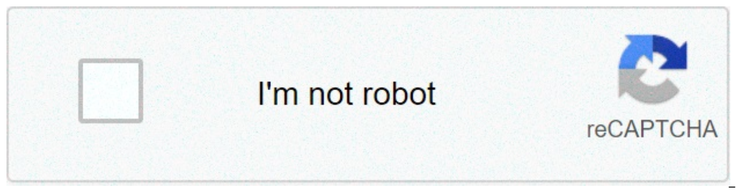

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Maize weevil pdf

Species of beetle Maize weevil Scientific classification Kingdom: Animalia Phylum: Arthropoda Class: Insecta Order: Coleoptera Family: Curculionidae Subfamily: Dryophthorinae Tribe: Litosomini Genus: Sitophilus Species: S. zeamais Binomial name Sitophilus zeamais(Motschulsky), 1855 Synonyms Calandra chilensis Philippi and Philippi, 1864 Calandra platensis Zacher, 1922 Cossonus quadrimaculata Walker, 1859 The maize weevil (Sitophilus zeamais), known in the United States as the greater rice weevil,[1][2] is a species of beetle in the family Curculionidae. It can be found in numerous tropical areas around the world, and in the United States, and is a major pest of maize.[3] This species attacks both standing crops and stored cereal products, including wheat, rice, sorghum,[4][5][6] oats, barley, rye, buckwheat,[6] peas, and cottonseed. The maize weevil also infests other types of stored, processed cereal products such as pasta, cassava,[5] and various coarse, milled grains. It has even been known to attack fruit while in storage, such as apples.[7] Description A close relative of the rice weevil,[6] the maize weevil has a length of 2.3 mm to 4.9 mm. The type of food consumed by the larvae influences the size of the adult (3.9-4.9 mm on corn, 3.0-4.6 mm on wheat, 2.9-4.3 mm on rice, 2.7-3.2 on rough rice, and 2.3-3.9 mm on shelled rice).[8] This small, brown weevil has four reddish-brown spots on the wing covers (elytra). It has a long, thin snout, and geniculate (elbowed) antennae.[6] Sitophilus zeamais appears similar to the rice weevil (Sitophilus oryzae), but has more clearly marked spots on the wing covers, and is usually somewhat larger.[2] It is able to fly.[6] The maize weevil and the rice weevil look very much alike but external features can be used to differentiate the vast majority of adults. However, the only reliable features to distinguish adults of both species are on the genitalia (see table below). Both species can hybridize. The genitalic structure of hybrids is unknown.[9][10][11][7] Maize weevil (S. zeamais) Rice weevil (S. oryzae) Punctures on pronotal dorsum typically nearly circular, rarely elliptical Longitudinally elliptical punctures on pronotal dorsum Pronotal punctures are nearly equally spaced apart, and pronotum typically has no median puncture-free area (rarely has a narrow puncture-free median zone) Pronotal punctures are separated by a flat, median, longitudinal puncture-free zone More than 20 pronotal punctures along the approximate midline, running from neck to scutellum (not reliable for individuals not reared on corn, which are typically smaller) Less than 20 pronotal punctures along the approximate midline, running from neck to scutellum Scutellar elevations typically farther apart compared to their longitudinal length Scutellar elevations typically closer together compare to their longitudinal length Scutellar elevations typically extend longitudinally approximately halfway down the scutellum Scutellar elevations typically extend longitudinally approximately more than halfway down the scutellum Proepimera meets behind the fore coxae and has a barely discernible notch along the posterior edge at the site of the meeting point Proepimera meets behind the fore coxae and along the posterior edge, has a distinct notch along the posterior edge at the site of the meeting point Male aedeagus has two dorsal, longitudinal grooves Male aedeagus is smooth and shiny on the dorsal surface Epipharyngeal rods of larvae tapering apically Epipharyngeal rods of larvae have virtually the same width throughout Lateral lobes of Y-shaped sclerite of female genitalia tapering and pointed at apex Lateral lobes of Y-shaped sclerite of female genitalia not tapering and rounded at apex More than 5 sensory organs at the tip of the labial palps of larvae Less than 5 sensory organs at the tip of the labial palps of larvae Distribution S. zeamais occurs throughout warm, humid regions around the world, especially in locations where maize is grown,[2] including: Polynesia, Argentina, Brazil, Burma, Cambodia, Greece, Japan, Morocco, Spain, Syria, Turkey, United States, USSR, Sub Saharan Africa and Yugoslavia. It is also widely distributed throughout agricultural areas of northern Australia.[7] This species has also been recorded in Canada, in the provinces of Ontario and Quebec,[6] and has been intercepted at ports, but is not well established there. It has, however, been present for several years in Montreal, where grain from the U.S. is stored.[12] Life cycle The complete development time for the life cycle of this species averages 36 days.[7] The female chews through the surface of the grain, creating a hole. She then deposits a small oval white egg, and covers the hole as the ovipositor is removed, with a waxy secretion that creates a plug.[6] The plug quickly hardens, and leaves a small raised area on the seed surface. This provides the only visible evidence that the kernel is infested.[7] Only one egg is laid inside each grain. When the egg hatches into a white, legless grub, it will remain inside and begin feeding on the grain. The larvae will pupate while inside, then chew a circular exit hole,[1] and emerge as an adult beetle. A single female may lay 300 to 400 eggs during her lifetime. Adults can live for 5 to 8 months.[2] Breeding conditions require temperatures between 15 and 34 °C and[vague]40% relative humidity. When the adults emerge, the females move to a high surface and release sex pheromones. Males are then attracted to this pheromone.[7] Host range The maize weevil commonly attacks standing crops, in particular, maize before harvest, and is also commonly associated with rice. It infests raw or processed cereals such as wheat, oats, barley, sorghum, rye and buckwheat. It can breed in crops with a moisture content of a much wider range than S. oryzae, and has been found in fruit, such as apples during storage. Although the maize weevil cannot readily breed in finely processed grains, it can easily breed in products such as macaroni and noodles, and milled cereals that have been exposed to excessive moisture.[7] Damage and detection Maize damaged by maize weevil larvae Early detection of infestation is difficult. As S. zeamais larvae feed on the interior of individual grains, often leaving only the hulls, a flour-like grain dust, mixed with frass is evident. Infested grains contain holes through which adults have emerged. A possible indication of infestation is grain, when placed in water, floating to the surface.[7] Ragged holes in individual grains, similar to damage caused by the rice weevil and granary weevil, may indicate infestation.[6] In large stores of grain, an increase in temperature may be detected. The most obvious sign of infestation is the emergence of adults. One study recorded, 5 weeks after infestation, the emergence of 100 adults per kg per day.[1] See also Granary weevil, also known as the wheat weevil (S. granarius) Rice weevil (S. oryzae) Home stored product entomology Invasive species List of common household pests Pest control References ^ a b c "PestWeb | Greater Rice Weevil". Agspsrv34.agric.wa.gov.au. Retrieved 2010-07-29. ^ a b c d "Greater Rice Weevil (Sitophilus zeamais)". Ozanimals.com. Retrieved 2010-07-29. ^ "Greater Rice Weevil (Sitophilus zeamais)". Ozanimals.com. Retrieved 2010-08-01. ^ ^ a b Control of Sitophilus zeamais Mots., 1958 and Sitophilus oryzae (L., 1763) weevils (Coleoptera, Curculionidae) in stored rice grain (Oryza sativa l.) with insecticide pirimiphos methyl (Actellic 500 CE) B. Alleoni1, W. Ferreira 9th International Working Conference on Stored Product Protection ^ a b c d e f g h "Maize weevil". Grainscanada.gc.ca. 2009-12-21. Retrieved 2010-07-29. ^ a b c d e f g h "Maize weevil | Padil.gov". 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External links Images USDA study on temperature management of the maize weevil USDA study on contest behaviour of maize weevil larvae when competing within seeds African Journal of Biotechnology: Laboratory evaluation of four medicinal plants as protectants against the maize weevil Retrieved from " If you want to view as pdf, click here DESCRIPTION Grain weevils in the genus Sitophilus are worldwide in distribution, but the granary weevil is more temperate in distribution. All three species attack grain and grain products, but they are primarily pests of whole grain in storage. Like all weevils, these have a distinct snout. When disturbed, it will draw its legs up to its body and remain motionless. Rice Weevil: This weevil has small round pits on the surface of the thorax (although miline is usually free of pits), four red to yellow markings on the forewings, and is able to fly. It is approximately 1/8 inch long (3 mm). Granary Weevil: This weevil is slightly larger (3/16 inch (4.8 mm)) than the other two weevils. It is black-brown in coloring although it can be red-brown shortly after adult emergence. If you examine the thorax closely you can see longitudinal punctures. Adults cannot fly. Maize Weevil: This weevil also has small distinct colored spots on the forewings, and punctures on the thorax, including the midline. Adults can fly. Rice weevil. (Photo Credit: John Obermeyer) Granary weevil. (Photo Credit: John Obermeyer) Maize weevil. (Photo Credit: John Obermeyer) BIOLOGY AND BEHAVIOR Eighty to 200 eggs are deposited on the outside of the kernel, grooves or holes made by other insects and the larvae bore into the kernel. The larva remains inside the kernel until adult emergence. The number of eggs is dependent on food, season, or temperature. Two or three larvae may develop on kernel of corn, but from other grains only one adult can be produced. There are three larval molts. The last larval instar usually spins a silken cocoon within the feeding cavity. The pupal case can be reddish brown to nearly black, depending on age. Adults emerge through a small round hole in the kernel. Upon adult emergence, females move to a surface above the food to release the sex pheromone. Males are attracted to this pheromone for mating. Development time from egg to adult varies with temperature from 30 days at 30˚C (86˚F) and 40 days at 25˚C (77˚F). Minimum temperature RH for development is 16˚C (60.8˚F)/30% Rh; optimum is 30˚C (86˚F)/75% Rh and the maximum is 36˚C (85˚F). Adults are generally short lived (about 7 days) and are non-feeding. Like many moths the peak time for flight activity is dusk. Females alight on grain and are simulated to oviposit. Air that has passed through the grain, especially grain that has some mold growth, acts as an attractant. Angoumois grain moth can coexist with sawtoothed grain beetle. However, maize weevil or lesser grain borers totally suppress Angoumois grain moth populations. The larva is dormant for four to five months during the winter in colder climates. There are generally four to five generations per year, although in heated warehouses there may be as many as 10 to 12 generations. FOOD Weevils can be found infesting a variety of grain and food materials. They attack all cereal grains, however are most often found in corn, oats, barley, rye, and wheat. They cannot breed in finely processed grain but will readily breed in manufactured products such as macaroni, noodles and milled cereals that have become caked from excessive moisture. CONTROL The only way to control these pests is fumigation. Since it is an internal pest, residual control will only kill exposed adults. To kill the internal stages (larval and pupal), you must fumigate. Heating grain to 60˚C can kill larvae, however, this may decrease germination and baking quality of flour. READ AND FOLLOW ALL LABEL INSTRUCTIONS. THIS INCLUDES DIRECTIONS FOR USE, PRECAUTIONARY STATEMENTS (HAZARDS TO HUMANS, DOMESTIC ANIMALS, AND ENDANGERED SPECIES), ENVIRONMENTAL HAZARDS, RATES OF APPLICATION, NUMBER OF APPLICATIONS, REENTRY INTERVALS, HARVEST RESTRICTIONS, STORAGE AND DISPOSAL, AND ANY SPECIFIC WARNINGS AND/OR PRECAUTIONS FOR SAFE HANDLING OF THE PESTICIDE. November 2018 It is the policy of the Purdue University Cooperative Extension Service that all persons have equal opportunity and access to its educational programs, services, activities, and facilities without regard to race, religion, color, sex, age, national origin or ancestry, marital status, parental status, sexual orientation, disability or status as a veteran. Purdue University is an Affirmative Action institution. This material may be available in alternative formats. 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