

THE IMPACTS OF AIR TEMPERATURE TO HARMFUL PESTS DURING OVERWINTERING PERIOD

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Summary. *The article studies the change in air temperature and relative humidity in winter, during the last 25 years in the condition of Karakalpakstan. The years were determined that the average of daily air temperature was in the range of 12-15°C and the minimum criteria of 24-26 °C and their influence on the wintering of insects of this agrobiocenosis. As a result, it is recommended that the production of forecasting be possible for the wintering of insect species from the minimum air temperature criteria.*

Key words. *Abiotic factors, air temperature, relative humidity, minimum criteria, insects, pest biology.*

Introduction:

It is known that abiotic factors in winter highly impacts to fostering conditions of the pests in early spring which grow in agricultural crops and bring damages to the plants. Especially, there is a big portion of changing air condition and layer of snow in winter. Because, it is clear in our region's agrobiocenosis all kinds of pests spread in plant fields, regarding to bio ecological developing conditions, some of them spend winter as an adult, others winters in phases of puppet and caterpillar or egg. Overwintering place of such kind of pests will be inside of fields, bottom of rest wild plants at the edge of fields, body of the plants and upper layer of soil in certain deep. The types of pests enter in diapauses condition before they leave overwintering place as getting physiological readiness. Thus there are going on research works and special observations on defining overwintering phases of main pests spread in agrobiocenose by using other research works and observations.

Results:

The results are being taken in this direction shows that these pests are found in the main plants of agrobiocenosis such as cotton (*Goosypium hirsutum L.*), wheat (*Triticum vulgare L.*), cucumber (*Cucumis sativus L.*), tomato (*Lycopersicon esculentum Mill.*), cabbage (*Brassica oleraceae L. var capital L.*), egg-plant (*Solanum melongena L.*), melon (*Melo orientalis (S.Kudr) Nab.*), water melon (*Citrulus vulgaris Sch.*), pumpkin (*Cucurbita pepo L.*), maize (*Zea mays L.*), corn (*Sorghum Pers.*), clover (*Medikago sativa L.*) etc. It has been determined that among the harmful pests there are the main representatives of the coin-wing insects such as the autumn shovel (*Agrotis segetum Den. et Schif*) and the heart and dart (*Agrotis exclamationis L.*) spend the winter in caterpillar phase at older age, the cotton shovel (*Heliothis armigera Hub.*), the gamma shovel (*Phytometra gamma L.*) spend the winter in puppet phase. It has also been taken under consideration that the essential

types of the group of equal-wings (*Homoptera*) such as the vegetable aphid (*Aphis gossypii* Glov.) in adult and infant, the cotton aphid (*Acyrtosiphon gossypii* Morv.), the wheat aphid (*Schizaphis graminum* Round.), the clover or acacia aphid (*Aphis medicaginis craccivora* Koch.), the apricot-reed aphid (*Hyalopterus Pruni* Geoffroy.), the peach aphid (*Myzodes persicae* Sulz.) spend winter in egg phase which placed on plants' bodies.

The two spotted spider mites (*Tetranychus urticae* Koch.) from the Actinotrichida (*Acariformes*) group, the tobacco thrips (*Thripstabaci* Land) and the wheat thrips (*Haplothrips tritici* Kurd.) from the group of Thysanoptera, the adult clover phytonomus (*Phytonomus variabilis* Hbst.) from the group of beetle, the melon mosquito (*Myiopardalis pardalina* Big.) belonging to the Tephritidae in the group Diptera spend winter in pupet phase. But the adult crop gyve (*Lygus pratensis* L.) and the clover gyve (*Adelphocoris lineolatus* Coeze.) from the group Hemiptera spend winter in egg phase. Above mentioned all harmful insects exist in plant fields and at the same time bring damage for the agricultural crops differs from each other according to spending winter in different phases (1.2.3.).

The possibility of overwintering of the emphasized pests depends on air and soil temperature of the winter period. Thus due to determine the influence condition of daily average and low degree of the temperature in winter to the pests spending winter the days have been clarified since 1994 till nowadays which are the average daily temperature lowered to 12-15 °C, and the minimal degree was about 20-25 °C.

The analyses prove that during three days (Dates: 15, 16, 18) of January in 1994 and on the 10th of February the air temperature decreased from the above-shown degree, but on the 12th and 15th of December in 1995 the weather had been cold and January and February was warmer. It means the winter months of 1994 and 1995 was rather cold. As a result of this some species of the agricultural insects expected of overwintering in crops, particularly the pests in the bottom of rest wild plants died. Consequently, it was noted that in next spring the number of harmful pests was lower.

On the 12th and 15th of December in 1995 as well as between the 10th and 20th of January in 1996 it was analyzed that the average temperature of air was 14-17 °C, the minimal degree was 20-21 °C. These coldest ten days caused dying of the species of pests which was not fully ready to overwintering.

The next coldest days were observed on January, 1998. The average of daily temperature was between -18,1-21,8 °C, the lowest limit reached 26-28 °C. These days lasted 8-10 days and during this period the temperature of soil's upper layer was equal to -30 °C. It proves that some pests overwintering in this place of soil was died during these days.

The next coldest winter happened in 2006. Though there were not met inconvenient days for the pests on December 2015, it is taken under consideration that from the 2nd of January 2016 the average of air temperature became -14,8-17,0°C, and the temperature's low border showed -20,0°C. Till the end of January there were observed some days which the average of daily air temperature reached -21,3-23,1°C, its lowest limit was equal to -25,8-26,9 °C. These coldest days caused the temperature of soil's upper layer was below -34-35°C and in consequence, it is

clearly shown that the most part of pests, even well-prepared to overwintering, were died.

This opinion is the proof of decreasing of the pests' numbers such as the shovels from the rodent insects group after overwintering in the spring of 2006. But the numbers of some pests such as the aphides from the suck insects group, the gyve and the types of two spotted spider mites increased at the end of May and June as a result of presence of convenient abiotic and biotic factors during this period of time.

By comparing the above observed years the longest duration of cold days were observed on January 2008. Because the days which the average of daily temperature decreased from $-12,4-14,0^{\circ}\text{C}$ to $-19,2-20,9^{\circ}\text{C}$, the minimal border of temperature decreased until $-24,8-25,5^{\circ}\text{C}$. These days lasted 20 days in January, 2 days in February. As a result, the autumn months of 2007 the weather was rather convenient for the pests: the most species had time to fully go to overwintering. But despite of a lot of convenience in December, it was proven that the most of them was died in consequence of cold weather occurred in January. Because, that year the number of overwintered pests decreased in the spring. It helped to have a good seedling phase from the agricultural crops.

Among the following years, January of 2010 came rather convenient but in February decreasing of the air temperature to $-25,6-27,0^{\circ}\text{C}$ continued between the 8th and 15th dates, in consequence, this brought rather inconvenient condition to the last days of overwintering period of the pests.

Such cold year happened in 2012 again. Though January was warmer, in February the air temperature went down to inconvenient degree for overwintering pests during five days. That year December was rather cold. Between 15 and 18 December the average of daily temperature reached $-18,7-21,4^{\circ}\text{C}$ and it was observed the days which the low border of temperature decreased till $-24,4-25,5^{\circ}\text{C}$. In 2013 January and February became warm and it informs that the most part of pests spend winter safe. Because the number of suck insects reached the maximal degree, in consequence, that year was characterized by providing more damages to the agricultural crops in certain level.

According to the observations held during last five years, it was proven that the most part of overwintering pests were died because of decreasing the average of daily temperature to $-20-21^{\circ}\text{C}$ from the last days of January and decreasing the low border of temperature to $-23,6-25,8^{\circ}\text{C}$ in the first part of February in 2014. Despite of this, the convenient weather which occurred on the spring months provided a good condition to overwintered shovel butterflies to fly by April 20 and to fall into a pheromone trap by April 24.

According to the observations held for last three years, the winters became rather warm. As a result of this the shovel caterpillars were found in the pheromone trap on the 22nd of April in 2015. As a result of the observations, it was found that in 2015, March, the air temperature was below the expected temperature. However, in the first decade of April, $9,3^{\circ}\text{C}$ was observed, the second decade was $14,5^{\circ}\text{C}$, and in the third decade, the increase of $19,0^{\circ}\text{C}$, with the accumulation of effective temperature amounts of $167,4^{\circ}\text{C}$, the early development of the main pest species

on this sowing.

Subsequent observations confirm that in June and July months there was a sharp increase in the air temperature, i.e. on some days the average daily air temperature was 31-33 ° C, the maximum criterion was 44-45 ° C, which adversely affected the development of pests in this biotope. Only to lick on crops the harmful kinds of scoops actively developed.

But in 2016, from the second decade of April the butterfly shovels fall into the pheromone traps placed in agricultural crops, they produced the caterpillars by the end of the month and these caterpillars brought damages to the agricultural crops. That year the numbers of some types of the give and aphesis increased and brought damages in certain level. It should be noted that the winter periods of 2015-2016 were observed at elevated temperatures in comparison with perennial temperatures. During December 2015, the average daily air temperature was 2.8-3.4 ° C, in the first decade of January 2016 0.7-1.1 ° C, the second decade 2.5-5.1 ° C and the third decade - 0.4 ° C, also the preservation of such warmer days in February (1.9 ° C, -0.9 ° C, 9.4 ° C) created the possibility of a normal wintering of pests. Subsequent favorable conditions for a mass exit from the pest wintering observed from the beginning of April. In connection with the increase in the air temperature of 9.5 ° C, 17.1 ° C for the second, and 20.1 ° C for the third decade, the flight of the butterfly to the overwintering generations of scoops contributed from the second decade of April. The accumulation of 375.1 ° C of the sum of effective temperatures, below the threshold of 10 ° C in May months, was given the opportunity to actively develop these pests on crops of vegetable crops and potatoes during the growing season, changes in the air temperature and relative humidity were facilitated by the active development of many species of wreckers, at the end of vegetation, aphids, spider mite and bedbugs, which harmed crops.

According to the observations held between 27 and 31 January in 2018, the average of daily temperature was -13,5-16,8 ° C, the low border of temperature decreased till -20,4-21,5 ° C. The average of daily air temperature was above 0 ° C.

As the conclusion of the observations held during last twenty-five years, we can emphasize 1998, 2006, 2008, 2010, 2012 and 2014 as the years had the coldest winters which the air temperature extremely decreased and uncomfortably impacted to overwintering of the harmful pests.

It was taken under account that in the years which lasted such cold days longer, the exit from overwintering of the agricultural pests was rather late as well as their number decreased. Thus we have to take under consideration that if the duration of cold days lasts more than 8-10 days and during these days the average of air temperature will be -14-15 ° C, the low border of temperature will be -20-24 ° C, then the most species of insects will be died. In such years the number of the rodent shovels decreases in spring, but by the end of May the number of suck insects increases.

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Rezyume. *Maqolada Qoraqalpog'iston sharoitida so'nggi 25 yil davomida havo harorati va nisbiy namlikning qish oylaridagi o'zgarishi o'rganilgan. Ushbu yillar davomida agrobiotsenozda mavjud hasharotlarga o'rtacha harorat 12-15°C, minimal darajasi 24-26 °C bo'lgan yillardagi qishlashiga tasiri aniqlangan. Natijasi bo'yicha ishlab chiqarishga hasharotlarning qishlab chiqishini qish davridagi havo haroratining minimal darajasi bo'yicha bashorat qilish tavsiyasi berildi.*

Резюме. *В статье изучено изменение температура воздуха и относительной влажности в зимние периоды, течение последних 25 лет в условиях Каракалпакстана. Определены годы, которые среднесуточная температура воздуха составляли в пределах 12-15 °C и минимальные критерий 24-26 °C и их влияние на перезимовку насекомых данного агробиоценоза. В результате рекомендованы производству прогнозирования возможностью перезимовку видов насекомых от минимального критерия температуры воздуха.*

Kalit so'zlar. *Abiotik omillar, havo harorati, nisbiy namlik, minimal darajasi, hasharotlar, zararkunanda biologiyasi.*

Ключевые слова. *Абиотические факторы, температура воздуха, относительной влажностью, минимальная критерия, насекомые, вредитель, биология.*