Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2015; 3(3): 348-349

Received: 21-04-2015
Accepted: 25-05-2015

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Population dynamics of aphids on turnip (*Brassica Rapa*) in Peshawar

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Abstract
To study the population dynamics of aphids on turnip *(brassica rapa*) in Peshawar, the present research work was carried out at New Developmental Farm (Malakandher), The University of Agriculture, Peshawar during 2014. Turnip *Brassica rapa* subsp. rapa (Brassicaceae: Brassicales) is a root vegetable commonly grown in temperate climates worldwide for human consumption and as feed for livestock. It is an herbaceous annual or biennial plant in the family Brassicaceae grown for its edible roots and leaves. The turnip's root is high in vitamin C. The green leaves of the turnip top are a good source of vitamin A, folate, vitamin C, vitamin K and calcium. Losses occur in turnips are due to weeds, diseases, predators, and insects. Weeds are generally not a problem once the turnip crop is established. Flea beetles, Wireworms and Root maggots. Besides these the most serious pest of the Turnip is the Turnip aphid *Lipaphis erysimi* Kaltenbach (Aphididae: Homoptera). The aphid population generally makes its appearance sometimes during winter and it continues to breed parthenogenetically till the end of spring when winged individuals are produced and large-scale dispersal takes place. From the experiment, it was concluded that the aphids appear and fluctuate throughout during the growing season. Overall mean density of aphids was higher on Purple Top White Globe of Jerryseeds (Pak.) than on Purple Top White Globe of Chriseeds (USA).

Keywords: Turnip, root vegetable, edible roots, insects, aphid, pests.

1. Introduction
Turnip or white turnip *Brassica rapa* subsp. *rapa* (*Brassicaceae: Brassicales*) is a root vegetable commonly grown in temperate climates worldwide for its white, bulbous taproot. Small, tender varieties are grown for human consumption, while larger varieties are grown as feed for livestock. In the north of England and Scotland, turnip (or *neep*; the word *turnip* is an old compound of *neep*) refers to the larger, yellow rutabagaroot vegetable, also known as the "swede" (from "Swedish turnip") [1]. Wild forms of the hot turnip and its relatives the mustards and radishes are found over west Asia and Europe, suggesting their domestication took place somewhere in that area [2]. Turnip, *Brassica rapa*, is an herbaceous annual or biennial plant in the family Brassicaceae grown for its edible roots and leaves. The plant possesses erect stems and 8–12 leaves forming a crown. The leaves are light green in color, hairy and thin. The plant produces light yellow flowers which are clustered at the top of a raceme and are often extended above the terminal buds [3]. Turnips are eaten as a vegetable after cooking. The shoots and leaves can be eaten fresh in salads or the entire plant can be used as forage for livestock [3]. Turnip produces high-quality forage if harvested before heading. Livestock eat the stems, leaves and roots of turnip plants. Above-ground parts normally contain 20 to 25% crude protein, 65 to 80% in vitro digestible dry matter (IVDDM), about 20% neutral detergent fiber (NDF) and about 23% acid detergent fiber (ADF). The roots contain 10 to 14% crude protein and 80 to 85% IVDDM [4]. Pliny the Elder considered the turnip one of the most important vegetables of his day, rating it "directly after cereals or at all events after the bean, since its utility surpasses that of any other plant" and it "prevents the effects of famine" for humans [5]. Losses occur in turnips are due to weeds, diseases, predators, and insects. Weeds are generally not a problem once the turnip crop is established. Insect pests of turnip include flea beetles, aphids, wireworms, and root maggots in which aphid is the most serious pest. The aphid population generally makes its appearance sometimes during winter and it continues to breed parthenogenetically till the end of spring when winged individuals are produced and large-scale dispersal takes place. The population, however, dwindles mostly due to climatic reasons and practically disappears for the whole of the summer and also most of the autumn [6]. These aphids are small (about 2 mm), generally globular with piercing and

sucking mouth-parts. They possess a pair of small tubular structures at the posterior region of their body, called cornicles. It pierces its proboscis into the tender plant tissue and sucks the plant sap. It excretes honeydew that covers practically the whole surface of leaves and the tender shoots. A black mould develops on the honeydew which interferes with the photosynthetic activities of the plant [6]. Several studies have indicated that weather plays an important role on the aphid appearance, multiplication and disappearance [7, 8, 9, 10]. Early sowing of the vegetable before 15th October will help to escape the attack of the pest and economic damage [6].

2. Materials and Methods

The experiment was conducted in New Developmental Farm (NDF), The University of Agriculture-Peshawar, Khyber Pakhtunkhwa, Pakistan in the year 2014. Two different varieties of turnip *Brassica rapa rapa* i.e. V_1, Purple Top White Globe of Jerryseeds (Pak.) and V_2, Purple Top White Globe of Chriseeds (USA) were purchased from the local market Peshawar, KP, Pakistan. The varieties were sown on 27th September 2014 on ridges in Randomized Complete Block Design (RCBD) with three replications in six plots. Plot size was 5*3 meters each. Each row was 5 meters long. The plant to plant and row to row distance was 25-30 cm and 50 cm respectively. Recommended agronomic practices were applied.

Thinning was carried out after 20 days of emergence. Weeding was performed at weekly intervals. Population of insect pests was observed from the plant emergence to crop maturity. The data on insect pests' population was recorded at weekly intervals, from their first appearance till the first week of December 2014. For recording insect pests' population, all the stages of the insects were observed and counted from the selected plants. Population data was recorded from three leaves per plant that were selected randomly. The data was recorded on 13th, 20th and 27th November and on 4th December 2014 in four weeks respectively.

3. Results and Discussion

Table 1: Mean no. of aphids per Leaf on two Turnip varieties during Nov-Dec., 2014.

Variety	Week-1	Week-2	Week-3	Week-4	Overall Mean
V_1	1.018	1.441	1.798	1.930	1.546
V_2	0.440	0.707	1.107	1.285	0.884

The results in table 1 revealed that on V1 density of aphids started in the first week of November with 1.018 aphids/ leaf, it increased gradually in the coming weeks till it reached to 1.930 aphids/ leaf in the first week of December. On V2 density of aphids/leaf was 0.440 in the first week of November. It increased gradually till it reached to maximum no. of 1.285 aphids/ leaf in the first week of December. Overall mean density of aphids was higher on V1 (1.546 aphids/ leaf) than on V2 (0.884 aphids/ leaf).

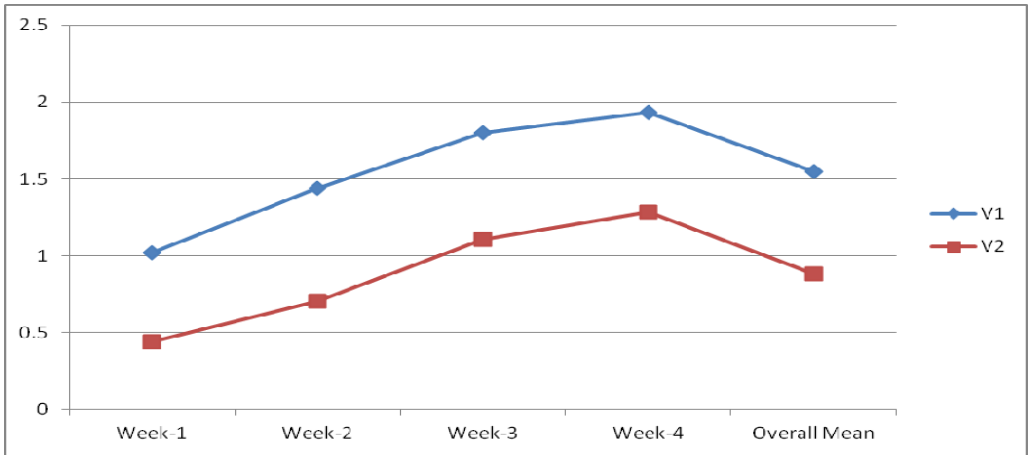

Fig 1: Mean no. of aphids per Leaf on two Turnip varieties during Nov-Dec., 2014

4. Conclusion and Recommendation

Aphid is a pest of turnip. It appears and fluctuates throughout during the growing season. Overall mean density of aphids was higher on V1, Purple Top White Globe of Jerryseeds (Pak.) than on V2, Purple Top White Globe of Chriseeds (USA). Turnip variety V1 is recommended for further research and sowing under field conditions.

5. References

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