

Chapter 5 – Insects of Field Crops

1. Cereal Bug – *Aelia germari*

Systematic position

Class: Insects; Subclass: Pterygotes; Group: Neopterans; Subgroup: Exopterygotes, heterometabolous Hemipteroids; Order: Heterometabola; Suborder: Geocorisae; Family: Pentatomidae; Subfamily: Pentatominae; Genus: *Aelia*; Species: *A. germari*.

In Algeria, 5 species are regulated: *Aelia germari* Kûts, *Eurygaster maurus*, *Eurygaster hottentota*, *Dolycoris numidicus* and *Carpocoris pudicus*, but the most dangerous is *Aelia germari*. It is classified as an agricultural pest; therefore, control is mandatory.

1.1. Morphological characteristics

- Bugs have a broad, approximately pentagonal shape.
- Forewing (hemelytron): leathery at the base (corium) and membranous and veined at the tip; the clavus and embolium are often present. Tarsi have 3 segments.
- Hind wings are completely membranous.
- Mouthparts are piercing-sucking and located at the front of the head.
- Antennae are long.
- Length: 10.3–12 mm; the anterior end of the jugal plates is rounded.
- The male has a truncated last abdominal segment, whereas it is rounded in the female.
- Yellowish, spindle-shaped bug with an elongated triangular head and dark longitudinal lines on the upper body.
- Scutellum with a central longitudinal white line bordered by two contrasting black lines on its anterior half.
- Middle and hind femora have one black spot or no black spot.
- Radial vein of the coria is not bordered internally by a black line.
- Bucculae have no sharp tooth and their anterior ends are rounded.

Hemelytra are leathery at the base and membranous at the ends.

Figure 33. *Aelia germari*

1.2. Biological characteristics

- Bugs are heterometabolous insects with incomplete metamorphosis.
- Juvenile differences allow very similar species to be distinguished at the adult stage (L5).
- Nymphs are paurometabolous: they have the same diet and way of life as adults.
- Adults overwinter at altitude and migrate into cereals in spring.
- Circum-Mediterranean species, also known from the Canary Islands and Madeira.
- It prefers Mediterranean grassland environments, especially warm and dry areas: ruderal fallows and roadsides.
- Very common in North Africa and extremely rare in northern Europe.
- Found on many grasses, notably barley, bromes, cocksfoot and foxtail.
- One of the main pests of wheat and barley in North Africa.
- Mating occurs when the bugs become adults, in spring when temperature reaches 20°C.
- The female emits sex pheromones and odors to attract the male; the male perforates the female abdomen with its spine- and hook-bearing phallus.

- Sperm is injected into special organs and transported through the female body to the ovaries, where fertilization occurs.

1.3. Biological cycles and voltinism

- Eggs are laid on narrow supports such as ear awns, plant stems and the upper surface of leaves.
- Oviposition: June–July; the female lays 50–100 eggs.
- Nymphs hatch after 1–2 weeks at 20°C; nymphal development lasts 40–45 days.
- Adults overwinter in soil or shelters near cultivated plots; egg maturation takes 30–40 days.
- The species is bivoltine; F2 appears in August or September. Overwintering adults belong to this generation.
- Each generation passes through three phases: winter, spring and summer.
- Adults overwinter in small groups in “winter shelters” outside agricultural areas.
- Diapause occurs inside clumps of wild grasses such as diss, which provide an ideal refuge.
- They leave diapause toward the end of March and beginning of April and disperse in search of food.
- Adults emerge during the warmest hours, expose themselves to the sun, feed for 15–20 days on early wild grasses and mate.
- Oviposition takes place on wild grasses. Nymphs hatch after incubation and pass through 5 stages: the spring F1.
- At the end of spring, bugs enter cereal fields, attack milk–dough stage grains and lay eggs on wheat to produce F2.
- This is the period when the greatest damage occurs.
- After harvest, they return toward their shelters to overwinter again.

2.4. Damage / harmfulness

- These pests cause significant damage to wheat in Algeria.
- Aelia germari is a permanent danger in cereal-growing regions of the Western and Central High Plateaus and Eastern High Plains, with subhumid or semi-arid bioclimates and cool or cold winters.
- The most serious damage is caused by nymphs, usually in June.
- In Iran, during severe infestation years, 20% of wheat areas (1 million ha) had yields reduced by 40–80%.
- Damage can reach 80% of production and even 100% without control.
- The insect feeds on aerial plant parts: stem, leaf and ear.
- Before heading, pierced leaves become chlorotic and wilt; a barely formed pierced grain becomes completely dried.
- During the milk–dough stage, grains are emptied of their contents.
- Attacks continue until harvest and reduce the baking value of wheat intended for bread-making (bug-damaged grains).
- The insect injects a liquid/proteolytic substance that dissolves the grain contents, which are then sucked up.
- A grain pierced shortly before maturity may look normal externally, but its gluten is strongly affected and quality is reduced.
- Adults possess odor-producing repugnatory glands on the thorax or abdomen. They give seeds a bad taste and may cause headaches in humans.

2. Other cereal pests

Cereal bug: Eurygaster maura

Blissus leucopterus

Control strategies

1. Field monitoring

- Field investigations are used to monitor bug populations and intervene at appropriate times to avoid damage to cereal production.

Winter phase: prospect winter shelters, monitor the first signs of the end of diapause, and use known, identified and georeferenced shelters.

- Treatments in winter shelters are not recommended because useful or neutral insects may also be hibernating there, and treatment may harm the environment and livestock feeding on shelter plants.

Spring phase: this crucial phase has two stages. First, detect the earliest emergence from shelters to prevent movement toward spring breeding areas. Second, when populations reach field edges, prevent reproduction on spontaneous grasses.

- These two stages determine most control operations.

Autumn phase: detect possible return flights toward diapause sites in winter shelters.

2. Chemical control

- Treat secondary host plants (adult overwintering sites) with one application of the insecticide Karate during March–April.
- A second crop application during May–June may be necessary, using the same product or another registered product such as Deltamethrin = Decis EC 25 and Chlorpyrifos.
- Chemical intervention is triggered when the damage threshold is reached (>3 individuals/m²) at field borders.
- Note: treatment operations are not recommended because they cannot be efficient.

3. Biological control

- Egg parasitoids: *Asolcus grandis* and *Ooencyrtus fecundus* (Hymenoptera: Scelionidae and Encyrtidae).

4. Other methods

- The course recommends dishwashing soap as an insecticide: mix 1 cup of water, 1 tablespoon of dishwashing soap and 1 tablespoon of vegetable oil; baking soda may be added.
- Mix gently in a large bowl, place the solution in a spray bottle, and spray infested areas while avoiding sensitive plants.