Journal of Plant Protection and Pathology

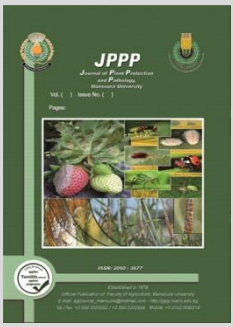
Journal homepage: www.jppp.mans.edu.eg
Available online at: www.jppp.journals.ekb.eg

Egg Laying and Feeding Preference of *Sesamia cretica* Led., on Primary and Secondary Hosts

Youssef, M. A. M.* and A. M. Khorchid

Field Crop Pests Dept., Plant Prot. Res. Inst., Agric. Res. Center, ala3liapc@gmail.com

Cross Mark



ABSTRACT

Some graminaceous fodder crops were compared to grain sorghum for larval feeding and ovipositional preference by *Sesamia cretica* Led., under laboratory conditions. The percentages of *S. cretica* larvae attracted to each host of the four gramineous plants studied in free choice test after one hour, for the sorghum, broom corn, pearl millet and sudan grass were 20.00%, 10.00%, 20.00% and 24.00% of larvae, respectively, with no significant differences between them. The four gramineous plants studied in free choice test after 24 hours varied significantly, sudan grass was the most attractive crop (32.00%), however, broom corn was the lowest in attractiveness (8.00%). The non-responded larvae number decreased from 26.00% in one hour observation to 17.00% in 24 hours observation. Data indicated a strong ovipositional preference for pearl millet (34.46%), however, broom corn harbored the lowest percent of egg deposit (14.04%).

Keywords: Host plants, *S. cretica*, Feeding preference, Ovipositional preference, Trap crop

INTRODUCTION

Grain sorghum (Sorghum bicolor L. Moench) -a primary host- is one of the most important cereal crops. It is one of the main stable for the world poorest and more food-insecure people. It ranks the fourth of the world cereal crops after wheat, rice and maize. In Egypt, Sorghum is grown in all Upper Egypt governorates but most of the area is concentrated in Assiut and Sohag governorates and Fayoum governorate came after that (Abd El-Raouf *et al.,* 2013). In Egypt, sorghum crop is attacked by different species of Lepidopteron insects. The most known and serious insect is the greater sugarcane borer, *Sesamia cretica* Led. This insect attacks sorghum plants after emergence, devours the whorl leaves and one of the most known symptoms of the pest is dead hearts (complete death of small sorghum plants). It is also, can damage older plants and making bores and tunnels into the stem (El-Rawy *et al*., 2013).

In nature, corn borers are active sorghum fields between late spring and late autumn. They spend winter as hibernated full grown larvae, in the stored stalks of the crop. Adult moths emerge from the hibernating larvae consider the source of new infestation on the next year's crop (Isa *et al.*, 1969). Host plant resistance and cultural control always used in a control strategies, some with partial or local success, but without giving a complete solution (Kfir *et al.*, 2002). In last years, habitat management strategies have been improved, such as the 'push-pull' method, a stimulo-deterrent diversionary tactic (Khan *et al.*, 2000). Using 'push-pull' method, stem borers are attracted and retained on trap plants (pull) planted as border rows, and repellent intercrops (push) prevent them from infesting the crop. The effective use of this strategies needs a good understanding of the host selection and acceptance processes of the insect pest. As illustrated by Hora and Roessingh (1999). Wild host plants of gramineous stem borers play a significant role in their ecology (Khan *et al*.,2001;Haile & Hofsvang, 2002).

The aim of the present work was to investigate the egg laying and feeding preference of *S. cretica* on primary and secondary host plants with respect to the potential use of secondary hosts as trap plants.

MATERIALS AND METHODS

Egg laying preference:

Sesamia cretica:

The final instars' larvae which were about to pupate and pupae were collected from the maize stalks from the field. Pupae thus, collected were kept in glass jars (10 × 15 cm) for the emergence of adults. The male and female moths after emergence were transferred in a proportion of 1:1 to the oviposition cages containing the maize plants of 15-20 day old.

Test plants:

Four host plants, namely, sorghum, broom corn, pearl millet and sudan grass were used for this study. To establish plant materials for conducting this experiment, seeds of each host plant were sown in plastic pots one seed for pot. These plants were used for oviposition experiment.

Oviposition bioassay:

In free-choice bioassay, plant in plastic pots 15-20 days old from each crop were placed inside the oviposition cage (45 x 50 x 50 cm). Five pairs of moths of *S. cretica* (5 female and 5 male), brought together in the mating cage previous night, were released in the oviposition cage. After two days moths were removed from the cage and number of eggs laid on the leaf-sheaths of each hybrid, was counted. Each female was used only once, and each test was replicated 10 times, having five pairs of insects.

* **Corresponding author.**
E-mail address: youssef44ag@gmail.com
DOI: 10.21608/jppp.2020.158441

Feeding preference:

The four host plants were arranged in a randomized blocks design, with 10 replicates. A Petri dish (19 cm diameter) containing five sections of 0.8 cm2 of host plant 15 days old per host plant. Plant sections were equidistantly distributed within the plate, creating an arena free choice test. 10 larvae (2nd instars') of *S. cretica* were released in the center of the arena. Evaluations were made after one and 24 hours from larvae release by recording the presence of larvae on the plant sections.

Statistically analysis:

The data were statistically analysis using one-way analysis of variance (ANOVA). The differences between crops were subjected by L.S.D. test (Snedecor, 1956).

RESULTS AND DISCUSSIONS

Some graminaceous fodder crops were compared to grain sorghum for larval feeding and ovipositional preference by *Sesamia cretica* under laboratory conditions

Larval feeding responses/preference:

After 1 hour:

Data illustrated in Figure (1) showed that, the percentages of *S. cretica* larvae attracted to each host of the four gramineous plants studied in free choice test after 1 hour. The analysis of data revealed that no significantly differences were observed between the four tested gramineous plants (F. value= 1.36, p= 0.2705). For the larval attractiveness, the sorghum, broom corn, pearl millet and sudan grass recorded 20.00%, 10.00%, 20.00% and 24.00% of larvae, respectively.

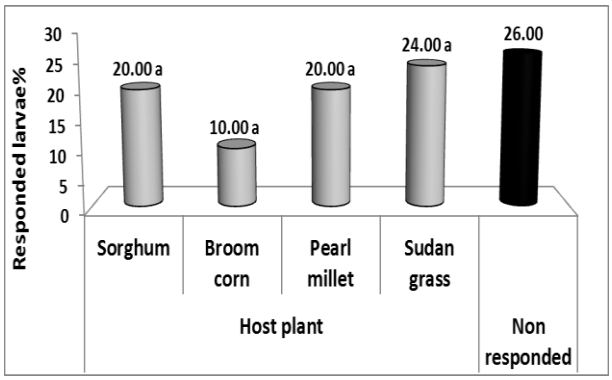


Figure 1. Larval feeding responses/preference of *Sesamia cretica* among primary and secondary hosts under laboratory conditions in free choice test after one hour. Column sharing the same letter are not significantly different at 5% probability.

After 24 hours:

Data obtained in Figure (2) indicated that, the percentages of *S. cretica* larvae attracted to each host of the four gramineous plants studied in free choice test after 24 hours. The previous host plants varied significantly after 24 hour (F. value= 5.30, p= 0.0039). According to L.S.D. value (12.511), sudan grass was the most attractive crop (32.00%). Next in attractiveness was pearl millet (24.00%), with insignificant difference with sudan grass, however, broom corn was the lowest in attractiveness (8.00%), followed insignificantly by pearl millet (19.00%). When larvae of *Sesamia. nonagrioides* could choose between maize and rice or sorghum, they exhibited different feeding preferences. (Camargo *et al*., 2020).

The non-responded larvae number decreased from 26.00% in one hour observation to 17.00% in 24 hours observation. In partial agreement, El-Solimany (2020) found that the aphid behavior affected by time and the number of non-responded aphids decreased after 24 hours observation comparing with one hour observation.

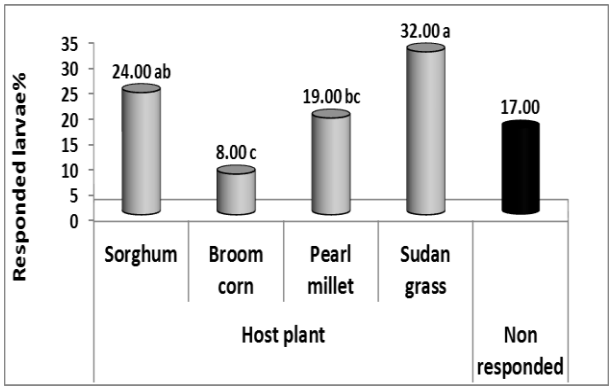


Figure 2. Larval feeding responses/preference of *Sesamia cretica* to some host plants under laboratory conditions in free choice test after 24 hours. Column sharing the same letter are not significantly different at 5% probability.

Ovipositional responses/preference of *S. cretica*:

Data presented in Figure (3) cleared that, the percentages of eggs deposited by *S. cretica* females on each host of the four gramineous plants studied in free choice test. Statistical analysis proved significant differences between the four host plants in the percent of eggs deposited (F. value= 14.3, p= 0.0000).

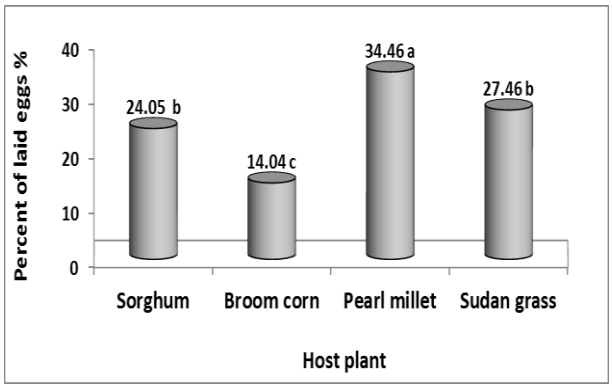


Fig. 3. Ovipositional responses/preference of *Sesamia cretica* to some host plants under laboratory conditions in free choice test. Column sharing the same letter are not significantly different at 5% probability.

According to L.S.D. value (6.4337), data indicated a strong ovipositional preference for pearl millet (34.46%). Sudan grass and sorghum came next by 27.46% and 24.05%, respectively, by insignificant difference between them. However, broom corn harbored the lowest percent (14.04%). Dimotsiou *et al*., (2014) illustrated that significantly more eggs of *Sesamia nonagrioides* were laid on sweet sorghum than on fiber sorghum johnsongrass. Also, they discussed the potential of secondary hosts to be

used as trap plants. In general more eggs of *Busseola fusca* were laid on the fodder crops than on either maize or grain sorghum (van Rensburg and van den Berg, 1990). In West Africa, Ndemah *et al*.,(2002) showed that Napier grass, used as a trap crop around maize fields, significantly reduced stem borer numbers. The latter study also showed that a trap crop alone, without a repellent intercrop, could significantly reduce stem borer numbers on maize. Since a lot of varieties of Napier grasses exist and are provided for use in stem borer habitat management systems. Li and Liu (2014) observed oviposition and larval feeding of two host plants. They indicated that there is a significant effect of plants on oviposition preference of the female adults and development and survival of larvae of *Trichoplusia ni*. The beet armyworm, *Spodoptera exigua* (Hübner), have a different host plants for oviposition and larval development, some host plants are preferred than others (Showler, 2001).

REFERENCES

Abd El-Raouf, M. S. A., El-M. A. El-Metwally and Bahar Elddin, A. A. 2013. Performance of some grain sorghum (*sorghum bicolor* L. moench) genotypes under different sowing dates in Egypt J. Plant Production, Mansoura Univ., Vol. 4 (5): 763 – 772.

Camargo, A. M., Martín, M. A., Castañeraa P. and Farinósa, G.P. 2020. Performance of *Sesamia nonagrioides* on cultivated and wild host plants: Implications for Bt maize resistance management. Pest Manag. Sci. 2020, 76: 3657–3666.

Dimotsiou O. C., Andreadis, S. S. and Savopoulou-Soultani, M. 2014. Egg laying preference of *Sesamia nonagrioides* (Lepidoptera: Noctuidae) among primary and secondary hosts. Appl. Entomol. Zool. 49:27–33.

EL –Rawy , A. M. , Mourad A. E. A. A. and EL –Kady, A. M. 2013. Evaluation of some grain sorghum lines for resistance to *sesamia cretica* led. And yield potential Egypt. J. Agric. Res., 91(3): 977-989.

El-Solimany, E. A. (2020). The impact of faba bean seeds soaking in salicylic acid, acetyl-salicylic acid and methyl salicylate on inducing plant resistance against the cowpea aphid, *Aphis craccivora* Koch. J. of Plant Protection and Pathology, Mansoura Univ. 11(5):243 – 247.

Haile, A. and Hofsvang. T. 2002. Host plant preference of the stem borer *Busseola fusca* (Fuller) (Lepidoptera: Noctuidae). Crop Protection 21: 227-233.

Hora, K.H. and Roessingh P. 1999. Oviposition in *Yponomeuta cagnagellus*: the importance of contact cues for host plant acceptance. Physiological Entomology 24: 109–120.

Isa A. L., Awadallah, W. H. and Tantawy, A. M. 1969. The susceptibility of some corn varieties to infestation with corn borers and other corn pests. Agric. Res. Rev. Cairo 47:23 – 28.

Kfir R., Overholt W.A., Khan Z.R. and Polaszek A. 2002. Biology and management of economically important lepidopteran cereal stem borers in Africa. Annual Review of Entomology 47: 701–731.

Khan Z.R., Pickett J.A., van den Berg J, Wadhams L.J. and Woodcock C. M. 2000. Exploiting chemical ecology and species diversity: stem borer and strategies control for maize and sorghum in Africa. Pest Management Science 56: 957–962.

Khan, Z.R., Pickett, J.A., Wadhams, L.J. and Muyek-HO, F. 2001. Habitat management strategies for the control of cereal stem borers and Striga in maize in Kenya. Insect Science and its Application 21: 374–380.

Li, Y.X. and Liu, T.X. 2014. Oviposition preference, larval performance and adaptation of *Trichoplusia ni* on cabbage and cotton. Insect Sci., 22, 273–282.

Ndemah, R., Gounou, S. and Schulthess, F. 2002. The role of wild grasses in the management of Lepidopterous stem borers on maize in the humid tropics of western Africa. Bulletin of Entomological Research 92(6):507-519.

Showler A. T. 2001. *Spodoptera exigua* Oviposition and Larval Feeding Preferences for Pigweed, *Amaranthus hybridus*, over Squaring Cotton, *Gossypium hirsutum*, and a Comparison of Free Amino Acids in Each Host Plant Journal of Chemical Ecology, Vol. 27, No. 10: 2013-228.

Snedecor, G. W. (1956). Statistical methods. Lowa State Collage Press, Ames, Iowa, U.S.A.

Van Rensburg J. B.J. and van den Berg J. 1990. Host plant preference by the maize stalk borer, *Busseola fusca* (Fuller) (Lepidoptera: Noctuidae), South African Journal of Plant and Soil, 7:2, 117-120.

تفضيل يرقات دودة القصب الكبيرة للتغذية والحشرة الكاملة لوضع البيض على عوائل اولية وثانوية

محمد علي محمد يوسف و علاء محمد خورشيد

قسم أفات محاصيل الحقل- معهد بحوث وقاية النباتات- مركز البحوث الزراعية

تم مقارنة تفضيل يرقات دودة القصب الكبيرة للتغذية على بعض محاصيل العلف النجيلية مع محصول الذرة الرفيعة للتغذية وكذلك تفضيل الحشرة الكاملة لدودة القصب الكبيرة لوضع البيض تحت الظروف المعملية. نسبة اليرقات التي انجذبت لكل عائل من العوائل النجيلية الاربعة التي تم دراستها في اختبار الاختيار الحر بعد ساعة واحدة, كانت بالنسبة الذرة الرفيعة, ذرة المكانس, الدخن وحشيشة السودان ٢٠%, ١٠%, ٢٠% و ٢٤% من اليرقات على التوالي, مع عدم وجود اختلافات معنوية بينها. كان هناك اختلافات معنوية بين العوائل النجيلية الاربعة التي تم دراستها في اختبار الاختيار الحر بعد ٢٤ ساعة, كان حشيشة السودان هو المحصول الاكثر جذباً (٣٢%). بينما, كان محصول ذرة المكانس هو الاقل جذباً (٨%). قل عدد اليرقات الغير مستجيبة من ٢٦% عندما تم الملاحظة بعد ساعة واحدة الى ١٧% عندما تم الملاحظة بعد ٢٤ ساعة. اوضحت البيانات تفضيل عالي لوضع البيض على محصول الدخن (٣٤,٤٦%). في حين سجل محصول ذرة المكانس اقل نسبة بيض (١٤,٠٤%).