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Features of phenology of apple moth in conditions of warming of climate in Forest-Steppe

Purpose. To investigate the changes in the phenology of apple seedlings in the Ukrainian forest-steppe gardens. Methods. Commonly accepted methods of faunal studies in entomology, population ecology, plant protection. Results According to the results of the experiment, the beginning of the fly of the butterflies of the apple seedlings of the overwhelming generation on the pheromone traps in 2013 was recorded in the first decade of May (CET 80.4 ° C). The peak of the fly fell on 25.05.13 at SEET302 ° C, trapping traps made 40 traps per 5 days. The peak of the first year's flight fell on July 15, 13, 2002 (CET 872.5 ° C), the trap catches were 23 pieces / trap in 5 days. Also noted is another peak of the fly, which indicates the development of butterflies 2 nd generation from 10.08.13 (SET 1156 ° C) to August 30, 13th. The third peak of the fly in terms of the number of butterflies significantly exceeded the first two peaks. This is due to the use of pesticides during the vegetation of the garden and their absence before harvesting. Conclusions During the flying of the apple tree marmot on the pheromone traps there is an overlay of development phases, which makes it impossible to determine the limits in the cycle of phytophagus development. For monitoring of the number of preimaginal stages of apple tree planting, fishing belts are used.

Key words: climate change, apple tree planting, alternation of generations, apple tree, phenology, monitoring, imago.

Apple tree is the main fruit crop in Ukraine due to favorable soil-climatic conditions for its cultivation in all soil-climatic zones, in particular, in the forest-steppe. Significant distribution of apple due to the variety of its economically valuable features [7]. Pests of fruit crops are characterized by a large variety of species composition, differences in lifestyle and the nature of nutrition. An especially dangerous group of pests are insects that damage the fruit [1, 3]. The most dangerous and most widespread among them is the apple tree seedling (Suiyia rotopeiiia L.), which in some years can damage from 30 to 70 and even 100% of the crop of apples [2, 7]. The effectiveness of integrated plant protection largely depends on the informativeness and reliability of phytosanitary monitoring. Among the various methods of monitoring lucerne pests of fruit crops, the use of pheromone traps is the least labor-consuming and economically very beneficial. Thus, the use of pheromones to determine the number of lucerne complexes increases the productivity of labor in comparison with other methods of pest accounting 6 times [10]. Nowadays technologies of pheromone monitoring of different types of pests are well founded and are a reliable tool for phytosanitary analysis [9]. However, climate change constantly affects the cycles of development of insect phytophages of fruit plants, which, due to the natural selection of adaptive features, causes gradual changes in the ecological characteristics of pest populations [10]. Climate change in the direction of warming contributes to the extension of the development cycle of apple seedlings and leads to an increase in the number of generations of pests.

The purpose of the research is to study the changes in the phenology of apple tree planting in the forest-steppe gardens.

Research methodology. Field studies conducted in fruit plantations Agricultural Complex "Tarasovskaya" (Kiev region., Kiev Svyatoshinsky district) in the apple orchards of different ages, different varietal composition and protection system. In the garden of the 18-year-old varieties Aidared, Spartan, Prima, Renet Simirenko were not cultivated by means of plant protection; In the garden of the 13-year-old Johnogold variety and his clones, Florin, the Champion was treated with intensive technology (at least 11 treatments per season); In the garden of the seven-year-old variety Johnagold, Golden Delishes, White Nourish was processed three times a season.

To identify adult codling moth and study the dynamics of the number of traps used ferro- Monnet Atrakon-A Pestyfiks with glue and synthetic pheromone firm Intervab (Moldova). The traps were posted in the beginning of May in the neighborhoods of the garden on the outer branches within the crown of fruiting model trees on the southern side. The distance between the traps is at least 50 m apart from the other. The records were carried out once every 5 days, pheromone capsules were replaced every 20 days, adhesive liner - every 10 days [5]. To study the dynamics of the codling moth for use catching belts on apple varieties late term maturing on June 1 on the barrel 10 trees superimposed belt with corrugated paper width of 20 cm. ACCOUNTING zones performed every 7 days for each account pupae of zones chosen, And caterpillars left [6].

Research results. A lot of works are devoted to the study of the biology of apple cultivation, but a number of questions still remain unexplored. So, there is no unequivocal answer to the question of whether climate warming has affected the number of generations of grasshoppers in the conditions of the forest-steppe. During the fly generations in adult codling moth Pheromone trap occurs overlapping phases of development, which makes it impossible to clearly define the boundaries in the development cycle herbivores. Fishing grounds are used to monitor the number of premonginal stages of apple tree mating. According to the results of the experiment, the beginning of the fly of butterflies of apple seedlings on pheromone traps in 2013 (Fig. 1) was recorded in the first decade of May for the sum of effective temperatures (SET) of 80.4 ° C. The legs of the passing butterflies continued from 01.05.13 to 25.06.13. Its peak fell on 25.05.13 (SET 302 ° C), the traps were 40 traps per 5 days. Lit butterflies 1st summer generation lasted from 07.05.13 g. (SET 757,5 ° C) to 08/05/13 p. Peak fly fell on 15.07.13 g. (SET 872,5 ° C) trap catches were 23 Ex. / Trap within 5 days. Also noted fly another peak, indicating the development of butterflies 2nd summer generation 10.08.13 g. (CET 1 156 ° C) to 30/08/13 was. The maximum was recorded fly 8.15.13 g. (1212,5 ° CET C), catch traps were 9 items / trap in 5 days.

Butterflies of the apple tree carver in the orchard with intensive treatments were observed on 01.05.13 (SET 80.4 ° C) and lasted till 20.06.13 (figure 2). The peak of the flight of the overwhelming generation fell on 15.05.13 (SET 210.5 ° C) and was 6 units / trap in 5 days. The litter of the first generation butterflies was marked from 30.06.13 (SET 695 ° C) to 25.07.13. The maximum of the fly was observed on July 5, 2003 (SET 757.5 ° C) and amounted to 4 specimens per trap 5 days The litter of the 1st generation of butterflies was negligible and did not exceed the EPPS. Also noted is the following peak on the fly from 30.07.13 (SET 1020.5 ° C) until 10.09.13, which indicates the development of butterflies of the 2 nd generation. The maximum of the ice fell on 05.10.08.13, gauging of the traps was 9 items / trap in 5 days.

Fig. 1. Dynamics of apple fruit production (control, village Tarasivka, Kyiv region, 2013): - ■ caterpillar in a cocoon; - ♦ pupae; - butterflies (for figs 1-3)

Fig. 2. Dynamics of development of apple seedlings (garden with intensive treatments, village of Tarasivka, Kyiv region, 2013)

Fig. 3. Dynamics of development of apple seedlings (private plots, village Knyazhiychi, Kyiv region, 2013)

The third peak of the fly on the number of butterflies significantly exceeded the first 2 peaks. Such an atypical dynamics of the fly of butterflies can be explained by the fact that during the vegetation period the gardens are treated with pesticides, which holds back the development of pests. However, before harvesting, treatments are not carried out with chemicals, as this is prohibited by sanitary and epidemiological standards, which allows phytophagus to increase its size. The leaves of butterflies of apple-tree nursery in the variant of private plots (Fig. 3) were observed on 03.05.13 (SET 97.2 ° C) and lasted till June 15, 13, 2006. The maximum of the fly of the butterflies of the generation that was wintering was noted on May 25, SET 302 ° C), the trap catches were 10 units / trap in 5 days. The litter of the first generation butterflies began on June 25, 13, 2006 (SET 629 ° C) and lasted until 05.08.13. The peak of the fly fell on July 15, 13, 1997 (SET 972.5 ° C) and amounted to 7 ex. / Trap within 5 days. Also, we noted another small peak of the fly, indicating the development of the butterflies of the 2nd summer generation from 10.08.13 (SET 1156 ° C) until 10.09.13 p. The maximum of the fall fell on August 25, 13 (SET 1301 ° C) and was 5 times / trap in 5 days. Butterflies were insignificant and did not exceed the EPPS. In the course of the research, the beginning of the pollination of caterpillars of the generation that was wintering was established - on June 17, 13th, in the control version and in the version with intensive treatments and on June 15, 13th - in the garden on the farmyards. The pollination of the caterpillars of the apple planting of the winter generation begins at the end of July in early August. The sum of effective temperatures, which corresponded to the beginning of pollination of caterpillars,

averaged 560 ° C with a variation of 51-61 ° C [9]. The amount of the NET on June 15, 1313 was 501.5 ° C, on 17.06.13 p. - 526.1 ° C. The massive increase of caterpillars in the belt in the garden without treatment (see Fig. 1) on July 1, 13th, signaled the beginning of the seduction of the 1st generation of the elderly, and the appearance of caterpillars in the belts of July 29, 1313 testified to the beginning of the calming of caterpillars of the 2 nd summer Generation and revival of 2nd-generation moths. In the garden for an intensive degree of protection (see Figure 2), a similar situation was observed: massive increase of caterpillars in the belts took place on July 1, 13, and on July 29, 13th, indicating the presence of 1 st and 2 nd summer generations. In gardens on private plots (see Figure 3), the massive number of caterpillars in the belts of 08.07.13 indicates the beginning of the seduction of the 1 st generation, and the emergence of caterpillars in the belts of August 12, 13, 2003 - about the beginning of pollination of caterpillars of the 2 nd Summer generation and the revival of 2nd-generation moths.

Conclusions

It has been established that in the forest-steppe, under the current indicators of climate warming, apple seedlings develop in the winter and 2-year generations. The beginning of the fly of apple-tree apple butterflies on pheromone traps in 2013 is registered in the first decade of May for CET 80.4 ° C. The peak of the ice fell on 25.05.13 (SET 302 ° C). The peak of the first-generation generation flooded on July 15, 13th, (CET 872.5 ° C). Also noted is another peak of the fly, which indicates the development of butterflies of the 2nd generation from 10.08.13 (SET 1156 ° C) until August 30, 13th. It was observed the butterflies of the apple seedlings of the generation that went over in the garden with intensive treatments, The peak of which fell on 15.05.13 (SET 210.5 ° C). The litter of the first generation butterflies was marked from 30.06.13 (SET 695 ° C) until July 25, 13, its maximum was 05.07.13 (SET 757.5 ° C). The next peak of the fly was observed from 30.07.13 (Seth 1020.5 ° C) until 10.09.13, which indicates the development of the butterflies of the 2 nd generation. The third peak of the fly on the number of butterflies significantly exceeded the first 2 peaks. The peak of the butterflies of the apple seedlings of the generation, which was wintering on the plots, was 25.05.13. (SET 302 ° C). The peak of the fly of the first-generation butterflies fell on 15.07.13r. (SET972.5 ° C). There is also noted one more minor peak of the fly, which testifies to the development of the butterflies of the 2 nd generation from 10.08.13 (SET 1156 ° C) to 10.09.13.

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