can destroy about 25-50% of developing plants, in severe condition pea aphid may damage up to 100% of standing crop if control decision is not taken within time. Economic threshold level of pea aphids in lentil is 30-40 aphids per 38 cm shoot length. Both nymphs and adults of aphid suck the plant cell sap from almost all parts of the plant except roots resulting in less setting of flowers, stunted growth with a smaller number of pods. (Aman *et al.*, 2023).

The aphids are becoming major threat to lentil crop in Pakistan, so there is need to find a resistance variety against this notorious and destructive pest. By keeping in view, the current study was conducted to check the resistance response of different cultivar against aphids in the country.

Material and Methods

This study was conducted in the newly developmental farm, the University of Agriculture Peshawar. Eleven lentil genotypes received from agronomy department were screened for relative resistance against aphid during winter seasons, 2023. The experiment was conducted by Randomized Complete Block Design with three replications. The row length was 10m while row to row spacing was maintained 0.5 m and plant to plant spacing was kept as 1-3 cm maintained. The total plot size was 15 square meters.

Insect data were collected on weekly basis; aphid population found at apical twigs (10 cm) per plant and aphid scoring during flowering and pod formation stage. All the sub-plots were measured and total five rows per plot were selected while 10 plants per row were maintained. The data sampling from each entry was using, randomly three plants per sub plot were selected to record the data/observations on upper lower and middle twigs were checked and recorded on weekly basis. The assessment of infestation by insect pests on various cultivars was done as per the scale given by Nagrare and his co-workers (Nagrare *et al.*, 2011. Saraswati, 2020).

Results and Discussion

Table 1: Plant growth and development stages of the tested Lentil cultivars.

Lentil cultivars	Plant height (cm)	Stem nodes	No. of secondary branches	No. of leaflet	Days to flowering	Days to first pod	Days to maturity
Sanli-bey	36.33B	11.10B	8.90B	15.37A	169.53A	172.67A	185.90A
Atacan	34.80B	9.43C	8.67B	15.43A	156.67B	166.43B	179.00B
Masoor-93	42.00A	12.43A	11.13A	15.20A	150.67C	161.77C	177.00B
LSD	3.010	0.919	1.357	1.269	3.949	1.058	2.413

Results showed a significant difference among the lentil varieties in response to plant height as shown in table-1. The plant height was observed maximum in Masoor-93 (42.0 cm), while Sanli-Bey (36.33 cm) and Atacan (34.80 cm) were observed with the least plant height having non-significant difference from each other.

Number of stem nodes in different lentil varieties was also significant as shown (table-1). Among the varieties, Masoor-93 produced a maximum number of main stem nodes (12.43) followed by Sanli-bey (11.10 nodes) and the least numbers were counted in Atacan (9.43 nodes).

Number of secondary branches significantly differed in the tested verities (table-1). Among these, the maximum number of secondary plant branches were produced by Masoor-93 with 11.13 branches per plant, while Sanli-bey and Atacan were observed with least number of 8.90 and 8.67 secondary branches respectively, which were non-significant to each other. In response to number of leaflets per apical shoot, the verities showed similar characteristics with non-significant difference.

The local verity Masoor-93 exhibited high potential to produce early flower as compare to Sanli-bey and Atacan. The variety Masoor-93

produced its first flower from sowing in as little as 150.67 days followed by Atacan (156.67 days after sowing) and the maximum time was attained by Sanli-bey producing its first flower 169.53 days after sowing.

The tested varieties varied significantly in pod formation time. As like flowering, the local verity Masoor-93 also formed early pods (162.77 days) when compared to other two cultivars, where Atacan required 166.43 days for forming its first pod followed by Sanli-bey (172.67 days) that took maximum time after sowing of lentils.

Regarding crop maturity, the varieties also varied significantly as showed in table-1. Among these, Masoor-93 has high potential to reach its maturity with lowest days requirement (177 days) but with non-significant difference from the time required by Atacan (179 days) for maturity. The maximum duration was taken by Sainli-Bey (185.90 days) in reaching to mature.

Table 2: Mean aphid population on lentil cultivars Sanli-bey, Atacan and Masoor-93 at weekly intervals

Lentil cultivars	Weekly Intervals						Mean
	W1 15-Feb	W2 22-Feb	W3 1-Mar	W4 8-Mar	W5 15-Mar	W6 22-Mar	
Sanli-bey	0.67	4.22	10.00	17.33	16.90	14.55	10.61A
Atacan	1.11	3.45	10.56	19.00	18.45	14.78	11.22A
Masoor-93	0.56	1.22	6.22	13.44	13.44	10.22	7.52B
Mean	0.78D	2.96D	8.93C	16.59A	16.26A	13.18B	

Table-2 showed a statistically significant difference among the mean values of aphid population regarding lentil varieties and time interval, while its interaction (varieties x time) was non-significant.

Aphid population on lentil cultivars first appeared in the second week of February, 2023.

The Sanli-bey cultivar was first attacked by *Aphis caraccivora* (black pea aphid), while local verity Masoor-93 showed maximum resistance against aphid attack with minimum (7.52 mean number of aphids per 2.5cm twig). The other two cultivars, Atcan and Sanli-bey were observed with maximum aphid population (11.22 and 10.61 aphids respectively) and with non-significant difference from each other.

During weekly infestation, the population of aphid was maximum in the 4th and 5th week with mean 16.59 and 16.26 aphids per 2.5cm twig and there were non-significant to each other. The lowest and non-significant mean number of aphids were counted in the 1st and 2nd week of data collection (0.78 and 2.96 aphids respectively).

Conclusion and Recommendations

From the above study it was concluded that Masoor-93 showed high potential to grow faster, producing early flowering and pudding. The Variety also showed maximum resistance against aphid attack with minimum population of aphids.

Based on our conclusion, it is thus recommended that Masoor-93 is suitable for cultivation in Peshawar region due to high potential of well growth and has high resistance against aphid infestation.

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