FLORAL ACTIVITY TIME PERIOD OF POLIINATORS ON SAFFLOWER *Carthamus tinctorius* L.

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ABSTRACT: *Investigations were carried out on the floral activity period of pollinators at experimental plot in the Faculty of Crop Protection, Sindh Agriculture University, Tando Jam, Pakistan. There were six different activities time periods of pollinators at two hours interval were observed from 7a.m. to 5.p.m. Approximately three different species of pollinators were identified comprising two Bees and one Syrphid fly. The result showed that the peak activity time period was observed at 9.am. In bees, A. dorsata (0.47 ± 0.04/plant) followed by M. perihirta (0.11 ± 0.01/plant). Similarly, the population of Syrhid fly, E. baltaetus (0.01 ± 0.003/plant; 0.01 ± 0.004/ plant) was observed during 9 a.m. and 7 a.m. respectively. The results further revealed that the lowest activity was observed at 11.a.m. in bees, A. dorsata (0.15 ± 0.02/plant) followed by M. perihirta (0.04 ± 0.005/plant) and Syrphid fly, E. baltaetus (0.005 ± 0.002/plant). The results further indicate that the floral visit of A. dorsata and Syrphid fly, E. baltaetus were zero after noon. However, the bee, M. perihirta remained on flower throughout the day. The temperature have negative and humidity have positive correlation with floral activity of pollinators at different visiting times.*

Key words: Pollinators, Floral activity, Safflower.

INTRODUCTION

Safflower (***Carthamus tinctorius*** L.) is a highly branched, herbaceous, thistle-like annual plant. It is commercially cultivated for vegetable oil extracted from the seeds. Plants are 30 to 150 cm (12 to 59 in) tall with globular flower heads having yellow, orange, or red flowers. Each branch will usually have from one to five flower heads containing 15 to 20 seeds per head. Safflower is native to arid environments having seasonal rain. It grows a deep taproot which enables it to thrive in such environments [1].Insect pollinators play significant role in the pollination of flowering plant for the multiplication and fruit formation for wild plant communities [2]. Pollinator is the biotic agent (vector) that moves pollen from the male anthers of a flower to the female stigma of a flower to accomplish fertilization or 'syngamy' of the female gametes in the ovule of the flower by the male gametes from the pollen grain [3].The most recognized pollinators are the various species of bees, which are plainly adapted to pollination. Bees typically are fuzzy and carry an electrostatic charge. Both features help pollen grains adhere to their bodies [4]. About 90% of all flowering plant speceis depend on population mostly by insects such as bees in the ecosystem [5].

It was observed double as more seed was obtained from that plots where bees were active during flowering as compared to plots caged not to include the pollinating insects [6]. The foraging activity of some insect pollinators were assessed that the *Apis cerana indica* was the foremost pollinator of mustard crop, followed by *A. dorsata, A. mellifera* and *A. florea* [7]. It is justified that among bees, *A. dorsata* designated as abundant pollinators among other true flies (Syrphidae) [8]. All insect pollinator species are more dynamic during 10:00 a.m. to 12:00 noon [9].

MATERIALS AND METHODS

The experiment was designed to study the floral activity period of pollinators on safflower at experimental area of Faculty of Crop Protection, Sindh Agriculture University, Tando Jam, Pakistan, during Feb – Mar, 2013.

After all agronomic practices safflower crop was sown on an area about 0.5 acres. The observations were made in the two hour intervals in each treatment from 7:00 am to 5:00 p.m. To monitor the foraging activity of insect pollinators, six different time periods were selected i.e. T1=7a.m., T2=9 a.m., T3=11 a.m., T4=1 p.m., T5=3 p.m. and T6= 5.pm. during the flowering period. Insect collection net was used for collection of insect pollinators. The composed pollinators were stuck in an insect collection box separately with the help of scientific pin. The naphthalene balls were kept in collection box for their preservation. The field collected pollinators were identified by taxonomist. About 25 plants were selected randomly to monitor the floral activity of pollinators. Only the flowers were monitored and counting numbers of individuals visiting pollinators. The data was collected on each alternate day throughout the flowering period. The temperature and relative humidity were also monitored. The data of floral activity were subjected to the statistical analysis.

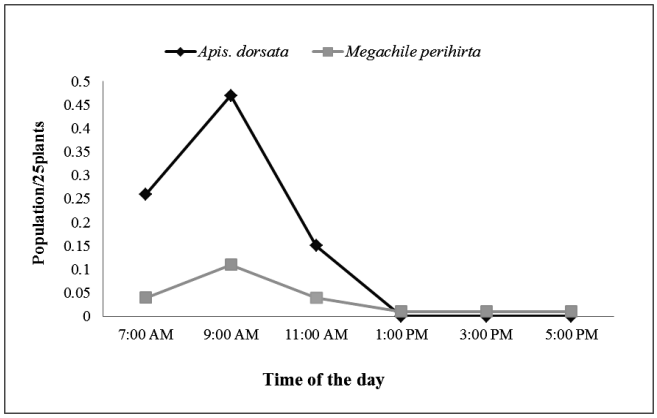

Fig. No.1. Floral activity pattern of *A. dorsata* and *M. perihirta* on safflower in Tando Jam, Pakistan.

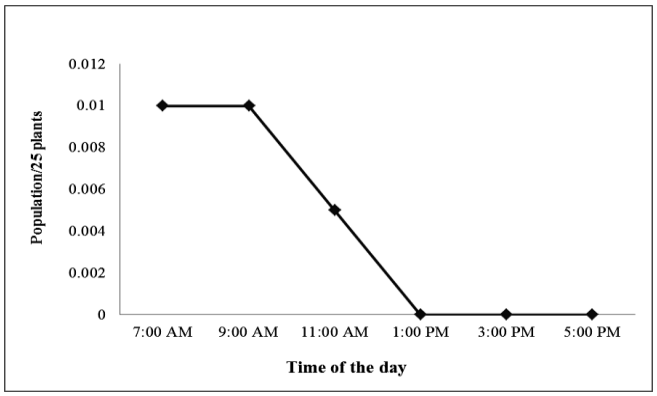

Fig. No.2. Floral activity pattern of Syrphid fly, on safflower in Tando Jam Pakistan.

RESULTS AND DISCUSSIONS

The pollinators were mainly consisting of two bees, *Apis dorsata, Megachile perihirta* and Syrphid fly, *Eplyrphus baltaetus.* The result in fig. No.1 revealed that the bees, *A. dorsata* and *M. perihirta* were more active pollinator during the floral activity with the increase in temperature and decrease in the humidity. The peak activity was observed between 7.00 a.m. to 11.00 a.m. with the temperature ranging from 26 ºC to 33 ºC. The maximum population dynamic of *A. dorsata* was (0.47/plant) at 9.00 a.m. (28.6 ºC) and then declined as temperature increased and humidity decreased it reached (0.15/plant) at 11.00 a.m. temperature (33 ºC) and humidity (68%) was recorded. Whereas, floral activity become zero from 1.00 to 5.00 p.m. Similarly, the bee, *M. perihirta* was also more active at the same time period, temperature and humidity %. The maximum population dynamic of *M. perihirta* was (0.11/plant) at 9.00 a.m. (28.6 ºC) and then declined as temperature increased and humidity decreased it reached (0.04/plant) at 11.00 a.m. temperature (33 ºC) and humidity (68%) was recorded. Whereas the floral activity of pollinator was observed (0.01/plant) on 1.00, 3.00 and 5.00 p.m. respectively. The Fig.2 revealed that the population dynamics of syrphid fly was very low as compare to other pollinators. The peak activity period was started from early-morning to mid- morning time (0.01/plant) at temperature and relative humidity (26-28.6 ºC) and (86.7-75.8 %). Whereas, floral activity of pollinator was decreased at (0.005/plant) at 11.00 a.m. temperature (33 ºC) and humidity (68%) was recorded. Similarly, floral visit was recorded zero from 1 to 5 p.m. The temperature have negative correlation, whereas, the relative humidity have positive correlation with floral activity of pollinators at different visiting times. There was a significant difference in the floral activity time periods (F=93.72; df =34; $p<$ 0.0001) of different pollinators.

The data of our result supported by findings of [4] and [7] showed that *A. dorsata* was more abundant pollinator, however the peak floral activity period 10:00 to 12:00 h of different pollinators was observed throughout the day.

CONCLUSION

It is concluded that the bee, *A. dorsata* was more dynamic at 9.00 am, however the floral activity of bee, *M. perihirta* was very low but active throughout the day. Similarly, syrphid fly occurred in least number during 7.00 to 11.00.

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