

Influence of Ecological Factors on the Development of Insects in Extreme Condition of Karakalpakstan

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Abstract: *There given the results of researches which study the impacts of a biotic and biotic factors influencing on agriculture crops and the development bio ecology of insects distributed in fields on a basis of agrobiocenoses peculiarities of the republic of Karakalpakstan. Insects are divided into pests and entomoacarifagus according to their relation to plants. Observations proved that the impacts of the ecological changes led to the extinction of some kinds of animals and appear other kinds of animals. There also appeared dominant insects according to their damage and distribution area. It was taken into consideration that the air temperature, reaching maximum level of 40-45°C and reduce of 15-20 % of relative moisture of air influenced negatively on the dynamics of insects development. It has been scientifically proven that the main ecological factor was despite the mild winter climate which was very convenient to wintering insects, and increase of temperature in July-August led to diapauses and extinction of some of them.*

Key words: biocenosis biology, plant, insect, pests, abiotic factors, temperature, air moisture

1. Introduction

The territory of the republic of Karakalpakstan occupies 165, 6 thousand km² in the world map in latitude 59⁰-76⁰ south, and in latitude 36⁰-44⁰ northwith sharp continental climate. Basically it is bordered with the republics of Kazakstan, Turkmenstan, it is distinguished with its flora in a certain level from other regions of Uzbekistan.

The main distinctive agro climate features: winter is colder, average temperature in some years decreased to 20-25⁰ C, summer is dry hot, in June, August, maximum level of hot weather increased to 40-45⁰ C, relative air moisture reduced to 15-20%. However, seasonal increase tendency of the region has been taken into consideration in the observation. [2: 6].

Because of Aral Sea desiccation abiotic and biotic factors changed and it led to change of some kinds of plants and animals. Despite of the seasonal conditions we can achieve an expected yield from agricultural crops sown in the agrobiocenoses. [4;5].

Despite of the recent changes in the agrobiocenoses of the republic main agriculture crops such as cotton 100 -110 thousand, wheat 50-60 thousand, rice, barley and other crops 20-30 thousand , vegetables 15-20thousand, fodder crops 30 thousand, gardening 10-15thousand, viticulture 2000 ha and mulberry growing 1000 ha also grown in open fields.

Farming in greenhouse is one of the developing spheres, in the last two years almost in all farming in closed areas in autumn-winter and winter-spring seasons started farming cycles. (Agriculture statistics, 2016-2019).

The insects in the given biocenosis that inhabit in agriculture crop fields are considered to impact on the types of crops and their development conditions, environment and damaged them in a certain level.

The insects which appear in agrobiocenoses where agriculture crops grown in the fields impact negatively on

the crop growth and required pest control by human to influence on their development bio ecology and the measures should be taken into consideration. It has been scientifically proven with the research works are being done in Karakalpakstan condition which will be resulted in change of their types and their quantities [3; 7; 9; 10; 11].

Therefore the study of plants and insects in this agrobiocenoses with such ecological changes, biological estimation is of theoretical, practical value and actual task in biology science.

The methods of research: Recent years in order to identify the changes of abiotic and biotic factor elements; Shimbay metepost information has been received, done analyses compared to average many years [6].

Plant types in the fields, the phases of agriculture crops studied on a basis materials by K. Seyfullaev and others [8]. The types, bio ecology, distribution area of insects determined by B.P. Adashkevich [1], Sh.T. Xodjaev methods [10].

2. Results and their analyses

According to the agro climate, soil, and flora the territory of Karakalpakstan are divided into mainly south, medium and north zones, by occupational area the north zone is the main zone of the region. Therefore, taking into consideration the distinctive features of the region, agriculture crops which are the basis of the agrobiocenoses and the types of distributed insects, according to their relations to plants they can be divided into pests and entomoacarifagus, and differences in relations to environment have been studied during 2015-2019 years.

The results of observations and conducted experiments; in our republic in farmers fields and plots are cultivated and grown such plants as cotton (*Goosypum hirsutum.*), wheat (*Triticum vulgare L.*), rice (*Oryza sativa L.*), barley(*Sorghum Pers.*), corn (*Zea mays L.*), among vegetables cucumber (*Cucumis sativus L.*), cabbage

(*Brassica oleraceae* L.), tomato(*Lycopersicon esculentum* Mill.), egg plant (*Solanum melongena* L.), carrot(*Daucus sativus* (Hoffm) Roehl.), onion(*Allium cepa* L.), pepper(*Capsicum annuum* L.), radish(*Raphanus sat. var. ract. Pers.*), vegetables; melon (*Melo orientalis* (S.Kudr) Nab.), water-melon (*Citrulus vulgaris* Sch.), pumpkin (*Cucurbita pepo* L.), Lucerne (*Medicago sativa* L.), potato (*Solanum tuberosum* L.), sun-flower (*Helianthus annuus* L.), leguminous peas (*Phaseolus aureus* Roxb.), beans (*Phaseolus vulgaris* L), fruiter; apple (*Malus domestica* Borkh.), pear (*Pyrus communis* L.), apricot(*Armeniaca vulgaris* Lam.), cherry(*Cerasus vulgaris*), plum (*Prunus domestica* L.), peach (*Persica vulgaris* Mill.) and grapes(*Vitis vinifera* L.) besides being main human food they are exported as a raw material. Despite of agro technical measures, the pests according to their micro climate, feed on the plant types in the biotope and, influence negatively on their growth, yield, they are turnip moth(*Agrotis segetum* Den. et Schif.), heart and dart agrotis exclamationis (*Agrotis exclamationis* L.), silver moth(*Phytometra gamma* L.), cotton-melon aphid(*Aphis gossypii* Glov), the cowpea aphid (*Aphis medicaginis craccivora* Koch), the mealy plum aphid(*Hyalopterus pruni* Geoffr), cotton aphid(*Acyrtosiphon gossypii* Morv), green bug(*Schizaphis graminum* Rond), green peach aphid(*Myzodes persicae* Sulz), tobacco thrips(*Thrips tabaci* Land), flower trips(*Haplothrips tritici* Kurd), greenhouse whitefly(*Trialeurodes vaporariorum* Westw), tobacco whitefly(*Bemisia tabaci* Genn), 2 spotted spider mite, tomato russet mite (*Aculops lycopersici* Masee), Lucerne bug(*Adelphocoris lineolatus* Coeze), cotton cicada (*Cicadatra ochrea* Mel), corn bug (*Eurygaster integriceps* Put), Italian locust (*Calliptamus italicus* L.), migratory locust (*Locusta migratoria* L.) are of great importance in reducing pest quantities and also entomofagous such as the seven spotted lady beetle(*Coccinella septempunctata*), golden eye(*Chrysopa cornea* Steph.), pied hoverfly (*Scaeva pyrastris* L.), the spider mite destroyer(*Stethorus punctillum* Ws.), aphid midge (*Aphidoletes aphidimyza* Rand.), aphid parasitoid (*Aphidius ervi* Hal.) cause to biological differentiation.

The insects have been divided into groups according to their influence level of ecological factors which needed to their growth.

It was clear that the elements of abiotic factor; the temperature of environment; low, optimum, and high are needed factors for their life condition. Because many insects start their physiological development when minimum temperature reaches 10⁰ C, they reached the highest point when it remained 24-27⁰C, and supplied the development of phases in shown period.

Relative moisture of air also influence differently on the development bio ecology of insects, when the relative moisture of air is 40-60 % in spring and autumn months they massively grow, when relative moisture of air reaches minimum degree of 15-20% in summer they get into summer diapauses.

The role of plants in insects' lives is great, as a biotic factor; they take body energy by feeding on these plants. When

feeding by adapted plants they grow actively, feeding by another non-adapted compulsory plant can be observed lack in normal growth. Therefore, insects inhabited in some types of plants have property to reproduce and be patient to negative factors.

One of the main biotical factors of animals are entomofagous (another type of insects mainly feed on insects) are elements that help to reduce pest quantities in the environment. Because birds, reptiles and aquatic animals feed on insects, are elements of "food chain" in biocenosis, are active factors to reduce these types.

Taking into consideration these data, recent abiotic factor impacts are being studied. As a result in 2015 in January during 29 days minus temperature remained, average daily temperature reduced to -14,7⁰C, average monthly temperature was -3,0⁰C. In February 16 days minus temperature remained and minus temperature reduced to -6,5⁰C, -8,1⁰C, and average monthly were 0,8⁰C. In April at the end of the first 10 days average temperature increase to 10⁰C, average was 9,0⁰C, on the second 10 days was 12⁰C, third was 14,7⁰C, in May increased to 22,4⁰C, re till the end of the period it reached to 562,6⁰C and accumulate needed warmth. This year in summer months average daily temperature was around 23.0-30.0⁰ C, the high point remained as 38.0-40,0⁰ C, it showed winter was not convenient for the insect types but for vegetation period it was convenient.

As observation periods of winter months of 2015-2016 shows, winter months were mild, the first 10 days of February was 1,9⁰C, the second was -0,9⁰C, the third was 9,4⁰C and on the first 10 days of March remained on 11,1⁰ C gave insects an opportunity to be more active and awoke from wintering earlier than usual. Average temperature in April was 15,5⁰C, in May 22,1⁰C in June 27,0⁰C, in July 28,7⁰C in September 20,1⁰C this year was very convenient for many types of insects.

The air temperature change in 2017 during the year was different in March was 5,3⁰ C, in April 14,2⁰C, in May reached to 22,5⁰C, average temperature June -July months 26,5, 29,3⁰ C, and in September 20,2⁰C remained constant and it showed convenient period for pest reproduction.

The beginning of 2018 was different than other years average daily temperature in January was - 4,7⁰ C, in February was -3,2⁰C, in March 6,8⁰C, in April 13,5⁰C, in May 21,5⁰C, observed the same convenience for them. But the increase of temperature to maximum level 40⁰C in June, July August and lasted 12-17 days impacted negatively on insects and it made them get into compulsory summer diapauses.

Furthermore, winter months of 2019 was warmer, January minimum level was around -2,2⁰ C average monthly temperature was 0,4⁰C, in February 0,1⁰C, in March 8,9⁰ C, was an optimum condition for their wintering. Although observed temperature in April was 14,1⁰C, (12,8; 13,5;14,0⁰C) lower than previous years the temperature in May was 23,1⁰C,(21,8; 25,0; 22,4⁰C) supplied insects with good opportunity with complete wintering. Nevertheless

observed less convenient temperature in July-August, average daily temperature was 30,3-32,9⁰C sometimes increased maximum level 43,6-44,4⁰C led to long summer diapauses, consequently it reduced minimally their development. Despite of that most insects could get into wintering as October and November temperature was (19,2-23,9⁰C).

In observed years relative air moisture in spring, autumn was 60-70% in vegetation period 35-50%, minimum level decreased to 20-26% in some days impacted negatively on the insects.

Observation were made of rainy season and it was lower than many other years, it was 169,6 mm in 2015, 205,6 mm in 2016, 130,9mm in 2017, 120,5mm in 2018, 73,4 mm in 2019, mainly in spring months in April 2015 was -15,2 mm, in May 42,3mm, in April 2016 was 7,6 mm , in May 48,3 and in October 2017 was 37,8mm, in February 2018 was 48,8mm and it showed that it influenced negatively on their wintering period.

Analyses of air temperature, relative moisture, rain quantity in the region and observation showed that in 2016-2017 abiotic factors were convenient and it gave opportunity for the insects active growth in vegetation period, but in 2015, 2018-2019 air temperature reached the maximum level 40-44⁰C and relative moisture of air was 30-55 % , proved that they impacted negatively and this period distribution area of the insects was fewer.

3. Conclusion

Insects inhabited in agriculture crop field grown in agrobiocenoses of the republic of Karakalpakstan is the main biotical factor of biotope, it is identified many ecological factors influenced positively and negatively on their biological development conditions. The interaction, of the insects with environment, impacts of ecological factors, based on human needs, it was proven theoretically and practically that is purposeful to divide them into pests and entomoacarifagus.

Because they divided into pest groups which feed on the plants and impact on their growth, and entomoacarifagus groups which feed on these pests.

It was identified that it is purposeful to divide them into abiotic, biotic and anthropogenic factors taking consideration their role in" food chain", their relation, and biological development conditions.

Abiotic factors should be taken into consideration according to the air temperature, relative moisture of air, rain season, optimum, minimum, and maximum criterion of temperature, needed warmth, longitude and conciseness of light, and impacts of rain. These factors also influence on water and soil ecosystem.

Biotic factors also studied as plants, criterion, main, secondary types, phases, another types of animals- birds, reptiles, aquatic animals, entomoacarifagus-p parasites, predators and micro bodies causing diseases.

Recent year air temperature, one of abiotic factors, identified that was different than other years, the air temperature in winter was warmer and it led to increase of vegetation period. As a result, despite the convenient climate temperature in winter and spring, the maximum level of hot temperature (June-August) was 43-45⁰C and remained for several days and relative moisture decreased to 15-20% made them get into compulsory summer diapauses. Consequently, in the years which lasted long identified that they might cause their extinction. The scientific novelty is prognosis of the pests' long-term and short-term development bio ecology, use them in pest control, and propose to industry.

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