



# The Effect of Genotypes and plant distances on leaf miner infestation in pea plant (*Pisum sativum L.*)

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## ABSTRACT

Green pea plants are liable to infestation by vegetable leaf miner *Liriomyza* spp. (Diptera: Agromyzidae), is a polyphagous species spread around the world, becoming vegetable crop pests. An experiment was carried out in the directory of agricultural research, Iraq, Sulaimanyah in Plant Protection Research Station in Bakrajo region during season 2020 to study the effect of different genotypes and planting spaces on the population density of Leaf miner infesting pea plants. The obtained results revealed that the population density of leaf miner on pea plants not differed significantly according to the planting spaces (5cm, 15cm and 25cm) during the season. Planting of pea seeds in the planting space (5cm) population density of leaf miner decreased by the first planting space (%16.895). The pea plants were sown in the planting space (15cm) infested by the highest level of the insect (leaf miner) (%18.452) followed by pea plants sowing at the planting space (25cm) which infestation level was (%17.967) respectively. For the physical characters of the plant (plant high, total weight and weight of 100 grains) the results shows that the sowing pea in the spacing of (15cm) were significantly difference, followed by (5cm) while planting distance of (25cm) showed lowest levels of result for last three parameters.

**Keywords:** Leaf miner, Genotypes, Infestation, Plant spacing, Pea plant

## 1. INTRODUCTION

*Liriomyza* spp. (Burgess) (Diptera: Agromyzidae) are polyphagous vegetable leaf miners that have spread over the world and become pests of vegetable crops. In all Mediterranean-bordering countries, it is universally recognized (Chaney, 1995). The damage is punctures caused by females during the feeding and ovipositional processes can result in a stippled appearance on foliage, especially at the leaf tip and along the leaf margins (Chaney, 1995) and (Wilkerson, et al., 2005). However, the major form of damage is the mining of leaves by larvae, which results in destruction of leaf miner.

Three to four days after ovipositional, the mine forms and grows in size as the larva grows (Capinera, 2001). (Bueno, et al 2007). The mining pattern is unpredictably erratic. Leaf mining and stippling can both significantly reduce a plant's photosynthetic rate. Premature leaf drop can also result in a lack of shade and fruit scalding as a result of extensive mining (Bueno, et al 2007). Wounding of the foliage also allows entry of bacterial and fungal diseases (Abou-fakhr-Hammad and Nemer. 2000). Pea *Pisum sativum*, Citrine (Leguminaceae) is one of the most important economic vegetables (Onwueme and Sinha, 1991 and FAO, 1993) its cultivated area was increased during the last years especially in new reclaimed land for local consumption.



As a result, 100-120 kg nitrogen per hectare is required after harvest, equating to 20-25 tons of organic fertilizer, which is sufficient for the establishment of another crop. Green peas have a total cultivated area of roughly 2.8 million acres around the world.

Many studies have been conducted in the past on the effects of planting spaces, climatic conditions, and plant age on the infestation of particular insects that infest leguminous plants, Meena and Bhargava (2001); Mishra et al. (2001); Wale (2002); AbdElmalak and Salem (2002); Shalaby (2004); Mittal and Ujagir (2005); Arif et al. (2006); Hanafy A.R.I (2007); Hanafy et al. (2008); Afsah (2009); Hussein et al., (2010); Abdel Hamed et al. (2011) and Omaprakash and Raju (2014); Shaalan, H. S. and Maha, S. El-Ghanam(2016).

The aim of the present study to determine the suitable genotype of pea plant to be sowing to avoiding from the infestation of leaf miner, which causes a serious damage of leaves and study the effect of three tested planting spaces.

## **2. RESEARCH METHOD**

Field experiment was carried out to study the effect of planting space and different genotypes on the population density of Leaf miner infesting pea plants (*Pisum sativum* L.). The pea seeds (Viola and Kaspia) were obtained from Department of crop fields, Directory of Agriculture Research. An area of about 36 m<sup>2</sup> was cultivated in three planting space, 5cm, 15cm and 25cm in Plant Protection Research Station in Bakrajo region, Sulaimanyah Governorate throughout season 2019. the experimental area was divided into 18 plots; each replicate was 2 m<sup>2</sup>. Each planting space was represented by three replicates. All replicates were arranged in Randomized Complete Block Design. All agricultural practices were done and no pesticide treatments were applied. monthly randomized samples of pea leave (20 of each replicate) were taken after foliage appearance and continue for three months. Each sample from each replicate were kept in tightly closed paper bags and transferred to the laboratory where all samples were thoroughly examined by the aid of stereomicroscope to count the number of leaf miner. Data were analyzed according to XLSTAT program and mean separation was conducted by using Duncan's multiple range test in this program.



### 3. RESULTS AND DISCUSSION

#### Effect of difference genotypes on pea leaves infestation by leaf miner

**Tale 1:** comparison between to Genotypes of Pea on infestation level of leaf miner, plant high, total weight and weight of 100 grains

Genotype	% leaf infestation	plant hight/cm	Total weight/gm	weight of 100 grain/gm
<b>Kaspa</b>	12.642 b	88.556 a	1155.216 a	0.259 a
<b>Viola</b>	22.900 a	76.444 b	1033.437 b	0.217 b
<b>Pr &gt; F(Model)</b>	0.004	< 0.0001	< 0.0001	0.000
<b>Significant</b>	Yes	Yes	Yes	Yes

Results in Table (1) revealed that the infestation of leaf miner on pea plants was significantly differed according to the genotype, data in Table (1) showed that the infestation of the leaf miner increased by the viola genotype. The pea plants in the genotype of (kaspa) were infested by the significantly lowest numbers of leaf miner. however, for last three parameters (plant height, total weight and weight of 100 grains) there were significant difference for the (kaspa) with the comparisons of (viola).

#### Effect of plant spacing on pea leaves infestation by leaf miner

**Table 2:** Effect of three plant distance on infestation levels, plant height, total weight and weight of 100 grains

Plant distance	% leaf infestation	plant height/cm	Total weight/gm	weight of 100 grain/gm
<b>15</b>	18.452 a	99.833 a	2175.333 a	0.294 a
<b>5</b>	16.895 a	81.000 b	1107.167 b	0.244 b
<b>25</b>	17.967 a	66.667 c	0.480 c	0.175 c
<b>Pr &gt; F(Model)</b>	0.004	< 0.0001	< 0.0001	0.000
<b>Significant</b>	Yes	Yes	Yes	Yes

The data illustrated in table (2) showed that the infestation levels of leaf miner not significantly differed according to the planting spaces for both genotypes, data in Table (1) showed that in the planting distance (5 cm) population density of leaf miner decreased by the first planting space (%16.895). The pea plants were sown in the planting space (15 cm) infested by the highest level of the insect (leaf miner) (%18.452) followed by pea plants sowing at the planting space (25cm) which infestation level was (%17.967). for the last three parameters (plant high, total weight and weight of 100 grains) there were significantly difference for the planting distance (15



cm), followed by (5 cm), while planting distance of (25 cm) showed lowest levels of result for last three parameters.

### Interaction between genotype and plant spacing on the leaf miner infestation

**Table 3.** The interaction between genotype and plant distance on the level of infestation

Genotype*plant distance	% leaf infestation	plant hight/cm	Total weight/gm	weight of 100 grain/gm
<b>Kaspa*15</b>	14.753 b	107.333 a	2259.667 a	0.340 a
<b>Viola*15</b>	22.150 a	92.333 b	2091.000 a	0.248 bc
<b>Viola*5</b>	23.767 a	74.333 c	1009.000 b	0.213 cd
<b>Kaspa*5</b>	10.023 b	87.667 b	1205.333 b	0.275 b
<b>Viola*25</b>	22.783 a	62.667 c	0.312 c	0.189 cd
<b>Kaspa*25</b>	13.150 b	70.667 c	0.648 c	0.161 d
<b>Pr &gt; F(Model)</b>	0.004	< 0.0001	< 0.0001	0.000
<b>Significant</b>	Yes	Yes	Yes	Yes

The results in Table (3) shows the interaction of plant distances and genotype on infestation levels. Data illustrated in the table shows that (viola) in the plant distance of (5cm) differed significantly by infestation of highest level of leaf miner (%23.767), followed by (viola) (25 and 15cm) that recorded (%22.783 and %22.150). (kaspa) in the plant spacing (5cm) recorded best result of infestation level (%10.023), followed by (kaspa) in the plant distance (25cm) that the levels of infestation were (%13.150), while the highest level of infestation in the (kaspa) genotype was (%14.753) respectively. However, for the plant high, total weight and weight of 100 grains (kaspa) in plant spacing (15cm) showed the best results.

## 4. CONCLUSION

Leaf miner incidence and severity not depended on the plant spacing, that mean sowing the seeds in plant spacing (5cm), (15cm) and (25cm) not important for pea plant to prevent infesting of leaf miner (Table 2), on another hand not have significant differences between all three spacing, that's because of growing the plant vertically and having no much foliage. Although the results of Kapsa genotype shows to be more resistance against leaf miner infestation (Table 3).

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