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INJURY OF EUROPEAN SUNFLOWER MOTH (*HOMOEOSOMA NEBULELLUM* DENIS ET SCHIFFERMÜLLER)

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Abstract
Nyírség is the most important production area of confectionary sunflower for browning purpose. Kisvárdai cultivar, applied most frequently for this purpose, has no shield achene containing phytomelane layer) to protect the seed against chewing of moth larva. Therefore the sunflower moth is an important quality and quantity influencing factor in confectionary sunflower production. Kisvárdai cultivar developed from local varieties in Nyírség during the passed 200 years, so it is very variable in the length of growing perioid, habit and achene characteristics as a typical open pollinated variety. Our observations tended toward the monitoring of the moth sworming dynamics in 2005-2006 and toward the examination the Kisvárdai cultivars susceptibility of different growing period. During our research activity the regression between the trapped individuals and the injury level was wanted to answer.
Keywords: *European sunflower moth, swarming dynamics**,** confectionary sunflower, achene, phytomelane layer.*

1. INTRODUCTION

Although the European sunflower moth having many host-plant is indigenous in the Carpathian basin but it get connected with that sunflower varieties served as a source for the first selected Hungarian confectionary sunflower cultivars only in the 18th century. According to the earliest sunflower moth related publications high propagation of sunflower moth in Romanian and South Italian production area after the World War II was caused by the increased sunflower sowing area (Reh 1919). The moth has already been described at the end of 19th century (Porrit 1884). The first sunflower moth related communications in Hungarian originated probably from Gyula Szelényi considering the moth to be the only pest of sunflower (Szelényi 1941). In the early 1940 the moth was considered to be as only a potential (Uzonyi 1942) but after the World War II Kadocsa (1947) reported a meaningful damage due to the increased sunflower sowing area. In 1954 seed injury of 80-90 % in the environs of Kunhegyes, in the late 1950 blossom infestation of 5-48 % in Trans Danubian region and of 5-10 % in Nyírség and in environs of Debrecen had been reported (Reichart, 1959).

Importance of this pest decreased in the following decades because cultivars having phytomelane layer (so-called 'armoured' cultivars) were grown. These cultivars and newly developed hybrids were provided against the moth injury and did not develop twin dishes.
Development of phytomelane layer is a result of a special cell division process. By this way, 3-4 cell soros carbon layer had been developed in the outer part of the achene shell containing carbon compound of 70-76% and occuring in other parts of the plant as isolated spots (Sárkány 1947).

Due to the moth injury corolla of petals are dropped off turn brown and cobweb-like network appears on them. Faeces of the caterpillar is placed in the network and achenes are hollowed out on their top. First the moth damages the periferial part of the dish but later by the advanced flowering other parts of the dishes are also damaged. Spots under favourable weather conditions for the moth could confluence. In many cases the moth chews the edge of the receptaculum (Bognár és Huzián 1974)

Caterpillars chew the capitulum directly prefering the tender seeds (Jenser et al., 2003). Damage of sunflower moth promote fungus infection on the damaged dishes. (Klisiewitz, 1979; Bujáki, 1980; Horváth and Bujáki, 1992; Horváth and Fischl, 1996; Horváth et al., 2005),

In the early 1990 Horváth (1993) and Szarukán et al. (1993) draw attention to the fact that European sunflower moth is a very important pest on sunflower and could cause serious damage without using Russian breeding lines having thick phytomelane layer.
However, swarming dynamics of the moth is elucidated by cultural experiments (Reichart 1959) many site factors including climate and host plants influence the number of individuals (Kadocsa 1947). Number of generations is not considered to be immutable because the third generation could appear in certain years (Jenser et al., 2003).

The nearly forgotten sunflower moth became potential pestiferous on confectionary sunflower cultivars in the recent decade due to the considerable increase in sowing area of Kisvárdai cultivar used for toasting purpose exclusively. Purpose of our research study was to examine the differences in swarming dynamic of the moth in ceratin years and production sites.

2. MATERIAL AND METHODS

In 2005 swarming dynamic of Eurpoean sunflower moth was examined in the four main site of Szabolcs-Szatmár-Bereg County important for confectionary sunflower production

including 17 settlements (Nyíregyháza, Nyíregyháza-Oros, Felsősima, Kálmánháza, Újfehértó, Érpatak, Geszteréd, Balkány, Kisvárda, Ajak, Anarcs, Nyírtass, Nagyecsed, Győrtelek, Ökörítófülpös, Tyukod, Rápolt) and 32 plots. In 2006 swarmning dynamic was examined in 6 settlements (Ajak, Geszteréd, Nyíregyház, Nyíregyháza-Oros, Nyírmada, Vámosoroszi) and in 13 plots representing the four cultivation area.

The swarming was traced by using transparent plastic triangle shaped sticky CSALOMON traps (MTA Plant Protection Research Institute, Budapest). The traps were placed out from 23 May to 25 May in 50-500 m distance from each other depending on the plot size. Traps were operated until the swarming end of the first generation. After this, traps were not reading off for two weeks. So the traps were read off on 16-17 September 2005 at the last. In 2006 traps were placed out between 3 and 5 of May and operated right on end. Because of the considerable hand labour requirement of the cultivation the plot size is small. Size of the examined plots were 0.2-2 hectare exept one which was 10 hectare. As there were no any chemical control used during the cultivation pesticides could not influence our results. Sunflower was the previous crop either in the experimental plot or in the neighbouring plot in every cases. Number of male moths were checked out and registered weekly. Pheromone capsules were changed in every six week and the sticky plates were changed as circumstances required. Kisvárdai cultivar was cultivated in every plot. Among the many varieties cultivated at the present two different variety of the Kisvárdai cultivar was cropped in the experimental fields. One of them has longer growing period (150-165 days). It is bigger in height (3,2-4 m) and in 1000 kernel mass (130-150 g). The another one has shorter growing period (130-140 nap) and it is smaller in height (2,2-2,7 m) and in 1000 kernel mass (110-130 g).

3. RESULTS AND DISCUSSION

Results of our swarming dynamic examination carried out in 2005-2006 support the related research data (Szarukán et al., 1996). The extremities of the weather have a great impact on moth swarming dynamic. Therefore swarming of the first generation impeded by the weather not clear of anomalies in 2005. Due to the unusually cold early June number of the moth individuals was low displaying a non typical low swarming peak (Figure 1). Copious rainfall in early summer was fair for moth eggs survival and established the vigorous second generation. Due to the canicular days began in the end of July the second generation swarmed strongly and the number of individuals reached a high peak.

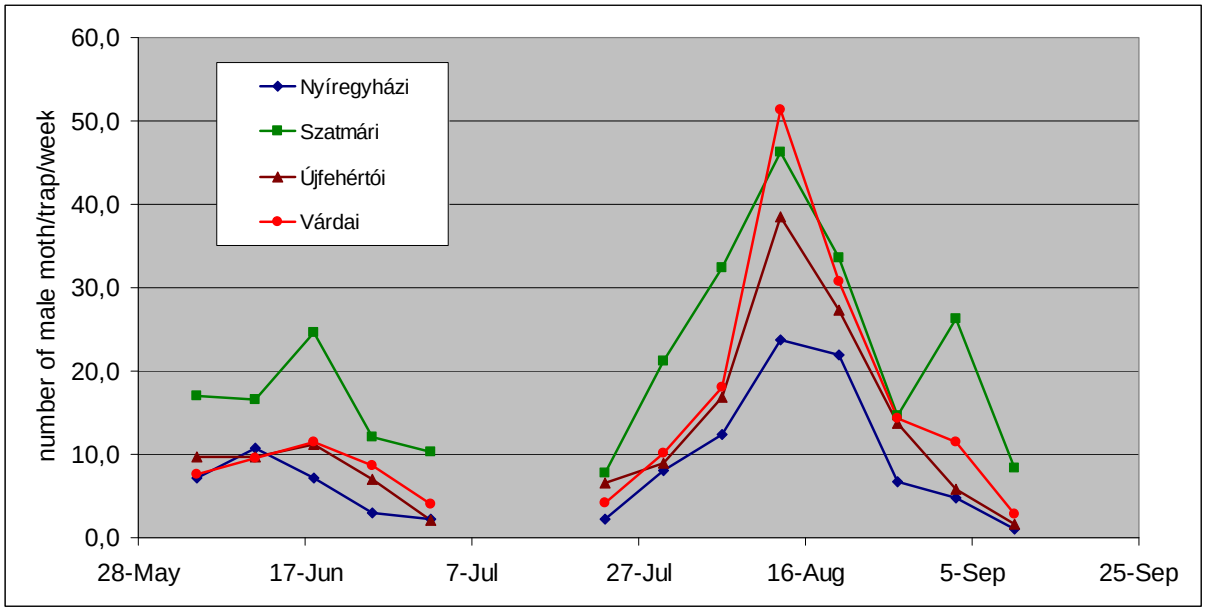

Fig.1. The swarming dynamics of the sunflower moth in four important confectionary sunflower growing districts. (2005)

Observing the swarming dynamic of the first generation catching results of the traps placed out in Szatmári cultivation area are outstanding. In case of the second generation Várda cultivation area proved to be the most infected. Highest number of individuals of 70 male moth/trap/week was detected there on 16 Augustus. Újfehértó district is the most expressive confectionary sunflower cultivation area having more than 14 seed toaster enterprises there. Notwithstanding that Kisvárdai cultivar is cultivated there in the largest land lower number of individuals were indicated by swarming dynamic examinations. The lowest swarming individuals was detected in Nyíregyházi cultivation area, representing Nyíregyháza, Oros and Felsősima settlements.

In 2006 swarming of the first generation started in the middle of May with a relatively low number of individuals, in early June the long lasting cold weather postponed the swarming peak with two weeks for the average (Figure 2). Due to the warm rainless July development of the second generation accelerated but the cool and rainy weather not fair for the moth set off and moderated the swarming peak. Development of the third generation was promoted by the considerably warm and dry September for the average. Swarming ended in the middle of October in the long-continued autumn. In the past four decades there was no precedent for so late swarming of the third moth generation in Nyírség region.

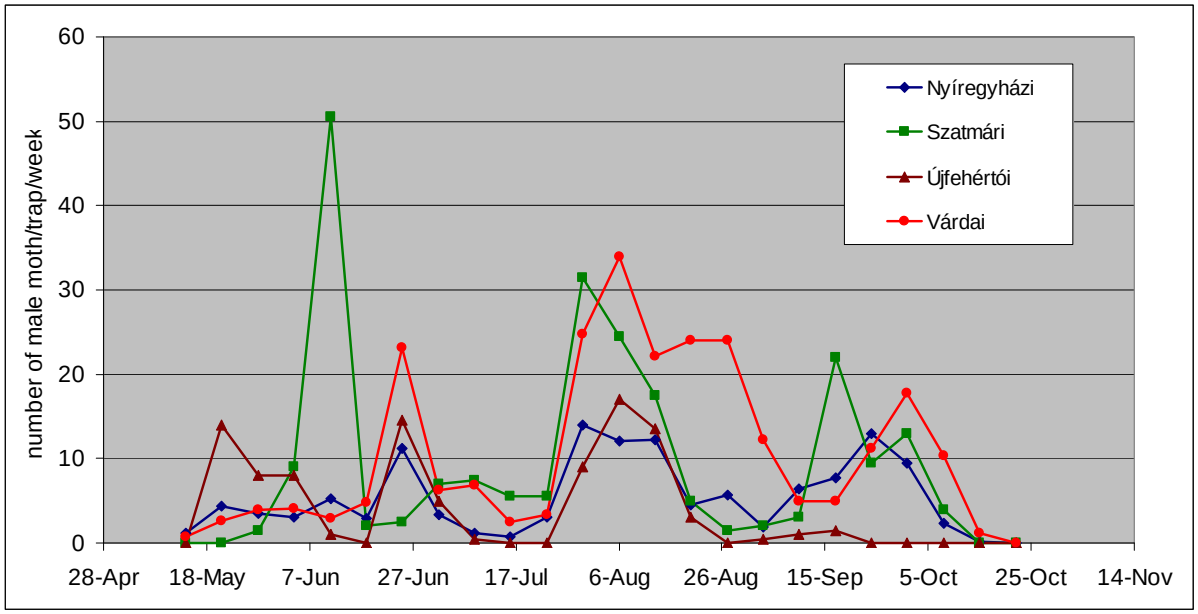

Fig.2. The swarming dynamics of the sunflower moth in four important confectionary sunflower growing districts. (2006)

Probably as a consequence of the easily upwarming soils swarming started more strongly in Újfehértó cultivation area than in the four others. Swarming peak of the first and second generation was similar notably and the third generation did not appeared in this cultivation area.

In Szatmár region swarming of the first generation was very strong same as in 2005, and swarming peak appeared two weeks ahead of its usual time. In case of the second and third generation swarnming appeared only one week earlier than it is usual.

In Várda cultivation area swarming peak of the first generation showed up in the third week of June similarly than in Nyíregyháza cultivation area. Swarming of the second generation was disturbed by the rainfall in mid-August and lasted for six weeks. Therefore the third generation could not have been clearly confined.

In Nyíregyháza cultivation area swarming peaks coincide with the aformentioned period but number of moth individuals lag behind that of the other areas.

4. CONCLUSION

It could be concluded that beside the site effect the weather conditions greatly influence the swarming dynamic of European sunflower moth. Late Spring thermal

conditions bear on the appearance date of the first moth generation. Similar to this, amount of precipitation and temperature variation (mainly the cooling off) during the swarming period affect upon the swarming current and number of individuals, definitely. The number of generations are crucially influenced by the weather conditions in late summer and early autumn.

References

BOGNÁR S., HUZIÁN L. (1974): Növényvédelmi állattan. Mezőgazdasági Kiadó, Budapest 258-259

BUJÁKI G. (1980): A napraforgó kártevői, különös tekintettel a csíra és csíranövény kártevőkre és a levéltetvekre. Doktori értekezés, Gödöllő 9-10.

HORVÁTH Z. (1993): A napraforgómoly (*Homoeosoma nebulellum* Hb.) elleni genetikai védekezési módszerek. Növényvédelem 29: 259-263.;

HORVÁTH Z. BUJÁKI G. (1992): A *Habrobracon hebetor* Say (Hymenoptera: Braconidae) mint a napraforgómoly (*Homoeosoma nebulellum* Hb.) legfontosabb hazai parazitája. Növényvédelem 28: 196-200.;

HORVÁTH Z., BÉKÉSI P. VIRÁNYI F. (2005): A napraforgó védelme. Növényvédelem, 41 (11): 307-328.

HORVÁTH Z. FISCHL G. (1996): A napraforgómoly (*Homoeosoma nebulellum* SCHIFF.) és a gyapottok-bagolylepke (*Helicoverpa armigera* HB.) károsítása nyomán fellépő kórokozók napraforgó- és kukoricanövényeken. Növényvédelmi Fórum 96., Keszthely, Január 25-26. p.17.

JENSER G., BOGNÁR S. VÖRÖS G (2003) : A kártevők életmódja In: Jenser G. (szerk) Integrált növényvédelem a kártevők ellen. Mezőgazda Kiadó, Budapest 92

KADOCSA GY. (1947): A napraforgómoly és az ellene való védekezés. Fol. Ent. Hung., 2: 33-37;

KLISIEWITZ, J. M. (1979): Relation of infection with sunflower moth Homoeosoma electellum larvae tothe incidience of Rhizopus head rot in sunflower seed heads. Can. J. Plant Sci. 59 p. 797-801.;

PORRIT, G. T. (1884): Description of the larva of Homoesoma nebulella. Entomologist Vol. 17: 143-144;

REH, L. (1919): Homoeosoma nebulella Hb. Als Sonnenblumenschädling in Rumänien. – Z. angew. Ent. 5, 267-277;

REICHART G. (1959): A napraforgómoly (*Homoeosoma nebulellum* Hb.) neveléssel kapcsolatos megfigyelések. Fol. Ent. Hung., 12: 497-510;

SÁRKÁNY S. (1947): A napraforgó nemesítése és a fitomelán kérdés Agrártud. Szemle. 1 p. 97-101.;

SZELÉNYI G. (1941): Az ipari növények kártevői. In Kadocsa Gy. (szerk.): A szántóföldi növények kártevői. „Pátria" Irodalmi Vállalat és Nyomdai Részvénytársaság, Budapest. 113.

SZARUKÁN I., HORVÁTH Z., TÓTH M., SZŐCS G. UJVÁRY I. (1996): A napraforgómoly (*Homoeosoma nebulellum* Den. et Schiff.) rajzáskövetése feromoncsapdával. Növényvédelem 32: 601-604.;

UZONYI F. (1942): A napraforgómoly. Köztelek LII. Nr. 38. Bp. 857-858.