SCIENTIFIC NOTES

# *SALVIA SCLAREA* L. (LAMIALES: LAMIACEAE) - A NEW HOST RECORD FOR *HELICOVERPA ARMIGERA* (HÜBNER) (LEPIDOPTERA: NOCTUIDAE)

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American bollworm, *Helicoverpa armigera* (Hübner) (Lepidoptera: Noctuidae) is a widespread pest species of world-wide economic importance on many agricultural and horticultural crops. It is highly polyphagous, causes severe damage and loss to a wide range of food, fibre, oil, fodder, vegetable, horticultural, ornamental, aromatic and medicinal plants as well as wild hosts. In India alone, it is reported to cause annual crop damage of ca. $1 billion (Gujar et al., 2004). Due to its polyphagous nature of feeding, it is quite difficult to control and is known to attack more than 200 host plants all over the world (Bharti et al., 2007) and number of hosts are still increasing. The most important crop hosts of which *H. armigera* is a major pest are tomato, cotton, pigeon pea, chickpea, sorghum and cowpea. Other hosts include *Dianthus*, *Rosa*, *Pelargonium*, *Chrysanthemum*, groundnut, okra, peas, field beans, soybeans, lucerne, *Phaseolus* spp., other Leguminosae, tobacco, potatoes, maize, flax, a number of fruits (*Prunus*, *Citrus*), forest trees and a range of vegetable crops. The specificity of ovipositing females in selecting plants makes lepidopterons potentially powerful agents of natural selection on plant species.

Though a large number of plants belonging to different taxonomic groups have been reported as hosts for this pest, *H. armigera*, to the best of our knowledge no report is available on Clary sage, *Salvia sclarea* (Lamiales: Lamiaceae) as a potential host for this insect pest. *S. sclarea* is of economical importance as flavoring agent in the food industry, perfumery and cosmetic industries. It is an aromatic perennial plant which can be cultivated as annual crop also. Its stems are square, brownish and hairy with few branches. The leaves are large, oblong, heart-shaped, arranged in pairs, wrinkled, irregularly toothed at the margins and covered with velvety hairs. The flowers are set in whorls in a long, loose, terminal spike. Recent studies have shown that the clary sage oil has some interesting biological properties (Farkas et al., 2005). Herb and roots of *S. sclarea* are used for stomachache, diarrhoea, sore throat, swellings and headaches. *S. sclarea* contain flavonoids, monoterpenoids, sesquiterpenoids and diterpenoids. The essential oil, known as clary sage oil or muscatel sage, contains l-linalyl acetate, linalool, and nerol as major compounds. The concrete and absolute of clary sage include linalyl acetate, linalool, sclareol, and sesquiterpenes.

*S. sclarea* is considered native to Southern Europe. It has been additionally brought into Middle Europe, where it is cultivated nowadays for industrial use (Pešić & Banković, 2003). In 2002 this crop has been introduced by Institute of

Himalayan Bioresource Technology, Palampur, India at its Chandpur Farm (Latitude, 76°33′29″ East; Longitude, 32°6′20″ North; Elevation, 1356 m amsl) (Fig. 1A.). During the course of surveying insect pests in the month of June-July 2006, it was observed for the first time on *S. sclarea* causing a great deal of damage to the flowers of (Fig. 1B). Thereafter, this pest is found to attack *S. sclarea* crop every year in the month of March-April onward. Due to the pinkish color of flowers and their arrangement in whorls on a green spike, it was quite difficult to see the damaging insects on this crop. There were holes in the flowers and frass pellets on the leaves and flowers. When observed carefully, this damage was found to be due to the attack of *H. armigera* larvae feeding on the flowers (Fig. 1C,D,E & F). No damages or feeding of leaves were observed which may be due to the presence of velvety hairs on the leaves and availability of large number of flowers for the developing larvae. All the larvae observed were of different stages. All the stages (second instar onward) were collected from the flowers which indicated that females of *H. armigera* laid eggs on multiple occasions. All the larval instars stages collected from this crop suggesting *S. sclerea* can support development of *H. armigera*. 3-6 larvae per plant were recorded. Larvae bore holes in the flowers and one larva damaged many flowers. This is the first report of *H. armigera* attacking *S. sclarea*. Some of the collected larvae were brought into the laboratory and reared individually in plastic cups on semi-synthetic diet at a temperature 25±2°C and 14:10 (L: D) hours photoperiod for further studies. Attack of this pest on the flowers resulted in reduction of flower production which may ultimately lead to decline in seed and essential oil production. *H. armigera* activity in farm understudy was evident from the succeeding year study based on the male moth captured with sex pheromone traps.

In the same farm there was 6 hectares of *Rosa damascena* (Damask rose) plantation. Flowering and flush of this crop is attacked by *H. armigera*. Flowering starts in April and ends in May. *H. armigera* only attacks buds and flowers of roses; it is possible that after rose crop is over, moth population utilizes *S. sclerea* as its potential alternative host. Information regarding the impact of *S. sclerea* on the *H. armigera* populations is currently unavailable and further studies are required to understand the ecology and evolution of interactions between *H. armigera* and new identified host, *S. sclarea*.

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Figure 1A. *Salvia sclarea* crop.


Figure 1B. Damaged *S. sclarea* plant with frass.

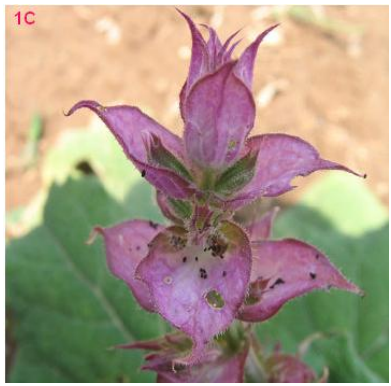


Figure 1C. Damaged *S. sclarea* flowers.




Figures 1D,E,F. *H. armigera* larvae on flowers of *S. sclarea* with damage and frass.