



## Effect of Sowing Date and Faba Bean Cultivars on the Incidence of Leaf Miner (*Liriomyza Trifolii*) in Halfa Aljadidah Scheme

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### ABSTRACT

The study was carried out for two winter seasons of 2015/2016 and 2016/2017 at the Demonstration farm of Faculty of Agriculture and Natural Resources, University of Kassala, Halfa aljadidah. The objective of this study was to study the effect of sowing date and faba bean cultivar on the incidence of the leaf miner in faba bean. The four cultivars were Hudeiba93, SML, Bassaber, Eddamer while three sowing dates were 5 November, 20 November and 5 December. Data were recorded for leaf miner infestation and grain yield components (number of pods, weight of 100 seed and seed weight kg/ha). The results indicated that mean number of mines of *L.trifolii* in the third sowing date was higher than those of first and second sowing dates, respectively. Also, the highest number of pods per plant (6.27) was recorded in Hudeiba 93 which was significantly higher than SML cultivar. Moreover, the highest seed yield (871kg/ha) was recorded from Eddamer followed by Hudeiba 93(792kg/ha) and Bassaber (755 kg/ha) while lowest seed yield of (571 kg/ha) was recorded from SML. In conclusion, the highest seed yield of 1017kg/ha was recorded in Eddamer at second sowing date.

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### Introduction

The Faba bean, (*Vicia faba* L.) is a member of the fabaceae family. It is a native to northern Africa and south western Asia. Faba beans are grown in 58 countries [1]. In Sudan, faba bean is cultivated in vast areas in the River Nile and Northern State where suitable climate conditions prevail, it is also cultivated in small areas in Gezira Rahad, New Halfa, schemes and Khartoum State.

In Sudan the stewed dry seeds form the main dish in breakfast and dinner for millions of people especially those at low and middle income level. It is seen as an agronomical viable alternative crop to cereal, with a potential of fixing free nitrogen up to 300 kg N/ha. Faba bean can be used as human food in developing countries and as animal feed industrialized countries [2]. Leaf miner, *Liriomyza trifolii* is a polyphagous insect pest and it was recorded from 25 plant families [3]. It also caused serious damage to faba bean in Gezira, Khartoum and Halfa aljadidah areas [4, 5]. In Sennar and Gezira areas [6,7] showed that, the yield losses caused by *Liriomyza spp.* in faba bean crop were more than 42%. Plant varieties and planting dates are playing an important role in reducing population densities of many pests that attack the plant [8,9]. Such information is needed about faba bean in the study area. Therefore, the objective of this study is to determine the effect of sowing date on the incidence of the leaf miner in faba bean cultivars.

### Materials and methods

Two field experiments were conducted for two consecutive winter seasons (2015/2016 and 2016/2017) in the Demonstration Farm of the Faculty of Agriculture and Natural Resources, University of Kassala, Halfa aljadidah, Sudan (Latitude. 15° 18'-15° 21' N and Longitude. 35° 36'-35° 37' E and Altitude 450 m above sea level as described

by [10]. The land was prepared as recommended by Agricultural Research Corporation. Four faba bean cultivars namely (Hudeiba 93, SML, Eddamer and Bassaber) were sown at the three sowing dates (5/NOV, 20/NOV and 5/DEC). The experiment was arranged in a randomized complete block design with three replications. The plot size was (4x5m) consisted of 5 ridges. The seeds of the four cultivars were obtained from Hudeiba Research station. The seeds were sown in holes of 20 cm distance along the ridges, and then thinned to two plants per hole three weeks after sowing.

Ten plants per plot randomly chosen, and the number of mines per 10 leaflets per plant counted at weekly intervals for the assessment of infestation levels by *L.trifolii* as described by [11].

To assess the effect of *Liriomyza trifolii* infestation on the yield, the following parameters were determined:

-Number of pods/plant from 10 plants/plot.

-Weight of 100 seeds (g).

-Weight of seeds kg/hectares

The data were statistically analyzed according to the method described by [12] using computer software (STATISTIX version 10.0) for Randomized Complete Blocks Design (RCBD). Means were separated according to Duncan Multiple Range test method described by (DMRT) at 5% level of probability.

### Result and Discussion

The data recorded on *L.trifolii* mines in different sowing dates presented in table 1 revealed that, sowing date had non-significant differences on the number of mines during the first season. While during the second season, the mean number of mines in the crop sown in the third sowing date was (3.93 mines/leaf) which was significantly higher than the mean number of mines (2.89 and 3.16) mines/leaf in the crop

**Table 1. Mean number of *L. trifolii* mines per Faba bean leaflet recorded on four cultivars grown in three sowing date during two seasons.**

| Treatments          |           | Number of mines per leaflet season 2015-2016 | Number of mines per leaflet season 2016-2017 |
|---------------------|-----------|--|--|
| Sowing date         | 5 Nov     | 2.23   | 2.75   |
|                     | 20 Nov    | 2.57   | 2.57   |
|                     | 5 Dec     | 2.75   | 2.23   |
| LSD <sub>0.05</sub> |           | 0.80   | 0.80   |
| Cultivars           | Hudeiba93 | 2.40   | 2.94   |
|                     | SML       | 2.58   | 3.93   |
|                     | Bassaber  | 2.55   | 3.69   |
|                     | Eddamer   | 2.51   | 2.74   |
| LSD <sub>0.05</sub> |           | 0.35   | 0.61   |

**Table 2. Yield and yield components of four faba cultivars grown in three sowing dates combined two season.**

| Treatments          | Pods      | 100 seed | Weight /ha |      |
|---------------------|-----------|----------|------------|------|
| 5 Nov               | 6.27      | 51       | 812        |      |
| 20 Nov              | 5.63      | 53       | 769        |      |
| 5 Dec               | 4.87      | 50       | 660        |      |
| LSD <sub>0.05</sub> |           | 0.27     | 115        |      |
| Hudeiba93           | 6.20      | 48       | 792        |      |
| SML                 | 4.86      | 62       | 571        |      |
| Bassaber            | 5.62      | 46       | 755        |      |
| Eddamer             | 5.67      | 50       | 871        |      |
| LSD <sub>0.05</sub> |           | 0.32     | 132        |      |
| 5 Nov               | Hudeiba93 | 7.46     | 48         | 794  |
| 5 Nov               | SML       | 5.65     | 60         | 620  |
| 5 Nov               | Bassaber  | 5.96     | 50         | 953  |
| 5 Nov               | Eddamer   | 6.03     | 48         | 383  |
| 20 Nov              | Hudeiba93 | 6.06     | 50         | 840  |
| 20 Nov              | SML       | 4.58     | 65         | 617  |
| 20 Nov              | Bassaber  | 5.91     | 45         | 603  |
| 20 Nov              | Eddamer   | 5.96     | 60         | 1017 |
| 5Dec                | Hudeiba93 | 5.08     | 46         | 743  |
| 5Dec                | SML       | 4.36     | 63         | 476  |
| 5Dec                | Bassaber  | 5.00     | 45         | 709  |
| 5Dec                | Eddamer   | 5.03     | 46         | 713  |
| LSD <sub>0.05</sub> |           | 0.55     | 230        |      |

sown in the second and first sowing dates, respectively. Also, the result revealed that, early planting of faba bean could escape the attack of *L. trifolii*, this was in agreement with findings reported by [13,14,15]. On the other hand, [16] reported that, chick pea planted in late sowing date had a significantly higher number of damage leaflets than the early sowing date. Moreover, in the first season, table (1) showed that there were no significant differences in the mean number of mines among the tested cultivars. However, the mean number of mines per leaf were ranged between 2.43 and 2.59. As shown in table 2 with respect to the effect of faba bean cultivars, due to the infestation of *L. trifolii* during the second season, the analysis of variance showed significant differences between cultivars. In this regard, SML cultivar significantly recorded more mean number of mines when compared with other cultivars, during the second season of 2017/2018. The obtained results revealed that, SML cultivar which have got large leaflets was the most preferred to leaf miner damage while cultivars having small leaflets were least preferred to *L. trifolii*. Similar results were reported by [15] who showed that, faba bean cultivars having large leaflets were susceptible to leaf miner damage. The present results also are in agreement with those reported by [16-18] who found that chick pea cultivars with larger leaflets were the most sensitive to leaf miner damage. The early sowing date (5NOV) produced the highest number of pods (6.27) per plant

and highest seed yield of 812 kg /ha compared with other sowing dates (Table 2). While, the lowest number of pods and seed yield were recorded in late sowing date(5DEC). The 100- seed weight character showed significantly different among the three sowing dates (Table2).

Among different tested cultivars, the highest mean number of pods per plant (6.20) was recorded in Hudeiba 93 which was significantly higher than SML cultivar(Table2). The highest seed yield(871kg /ha) was recorded from Eddamer followed by Hudeiba93 (792kg/ha ) and Bassaber (755kg /ha). While the lowest seed yield of 571 kg /ha was recorded from SML cultivar. SML cultivar significantly recorded the highest 100- seed weight (62 g) as compared to the other cultivars, although, it is produced the lowest number of pods per plant(4.86), and lowest seed yield (Table 2). The obtained results were accordance with those reported by [15, 20, 21] who indicated that, highest infestation and yield losses by *L.trifolii* were recorded on late sown faba bean. Concerning the effect of faba bean cultivars on yield components, the highest number of pods per plant was recorded in Hudeiba 93 cultivar which was significantly higher than SML cultivar. The interaction between faba bean cultivars and sowing date was significant for all yield components. In this regard, the highest number of pods /plant was obtained with Hudeiba 93 when sown at early sowing date while the highest seed yield of 1017kg /ha was recorded in Eddamer at second sowing date (Table 2).

**In conclusion,** Eddamer cultivar gave the highest seed yield and lowest number of mines particularly at the second sowing date in Halfa aljadidah scheme.

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