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POPULATION ABUNDANCE OF APHID ON FENUGREEK: (FAMILY, FABACEAE) SOWN IN DIFFERENT DATES WITHIN A SEASON

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A B S T R A C T

Aphids are notorious agricultural pests known to inflict damage by feeding on plant sap and transmitting plant diseases. Understanding the dynamics of aphid populations on fenugreek can provide valuable insights for optimizing cultivation practices and pest management strategies. *Trigonella foenum-graecum* L. is a vegetable as well as used for its medicinal value in the globe. The winter sowing is severely damaged by aphid infestation. The experiment involved sowing fenugreek seeds at multiple dates during the growing season, and regular monitoring was conducted to assess the aphid population abundance on the plants. Results showed that aphid infestation can be less on crop sowing in the February. The minimum numbers of aphids were recorded in last observation with mean number 6.17 ± 0.33. The peak populations of aphids were recorded 23.83 ± 0.33 in the fourth observation. The minimum numbers of aphids were recorded in the second treatment. Result showed that the appearance of aphid population from first week with mean number 1.50 ± 0.22 in the treatment three and the peak aphid population were recorded 8.33 ± 0.21 in the three observation. Preliminary findings indicate that the timing of fenugreek sowing significantly influences the aphid population dynamics. Early sown crops may experience a different pattern of aphid infestation compared to those sown later in the season. The study contributes to the broader understanding of the ecological interactions between aphids and fenugreek within a seasonal context, aiding in the development of sustainable agricultural practices.

Keywords: Extensive survey; Fenugreek; Lower Sindh; *Trigonella foenum-graecum*

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INTRODUCTION

Fenugreek (*Trigonellafoenu-graecum* L.) is an annual legume, belongs to the family *Fabacecae*. It is widely extensively cultivated throughout the world for its medicinal and food value (Petropoulos, 2002). As a leguminous plant, fenugreek plays a crucial role in crop rotations, enhancing soil fertility through nitrogen fixation. However, like many crops, fenugreek is susceptible to various pests, among which aphids (order: Hemiptera; family: Aphididae) pose a significant threat (Sun et al., 2021).

However medicinally in most of the countries Plants are used as a source of many influence and powerful drugs. For that way when extra calories are stored in the body as it decreases fats of the body and effectively works (Basu, 2006). Moreover Khalki et al. (2010) reported that Fenugreek has potential therapeutic activities in so many treatments such as, baldness, breast feeding, cancer, diabetes, atherosclerosis, digestive, chronic coughs problems, inflammation, Parkinson's disease, exercise performance and milk flow in tuberculosis. Meanwhile, Thomas et al. (2011) described as a practice in ancient times, fenugreek seeds were purportedly utilized as sacred incense during Egyptian embalming rituals

in the era of the pharaohs.

While Fugh-Berman (2003) has indicated limited clinical evidence supporting these assertions, there is widespread utilization of fenugreek leaves and seeds in the preparation of extracts and powders for medicinal purposes (Smith, 2003). Fenugreek seeds and leaves have been identified to contain several key chemical compounds with medicinal properties (Petropoulos, 2002).

This unique utilization of fenugreek is said to be rooted in antiquity. Besides its ritualistic significance, fenugreek also claims the distinction of being one of the earliest recorded medicinal plants, a fact chronicled in the herbal history archives. Observations have revealed that fenugreek plants face infestations from several insect species during their growth. Herbal history archives chronicle the medicinal use of fenugreek dating back to ancient times. During their growth, fenugreek plants have been observed to contend with infestations from various insect species (Smith, 2003). Aphids are sap-sucking insects that can cause considerable damage to crops by feeding on plant sap, transmitting diseases, and inducing stress, ultimately affecting yield and quality. The population dynamics of aphids can be influenced by various factors, including environmental conditions, plant phenology, and cultivation practices (Hullé et al., 2020).

According to Lucy (2004), significant damage to fenugreek forage yield in Australia can be attributed to insects like aphids, thrips, pod-borers, and heliothis. Additionally, reports from Australia, as noted by Jongebloed (2004), indicate that root rot caused by the soil-borne nematode Meloidogyne incognita has been observed, leading to the demise of immature plants.

Furthermore, winter-growing fenugreek plants are more susceptible to aphid attacks, disrupting their growth and diminishing yields. Fenugreek is adaptable to various climates, ranging from 10 to 32 ℃, suitable for warm and hot environments. Given the documented benefits of fenugreek and its susceptibility to insect infestations, this study was designed to investigate the cultivation of fenugreek at different sowing dates. This study focuses on investigating the population abundance of aphids on fenugreek crops sown at different dates within a season. Understanding how aphid populations fluctuate in relation to sowing dates is crucial for developing effective pest management strategies and optimizing fenugreek cultivation practices.

MATERIALS AND METHODS

Study site selection

This experiment was conduct to observe the effect of sowing dates on aphid population at SZABAC, Dokri, at Latitude 27.3743°N Longitude 68.0967°E and Altitude 39 meters.

Experimental design

Randomized complete block design was implemented for potential variations in soil, climate, and other factors. Fenugreek seeds were soaked for 8 hours before sowing. Seed were sown at three different plots of 1 x 2 meter seed beds. Seeds were sown with an interval of 15 days. All germinations were completed within seven days. Urea was applied 30g per plot on 30 days of germination and it applied continuously with an interval of 30 days. Field was irrigated and weeding was done by hand-pulling whenever it was necessary.

Data recording

Aphid population monitoring

Data were examined after every 25days of germination of each sowing period. During morning twenty plants were observed for aphid population, after interval of three days. Presence of Adult and nymph of each plant were also counted.

Data analysis

A statistical tool, i.e. analysis of variance (ANOVA), was done to assess the significance of temporal variations in aphid population density.

RESULTS

Three treatment combinations were implemented, and each had a distinct effect on aphid infestation in fenugreek, resulting from different sowing dates. Whereas after twenty days three plots and that deferent sowing dates examined the aphid infection on plots.

First sowing

To analysis the population of aphids in the first treatment, we observed the effected crops in start week of every month. The minimum numbers of aphids were recorded in last observation with mean number 6.17 ± 0.33. The peak populations of aphids were recorded 23.83 ± 0.33 in the fourth observation (Figure 1).

Second sowing

The first and second treatment result showed that the population of aphid are normal and deferent from the first treatment and the minimum number of aphids were counted in the last observation with mean number 4.17 ± 0.26 in treatment two and peak population of aphids were recorded 25 ± 0.58 in the fourth observation (Figure 2).

Third sowing

The minimum numbers of aphids were recorded in the second treatment. Result showed that the appearance of aphid population from first week with mean number 1.50 ± 0.22 in

the treatment three and the peak aphid population were recorded 8.33 ± 0.21 in the three observation (Figure 3).

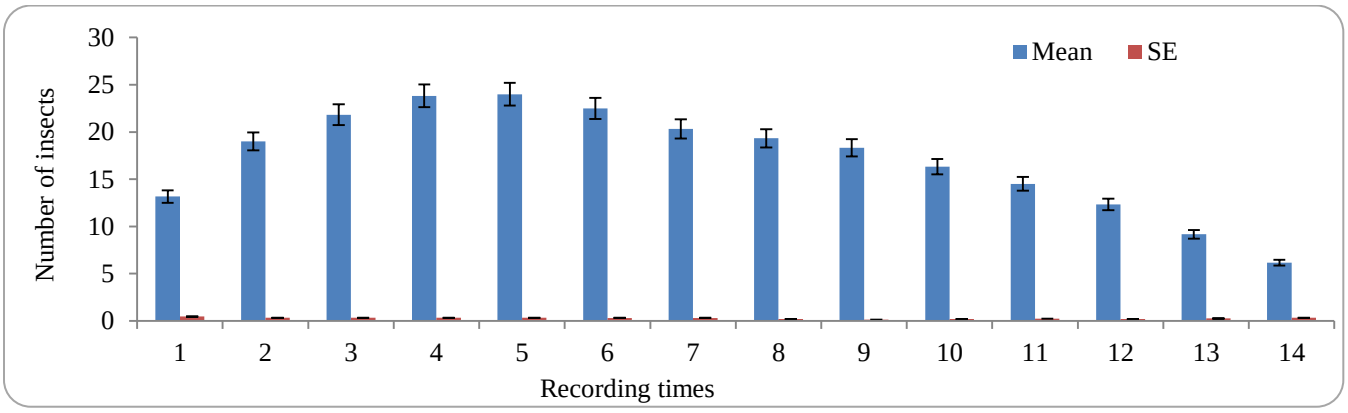

Figure 1. Showing aphid population per plant in the first sowing date, data is the mean of 20 replication.

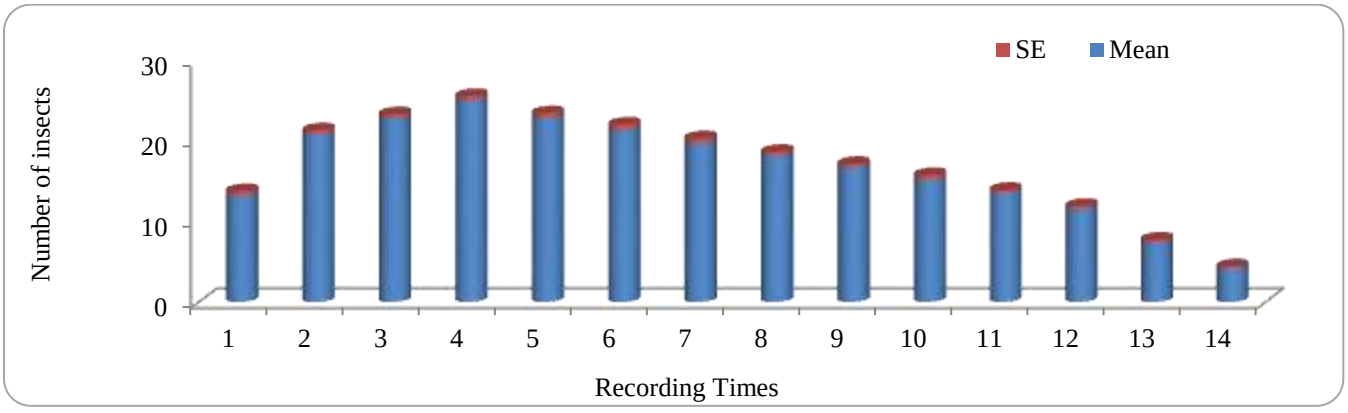

Figure 2. Aphid populations per plant in the second sowing date, data are the mean of 20 replications.

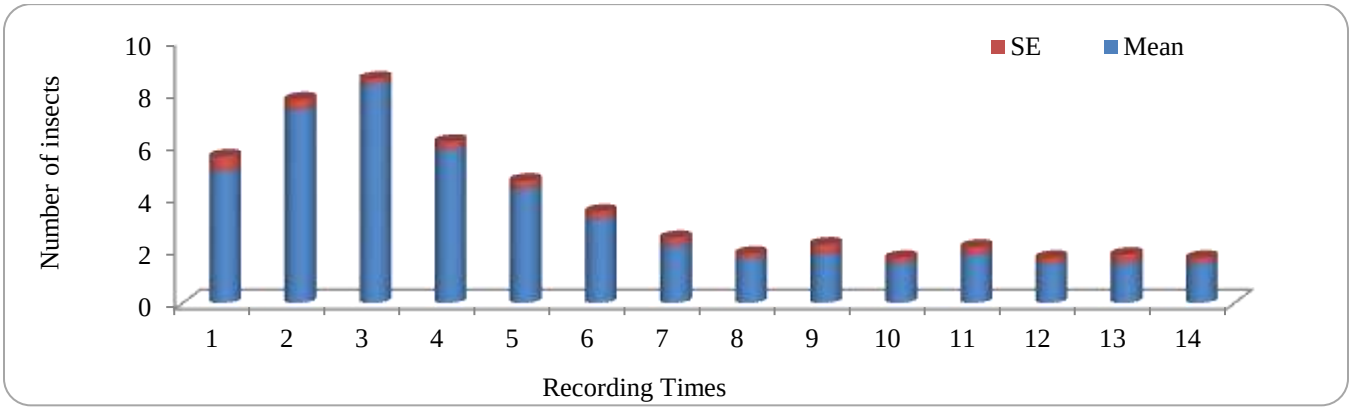

Figure 3. Aphid populations per plant in the third sowing date, data are the mean of 20 replications.

It was observed that there was significant difference while comparing the aphid infestation in all treatment. Minimum aphid attack was recorded from the treatment three with mean number of 1.63 aphids per plant, followed by treatment two and treatment one with mean number of 11.39 ± 196 and 12.81 ± 1.86 aphids per plant (Figure 4).

DISCUSSION

The analysis of our results indicates a noteworthy correlation between different sowing dates and aphid population on fenugreek. This aligns with the observations made by Kethran et al. (2014), who asserted that the attractiveness of the crop to insect pests is a leading cause of aphid infestation on fenugreek leaves. Our study supports

this claim, as we observed a consistent appearance of aphid populations from germination to harvest.

The observed temporal variations in aphid populations align with previous studies on insect phenology and population dynamics. Studies by Akbar et al. (2017) demonstrated similar fluctuations in aphid populations in response to changing environmental conditions and plant phenology. These findings underscore the importance of considering temporal factors when assessing pest dynamics in agricultural systems Hodgson et al. (2012).

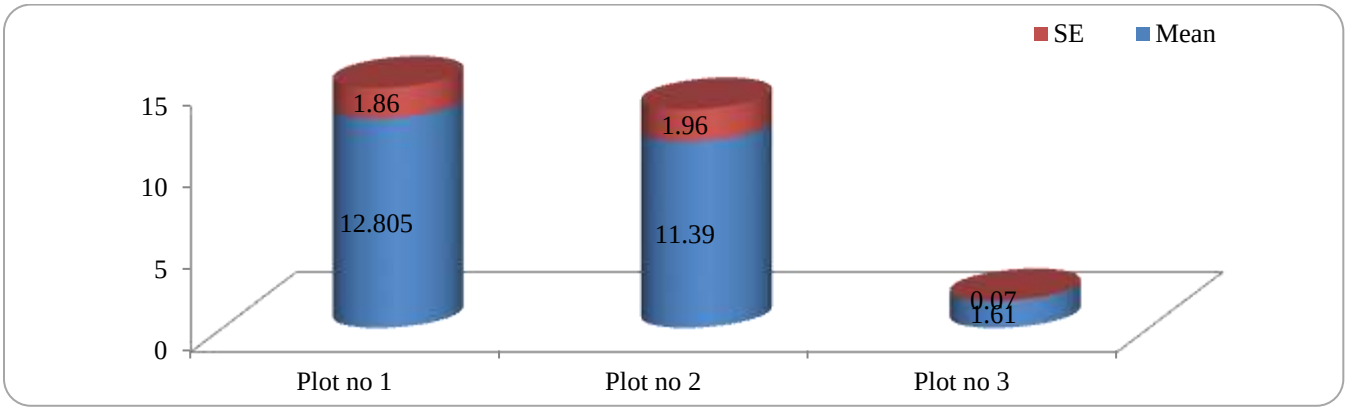

Figure 4. Overall mean population of aphids in all three fields.

Our results are consistent with the broader understanding of how environmental factors impact aphid populations. Previously, Selvaraj and Kaushik (2014) highlighted the significance of temperature and humidity in influencing aphid reproduction and abundance. These factors are known to affect aphid life cycles, influencing their development and population growth Moshira and Ghada (2022).

Further strengthening our findings, the present study concurs with the observations of Bindra and Mahal (1981), indicating a significant increase in aphid population correlated with plant growth. This emphasizes the importance of understanding the dynamics between plant development and aphid infestation.

Importantly, our study aligns with the recommendations made by previous research, particularly that of Schellhorn et al. (2000), highlighting cultural practices as effective means to minimize insect infestation. The practice of altering sowing times, along with strategies like weed eradication and balanced fertilizer application, has been noted to significantly reduce aphid infestation. This is consistent with our findings, where we observed a clear impact of different sowing dates within a season on minimizing aphid populations.

Moreover, the multifaceted nature of our study, incorporating environmental factors, plant growth metrics, and pest population dynamics, contributes to a more nuanced understanding of the complex interactions within the fenugreek ecosystem. This holistic perspective is vital for devising sustainable and tailored agricultural practices that balance crop productivity with pest management (Hodgson et al., 2012).

The observed negative effects of aphid infestation on fenugreek plants corroborate findings from previous research. Similar studies on other crops, such as Mamatha and Panyam (2021) work on soybeans, have reported stunted growth and reduced yield due to aphid feeding. These detrimental effects underscore the economic importance of implementing effective pest management strategies (Rao and Shanower, 1999).

The endorsement of cultural practices, such as altering sowing times, weed eradication, and balanced fertilizer application, as effective means to reduce aphid infestation aligns with the recommendations of Schellhorn et al. (2000). This suggests that farmers can leverage these practices as part of an integrated approach to pest control. Adjusting sowing times within a season emerges as a particularly impactful strategy, as our study indicates a significant association between sowing dates and aphid population dynamics.

In conclusion, both the existing research evidence and our results collectively suggest that the timing of sowing plays a crucial role in mitigating aphid infestation on fenugreek. Adopting strategic sowing practices within a season can be an effective and sustainable approach to minimize the impact of aphids, contributing to improved crop yield and overall agricultural productivity.

CONFLICT OF INTEREST

The authors declared no conflict of interest.

AUTHOR'S CONTRIBUTION

All authors contributed and supported towards writing of this manuscript.

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