

Grasshoppers That May Cause Significant Damage to Agriculture in Azerbaijan **(Orthoptera: Acrididae)**

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As the diversity of land and climate conditions in Azerbaijan is practical for the cultivation of a number of agricultural plants it also provides wide opportunities for the reproduction of pests in such areas. During the mass reproduction such pests cause substantial damages to various agricultural fields, including farming and individual crop fields.

The species belonging to Acrididae family of Orthoptera order take a special place among such pests.

One of the major species which have experienced a mass reproduction in various years in the republic is the *Dociostaurus maroccanus* Thunb.

The main areas of reproduction for the *Dociostaurus maroccanus* Thunb was semi-arid plains. It has widely spread in Mil, Mugan, Karabakh, Jeyranchol and Shirvan. During the period of collective farms, the pests were dramatically reduced in amount and almost wiped out through mass disinfestation. In recent years, they have started to widespread and cause significant damages in some regions of the republic.

Adult species of the *Dociostaurus maroccanus* Thunb are grey and hazel with dark strains. Male individuals measure up to 20-28mm while female individuals measure up to 28-30mm. An X-like symbol is visible on the upper back. Its wings are transparent and lie from the top of the leg to the sides.

Depending on the temperature the larva phase takes up to 2 months. It sheds its skin for five times. The adults mate 6-12 days after the last skin-shedding and start to lay eggs in 8-14 days. The female individuals lay 3-5 clusters each containing 20-40 eggs.

The grasshopper winters during the egg stage. The first larvae are observed in the second half of April (18-20 IV). These grasshoppers are often found in steppes and areas with ephemeral plants but they move to and feed in other crop fields once the plants dry out. It should also be mentioned that II age larvae of the *Dociostaurus maroccanus* Thunb start to be seen in our republic earlier than other species, namely, from mid-April. It's possible to find the larvae in the nature till mid-July. The first adults (imagines) can be found from early July till late July. In late June, the female grasshoppers lay their eggs in the soil 2 to 3 cm below the surface. Such eggs experience the diapause and winter in such stage till the Spring in the next year. They hatch once a year.

One of the rather widespread species in the republic is the *Locusta migratoria*. It has widely spread around Kur-Araz.

Depending on the climate the wintering larvae hatch in late April and early May. The hatching period also depends on the composition and structure of the soil where the eggs are laid. That is to say, the larvae can hatch in the mildly composed soils and soils easily crumbling in contact with water.

The colour of the hatching eggs is white and opal. Their colour changes soon and becomes dark greyish or darkish. The larvae experience five age stages and turn into imagines in 35-42 days.

The female individuals ferment 2 weeks (10-18 days) after the last skin shedding. The egg-laying starts 1 month (28-36 days) after the fermentation. They prefer laying the eggs in the soils with light sand. In the summer they lay the eggs in rather humid fields while, in the autumn, they lay their eggs in dry fields.

The egg-laying continue from early September till late October. The eggs laid during such period winter in the clusters till the spring in the next year. The imagines end their life.

The *Anacridium aegyptum* must be particularly mentioned among the pests, which have widely spread mainly in Absheron in the recent years and the mass reproduction of which was recorded in 2017.

It should be mentioned that this species is different from the previous two types for a number of its morphological and bio-ecological features. The adults of the *Anacridium aegyptum* are greyish and yellow, greyish and hazel or grey. The male individuals are relatively darker than the female ones. Its antennae are darkish mainly with light knuckles. The frons between the antennae is flat with dots. The upper back is greyish and hazel with dots and transverse lines.

The wings are rich with mat dots and lines over them. The wings are transparent and mainly hazel with lots of dots and lines.

Like other members of the Acrydium family this species doesn't have clusters either. Also, it doesn't have frothy fluid. The eggs are laid inside the soil leaning to each other like ear grains without any external cover.

The egg-laying capacity of the female individuals is high and ranges between 65-140 eggs. A female individual can make more than 10 nests (maximum 12-15 nests) and lay more than 2000 eggs (maximum 1894 eggs in our practice) as long as is alive. The eggs have a longish shape getting relatively thinner in the top. They are brown and hazel and 4.5-4.7 mm long with about 1 mm width in the middle. The embryonic development continues for 38-45 days depending on the temperature and humidity. It should be mentioned that the eggs laid in the same day hatch differently. It must depend on in which part of the soil and under which conditions the eggs are laid rather than the temperature. The egg-laying continues till late July. The eggs laid in May (11.05) start to hatch in June (19-20 VI).

Mass hatching mainly start in the third decade of June and continue till early August. However, it may also be observed in the I decade of September. It should be mentioned that the larvae of such species become green when they hatch. After the second skin-shedding grey, brown, greyish-brown, coffee-coloured, even darkish colours can be observed among the individuals. Majority of them (75-80%) has the same colour – greyish and coffee-coloured. After the last skin-shedding all individuals have the same colour.

The studies revealed that the development of larvae took so long. That is to say, the larvae hatched on 19 June become imagines only early August (27.08). So, the larva development stage continues for 65-70 days. It should also be mentioned that the first age period takes longer than others. That is, the later periods continue for 6-9 days while the first age period ends in 10-12 days.

After the last skin-shedding the imago catches the substrate again and tries to open its wings with different movements. Such process takes a several minutes (8-10 minutes) and the wings become open widely. During the first minutes the individual's wings are rather transparent and have less ornaments. Approximately 50-55 minutes later the wings become completely colourful and get covered with ornaments in various sizes. The wings get their real colour. It should be mentioned that the male individuals are a little darker than the females.

As it seems, the complete development of a generation requires 105-107 days. It may be possible to have 2-3 generations per year if optimized conditions are provided in a laboratory.