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DEVELOPMENT FEATURES of *Eurygaster integriceps* Puton, 1881 - A PEST OF GARDENS IN THE KAZAKH-TOVUZ ECONOMIC REGION OF AZERBAIJAN

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ОСОБЕННОСТИ РАЗВИТИЯ *Eurygaster integriceps* Puton, 1881 - ВРЕДИТЕЛЯ САДОВ В КАЗАХ-ТОВУЗСКОМ ЭКОНОМИЧЕСКОМ РАЙОНЕ АЗЕРБАЙДЖАНА

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Abstract. The results of studies conducted in 2022-2023 are reflected. Periods of activity of *Eurygaster integriceps*, a serious pest of grain farming in the Shamkir district, have been identified. This is one of the main grain regions of Azerbaijan. The studied species, when present in high numbers, causes serious damage to grain farms. It has been established that the pest under these conditions produces one full generation and is more active in the agrocenosis from May to June. A phenological calendar is presented, which can be used in the development of planned measures for protection against this pest.

Аннотация. Отражены результаты исследований, проведенных в 2022–2023 годах. Выявлены периоды активности *Eurygaster integriceps*, серьезного вредителя зернового хозяйства Шамкирского района. Это один из основных зерновых регионов Азербайджана. Исследуемый вид при высокой численности наносит серьезный ущерб зерновым хозяйствам. Установлено, что вредитель в этих условиях дает одно полное поколение и более активен в агроценозе с мая по июнь. Приведен фенологический календарь, который, может быть использован при разработке плановых мероприятий по защите от этого вредителя.

Keywords: Azerbaijan, Kazakh-Tovuz, *Eurygaster integriceps*, ontogenesis.

Ключевые слова: Азербайджан, Казах-Товуз, вредная черепашка, онтогенез.

Grain growing is one of the oldest agricultural fields, it is estimated that it existed in the VII-VI millennium BC. There are a number of theories about the origin of grain growing in Eastern Asia and Transcaucasia [3, 5].

Wheat, being the most widely grown crop in the world, is considered the most important source of carbohydrates for ensuring food security. It provides about 60% of the energy and protein needs of humans. According to official statistics, the demand for wheat in Azerbaijan is approximately 3.3-3.4 million tons. 1.9 million tons of the indicated amount is made by local production. The rest are imported from other countries. Therefore, expansion of this field and increase of productivity are among the most important issues of the day.

The high production of wheat and the quality of the product directly depends on the implementation of effective measures against pests in addition to proper agrotechnical care of the plant. It is for this reason that determining the species composition of plant-damaging insects, monitoring the development of species that seriously damage productivity in agrocenosis, and

specifying their phenological calendar can play an important role in the timely implementation of effective pest control measures.

Taking into account the above, in 2022-2023, we found it necessary to conduct research on the activity of the *Eurygaster integriceps* that causes serious damage to productivity in the grain farms of Shamkir district, which is one of the main grain-growing regions of the Republic.

Materials and methods

During experiments related to the biology of the *Eurygaster integriceps*, individuals collected from wintering places in early spring were used. Wheat sprouts planted in vegetation pots were used to feed the *Eurygaster integriceps*. After wheat sprouts fully emerged in the pots, one female and one male individual were transferred to each. Vegetation containers with seedlings were covered with a filter and visual observations were made on the development and reproduction of individuals regularly every day. During observation, the number of eggs laid by females, embryonic development, hatching of larvae from eggs, shell changes, periods of development of larvae to imago, etc. determined by monitoring biological indicators. During the laboratory experiments, the temperature in the room was 23-25 °C, and the relative humidity was 50-65%. Experiments were performed with at least 5 replicates.

Phenological observations were carried out in agrocenosis and surrounding biocenoses of the grain farms of Shamkir district (40'45'24" sm. e.; 45'52'45" sm. e.) with general methods has been held [6, 10, 11].

Analysis of the obtained results

Eurygaster integriceps Puton, 1881 belongs to the *Eurygaster* genus of the Hemiptera order, Scutelleridae family.

The body length of the imago varies between 10-13 mm. The edges of the front back are convex, rounded. Front spar at least 1.5 times longer than head.

The first information about this species being a serious pest came from Baghdad at the end of the 9th century [12].

The first information about the pest of this species in Russian territories was recorded in 1865-1867. In those years, information was given about the massive growth and reproduction of the *Eurygaster integriceps* in the desert areas of the Stavropol region and serious damage to plants. Later, such information began to come from the southern regions of Russia and the regions close to it. One of the mass increases was recorded in the Kuban territories in 1995-1996 [7].

The area where the pest is spread is Romania, Bulgaria, Yugoslavia, Croatia, Bosnia, Albania, Macedonia, Greece, Italy, Cyprus, Egypt, Syria, Jordan, Israel, Lebanon, Turkey, Iran, Iraq, northern regions of Pakistan, northwestern China, northern and northeastern regions, Afghanistan, etc. countries are also included [13].

According to Asanova, this pest is widespread in the western, southwestern and central steppe areas of Kazakhstan [2]. It is noted that it is distributed in the south of Turkmenistan, along the Amudarya River of Uzbekistan and in the southern areas, in the river valleys of Tajikistan and Kyrgyzstan, and in the areas with wild vegetation of mountain slopes.

Eurygaster integriceps does not rise above the forest belt (1800-2000 m above sea level). In the Qashqa-Derin province of Uzbekistan, stilts winter in the Hissar areas at altitudes up to 3000 meters above sea level [1].

Although there is enough information about the northern and eastern areas of the pests, the opinion of the authors does not coincide. For example, according to Puchkov [9, 14], in the years of

Females start laying eggs 7-15 days after migration to the fields. The first egg-laying occurs in the second decade of April (13-15. IV). The egg-laying process continues until the end of the second decade of May (Table). In favorable weather conditions, this process ends in 15-20 days. In cool, rainy weather, the egg-laying process can last up to 35-40 days. Late laid eggs are highly infected with parasites. Females lay their eggs on the undersides of weed leaves, stems, and sometimes in soil clods. They usually lay 14 eggs in 2 rows, 7 in each row. The potential egg-laying productivity of females ranges from 70 to 84. The actual number is 28-42 eggs. Embryonic development can vary from 7 to 19 days depending on the temperature. Hatched larvae gather near eggshells without feeding.

Hatched specimens are called 'nymphs'. So, they look like adults. Nymphs shed their shells every 5-6 days to develop into the adult stage.

Hatched nymphs are yellowish-green in the first instar, and completely brown after about an hour. The body length of nymphs is 1-2 mm. After 4-6 days of the first instar stage, the nymphs change their shells and enter the second instar stage. Nymphs in the second instar stage have black heads, light brown bellies, and body lengths of 2-3 mm. At the end of the second instar, the nymph's abdomen becomes swollen and pinkish-brown in color. In the third age stage, the color of the nymphs is yellowish-brown, and the body length is 3.5-4.5 mm. During this period, shields begin to appear on the nymphs. In the fourth instar stage, the color of the nymphs is yellowish-brown, the body length is 5-6 mm. Shields almost cover the thorax.

Wheat grains are in the milk phase when the wheat is 2-4 years old. Therefore, the larvae pass there and suck the juice of the grains. Larvae move down the stem of plants in warm weather and during the process of shedding, settling in the lower part of the stem or in the root throat.

Fifth instar nymphs resemble adults in size and shape. Their body length varies between 7-9 mm. Shields develop and spread up to the third segment of the abdomen. At this age, nymphs change their shells and become adults after 6-10 days. As the mouthparts of adults and their nymphs are piercing-sucking, they pierce the stem, shoots and seeds of the plant and suck their sap.

As can be seen from the table, the development of larvae continues until the end of the second decade of June. The first images begin to appear from the beginning of June.

Depending on the air temperature, the development of larvae can sometimes vary between 27-35 days. After the fifth molt, young *Eu. integriceps* are formed. They actively feed and accumulate the necessary reserve fat for wintering. Their feeding continues even on mowed grounds. When the harvest is over, the young *Eu. integriceps* fly to their wintering grounds.

Eurygaster integriceps borer produces one generation per year in the study areas. Their lifestyle is divided into two phases, active and passive.

The passive period, which lasts about 8 months, includes part of the summer season, fall, winter and the beginning of the spring season.

Before entering the passive period, the adult individuals from the winging phase feed greedily in the wheat fields, accumulating fat and preparing for wintering. Adult individuals use their accumulated fat reserves sparingly and go to the spring of the next year with that reserve. Although they use the oil reserves with minimum savings in winter, the use of oil increases in hot summer days.

The active period of the pest begins with its migration to grain fields after wintering. Of course, the timing of migration varies depending on the climate. At the same time the phenology of cereal plants can be different.

Pests mainly in the passive period, the individuals that come out of hibernation actively feed and reach sexual maturity. Feeding is mainly more active in windless, sunny weather, while in rainy, rainy and windy weather, they do not feed and hide at the root base of plants and in soil cracks.

Adults of the new generation can be seen in grain fields in late May and early June. Although the seeds are yellow-white during this period, the pests feed on various organs of the plant (mainly spikes). In order to collect spare food (fat) for wintering, adult individuals feed very actively and greedily during this period, causing serious damage to farms. After 20-25 days of active feeding in grain fields, when the air temperature is above 30-32°C adults migrate to wintering places. The active period of the pest ends with their migration to their wintering places.

Imagoes spend their winters in various plants, mainly oak, pine, astragalus, juniper, etc. they spend around the roots of trees, under the bark and under the remains of fallen leaves.

The information we obtained regarding the development and phenology of the pest can be used when preparing a plan of complex control measures to be taken against it in agrocenosis.

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