POPULATION DYNAMICS OF COMMON THRIPS IN MARIGOLD CROP

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ABSTRACT
Damages produced by the pest insects can be very big, thus care must be taken about some aspects concerning the incidence in samples, dynamics and evolution of one of the most important insect pests of the flowers, such as Thysanoptera. Due to the relatively high incidence of *Thrips tabaci* in the samples collected from the experimental field of marigold, the species presented a real economic importance. To obtain a high production and superior quality it was necessary to choose the best moment for treatments by applying in function of population dynamics of those pests. In case of population dynamics of adults and larva of *Thrips tabaci* from the crop of *Calendula officinalis* L., the maximal values in all local populations taken in study were in increase in the second decade of June, and reached the maximum level in the third decade of June. It was followed by an obvious decrease in July - their number started to decrease to the end of the collecting period, until the second decade of August, thanks to the end of vegetation period of the flowers. In function of population dynamics, the best time for applying treatments in the crop flowers was during the period 15.06.2011- 26.06.2011.

Key words: *Thrips tabaci*, *Calendula officinalis* L., population, evolution

INTRODUCTION

Cropped in the oldest times by Egyptians, Greeks, Hindus, Arabs, marigolds begun to be arisen in the European gardens later, beginning with the XIIth century. Firstly, it was known as ornamental flower, afterwards it was appreciated by its curative qualities, as medical plant (GONCEARIUC, 2000). Therapeutic properties of marigolds were known and used in popular medicine of some peoples. The species was chosen in many European countries, such as Germany, England, Netherlands, France both as medicamentary and alimentary ingredient, thanks to its aroma and special flavor offered to culinary products, but especially to its reduced price compared to the relatively expensive oriental condiments,. The medical plants had an important role in our popular medicine. The profound knowledge of medical plants, including the marigold, its extended usage became wide-spread in the second half of the last century. Lots of people are interested in its crop, thanks to its therapeutic qualities based on the complex of active biological substances (BRÂNZILĂ, 2005). The health status of the plants represented the main way of increasing yield and the accumulation of the active principles in the medical plants.
Tobacco thrips (*Thrips tabaci*) is a major pest, the attack by its larvae and adults diminishing the flower production in a great measure. The tobacco thrips proved to be the most dangerous pest among the thrips of Europe in the last years, which attacked more important plants of economic point of view (ANDJUS AND TRDAN, 2005). During few years of thrips investigation in Europe, the tobacco thrips was discovered in more crop plants and in the natural flora. According to several authors, it was discovered in over 200 plant species from 30 botanic families (RASPUDIĆ AND IVEZIĆ, 1999). The Russian author DYADECHKO (1977) mentioned that the number of host plants could hit 400 species. *Thrips tabaci* is spread very much also in Romania, and appeared in the drought years for the insect development, causing great damages to the crop plants.

In the eastern part of Romania, MUNTENAŞU (2006) studied the structure and dynamic of identified thrips populations at Bârlad's greenhouses during 2004–2005, under the aspect of development stages (monthly), evolution cycles and density on different flower plants (*Dianthus caryophyllus*, *Begonia* sp., *Nerium oleander*, etc.). However, in the western part of the country there were few invetigations of that insect, thus the work proposed to emphasize some experimental data about thrips population dynamics in the medical plants crop. The knowledge of population dynamics particularities of thrips, contributed to determine the best moment of applying treatments for an integral control of that pest in marigold crop.

MATERIAL AND METHOD

To make investigations on population dynamics of Thysanoptera, the experimental field was placed to Didactic Base of USAB from Timisoara.

Conditions of collecting samples

In the experimental year 2011, monitoring thrips populations from the marigold crop were made at an interval of 3-4 days, beginning with 11th June and ending with 21st August, during all the marigold vegetation period. Thus, the probes on the plants were made during 10 weeks. The 20 samples were collected in the morning between 08:00-09:00 hour when the temperature was between 18-26 ºC and the humidity was 60-74%, or in the evening around 20:00 hour, because of the high temperatures. For the population analysis of thrips adults and larvae from the flower crop, the method of plant organ jarring was applied which presented samples to analyze. The entomological material collected from the flowers was made from a number of 30 plants, put in 3 repetitions, 10 plants/repetition, the jarring made from a number of 30 flowers/repetition, 30 flowers/plant.

Preparation and preservation of entomological material

After collecting insects in carrier bags, those were killed with acetone. The selection of the entomological material by the binocular loupe was followed by its preserving. The samples were introduced in alcohol (70%) bottles and labelled with the cropping date. For gathering, preparation, preservation and the determination of the collected material, the following materials were used: microscopes, binocular eyeglasses, simple eyeglass, lamellae, blades, preparation pins, pincers, paper envelopes, glass wand, fixing solutions, chloroform, acetone, 70% ethyl alcohol, ether, 50% diluted acetic acid, distilled alcohol, Swan liquid, xylol, Canada balm, etc. After the collected material was preserved, observations were made at the microscope to determine where was only the *Thrips tabaci* species present.

RESULTS

The study of population dynamics of thrips collected from the experimental field showed both the adults and larvae of *Thrips tabaci*.

Incidence of the pest thrips adults in the *Calendula* crop samples

From the investigations made in the year 2011 on *Thrips tabaci* adults there was observed a constant and significant presence of tobacco thrips in the samples. The adults' appearance was signaled for the first time on the 11.06.2011. The thrips were always found

in flowers before they were found on leaves, this was in accordance with the results obtained by HIGGINS AND MYERS (1992a, b) in S.U.A.. From *Table 1* it can observed that the highest number of adults (590) was collected on the 29th of June. This was not in accordance with WELLS *ET AL*. (2002), which monitored tobacco thrips populations during the early spring at four locations in south Georgia, determined dynamics and found the biggest number of collected adults on the 21st of May. BOSCO AND TAVELLA (2010) in Italy, found the maximum mean values in September, this difference is probably due to the different climatic conditions.

Table 1. *Thrips tabaci* adults collected from the experimental field, Didactical Base of USAB Timisoara, 2011

Collection date	Total number of adults of *Thrips tabaci*	Sample mean $x \pm s_x$
11. 06. 2011	188	62.66 ± 11.02
15. 06. 2011	269	89.66 ± 16.17
19. 06. 2011	275	91.66 ± 6.23
22. 06. 2011	363	121.00 ± 16.23
26. 06. 2011	420	140.00 ± 12.37
29. 06. 2011	590	196.66 ± 45.78
02. 07. 2011	556	185.33 ± 22.84
05. 07. 2011	480	160.00 ± 36.96
09. 07. 2011	469	156.33 ± 19.40
12. 07. 2011	393	131.00 ± 29.17
16. 07. 2011	370	123.33 ± 19.12
20. 07. 2011	274	91.33 ± 20.06
24. 07. 2011	210	70.00 ± 21.04
28. 07. 2011	136	45.33 ± 0.72
01. 08. 2011	105	35.00 ± 2.50
05. 08. 2011	93	31.00 ± 1.70

The smallest number of adults was collected on 05.08.2011 with a number of 93 specimens. The biggest number of adult thrips was collected on the 29th of June. It was on average 196.66±45.78 per sample and on the 02nd of July 185.33±22.84 per sample. A relatively low number of specimens was collected in the third decade of July, having an average between 91.33±20.06 and 45.33±0.72 specimens/sample. The high average values of adults/sample emphasized the pest's importance due to its incidence during all the period of observation.

The population dynamics of *Thrips tabaci* adults from the *Calendula* crop

From *Figure 1* it could be observed that population dynamics of *Thrips tabaci* adults presented a maximum of specimens on 29.06.2011, and a minimum of specimens on 05.08.2011.

From 11.06.2011 there could observed a continuous increase of insect number collected until 29.06.2011. The number increased from an average of 62.66±11.02 specimens/sample to an average of 196.66±45.78 specimens/sample. It could also be observed that from the 29th of June the thrips number decreased until the 05th of August, from an average of 196.66±45.78 specimens/sample to 31.00±1.70 specimens/sample. Population dynamics of *Thrips tabaci* adults of the marigold crop presented maximal values in the third decade of June and in the first decade of July with a maximum on the 29th of June 2011, followed by an obvious decrease until the end of the collecting period.

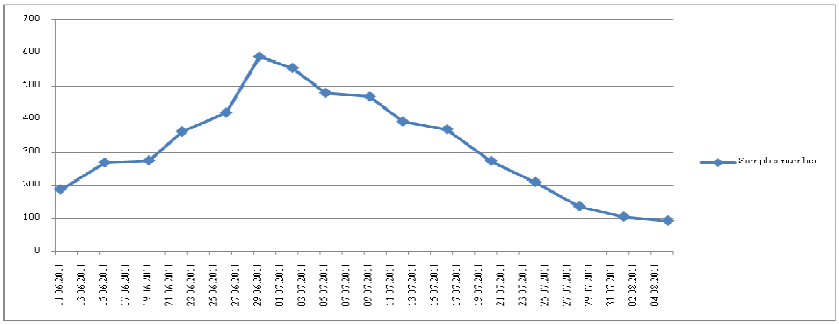

Figure 1. Population dynamics of *Thrips tabaci* adults collected in the experimental field from Didactical Base of USAB of Timisoara, 2011

Incidence of the pest thrips larvae in the *Calendula* crop samples

From the investigations made in the year 2011 on *Thrips tabaci* larva it can be observed that during the period 11.06.2011-05.08.2011 the most reduced number of species was registered on 29.06.2011 (*Table 2*). The average number of specimens oscillated between 23.00±0.47 and 109.33±26.71.

Table 2. *Thrips tabaci* larvae collected from the experimental field of Didactical Base of USAB Timisoara, 2011

Collection date	Total number of larvae of *Thrips tabaci*	Sample mean $x \pm s_x$
11. 06. 2011	79	26.33 ± 7.33
15. 06. 2011	109	36.33 ± 3.03
19. 06. 2011	116	38.66 ± 10.47
22. 06. 2011	179	59.66 ± 7.63
26. 06. 2011	233	77.66 ± 5.53
29. 06. 2011	328	109.33 ± 26.71
02. 07. 2011	296	98.66 ± 17.50
05. 07. 2011	256	85.33 ± 5.05
09. 07. 2011	250	83.33 ± 4.58
12. 07. 2011	212	70.66 ± 12.79
16. 07. 2011	211	70.33 ± 9.03
20. 07. 2011	162	54.00 ± 6.61
24. 07. 2011	125	41.66 ± 5.98
28. 07. 2011	122	40.66 ± 0.72
01. 08. 2011	99	33.00 ± 1.70
05. 08. 2011	69	23.00 ± 0.47

From the data obtained there could be observed an average of 109.33±26.71 larvae/sample. Besides, a number of 196.66±45.78 adults/sample had demonstrated once again the pest's importance thanks to its high incidence in the samples of the year 2011.

The population dynamics of *Thrips tabaci* larvae from the *Calendula* crop

The data presented in *Figure 2* showed that from 29th of June the larva number was in decrease, arriving to 69 species/sample in the last day of collecting, in 05th of August.

Also, it could be observed that in the first days of collecting, from 11th to 26th of June the number of insects collected had tripled, arriving to a number from 79 to 233 specimens. From 02.07.2011 until 24.07.2011 the larva number decreased from 98.66±17.50 specimens/sample to 41.66±5.98 specimens/sample, so its number reduced to half. From

29.06.2011 its number was in a continual decrease until the last day of collecting, 05.08.2011, when it registered the smallest number of larvae. In the function of population dynamics the best time of applying treatments was during the period 19.06.2011-22.06.2011.

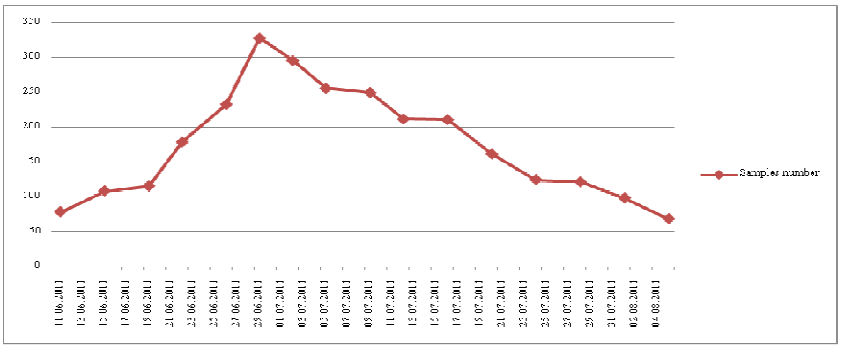

Figure 2. Population dynamics of *Thrips tabaci* larvae collected in the experimental field from Didactical Base of USAB Timisoara, 2011

In the case of both *Thrips tabaci* larvae and adults, the biggest number of specimens was registered on 29.06.2011, and the smallest number of specimens collected was registered on 05.08.2011 (*Figure 3*).

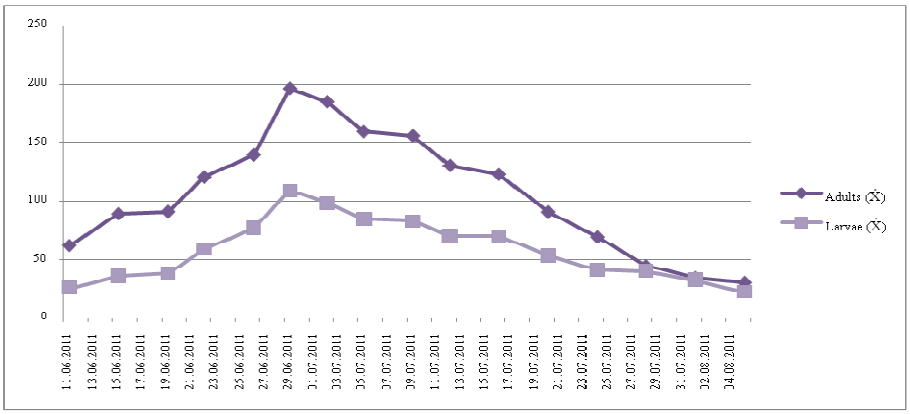

Figure 3. Population dynamics of thrips larvae and adults collected in the experimental field from Didactical Base of USAB Timisoara, 2011

Analyzing the dynamics of thrips specimens totally identified in collected samples from the experimental field of Didactical Base of USAB Timisoara, we can emphasize the great economic importance of these pests and their major role in quality and quantity depreciation of the flower crops.

CONCLUSIONS

The incidence and dynamics of the pest thrips adults in the samples

From the total of *Thrips tabaci* adults collected from the flower crop the maximum of specimens was collected on 29.06.2011 with an average of 196.66±45.78 specimens/sample. The minimum number of collected adults was registered on 05.08.2011 with an average of 31.00±1.70 specimens/sample. The specimen number collected gradually increased from 11.06.2011 until 29.06.2011 when the biggest number of species was registered, followed by an obvious decrease until the end of the collecting period.

The incidence and dynamics of the pest thrips larvae in the samples

The larva number from marigold crop, in 2011, increased beginning with the first decade of June until the third decade of the same month. Afterwards it decreased beginning with the first decade of July, the decrease continued until the first decade of August when the smallest number of collected specimens was registered. From the investigations made in 2011 in marigold crop on *Thrips tabaci* larvae, we determined that during the period 11.06.2011- 05.08.2011 the most reduced number of specimens was registered on the last day of collecting, and the highest number of specimens, was registered on 29.06.2011, the same that in the case of adults. The best time of applying treatments was during the period 19.06.2011-22.06.2011 before the adult and larva population decreased in an obvious way.

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