



COMPOSITION OF PEST SPECIES MET IN LICORICE (GLYCYRRHIZA GLABRA) IN THE CONDITION OF KARAKALPAKSTAN, BIOECOLOGICAL DEVELOPMENT CHARACTERISTICS

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ANNOTATION

*The article presents data on the species composition and bioecological characteristics of the main pests of licorice (*Glycyrrhiza glabra*-L.). As a result of our research, in the case of Karakalpakstan, three of the licorice (*Glycyrrhiza glabra*) first-level pests were found in the plantations of 24 species. These are the main pests of makeup and cause considerable damage to the makeup.*

KEY WORDS: *insects, phytophages, entomophages, acariphages, ticks, agroecosystem, insect fauna, sucking pests.*

INTRODUCTION

The high level of development of the economy of the Republic of Uzbekistan depends in many ways on the protection, reproduction and rational use of natural resources, including plants, without disturbing its historically established balance, relying on scientifically based indicators.

There are more than 4,500 types of plants in the territory of our republic, of which the licorice plant is the most important among the raw and medicinal plants for industry (750 species) and has a wide range of uses.

Therefore, decisions of the President on 2017.05.16. No. 2970 [11], as well as UzRCM No. 63 on 2018. 05. 16. [12] and 2019. 02. 15. No. 138 [13] were adopted.

Also, other decisions of the President and UzRCM related to this field, especially the President's decision PQ-4670 of April 10, 2020, and the establishment of the Scientific Production Center for the Cultivation and Processing of Medicinal Plants by the decision of November 26, are very relevant for this field.

Decree of the President of the Republic of Uzbekistan "On increasing the cultivation and industrial processing of licorice in the Republic of Uzbekistan" (№PP-2970 May 16, 2017) [11], "Measures for the further development of licorice and other medicinal plants in the Republic of Uzbekistan and industrial processing" on measures" (No. 63 January 27, 2018) [12], on additional measures of the Cabinet of Ministers of the Republic of Uzbekistan "On effective organization of cultivation and industrial processing of Kyzilmia and other medicinal plants" (No. 138 January 15, 2019 -February) [13] decisions were made. These documents define the tasks for the development of the cultivation of sweet products in our country.

Licorice (*Glycyrrhiza glabra*-L.) is a perennial herb belonging to the Fabaceae family.

The distribution area of Licorice is very wide, it is spread in the European part of the former union, Crimea, Caucasus, Siberia, Asia Minor, Iran, Afghanistan, North Africa.

Since the 1960s, scientists of Uzbekistan [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] have begun to comprehensively study the licorice plant.

The product obtained from this plant is widely used in medicine, food, cosmetics, light industry and agriculture.

The growing demand for it is causing the reduction of existing natural areas.



METHODS OF THE RESEARCH

Our research was conducted in licorice plantations of Nukus district, Republic of Karakalpakstan in 2020-2022. General entomological methods were used in the research process. As a result of the conducted research, it was found that licorice (*Glycyrrhiza glabra*) is a habitat for the following pests during the period of growth and development.

Pests of generative organs of licorice. Licorice seed pests are divided into 2. The first specialized pests are seed-eating bruchophagus (*Bruchophagus mutabilis* Nik.), grain-eater (*Bruchidius glycyrrhizae* Fohr., *B.tuberculicauda* Luk.et T.-M., tychius long-nosed - *Tychius rufirostris* Gyll.(*T.glycyrrhiza* Beck.)). The second is omnivorous - alfalfa beetle - *Adelphocoris lineolatus* Goeze, *A. seticornis* F., *Carpocoris fuscispinus* Boh., *Dolycoris penicilatus* Horv., *Cellobius abdominalis* Jak., *Aphis craccivora*., *Oxytrea cinctella* Schaum.

Seed pests. The seed-eating bruchophagus (*Bruchophagus mutabilis* Nik.) is one of the serious pests. It causes up to 30% damage to licorice seeds. The seed-eater overwinters in the larval stage inside the seed scattered in the fields. In nature, it leaves the village at the end of March, beginning of April. When the average temperature of the air is 9-12°C, the larvae turn into cocoons. In the first decade of May, their imagos fly. The emergence of imagos coincides with the period of mass flowering of sweet. From the moment they fly, they feed on flower nectar and juicy waste from the leaves

Females of the first generation lay their eggs in the pods of licorice during the milk ripening phase.

At the beginning of June, the wintering generation dies, and in the second quarter, the second generation flies. The launch of this generation will last until the end of August.

The incubation period of eggs is 5-6 days, larvae - 8-10, and pupae develop in 6-7 days. The interval from egg to imago phase lasts 19-23 days.

The clutch of the seed-eater reaches 25-30 eggs.

Larvae feed on seeds. Only the surface of the seed is healthy, and the inside is covered. During the feeding period, the larva does not move from one seed to another. In order to fly out, the mature insect gnaws and punctures the seed.

This bruchophagous seed-eating pest also has natural traps that reduce the number of pests by free feeding during the larval stage. Eater is active from mid-May to the end of July.

Grain eater (*Bruchidius glycyrrhizae* Fohr., *B.tuberculicauda* Luk.et T.-M.) is one of the dangerous pests of licorice seeds. Larvae of different ages overwinter in the seed. The appearance of corns in sweet fields, that is, their emergence from the winter, is observed at the beginning of April when the air temperature is 8-10°C and lasts until the middle of May. Egg laying, hatching of larvae, turning into a pupae, emergence of the next generation are different. 50-65% of females were ready to lay eggs two days after mating. 80% of females of the second generation reach sexual maturity immediately after emergence. Overwintering females have 2 times more than males. Males and females of the first generation are equal in number. In August and September, male individuals reach 65-70%. Fertility reaches 25-30 eggs.

All stages of development of grain eaters take place inside the grain. It takes 3-5 days from egg laying until it turns into a larva of the first age (air temperature 23-25°C). It takes 8-12 days for the second instar larva to develop. It takes 4-5 days for the pupae to develop. The development of the grain eater from the egg to the imago takes 17-22 days.

In the first decade of June, the mass emergence of second-generation grain eaters is observed. The flight of the second generation of grain eaters will continue until August. 160,000 grain eater larvae were counted in 1 kg of licorice seeds collected at the end of September.

The larval stage is the most damaging stage of the grain eaters. During the growth period of licorice, the development of larvae takes place in only one seed. Larvae can move from one seed to another during the seed storage period in warehouses during the winter months when the temperature is optimal. Grains harvested from the field are less damaged than grains in warehouses.

There are also natural clutches of larval grain eaters. Larvae of the corn begin to attack during the period of mass emergence. The larvae overwinter in the imago state inside the licorice seeds. The efficiency of destroying the larvae of the cornworm reaches 5-12%.

Tychius longnose (*Tychius rufirostris* Gyll.(*T.glycyrrhiza* Beck.)) – damages licorice in the larval and beetle stages. The larvae damage the seeds, imago pods and flowers.

In the conditions of Karakalpakstan, *Tychius longnose* gives one generation. The beetle hibernates in soil at a depth of 20-25 cm.

The first appearance of the beetle is observed at the end of April, beginning of May during the licorice blossoming period. Beetles feed on chaff. After the appearance of pods, females lay 1-3 eggs on them. Larvae appear in the first decade of June. It takes 10-12 days from the egg stage of *Tychius* to adulthood.

Tychius larva destroys 2-3 seeds in pod during its development period. The larvae gnaw the pods and pupate in the soil. The incubation period lasts 5-7 days. After turning into a beetle, it stays in this place until next spring.



Damaged pods are slightly swollen and blackened.

During the period of ripening of the seeds, several species of beetles: *Carpocoris fuscispinus* Boh., *Dolycoris penicillatus* Horv., *Cellobius abdominalis* Jacques. attacks. Of these, *Cellobius abdominalis* Jacques. Is common. Imago causes damage during larval stages. Beetles suck bean juice. As a result, the pods fall off. The death of pods reaches 62%.

Flower pests. Flower pests include *Adelphocoris lineolatus* Goeze., *A. seticornis* F., *Aphis craccivora* Koch., *Mylabris* F., *Oxythrea cinctella* Shaum.

Alfalfa aphid (*Aphis craccivora* Koch.) is one of the most dangerous pests of licorice. Appears in early April. Colonies are collected on stems and petals. The plant is damaged up to 60-75%. The development of generative organs is delayed in heavily infected licorice. The petals and flowers fall off.

Alfalfa beetle (*Adelphocoris lineolatus* Goeze.) - is collected in licorice in the middle of May, during the period of mass flowering of the plant. During this period, 10-12 grains were counted in one bush. Aphids and larvae accumulate in the flowers, causing them to fall.

Coleoptera family. **Licorice blue leaf-eating beetle** (*Haltica deserticola* Ws) - licorice suffers significant damage under natural conditions. Licorice is the main food plant of the blue leaf beetle. It is a monophagous insect.

The licorice blue leaf-eating beetle overwinters in the licorice field, as well as between leaf litters, up to 40-60 individuals during the beetle period. The beetle leaves the winter at the end of March, the beginning of April, when the sweet berries are just beginning to turn green. During this period, the air temperature is 13-17°C, air humidity is 52-58%. In cool, wet weather, the beetles gather in the soil, on the roots of the licorice.

In licorice, the beetles that have come out of hibernation come out until the end of April. Weeds are collected from 6-7 to 11-12 pieces in 1 plant. In the first decade of May, the death of wintering populations is observed, first of all, male individuals die. Beetles of the new generation differ from wintering beetles by their external color. The new generation of beetles reproduce mass at the end of June. Without mating, the beetles go into diapause in July. At the end of August, the beetles come out of diapause to mate and lay eggs. The majority of the population remains in the wintering.

Nutrition. When licorice begins to turn green, beetles damage growth points, young leaves. It gnaws holes in the leaves. Infected leaves soon wither. In the summer months, feeding is in the morning and in the evening. At noon, beetles hide under leaves to avoid heat. In the spring and autumn, they eat during the lunch hours of the day. In the spring, affected branches reach 80%, the damage is severe. After emerging from diapause in the fall, the beetles feed on 2nd or 3rd year nectaries and cause no significant damage. Worms severely damage only 1st-year licorice.

Manipulation. Mating of individuals leaving the wintering takes place immediately at the end of March, beginning of April. Mass mating takes place in the 2nd and 3rd decades of April. Females re-mating during egg maturation. At the end of July, beginning of August, the first generations of beetles that went into diapause mate and soon begin to lay eggs. A small number of second-generation beetles go to the village without mating. Beetles of the first and second generation also overwinter. This indicates a public appearance in the spring of next year. It is proved by the predominance of female individuals in the life of beetles. And the male will die.

Mating of female individuals with mature ovaries begins in the last days of March and lasts until the first decade of April. The number of eggs ranges from 14 to 27.

It takes 10-15 hours from mating to egg laying. Egg laying lasts from the first decade of April to the end of May.

Beetles of the first generation lay eggs in August-September. The beetles lay their eggs on the back of the licorice leaf. They group their eggs from 6-11 to 27-30 pieces, 2 or 3 rows and stick them together. It lays up to 80 eggs per day. Pinkness depends on the age of the female. One female has been observed to lay up to 550 eggs. Egg-laying in nature lasts up to 1 month for the first generation, and only a few days for the second generation. This shows that the life of beetles is short. The egg is oval in shape. The size of the egg is 1.24 mm. Newly laid eggs are orange in color. The color of the egg becomes pale as it approaches hatching. Eggs develop in 6-8 days at a temperature of 21-27°C. Hatched larvae remain here until the first stage. The 2nd-year larvae crawl to the upper leaves.

In autumn, the number of larvae per plant and the number of infected plants decrease. The reason is that the population of the 2nd generation will be less.

Larvae of the second generation appear in the second decade of August. The larval period lasts 25-30 days. The larvae of the last age fall to the underside of the leaf, settle in the soil, and turn into a fungus. The transformation of first-generation larvae into pupae occurs in May-June. The transformation of the larvae of the second generation into a mushroom occurs in September.

The pupae stage lasts 2-3 days in summer, and 7-10 days in autumn.

In nature, these insects are also natural predators, attacking them in the larval and imago stages.

In conclusion, *Haltica deserticola* Ws. develops by giving two generations. Monophagous - eats only licorice. It hibernates in the beetle or imago phase in licorice soil. Leaving the village takes place at the end of March, beginning of April, when the sweet cherry is already blooming. It causes damage during the larval and beetle stages. The female lays an average of 72-94 eggs.



It lays its eggs on the underside of the leaf. Eggs develop in 6-8 days, larvae in 25-30 days, pupae in 2-3 days. Its natural enemy, *Zicrona coerulea* L., produces two generations per season.

The flowers of licorice are greatly damaged by bronzovka and narivniki.

Golden bronze (Cetonia aurata) - occurs from the end of May to August.

Marble bronze (Potosia lugubris) - can be found on the flowers. Worms are found in rotten wood. A pest is an insect.

Family of rattlesnakes (Elateridae).

Wireworm (Agriotes meticulosus Cond.) - causes great damage. Worms gnaw the roots and stems, and the affected plants wither. If the damage is 2 pieces per m² of land, it is considered low, 3-5 pieces is average, and more than 5 pieces is considered strong.

Meloidae family. Red-headed sparrow (Epicauta erythrocephala Gebl.) – beetles damage. There are 40-58 pieces in one bush.

Curculionidae family.

Green licorice longnose (Megamecus viridanus Men.) – beetles damage licorice leaves and branches. Up to 25-50 beetles were counted in one bush.

We studied that the pests of licorice are those that cause damage to the vegetative (leaf, stem, root) and generative (stem, flower, seed) organs of the plant. The second of the weeds, i.e., those that damage the generative (stem, flower, seed) organs, are considered more harmful.

The accumulation of pests in licorice is also related to the age of the plant. In our research, 1-year-old licorices are less affected than older 3- or 4-year-old licorices.

Carpocoris coreanus iranus Tam. beetle appears in large numbers during the flowering and fruiting period of licorice. It appeared in May and sucked the juice of young leaves, stems and buds. At the end of May, she lays her eggs in 2 rows. Eggs are white at first, then turn brown. Pods are damaged up to 62%.

Porphyrophora odorata Arch. cutworm is a dangerous pest of licorice root. Mass accumulates at the root and causes the death of the plant. The development of licorice is delayed by 9-12 days, the death of plants in the flowering phase reaches 7-12%. Larvae feed on licorice root juice. Spread 10-12 cm deep in the soil. It becomes more active when it warms up to 16-22 degrees.

The giant red worm (*Drosicha turkestanica* Ar.) is the main pest of licorice root, causing damage by sucking root juice. Sometimes it also damages the stem. Larvae and mature females are harmful. It leaves one generation per year. It lays 220 eggs in the upper part of the soil, in the root joint from the beginning of August to the middle of October. The larvae hibernate in soil at a depth of 5-30 cm.

In order to control pests, it is necessary to pay attention to the seed-eating and grain-eating pests that winter inside the seed. Because, the worms cause the seeds of licorice to fail to grow when planted.

Seeds should be stored in dense bags. It is necessary to collect seeds on time.

CONCLUSION

As a result of our research, in the case of Karakalpakstan, three of the licorice (*Glycyrrhiza glabra*) first-level pests were found in the plantations of 24 species.

Psylla glycyrrhizae, *Haltica deserticola*, *Chaetocnema heikertingeri*, *Chiorophanus caudatus*, *Bruchophagus mutabilis* Nik., *Bruchidius glycyrrhizae* Fohr. (*B.tuberculicauda* Luk.et T.-M.), *Tychius rufirostris* Gyll.(*T.glycyrrhiza* Beck.), *Adelphocoris lineolatus* Goeze, *A.seticornis* F., *Coriomerus vitticolis* Reut., *Bathysolen nubilis* Fall., *Aelia acuminata* L., *Carpocoris fuscispinus* Boh., *Carpocoris coreanus iranus* Tam., *Porphyrophora odorata* Arch., *Dolycoris penicilatus* Horv., *Cellobius abdominalis* Jak., *Aphis craccivora.*, *Oxytyrea cinctella* Schaum., *Mylabris* F., *Zygaena truchmaena* Ev., *Drosicha turkestanica* Ar., *Megamecus viridanus* Men., *Epicauta erythrocephala* Gebl.

These are the main pests of licorice and cause considerable damage to the licorice.

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