Developing an integrated plan of harvest protection as a tool of improving food supply security in Kyrgyzstan

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Abstract. The article shows that apricot plants in the South of Kyrgyzstan are wide spread in the Batken Region. This region is favorable for growing apricots sold both in the domestic and in the foreign markets. It is here where they cultivate many varieties of apricots which are subsequently exported in dried form to CIS and non-CIS states. Heat-resistant and drought-resistant rare varieties of apricots are cultivated in the Batken Region, such as: Kandak, Mirsanjeli, Khurmai, Subkhoni, Babai, Akhrori, Arzami, Isfarak, Kursadyk, Ak Uriuk (Sovetskiy). 22 species of insect pests of apricot plants were found; they are conveniently classified into five orders. The dominant pests of apricot plants are as follows: apricot seed wasps (Eurytoma samsonovi Vass.), plum seed wasps (Eurytoma schreineri Schr.), apricot snout-beetle (Rhynchites auratus ferghanensis News.), gypsy moth (Lymantria dispar L.), casebearer (Coleophora hemerobiolla Fil.), European leaf roller (Archips rosana L.), acacia lecanium - (Parthenolecanium corni Bouche). The most common apricot diseases in the climate of the Batken Region of Kyrgyzstan are shot-hole disease (Clasterosporium carpophilum Aderh.), frostly pod rot (Monilia cinerea Bon.), bacterial blight (Gummi.), verticillium wilt (Verticillium dahliae Kleb.), twig die-back (Cytospora arphosperma Fr.).

1. Introduction

There are more than 20 thousand hectares of apricot plants in the South of Kyrgyzstan. At the same time, the areas allotted for apricot orchards increase from year to year, and the gross yield reaches more than 60.0 thousand tons per year.

The climate in the Batken Region is favorable for growing apricots sold both in the domestic and in the foreign markets. The development of agriculture enables the state to establish its own food economy, provide additional financial investments in the budget through food exports, creating additional jobs and providing a certain standard of living for the local population living in rural areas. The Batken Region is an agricultural region in which many cultivated plants, including apricots, are grown.

It is here where they cultivate many varieties of apricots which are subsequently exported in dried form to the CIS and non-CIS states. Special attention is paid to the cultivation of such rare varieties of apricots as Kandak (is particularly popular in India, China, and Greece), Mirsanjeli, Khurmai, Subkhoni, Babai, Akhrori, Arzami, Isfarak, Kursadyk, Ak Uriuk etc. The study of morphological traits and pits has shown that most varieties of apricots in the studied districts are representatives of the Fergana and Zeravshan subgroups.

Apricot is a heat-resistant and light-demanding plant that is absolutely tolerant to high air temperatures which may reach up to 48 °C. The drying of lateral branches can be observed in the case of close planting.

Aridity is an identifying feature of climate of the Batken Region. The Batken forms of apricot are highly adaptable to local environmental conditions, being distinguished for their heat resistance and drought resistance, which ensures their longevity and high yields, including in dry years.

In recent years, many apricot orchards have been susceptible to strong influence of pests and diseases, as well as root wilting due to insufficient implementation of melioration measures. Taking into consideration the influence of various pests and diseases on apricot orchards, we should make scientifically grounded decisions on the implementation of control measures in particular conditions which is an important part of the integrated plan of protective measures.

Species composition, peculiar properties of bioecology of pests and diseases of apricot plants, the history of changes in their number, and their harmfulness in the Batken Region have not been yet studied.

2. Methods Used in Studies

The main methods of identification of pests and diseases, the extent of damage of apricot orchards with them were control sample examinations and systematic observations on farmer plots. The studies were carried out in cooperative “Alysh Dan” of Kara-Bak aimak, in the farming enterprise “Sapar - Ali” of Kara-Bulak aimak.

The assessment was performed in two terms: during the period from the beginning of the swelling of flower buds until the end of apricot blossoming and immediately after blossoming until harvesting. The visual examination of trees was carried out in two diagonal sections of the plot. Visual appraisal of damage degree and detailed assessment [18]. The census of insects was accompanied with the assessment of damage degree of flower buds, flowers, leaf rosettes and leaves.

The degree of damage of leaves was determined according to the points system. Fruits from each controlled tree were studied during harvesting with an individual calculation of the number of damaged and healthy fruits.

The morphological traits of pests at various stages were studied by speciments of imago, batches of ovules, larvas of all ages, and pupas collected within the area of examined districts, guided by manuals for the identification of pests by Gusev, V.I. (1990) [4]; Osmolovskiy, G.E. (1976) [14]; Toktoraliev, B.A., Kenzhebaev, A.A. (2007) [16], Bey-Bienko, G.Y. (1964) [2].

The study of the biology and ecology of pests was carried out according to generally accepted methods: Fasulati, K.K. (1971) [17], Poliakov, I.Y. (1984) [15]. The phenology of pests was studied using the methodology developed by Dobrovolskiy, B.V. (1969) [5].

The apricot diseases were studied using the methods of: Dzhafarov, I.G. (2001, 2002) [6; 7], Beloselskaya, Z.G. (1970) [3], Gusev, I.I.(1990) [4], Barakanova, N. (2004) [1], Chekulaev, I.A. (1988) [18], Chepurnaya, V.I. (1987) [19], Mozolevskaya, E.G. (1984, 2011) [10; 11].

The severity of the main pests in the Batken Region has been studied. The voracity of maggots of pests was determined under laboratory conditions using the methodology developed by Kozhanchikov, I.V. (1961) [9]. The data obtained in the experiments were processed using the method of variation statistics and variance analysis (Dospekhov, B.A., 1985; Poliakov etc., 1984) [8; 15].

3. Results of Studies

The results of studies have shown that the species composition of the main pests of apricot in the Batken Region is represented by 22 species of insects (Insecta) conveniently classified into 5 orders and 14 families. (Figure 1).

The order of Lepidoptera (57,1%) dominated in the systematic composition of pests; coleopterous Coleoptera, homopterans Homoptera (14,2%), hemipterous Hemiptera, hymenopterans Hymenoptera

amounted to (7.14%) each, with domination of families of Tortricidae (18.2 %) and Geometridae (13.6%); Eurytomidae, Coleophoridae and Coccidae each amounted 9.08% of the total number of revealed species.

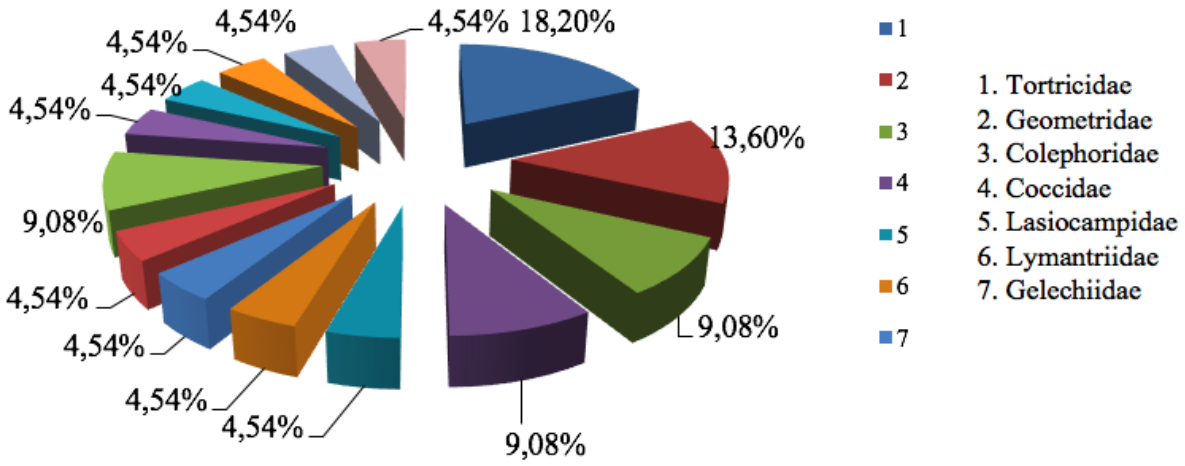

Figure 1. Species composition of the main apricot pests with a breakdown into families.

4 trophic groups of insects have been identified: leaf-eating insects - 10 species, sucking insects - 4 species, xylophages - 1 specie, fruit damaging - 7 species (Figure 2).

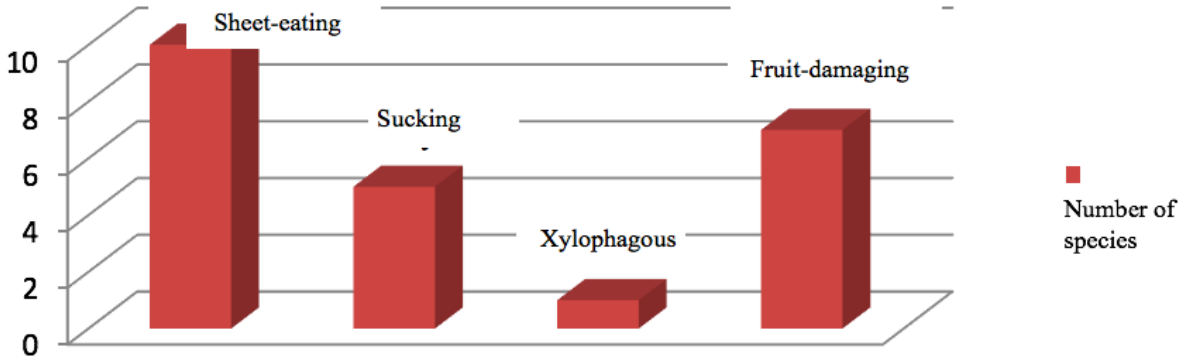

Figure 2. The structure of a set of apricot pests.

The dominant pests of apricot plants were as follows: plum seed wasps, apricot seed wasps, leaf rollers, apricot snout-beetle, gypsy moth, casebearer, acacia lecanium, green apple aphid, apple worm.

We have analyzed the history of changes in the number of dominant pests of apricot in the study area. The results are presented in Table 1.

Table 1. The history of changes in the number of dominant pests of apricot in the Batken Region, total area (thousand hectares).

No	Pest name	Years			
		2010	2011	2012	2013
1	Plum seed wasps (Eurytoma schreineri Schr.).	1795	1850	1745	1555
2	Apricot snout-beetle (Rhynchites auratus ferghanensis News.)	1170	840	980	985

3	Apricot seed wasps (Eurytoma samsonovi Vass.).	1100	1200	1150	980
4	Gypsy moth (Lymantria dispar L.)	1525	2714	1650	1605
5	Apple worm (Laspeyresia pomonella L.).	1170	840	980	985
6	Leaf rollers (Tortricidae L.).	2100	2050	2600	2800
7	Acacia lecanium (Parthenolecanium corni Bouche)	525	500	430	480
8	Casebearer (Coleophora hemerobiolla Fil.).	820	760	632	750

The data analysis failed to reveal any significant difference in the species composition of apricot pests in various districts of the Batken Region (Table 2.).

Table 2. Species composition and the propagation of pests and diseases of apricots by districts of the Batken Region.

No	Species and systematic position	Occurrence by districts		
		Batken	**Kadamjay**	**Leilek**
I	The class of insects – Insecta			
	The order of lepidopterous insects – Lepidoptera			
1	The family of owl moths - Noctuidae			
	The species of dried apricot noctuid moths - Cosmia subtilis Stgr.	*	*	*
2	The family of casebearer moths - Coleophoridae			
	The species of casebearer - Coleophora hemerobiolla Fil.	***	***	**
	The species of fruit casebearer - Coleophora hemerobiellaHb.	***	***	***
3	The family of drinker moths - Lasiocampidae			
	The species of mountain lackey moth - Malacosoma parallela Stgr.	*	*	*
4	The family of leaf roller - Tortricidae			
	The species of leaf roller - Tortricidae L.	***	***	***
	The species of European leaf roller - Archips rosana L.	***	**	***
	The species of plum seedworm - Grapholitha funebrana Tr.	***	**	**
	The species of apple worm - Laspeyresia pomonella L.	**	**	**
5	The family of geometers - Geometridae			
	The species of Moraceae geometers - Apocheima cinerarius Ersch.	**	**	**
	The species of dried apricot geometers - Pterocera armeniacae Djar.	***	**	**
	The species of great winter moth - Erannis defoliaria Cl.	**	**	**
6	The family of tussock moths - Lymantriidae			
	The species of gypsy moth - Lymantria dispar L.	***	**	**
7	The family of small ermine moths - Yponomeutidae			
	The species of fruit moths - Yponomeuta padellus L.	**	**	**
8	The family of gelechiid moths - Gelechiidae			
	The species of lesser bud moth - Recurvaria nanella Hb.	***	**	**
II	The order of hymenopterans – Hymenoptera			
9	The family of eurytomid wasps - Eurytomidae			
	The species of plum seed wasps - Eurytoma schreinerSchr.	***	***	***

	The species of apricot seed wasps - Eurytoma samsonovi Vass.	**	**	**
III	The order of coleopterous – Coleoptera			
10	The family of leaf-rolling weevils - Attelabidae The species of apricot snout-beetle - Rhynchites auratus ferghanensis News.	**	**	**
11	The family of jewel beetles - Buprestidae The species of ancylocheira novemmaculata - Capnodis sexmaculata Ball.	**	**	**
IV	The order of homopterans – Homoptera			
12	The family of lecanium - Coccidae The species of acacia lecanium - Parthenolecanium corni Bouche.	**	**	**
	The species of plum lecanium - Sphaerolecanium prunastri Fonsc.	**	**	**
13	The family of aphis - Aphididae The species of green apple aphid - Aphis pomi Deg.	***	***	***
V	The order of hemipterous – Hemiptera			
14	The family of bugs - Aradidae The species of pear bug - Stephanitus pyri F.	**	**	**
	Diseases			
1	Frostly pod rot - Monilia cinerea Bon.	***	**	***
2	Stonefruit blotch, shot-hole disease, or shot-hole blight on the leaves - Clasterosporium carpophilum Aderh.	***	***	***
3	Bacterial blight - Gummi.	***	***	***
4	Twig die-back - Cytospora carphosperma Fr.	**	*	**
5	Verticillium wilt - Verticillium dahlia Kleb.	*	*	*

Notation conventions: * - is rare, ** - is frequent, *** - is frequent and abundant.

Apricot snout-beetle (Rhynchites auratus ferghanensis News.). Another dangerous pest of apricot is apricot snout-beetle which is prevalent in all districts of the Batken Region. Apricot snout-beetle gives the one-year generation in the Batken Region. The apricot snout-beetles damage buds and flowers first, after which they damage fruits on the apricot trees. They damage fruits during feeding and during ovipositioning. The larvas of apricot snout-beetle eat the kernel away. Damaged fruits loose their commercial properties, and pits are absolutely unfit for consumption. Bugs and part of dormant maggots hibernate in small caverns in the soil under the tops of trees 2-4 cm deep.

The emergence of bugs out of the soil in the Batken was observed on March 25 in 2012, on March 20 in 2013, and on March 22 in 2015, when the mean daily air temperature was 9 - 12 °C. The emergence lasted more than a month with an increase in the number of bugs in the middle of this period. Beetles feed heavily in this period. After mating, female beetles begin ovipositioning one ovule per pit of the fruit, gnawing the holes up to the pit in the fruits, and a ring-shaped groove around the hole. One female pest can position up to 120 - 140 ovules. Maggots feed for 20-25 days; then they come out of the fruit and fall to the ground where they make small caverns for them. Most maggots turn into bugs in two months. Beetles remain in their caverns until next spring. However, some maggots впадает fall into dormancy and turn into bugs as late as in autumn in the next year.

Plum seed wasps (Eurytoma schreineri Schr.) is a dangerous pest of apricot in the Batken Region. Imago has a black tint; the belly is oval, shining, with transparent wings, one of which has a longitudinal vein; second thighs and tarsi are yellowish; female is up to 6 mm long, while male is 4 to 5 mm long. The size of an ovule is up to 0.6 mm. Junior maggots are usually whitish, footless, oblong, somewhat twisted, while senior maggots are barrel-shaped, milk-white, up to 6 mm long. The pupa is 5-6 mm long, milky-white at first, and then black prior to the emergence of imago. Maggots hibernate

inside the pit. Maggots pupate in spring, when the mean daily air temperature reaches 11 - 12 °C. The pupation period is lengthy; it lasts for about a month. The pupa develops for 13 - 16 days. Imago comes out through a round hole 1.5 mm in diameter gnawed in the pit. The hole is gnawed for 3 to 6 days. An insect cannot leave the dried pits. Plum seed wasps usually start flying in 4 - 6 days after the end of apricot blossoming. Mating occurs shortly after the flight. The lifespan of imago is 6 to 8 days. They are active at air temperatures of 16 - 18 °C. The ovipositioning begins on the 3rd or 4th day after the flight. The female pierces the ovary of the fruit with her ovipositor and positions one ovule inside the pit which is not yet hardened. The female's breeding power is 30 to 40 ovules. The embryonic development ends in 16 - 20 days. A new-born maggot is initially located next to the wall of the pit, and subsequently gnaws into its kernel. For 25 - 30 days, the kernel is completely or almost completely eaten away by the maggot and turns into loose powdered mass. Large-scale shedding of damaged fruits begins in the end of June and reaches its peak level in the first half of July. Maggots which finished their feeding remain inside pits until spring of the next year. Most maggots (up to 50%) slip into dormancy and hibernate for the second time (the third hibernation is possible for a small number of species).

Casebearer (Coleophora hemerobiolla Fil.) is a very dangerous pest. These larvas eat out the buds of leaves and fruits on the apricot trees. Heavily damaged buds wither, lightly damaged buds turn into deformed leaves. The lepidopterous larvas eat out the flesh of the leaves after budding; sometimes they even eat out the flesh of apricot fruits. Lepidopterous larvas hibernate in loose moss-cap, being located in the open in the forks of branches and offshoots. The emergence of lepidopterous larvas of the 1st year was first observed in the third decade of March. The weather conditions in spring 2012 facilitated the development of pests. Lepidopterous larvas mainly damaged buds, eventually moving to leaves and flowers. The transition of pests from leaves to branches was observed in late May – early June. The transition to dormancy was first observed in the second decade of June. The hatching of lepidopterous larvas of the second year was occurring in the first half of July; they were gnawing through epidermis and ate the flesh of the leaf, eating out small star-shaped holes in it. In late July, the moss-caps in which lepidopterous larvas continued to eat leaves, moving from one leaf to another and eating out round holes in them, were observed.

Significant damage was done to apricot plants in the Batken Region in the area exceeding 632 hectares.

Apricot seed wasps (Eurytoma samsonovi Vass.). Maggots of eurytomid wasps of dried apricots eat kernels of apricot fruits. Fruits with gnawed-away kernels fall prematurely, and if they remain on the trees, their quality is substandard. Maggots which stopped feeding hibernate inside pits of fruits.

During large-scale blossoming of apricot, maggots of seed wasps pupate in the same place, in the kernel, and adult insects emerge in two weeks and leave the fruits. The female positions only one ovule in one fruit. Ovipositioning lasts for about a month; the female's breeding power is about 120 ovules.

Gypsy moth (Lymantria dispar L.). The pests could be observed on apricots in the Batken Region in early 2000s. In 2010-2013, the pests gave a massive outbreak on apricot and apple plants (Table 3). The locuses of gypsy moth were found in the area of about 3 thousand hectares.

In Leilek district and in the city of the Batken as such, the area of plants damaged by gypsy moth was 1.5 thousand hectares; in this case, defoliation was 60–80% during the years of studies (Table 3).

According to our studies, in the period from 2010 till 2013, the hatching of lepidopterous larvas occurred in early spring from the end of April till the beginning of May, when the temperature reaches 11 °C at SET above 6 °C. The studies have shown that the mass reproduction of gypsy moth occurs after several years of hot dry summer and cold snowy winter. The terms development of all stages of silkworm moth were extended with the reduction of positive air temperatures.

Table 3. Propagation of gypsy moth in apricot orchards of the Batken Region.

Year	Examined, hectares	Populated, hectares	Area above EIT, hectares	Populated trees, %	Treated area, hectares	Number of lepidopterous larvas per long meter of branch
2010-2011	7360	1525	1170	5-80	1170	5-34
2011-2012	3015	2714	1735	10-85	1735	3-40
2012-2013	2600	1650	1520	15-30	1520	3-30
2013-2014	2515	1605	1495	15-30	1495	3-30

Apple worm – Laspeyresia pomonella L., is a wide-spread pest. It develops in three generations in the Batken Region. The weather conditions in spring and early summer 2010 were unfavorable for the development of the first generation of apple worm, being the reason for the reduction in the number of these pests in many districts. The flight of butterflies of the first generation was observed on April 30 in the Batken Region. The beginning of hatching of lepidopterous larvas of the first generation was registered in the second decade of May. The flight of butterflies of the second generation was first observed in late June – early July, while the hatching of their lepidopterous larvas was first registered in the second decade of July. High air temperatures which fell by that time, catalyzed the development of the second generation. The percentage of populated trees varied from 1 to 100%, while in some farms where systematic protective measures were not taken, the level of damage of plants came up to 85 %. The number of hibernating lepidopterous larvas of seedworm per tree was 0.1 - 2 species per tree.

Lepidopterous larvas of apple worm were taken into consideration in the average number of 0.5 - 1.8 species per tree during the spring assessment. The survival rate was 77 - 82 %. The beginning of pupation of lepidopterous larvas of hibernate generation was first observed in the third decade of March 2011. The flight of butterflies was first registered in the third decade of April (15 days earlier than in 2010). The ovipositions were first observed on April 25. The beginning of hatching of lepidopterous larvas of the first generation was registered as early as in the first decade of May. High air temperatures promoted fast passage of stages of development of seedworm. The hatching of lepidopterous larvas of the second generation was first registered on July 5, while the hatching of lepidopterous larvas of the third generation was first registered on September 3; these larvas developed on the late varieties. The formation of pupas and hibernation of lepidopterous larvas was first observed in the third decade of September and lasted till the beginning of October due to warm long autumn.

The most common apricot diseases in the Batken Region. The apricot is affected by pathogens of fungal, bacterial and viral diseases. The main dangerous plant diseases in the Batken Region are as follows: shot-hole disease, frostly pod rot, verticillium wilt, twig die-back. In addition, the apricot is harmed by brown patch (gnomeiosis) and leaf curl in some years. Significant harm is done due to withering caused both by infection (fungi, bacteria, viruses) and by unfavourable soil and climate conditions. Judging from the studies, the apricots of the Batken Region do not have high immunity to fungal diseases.

The greatest harm to the apricot in the Batken Region is done by stonefruit blotch, or shot-hole blight on the leaves. Clasterosporium carpophilum Aderh. - parasitic fungus which develops inside the tree tissues - is the agent of this disease. This disease decreases the quality and reduces the harvest of apricot fruits. Возбудитель Cl. carpophilum Aderh. It hibernates in the form of mycelium and conidia in the affected areas of offshoots, in gums, cracks, and between perulas.

It has been established that the duration of incubation period of fungus Cl. Carpophilum Aderh. under optimum conditions of the study area is 3 to 4 days, varying within 3 to 9 days depending on the air temperature. In this case, the most intense inoculation of plants occurs at an air temperature of +20... +26 °C.

The epiphytotics of the disease was observed in 2014, promoted by weather conditions which turned out to be favourable for pathogenic agent: open winter, optimum air temperature during the growth season, abnormal amount of precipitation in May - June (2–3 monthly average rates), increased relative humidity.

The first signs of a conidial stage of the pathogen of shot-hole disease on the leaves of Isfarak varieties which are higly amenable to diseases appeared on the controlled trees on April 10, during the phenophase “the end of blossoming”. The controlled propagation of pathogenic agent was 36% with the intensity of 19.4% in the second decade of May; by June 11, it increased to 55.0% with the development of 26.4%. By early July, the maximum propagation amounted to 74.3%, while development amounted to 33.4%, which is 20% higher than that in 2013.

According to the results of studies, it has been established that the required amount of effective temperatures for the development of a certain stage and the date of their occurrence differ in years and depend on weather conditions of the current growth season.

Frostly pod rot. The deterioration of the phytopathological situation with apricot plants was observed during our studies (2010 - 2015) with an increase in the rate of propagation of frostly pod rot (pathogen - Moniliacinerea Bonord Monilialaxa (Her.) Sacc.). According to the results of laboratory studies, it has been established that the emergence of seedlings of conidiums of M.cinerea requires humifying during at least 15 - 18 hours at an air temperature of 8 - 10 °C, 14 hours at an air temperature of 15 °C, 15 hours at an air temperature of 20 °C, and 6 hours at an air temperature of 25 °C. Thanks to consistent observations of specialists from the laboratory of the Batken Regional Division for Chemicalization and Plant Protection it has been established that if the infection occurs through a flower or several flowers in the middle part of the offshoot, then only part of the offshoot above the area of initial infection withered in this case, and if the infection occurred through a flower in the base of the offshoot, the entire offshoot withered. The flowers are usually affected with pathogenic agent during full budding period. The susceptibility of flowers decreases during the shedding of petals and the formation of the ovary. The period of manifestation of the monilial blight is 4-12 days after the end of blossoming of the plant. Damaged part of the offshoot differs in its dark-brown color.

Cytosporosis (Sutospora carphosperma Fr.). The apricots of all ages are susceptible to this disease. Signs of cytosporosis consist in the appearance of numerous bulgy mushroom sporulations of the genus of Sutospora on the surface of the bark, in the Batken Region, usually in early March, until the budding or during the blossoming; it results in withered young trees with large-scale development of mushroom sporulations on affected branches. Usually damaging dead, сильно ослабленные tree tissues, the fungus necroses its neighboring healthy cells with its toxins and then spreads up and down along the offshoot. It moves forward from the bark into the cambium and wood, resulting in the withering of the entire branch. In case of the strong development of the disease, the trees die prematurely.

Development of protective measures. Agronomical and mechanical methods, as well as chemical method as a measure of last resort, are the most efficient measures for control of pests and diseases of apricot plants; besides, the biological or integrated method of protection has recently been the most efficient for the protection against pests of fruit crops.

The requirements for the effective protection of apricot against pests and diseases include correct plot selection, high-quality seedlings (free from quarantine objects) and large-scale application of agrotechnology (soil maintenance, improvement of its agrophysical condition, timely fertilization and irrigation, pruning, formation of young trees, weed removal, harvesting).

Chemical treatment is necessary when the number of pests exceeds the specified amount. It is advisable to use low-toxic chemical pesticides in compliance with the recommended standards and alternate them to the extent practicable.

Testing of insecticides and biopreparations against phytophagan pests of apricots. In 2013 - 2015, laboratory and field tests of insecticides and biopreparations against lepidopterous insects of apricot plants were performed.

The experiments were performed in apricot orchards of the Batken. The treatment was performed against the 2nd and 3rd generations of phytophagan pests with a backpack sprayer "Microner UO 8000". The treatment time was established by phenological observations - during the mass appearance of lepidopterous larvas of 2-3 ages. The test results showed that Talstar, Nurelle D, Bi - 58, Kinmix, Decis, and Karate preparations showed good biological effectiveness (89 - 99.1%). The biological effectiveness of biopreparation Lepidocide in the form of concentrated powder was 83 - 85.6% (Table 4).

All the tested preparations can be widely used in the protection of apricot plants against a set of phytophagan pests.

Table 4. Biological effectiveness of insecticides against lepidopterous larvas of gypsy moth.

Item No.	Version	Consumption rate, l/hectares	The number of lepidopterous larvas before treatment, species	Reduction of the number of lepidopterous larvas as at the day of measurement (%)		
				3	7	14
1	Karate, 5% s.k.	0.3	280	94.1	97.5	99.1±4,9
2	Bi - 58	1-2	315	89.5	93.0	96.66±3.8
3	Nurelle D (Chlorpyriphos+Cypermethrin)	1-1.5	320	89.0	95.0	98.0±64.8
4	Kinmix, 10%	0.2	345	91.4	95.4	98.4±4.5
5	Decis	0.2	315	87.6	92.3	97,7±3.8
6	Talstar, 10% к.э.	0.3	385	93.1	95.1	98.1±4.4
7	Lepidocide (paste)	2.0 l/ha	320	50.2	69.4	83.5±3.1
8	Lepidocide (powder)	2.0 kg/ha	305	61.1	73.2	85.6±3.4
9	Control	-	345	-	1.2	1.9

4. Conclusions

22 species of insect pests are conveniently classified into five orders were found in the Batken Region of the southern Kyrgyzstan (Insecta). The dominating species are the representatives of the order of Lepidoptera - 57.1%, coleopterous Coleoptera, homopterans Homoptera - 14,3%, hemipterous Hemiptera, hymenopterans Hymenoptera amounted to (7.14%) each, in the course of domination of families of Tortricidae (18,2 %) and Geometridae (13,6 %); Eurytomidae, Coleophoridae and Coccidae - 9.08% respectively of the total number of revealed species. 4 trophic groups of insects have been identified: leaf-eating insects - 10 species, sucking insects - 4 species, xylophages - 1 specie, fruit damaging insects - 7 species which differ in peculiarities of the seasonal history of changes in the number and degree of harmfulness.

The dominant pests of apricot plants in the Batken Region are as follows: apricot seed wasps (Eurytoma samsonovi Vass.), plum seed wasps (Eurytoma schreineri Schr.), apricot snout-beetle (Rhynchites auratus ferghanensis News.), gypsy moth (Lymantria dispar L.), casebearer (Coleophora

hemerobiolla Fil.), European leaf roller (Archips rosana L.), acacia lecanium - (Parthenolecanium corni Bouche).

The most common apricot diseases in the climate of the Batken Region of Kyrgyzstan are shot-hole disease (Clasterosporium carpophilum Aderh.), frostly pod rot (Monilia cinerea Bon.), bacterial blight (Gummi.), verticillium wilt (Verticillium dahliae Kleb.), twig die-back (Cytospora arphosperma Fr.).

An integrated plan of protection of apricot plants against insect pests has been proposed; it includes a set of agronomical, chemical and biological method of controlling.

The high biological effectiveness (89 - 99.1) was demonstrated by insecticides as Karate, BI - 58, Nurelle D, Decis, Kinmix, Talstar, and the biological product Lepidocide (50.5 - 85.6%), which is recommended for use against most apricot pests, mainly lepidopterous insects.

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