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Effect of Different Sowing Dates On the Population of Rapeseed Aphids (Homoptera: Aphididae) On Different Varieties.

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Abstract: *The experiment was conducted in the Experimental farmer field Jaffar Abad. Five Rapeseed varieties namely, Toria,Sarson,canola,Raya and Mustard were grown in the Experimental Farm. All the Rapeseed varieties were grown on different sowing dates (20 October, 20 November and 20 December). Each variety were cultivated on (50 $m^{2)}$ plot with different sowing dates (20 October, 20 November and 20 December). Ten sub-plots from each variety were selected for collection of data. Five plants from each sub plot were taken for counting the population densities of the aphids. Whole plants were observed for examining the population densities of the aphids. Data were monitored on weekly basis. Data were taken after one month of the crop cultivation up to crop maturity. All the standard agronomic practices were conducted throughout course of the experiment. The metrological data were recorded throughout the experimental period. Data were subjected for statistical analysis.*

Keywords: Effect of different sowing date on the population of rapeseed aphids

1. INTRODUCTION

In Pakistan after cotton, rapeseed-mustard is the second most important source of oil in Pakistan. It is cultivated over an area of 307,000 hectares with annual production of 233,000 tonnes and contribute about 17% to the domestic production of edible oil.

Rapeseed and mustard seed is a rich source of oil and protein. The seed has oil as high as 46-48 percent, Whole seed meal has 43.6 percent protein. Rapeseed meal is an excellent feed for animals**.**

Canola: Canola is different from rapeseed and it is lower in erucic acid and glucosinolates, which are anti-nutritive and health. Canola type varieties are free of these elements.

Rapeseed (*Brassica rapa* and *B. napus*) and mustard (*B. juncea*) are the important crop of Brassica group grown as oilseed crops in Pakistan. These have remained one of the major sources of oil in the sub-continent for centuries. Rapeseed and mustard are rich source of oil and contains 44-46% good quality oil. In addition, its meal has 38-40% protein that has a complete profile of amino acids including lysine, methionine and cystine. The meal from canola quality rapeseed varieties is an excellent feed for animals and birds especially for poultry. The improvement in processing and refining techniques have enabled to extend the use of rapeseed and mustard oil as cooking medium, salad ingredient, shortening and in margarine. Recent development of canola quality mustard further enhanced the use of mustard oil for edible purpose. The brassica crops are mostly cultivated on soils having pH 7.0 - 8.0

2. REVIEW OF LITERATURE

Banumathy and Mahamay (2007) observed that oil and oil seeds are two of the most sensitive essential commodities. India is one of the largest producers of oil seeds in the world and this sector occupies an important position in the agricultural economy covering an area of 24 to 37 million hectares and accounting for the production of about 379 million tones.

Kaveri Biradar and Nadaf (2007) observed that groundnut is a global crop providing a high protein, high energy food source. It has a district position among oilseeds as it can be consumed and utilized in diverse ways. Groundnut is grown in about 84 counties and India is the second largest producer next to China.

Lakshmanan (2007) observed that India is among the largest vegetable oil economics in the world. It has 14% of oil seed area and accounts for 7.4% of the world oil seeds output 6.1% oil meal production, 3.9% oil meal export and about 7.0 ml of oil production nearly 12 MT is the average Indian

consumption ofvarious oils. It is about 12.5 kg/person/year as against the world average consumption of 17.8 kg with increase in cost the per capita consumption has declined to 7.5 kg.

Damaodarm and Hegde (2007) observed that Indian vegetable oil economy is the fourth largest in the world next only to USA, China and Brazil accounting for about 14% of world's oilseed area and light percent of world's production. However, the productivity in India is only 791 kg.ha (2000-2001) as compared to the world average of 1718kg / ha (1998-2001). In the domestic agricultural sector, oilseeds occupy a distinct position after cereals sharing thirteen percent of the country's gross cropped area and accounting for nearly five percent of the gross national product and ten percent of the value of all agricultural products. India ranks first in castor and safflower production and it is second largest producer of groundnut and sesame and rank third, fifth and ninth in linseed and rapeseed and mustard, soybean and sunflower, respectively. India is blessed with diverse agro-ecological condition ideally suited for growing nine annual oilseed crops viz., in addition to the above, more than 100 tree species of forest origin which have the potential to yield about one million tones of vegetable oil are grown in the country.

Agrawal (2008) observed that oilseeds account for about 14 percent of area and 8.5 percent of production of all the crops. Further, of the total oilseeds production in India more than 96 percent is edible. The five major oilseedsaccount for 85 percent of area and 88 percent of production of all oilseeds, of the five major oilseeds groundnut account for 64 percent of production and rapeseed and mustard about 2 percent of production. Thus, groundnut and rapeseed and mustard together account for 87 percent of production of five major oilseeds and the remaining three oilseeds namely sesamum, linseed and castor seed account for 5.5, 4.0 and 3.5 percent respectively of production of the five major oilseeds.

Nagarajan (2007) observed that in groundnut cultivation the highest investment that a farmer makes is for the purchase of seeds. The investment for seed comes to 30-35% of the total cost of cultivation. The Tiruthani farmers who were waiting to use the lands for groundnut cultivation firmly decided to switch over to an alternative commercial crop. Beyond Tiruttani farmers belonging to A.P had raised sunflower crop over vast areas. The increase in area is primarily due to good marketing facilities. The produce produced by sunflower farmers were directly purchased by merchants. This particular impact observed in Andhra influenced the minds of Tiruttani farmers and they also switched over to sunflower cultivation. In fact, sunflower cultivation is more lacey and profit obtained is almost equal to that obtained in groundnut

3. MATERIALS AND METHODS:

The experiment was conducted in the Experimental field of farmer Jaffar bad. Five rapeseed varieties namely, Toria,Sarson,canola,Raya and Mustard were grown in the Experimental Farm. All the Rapeseed varieties were grown on different sowing dates (20 October, 20 November and 20 December). Each variety were cultivated on (50 $m^{2)}$ plot with different sowing dates (20 October, 20 November and 20 December). Ten sub-plots from each variety were selected for collection of data. Five plants from each sub plot were taken for counting the population densities of the aphids. Whole plants were observed for examining the population densities of the aphids. Data were monitored on weekly basis. Data were taken after one month of the crop cultivation upto crop maturity. All the standard agronomic practices were conducted throughout course of the experiment. The metrological data were recorded throughout the experimental period. Data were subjected for statistical analysis..

4. RESULTS:

A field experiment on the effect of sowing dates on the population of Rapeseed aphids (Homoptera: Aphididae) on different Rapeseed varieties was undertaken in the Experimental farm jaffar abad 2016 Five different Rapeseed varieties including Toria,Sarson,canola,Raya and Mustard were cultivated under field conditions. Data on the aphid populations on different sowing dates on different Rapeseed varities was undertaken. The population densities of the aphids on different Rapeseed varieties on different sowing dates are shown in table 1, 2 and 3.

Early Sowing

The significant differences ($F_{3.57}$ df = 48; $P < 0.05$) were recorded in the aphid populations on different Rapeseed varieties when the crop was grown earlier. However, results revealed that during January 2016 no population of aphids was recorded on all the tested varieties except Toria which was 3.33. Furthermore, highest densities of the aphids were observed on sarsson which was 19.33 followed by canola (10.33) and minimum on Raya (2.33). However, no population of the aphids was monitored during March 2016 in early sowed Rapeseed genotypes as shown in table 1

Table. 1. Mean population of aphids on early cultivated Rapeseed varieties during 2016

Varieties	January	February	March	Mean

TORIA	0.00 b	10.67 b	0.0 a	3.55 b
SARSON	3.33 a	19.33 a	0.0 a	7.56 a
Canola	0.00 b	5.0 cd	0.0 a	1.66 c
Raya	0.00 b	2.33	0.0 a	0.78 c
Mustard	0.00 b	7.33	0.0 a	2.44 bc
LSD	2.57	3.93	0.0 a	1.86

Means in the same column followed by different letters are significantly different (Duncans multiple range test,P < 0.05).

Medium Sowing

The population densities of aphids were significant differences ($F_{53.53}$ df = 48; P < 0.001) on different Rapeseed varieties sowed at medium dates. However, in medium sowing dates SARSON harbored maximum densities of aphids as compared rest of the tested Rapeseed varities as shown in table 2. Furthermore, highest densities of the aphids were observed on SARSON during Feb 2016 which was 29.33 followed by Toria (21.33) and minimum on Raya (9.33). However, similar trend was observed on the scales of the aphid populations during March 2016 in medium cultivated Rapeseed genotypes.

Table. 2. Mean population of aphids on medium cultivated Rapeseed varieties during 2016

Genotypes	January	February	March	Mean
Toria	7.33 B	21.33 B	10.67 B	13.11 B
Sarson	14.0 A	29.33 A	14.33 A	19.22 A
Canola	0.0 D	13.67 C	3.33 C	5.67 CD
Raya	0.0 D	9.33 C	0.0 D	3.11 D
Mustard	3.0 C	11.67 C	5.33 C	6.67 C
LSD	2.64	5.82	2.8	3.08

Means in the same column followed by different letters are significantly different (Duncans multiple range test,P < 0.05).

Late sowing

The population densities of aphids were significant differences ($F_{665.30}$ df = 48; P > 0.001) on different Rapeseed varieties sowed at late dates. However, in late cultivation dates SARSON also harbored maximum densities of aphids (16.33) during January 2016 as compared rest of the tested Rapeseed varities as shown in table 3. Similarly, highest densities of the aphids were observed on SARSON during Feb 2016 which was 72.00 followed by TORIA(54.00) and minimum on Raya (15.33). However, similar trend was observed on the scales of the aphid populations during March 2016 in late cultivated Rapeseed genotypes.

Table. 3. Mean population of aphids on late cultivated Rapeseed varieties during 2016

Genotypes	January	February	March	Mean
Toria	12.0 B	54.0 B	30.67 B	32.21 B
Sarson	16.33 A	72.0 A	44.67 A	44.33 A
Canola	7.33 C	29.33 D	21.33 C	19.33 D
Raya	2.67 D	15.33 E	10.0 D	9.33 E
;Mustard	10.67 BC	36.67 C	28.67 B	25.33 C
LSD	3.53	6.92	3.29	2.11

Means in the same column followed by different letters are significantly different (Duncans multiple range test,P < 0.05)

Discussion:

In the current experiment five Rapeseed varieties were sown to study the impact of aphid populations on them under similar ecological conditions at Jaffarabad, Experimental Farm. It was observed that very slight population or no populations were recorded on the early sown Rapeseed varities as compared with medium and late sown crop. Moreover crop stage has also impact on construction

of the population magnitude of the aphids. Population reached in
highest peak in the February and March in medium sown crop as compared with early cultivated

Rapeseed crop. Interestingly, no higher trend was observed in early sown crop as both medium and late sown crops. Our results are in line with Muddathir (1976), who reported cereal aphid population decreases as the ear began to develop and leaves ceased to grow. Aphids multiply at a faster rate under favorable conditions to form dense colonies of nymphs and adults on leaves, stem and inflorescence (Hussain, 1983). According to Ahmed and Aslam (2000) aphid is a sucking pest which prefers to insert its stylets in soft parts of the plant to get easy and increased food supply. Jones and Jones (1984) observed food availability, temperature and humidity as important factors in population build up of aphids. Heat stress due to high temperature causes reduction in the reproductive potential and fecundity of aphids (Richer and Balde, 1993). Major activities of aphid species were correlated with the rising temperature in the month of

February but as the crop mature, fewer aphids were found on the tested Rapeseed varieties.

5. CONCLUSION

It was concluded from study that all the above mentioned Rapeseed varieties should be cultivated earlier rather than medium and late in order to skip from the aphid infestation. SARSON Rapeseed variety found most susceptible in terms of aphid infestation. The Raya variety inhibited aphid attack.

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