Bulletin UASMV Agriculture, 68(1)/2011
Print ISSN 1843-5246; Electronic ISSN 1843-5386

The Abundance and Dynamics of Lepidoptera Pests from Maize, Soybean, Sugar Beet Crops, In Conditions Of Agricultural Research And Development Station Turda

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Abstract. This paper presents experimental data conducted for this purpose, during 2009 – 2010 in ARDS Turda. Species of Lepidoptera present in field crops, studied in ARDS Turda are: *Agrotis segetum* (Den. & Schiff.), *Autographa gamma* L., *Amathes c-nigrum* L., *Mamestra brassicae* L., *Ostrinia nubilalis* Hbn., *Plutella xylostella* L..

The research were performed at ARDS Turda, during 2009 - 2010 in crops: maize, sugar beet and soybean; were used F1 traps type) with synthetic sex pheromones of the Romanian Institute of Chemistry Cluj - Napoca. Traps were placed in 3 repetitions, at the 50 m distance between, during June-September. The adhesive used was based on polyisobutylene, produced by the same institute. Pheromones baits and sticky plates were changed at 10 days, when were recorded the number of captured Lepidoptera. To compare data obtained, was performed percentage distribution of species of Lepidoptera, and observations on the abundance of Lepidoptera pests, highlighting the appeal and sex pheromones specific for the most common Lepidoptera.

At ARDS Turda, in maize, sugar beet and soybean, under normal climate of the years 2009-2010, were registered, in sex pheromones traps, more than 1.400 adults of the mentioned Lepidoptera species. These species showed a well defined allocation percentage as follows: *Ostrina nubilalis* represented a very significant percentage between 39.0 - 68.0% of the total of Lepidoptera pests, *Autographa gamma* 12,0-25,0%, *Amathes c-nigrum* 14,0-16,0% and other species (*Mamestra brassicae, Plutella Xylostella, Agrotis segetum*) between 2,0-11,0%.

The results have resulted in flight curves of the most common Lepidoptera pest crops, which shows the evolution of species according to specific climatic conditions, thus knowing the best time for applying treatments.

Key Words : Lepidoptera, pheromonal traps, maize, soybean, sugar beet crops.

INTRODUCTION

Lepidoptera, the generic name for all species of large butterflies and small butterflies (moths), they first appeared over 100 million years ago during the dinosaur, and despite a complicated life cycle, have some means to help them survive in their environment. The butterflies and moths scientific name - Lepidoptera - means "scale wing", which refers to "dust" found on their wings.

Lepidoptera are important for pollination of plants, a process necessary for seed formation. Lepidoptera life cycle includes four stages: egg, larva, nymph or poop and adult butterfly, which not only allows the insect to spread and colonize new areas, but also is the reproductive phase, during which breeding occurs.

In order to knowledge the structure and abundance populations of Lepidoptera pest and present in crops (*Agrotis segetum, Autographa gamma, Amathes c-nigrum, Mamestra brassicae, Ostrinia nubilalis , Plutella* xylostella) were used sex pheromone traps.

Broad spectrum of pheromone synthesis began at the Institute for Chemical Research, Raluca Ripan "Cluj Napoca" since 1973 (Hodoşan andOprean, 1979; Ghizdavu *et al*.,1983). Testing them for a series of Lepidoptera pests crop field was performed by several researchers (Mustea, 1973; Roşca *et al*., 1986; Mureşan *et al*.,1996, 2002).

Sex pheromones are emitted by individuals belonging a sex (usually by females) and are designed to attract the opposite sex in the breeding. Sex pheromones of Lepidoptera act with a high degree of specificity, signal substances emitted by females of some species attracts only males of the same species. Males had received sex attractant pheromone, are unable to distinguish if it comes from a female or an artificial source. This feature gives the ecological value "treatments" with pheromones, which affect only the species against which they are applied, the ecosystem as a whole is not affected**.**

In the following are some aspects of abundance and dynamics of major Lepidoptera pests present in crops from ARDS Turda.

MATERIALS AND METHODS

The research were performed at ARDS Turda, during 2009 - 2010 in crops: maize, sugar beet and soybean; were used F1 traps type (Ghizdavu and Roşca,1986) with synthetic sex pheromones of the Romanian Institute of Chemistry Cluj Napoca.

Traps were placed in 3 repetitions, at the 50 m distance between, during June-September. The adhesive used was based on polyisobutylene, produced by the same institute. Pheromone baits and sticky plates were changed at 10 days, when were recorded the number of Lepidoptera captured.

Observations were referred to the abundance of Lepidoptera pests, emphasizing the attractiveness and sex pheromones specific for the most common Lepidoptera.

To compare data obtained, was performed percentage distribution of Lepidoptera species and results have materialized in curved flight curves of the most common Lepidoptera pests crops, which shows the evolution of species according to specific climatic conditions, thus knowing the best time for applying treatments.

RESULTS AND DISCUSSION

In the period 2009 - 2010 (May- September), at Turda, the mean temperature was between from 14.2-21ºC, in May recorded an average temperature of 15.4 to 16.2 ºC, in June 18.7- 18.9 °C, in July and August 20.7- 21 °C, and in September 14.2 – 17.4ºC. The highest rainfall in 2009 was recorded in June, 113.4 mm, and lowest in September, 3.4 mm; in the other months being between 31.4 -52.5 mm. In 2010, June and July were noted with the 172.6 respective 121 mm, and in other months, the values were between 49.2 - 87.6 mm. These climatic conditions have proved the Lepidoptera pests flight of crops mentioned, there was intense, some species are thermophilic, maximum flight is performed at temperatures of 18 - 23 ºC (Tab. 1).

Tab.1

Climatic conditions recorded in the period 2009 - 2010 to ARDS Turda

Year	May		June		July		August		September	
	2009	2010	2009	2010	2009	2010	2009	2010	2009	2010
Temperature (ºC)										
Dec. I	14,4	16,3	17,8	18,3	20,0	18,5	21,0	21,9	17,9	14,0
Dec. II	18,1	12,8	19,0	21,1	21,1	23,6	20,3	22,4	18,1	15,2
Dec. III	16,1	17.1	19,4	17,4	21,8	20,1	20,7	18,9	16,0	13,4
Monthly averange	16,2	15,4	18,7	18,9	21,0	20,7	20,7	21,0	17,4	14,2
Precipitation (mm)										
Dec. I	0,8	17,2	20,1	11,0	24,7	27,0	23,8	38,4	0,0	22,8
Dec. II	0,2	50,8	24,4	73,8	27,0	8,0	11,6	2,8	3,0	23,4
Dec. III	30,4	19,6	68,9	87,8	0,8	86,0	2,7	8,0	0,2	21,0
Monthly amount	31,4	87,6	113,4	172,6	52,5	121,0	38,1	49,2	3,4	67,2

At ARDS Turda, in maize, sugar beet and soybean, under normal climate of the years 2009- 2010, were registered, in sex pheromones traps, more than 1.400 adults of the following species of Lepidoptera pests: *Agrotis segetum, Autographa gamma, Mamestra brassicae, Ostrinia nubilalis, Plutella xylostella*. Attractiveness of pheromones has proved to be very good, being between: 71.2 şi 82.3%. Specificity and efficacy of sex pheromones for mentioned Lepidoptera was very high, almost 100%, other species of Lepidoptera were recorded only incidentally, in an insignificant percentage. (Tab. 2).

Tab. 2

Lepidoptera species present in field crops and sex pheromones traps recorded
(Turda, June- September, 2009 - 2010)

Species	Number of adults captured		
	Nr. adults / species	Nr. adults / other species	Specific attractiveness(%)
Agrotis segetum	47	19	71,2
Autographa gamma	277	78	78,0
Amathes c-nigrum	220	67	76,6
Mamestra brassicae	51	13	79,7
Ostrinia nubilalis	782	168	82,3
Plutella xylostella	93	21	81,6
TOTAL	1470	366	-

Through good attractiveness and selectivity of sex pheromones for the followed species, was well evidenced their high abundance throughout the operation of the traps. In terms of thermal (warm) and precipitation (normal) in 2009, the highest number of adults was recorded to *Ostrinia nubilalis* species, (298 adults registered / pheromone traps during that period), then *Autographa gamma* and *Amathes c-nigrum* species, in 2010 the mentioned period as thermal aspect was warm, and pluviometric was rainfall excessive, abundance of Lepidoptera species was reduced, corn borer (*Ostrinia nubil*alis) except, which recorded a higher number of adults (484 adults / pheromone traps), which proves that this pest population is growing in maize crop. (Tab. 3).

Tab. 3

Abundance of most important species of Lepidoptera pest crops, pheromone traps recorded (Turda, June - September, 2009 - 2010)

Year / Species	2009	2010	Amount (Σ)	Media (X)
Agrotis segetum	30	17	47	23,5
Autographa gamma	189	88	277	113,5
Amathes c-nigrum	118	102	220	110,0
Mamestra brassicae	40	11	51	25,5
Ostrinia nubilalis	298	484	782	391,0
Plutella xylostella	81	12	93	46,5
Averange temperature (ºC) Thermal characteristics	10.3 warm	9.7 warm	normal: 8.9	
Precipitation (mm) The specific precipitation	493.4 normal	739.8 excessive rain	normal: 513.6	

These species showed a well defined allocation percentage as follows: *Ostrina nubilalis* represented a very significant percentage between 39.0 - 68.0% of the total of Lepidoptera pests, *Autographa gamma* 12,0-25,0%, *Amathes c-nigrum* 14,0-16,0% and other species (*Mamestra brassicae, Plutella Xylostella, Agrotis segetum*) between 2,0-11,0%. (Fig.1).

The results have resulted in flight curves of the most common Lepidoptera pest crops, which shows the evolution of species according to specific climatic conditions, thus knowing the best time for applying treatments.

In ARDS Turda, *Agrotis sege*tum and *Autograph gamma* adults flying, present in maize, began since May, intensified in the third decade of June, when was recorded their first maximum flight, and the second maximum flight in the second decade of August; present in maize in a very significant abundance was *Ostrinia nubilalis* species, since the end of June, maximum flight was recorded in the second decade of July. (Fig.2).

In sugar beet, *Amathes c-ni*grum species flight began since May, the first maximum flight was recorded in the first decade of July and the second maximum flight, was in the first decade of August; for *Plutella xylostella* species, adults flight began at the end of May, the maximum flight was recorded in the second decade of June, following that in the second decade of July to record a second maximum flight. (Fig.3) .

In soybean crop, *Mamestra brassicae* adults flight was began at the end of May, intensified in June, and in the first decade of July was recorded the first maximum flight; species was presents in July too, and in the second decade of August was recorded the second maximum flight, maintained in culture until September. (Fig.4).

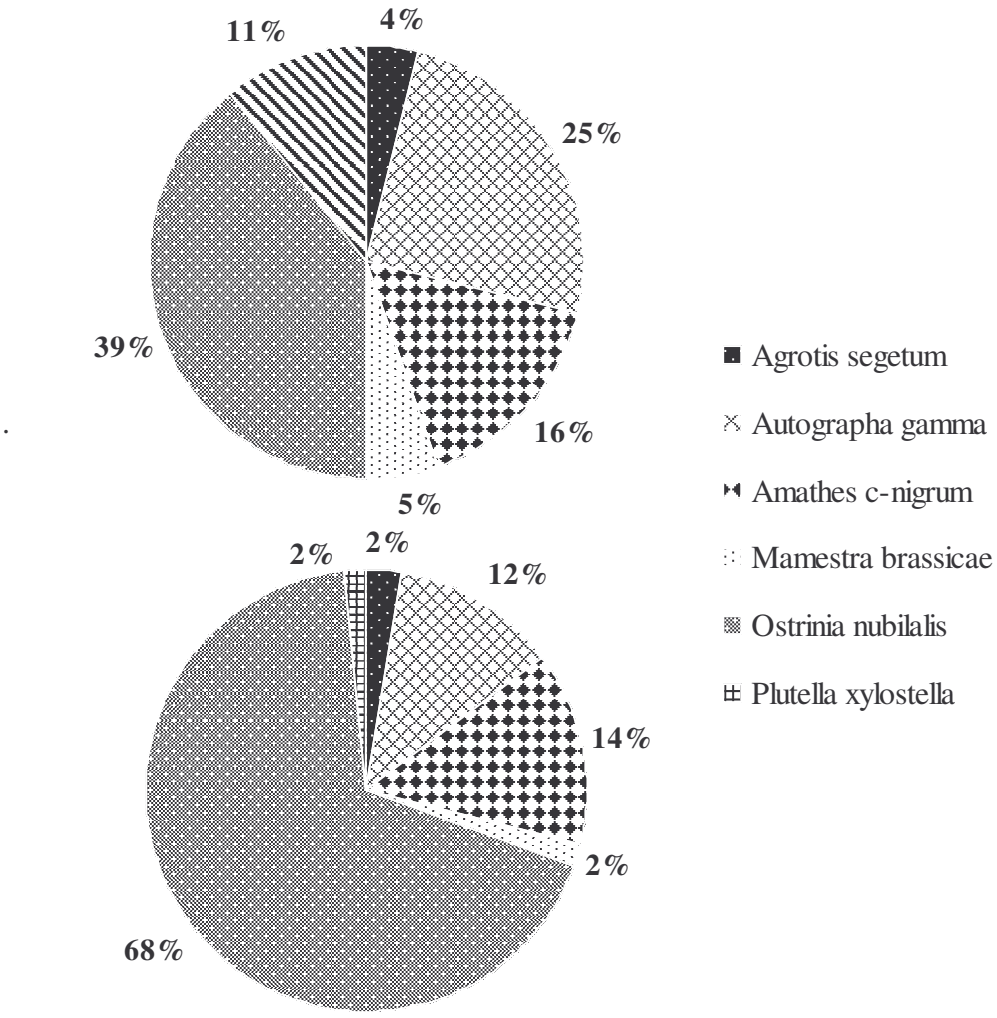

Fig. 1. - Percentage distribution of the most important species of Lepidoptera from field crops (Turda, 2009-2010)

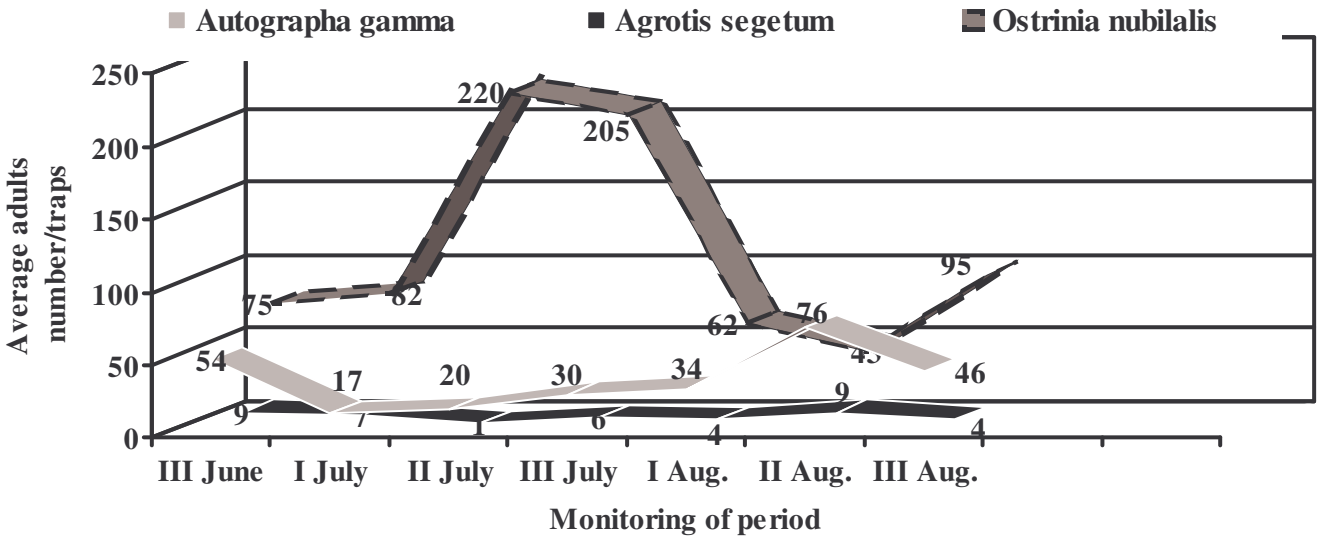

Fig.2. – The Lepidoptera species adults flight in maize, in climatic conditions from years 2009 - 2010, in ARDS Turda

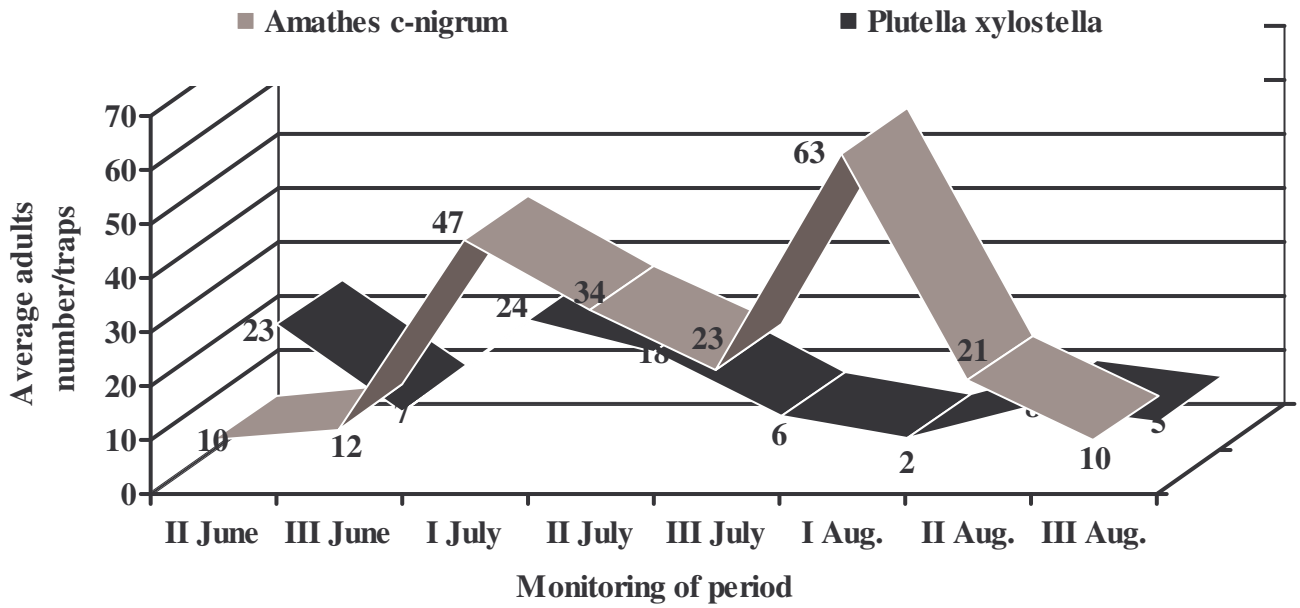

Fig. 3 -The Lepidoptera species adults flight in sugar beet,
in climatic conditions from years 2009- 2010, in ARDS Turda

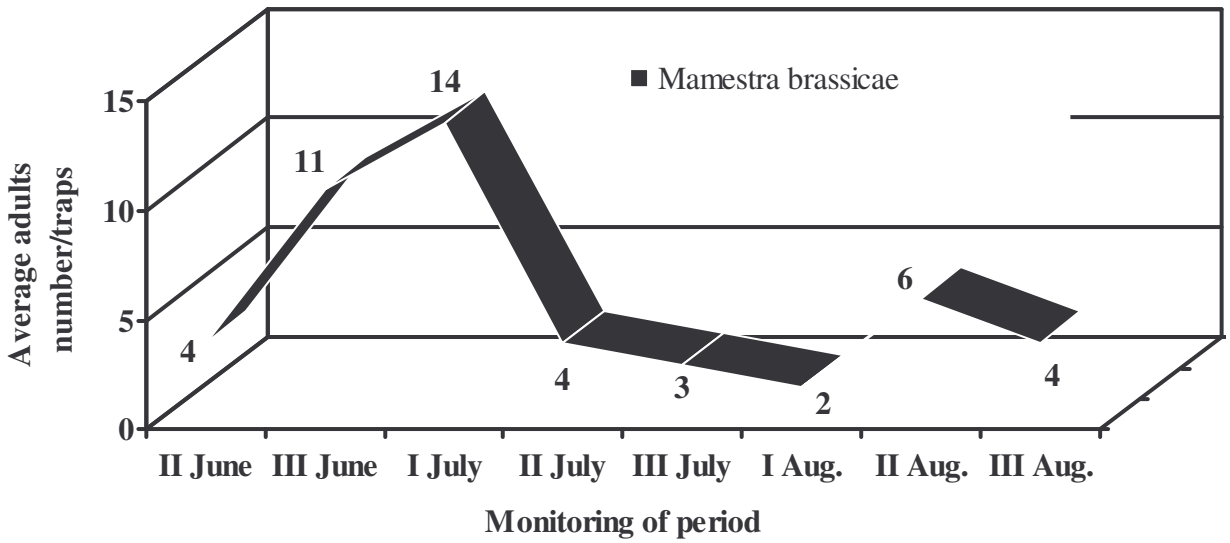

Fig. 4 - The *Mamestra brassicae* species adults flight in suybean,
in climatic conditions from years 2009- 2010, in ARDS Turda

CONCLUSIONS

In terms of two years of study, in field crops of ARDS Turda, were captured in sex pheromone traps over 1.400 adult mentioned Lepidoptera species pests; the high number was due the good potential attractiveness of pheromones, which was between 71.2 and 82,3%.

The placement of sex pheromone traps in the natural habitat and registration number of seizures correlated with the evolution of climatic factors, has allowed drawing flight curves, which by their form, number and time of capture, showed the number of generations that a species develops for a particular ecological zone.

These species showed a well defined allocation percentage as follows: *Ostrina nubilalis* represented a very significant percentage between 39.0 - 68.0% of the total of Lepidoptera pests, *Autographa gamma* 12.0-25.0%, *Amathes c-nigrum* 14.0-16.0% and other species (*Mamestra brassicae, Plutella Xylostella, Agrotis segetum*) between 2.0-11.0%.

Use of sex pheromone synthesis traps, allowed monitoring of Lepidoptera species pest of mentioned crops, the abundance of these species present in crops and the establishment of flight dynamics, played by flight curves which serve to study the biology of these species and to warning applications of treatments.

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