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Screening of two varieties of spinach against grasshopper under field condition

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Abstract

To study the screening of two varieties of spinach against grasshopper under field condition, the present research work was conducted at the New Developmental Farm (NDF) of The University of Agriculture, Peshawar in December 2014. Spinach is an edible flowering plant. Spinach occupies a good position among the vegetables due to its high nutritional value. There are certain insect pests and diseases that limit the growth and yield of spinach like Grasshoppers, Aphids, leaf minor and field cricket. In this experiment, two spinach varieties of *i.e.* single and double were purchased from the local market and were sown. Population of grasshoppers were observed from the plant emergence to crop maturity. In single spinach, the highest mean percent damage of 36% was recorded in second week whereas the lowest (21%) was recorded in week third. The mean percent damage recorded in week 1st was 29% which was followed by week 4th, 5th and 6th *i.e.* 27, 28 and 28%, respectively. In double spinach, the highest mean percent damage of 54% was recorded in third week whereas the lowest (36%) was recorded in week first. The mean percent damage recorded in week 1st was 36% which was followed by week 4th, 5th and 6th *i.e.* 49, 49 and 38%, respectively. On the basis of the study findings, it is recommend that single spinach variety should be used for better yield against grasshopper.

Keywords: Spinach, Grasshopper, high nutritional value.

Introduction

Spinach, *spinacia oleracea* (Amaranthaceae) in the order Caryophyllales is an edible flowering plant. Its native place is central and southwestern Asia. It is annual plant and rarely biennial. There are three basic types of spinach; savoy which has dark green curly and crinkly leaves, smooth leaf spinach which has broad smooth leaves and semi-Savoy is hybrid variety with slightly crinkled leaves. Plant grows up to 30 cm. Spinach may survive winter in temperate regions. Leaves are oval to triangular and are simple and alternate; leaf size is variable, about 2-3cm long and 1-15 broad. Flowers are inconspicuous, yellow green in colour having diameter of 3-4 mm. Flowers when matured turned into small, hard, dry and lumpy cluster 5-10 mm which consists of several seeds (Wikipedia).

China is the leading country in spinach production, followed by U.S.A, Japan, Turkey and Indonesia. Pakistan is ranked at 10th position among spinach producing country with the production of 82239 MT, during 2008. Top importing countries are Canada, U.K, Netherlands, Germany and Singapore. Top countries related to spinach export include U.S.A, Spain, Italy, Netherlands and Mexico (FAO 2008).

Requirements of highly productive spinach crop include well drained soil and efficient irrigation and fertilizer management. Quality seed should be used. Most commonly adopted seed sowing method is broadcasting. After sowing, irrigation is applied to keep the soil moist. After germination, irrigation frequency is adjusted accordingly. A nitrogenous fertilizer application aids in obtaining dark green, healthy and vigorous leaves. Flowering stalks appear from the plant, as the temperature rises.

Spinach occupies a good position among the vegetables due to its high nutritional value. It contains high anti oxidant properties along with several beneficial vitamins such as A, C, E, K and B2. It is also consists of magnesium, manganese, folic acid, iron, calcium, copper, phosphorous, zinc and selenium along with Proteins. Boiling of spinach leaves can reduce the nutritional value in some aspects. Spinach also has reportedly anti aging properties, anti-cancer effects, reducing the risk of cardiac disorders, muscular degeneration and vision-related discrepancies. It also helps in blood pressure regulation. It proves to be an efficient remedy for constipation, anemia, acidosis, night blindness, tooth and respiratory disorders, pregnancy and lactation and urinary disorders (Tahira Abbas *et al.* 2010) [1].

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There are certain insect pests and diseases that limit the growth and yield of spinach like Grasshoppers, Aphids, leaf minor and field cricket. Grasshopper has many species it may be grey, brown, black or yellow in colour. They have strong hind legs and they are up to 2 inches long. Most grasshoppers are strong flyers. In early September the weather has changed to hot and dry, at least for this week. Many weeds are drying up and grasshoppers are moving into container grown perennials and annuals. Some growers are reporting feeding damage on their plants in garden centers, nurseries and greenhouse operations growing plants outdoors. Grasshoppers cause some damage every year, but they become very destructive during dry periods (Wikipedia).

Green Peach and Potato Aphids There are two major aphid insect pests that affect the spinach crop. The potato aphid and the green peach aphid. The potato aphid is a larger aphid than the green peach aphid and it is not as active on spinach as the green peach aphid. The body of the potato aphid is longer than the green peach aphid and can be pink or green. The potato aphid can be found in colonies with the green peach aphid or by themselves. Potato aphid adult occur alone or with clusters of young aphids with them. There are several differences between these two aphids. Aside from the fact that potato aphids are larger than green peach aphids the other body part that is different is the tubercles of the two aphids. Tubercles are found inside the base of the aphid antenna. The tubercle of the potato aphid slope to the outside and the green peach aphid tubercles converge toward one another. The green peach aphid colonies tend to start at the bottom of the plant whereas the potato aphids are found all through the plant. The green peach aphid is green unlike the potato aphid which can be green and pink. Of the two aphids the green peach is more of a problem on spinach. Both aphids when in high numbers stunt the spinach and will contaminate the crop. Green peach aphids carry some viruses that can affect spinach. The green peach aphid reproduces asexually and sexually. Most of the green peach aphids reproduce asexually. Asexual reproduction occurs when females give birth without mating. Sexual reproduction in aphids occurs when male and female mate. The result of asexual reproduction is a great many active aphids in a very short time period. The young aphids grow to adulthood in 4 to 5 days. With their piercing sucking mouthparts the aphids stick their mouthparts into the plant tissue and sucks out the plant fluids. This is usually into the phloem that carries the spinach life supporting sugars to vital growth areas of the plant. This can cause stunting and plant deformity. During this feeding process the green peach aphid can be inserting virus diseases. While feeding on the plant in this manner the aphid produces large amounts of excrement. This excrement produced by the aphid, called honey dew, is dropped onto the leaves causing fungus and molds to grow. The result is a contamination of the spinach that cannot be shipped to market.

Materials and Methods

The present experiment was conducted at the New Developmental Farm (NDF) of The University of Agriculture, Peshawar, in 2014. Two spinach varieties of *i.e.* single and double were purchased from the local market and were sown in Randomized Complete Block Design (RCBD) with three replications in six plots. The plot size was 5 x 3 meters. A buffer zone of one meter was made among the plots. A border of 1.5 meter width was left barren around the field. The varieties were grown in. Sowing was performed with hand hoe in proper lining. Each row was 3 meters long. The plant to plant and row to row distance was kept at 15 cm and 50 cm,

respectively. After sowing, proper irrigation was performed and recommended agronomic practices were applied. Standard agronomic practices were done from sowing to harvesting.

Data recording

Population of insect pests was observed from the plant emergence to crop maturity. The data was recorded at weekly intervals. Three plants were randomly selected from each row and count the no of damage leaves per plant. Data was recorded on first appearance of pest till the first week of December, 2014. For recording insect pests' population, adult stages of grasshopper was observed and counted their numbers on randomly selected plants.

Data analysis

The experiment was laid in Randomized Complete Block design. Descriptive statistics was used to analyze the data by Micro soft Excel 2007.

Results and Discussion

The present research work was carried out at Horticulture Research Farm of the University of Agriculture, Peshawar to study the percent damage of Grass hopper in two Spinach varieties under field conditions.

Mean Percent damage of Grass hopper in single spinach

Fig.4.1 showed the mean percent damage of grass hopper in single spinach. Data in figure revealed that highest mean percent damage of 36% was recorded in second week whereas the lowest (21%) was recorded in week third. The mean percent damage recorded in week 1st was 29% which was followed by week 4th, 5th and 6th *i.e.* 27, 28 and 28%, respectively. Results showed that highest percent damage was recorded in second week and lowest was recorded in 3rd week. Percent damage after wards was noted same. This may be due to environmental conditions that the damage caused by grass hopper is higher.

- No previous work was found on mean percent damage of grasshopper in single spinach.

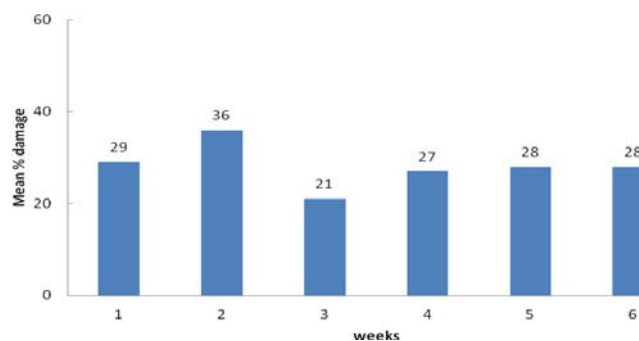


Fig.4.1: Mean percent damage of grass hopper in single spinach variety during 2014

Mean Percent damage of Grass hopper in double spinach

Fig.4.2 showed the mean percent damage of grass hopper in double spinach. Data in figure revealed that highest mean percent damage of 54% was recorded in third week whereas the lowest (36%) was recorded in week first. The mean percent damage recorded in week 1st was 36% which was followed by week 4th, 5th and 6th *i.e.* 49, 49 and 38%, respectively. Results showed that highest percent damage was recorded in third week and lowest was recorded in 1st week. Percent damage after wards was noted same. This may be due to environmental conditions that the damage caused by grass hopper is higher.

- No previous work was found on mean percent damage of grasshopper in double spinach.

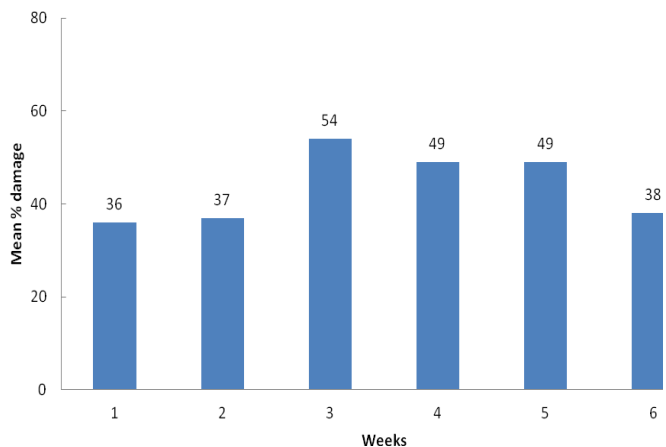


Fig 4.2: Mean percent damage of grass hopper in double spinach variety during 2014

Conclusions

Single spinach variety has the lowest mean percent damage as compared to double spinach where the mean percent damage of grasshopper was observed highest.

Recommendations

On the basis of the study findings it is recommend that single spinach variety should be used for better yield against grasshopper.

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