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| European Earwigs |
| Prepared for Professor Robert Noonan Entomology AGRI1150 Class 11 am MW |
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| *Abstract:*  The European Earwig *(Forficula Auricularia Linnaeus)* is one of the most common house hold insects in North America. There is known to be 1800 different types of Earwigs and they are known to feast on about anything that is available with their mouth. European Earwig have a pair of strong pitchers that strongly identify the insect to all. Especially if found in a house where it can be found unexpectedly. (Cave, Rob et al. 2002)  **Introduction:**  The European Earwig *(Forficula Auricularia* Linnaeus*)* is one of the most common North America insects found in houses across North America. Part of this reason is in the fall they can form in large numbers on trees, sides of homes, and other areas as they seek out protected areas in which to spend the winter. Earwigs find their way in homes through cracks in foundation, around basement windows, and doors. These insects have wings but seldom fly. This insect Name earwig was created from the myth for going into a person ear, and laying eggs in a persons brain when they are sleeping. Other say it is because of the way the wings on the adult Earwig look similar like an ear. European Earwigs are in fact harmless to humans even though they like to live in small crevasses and have a pair of pinchers on the abdomen tail end of the insect. With these pinchers that look like they might hurt, they can pinch for a defense if the insect is bothered. Even through earwigs are one of our weirdest insects, they are not known to bite or sting, eat your house, stored food, or prey your pets, transmit diseases or harm trees. These insects are nocturnal and refuse to go out in the daylight. During the day, the European Earwigs can be found in moist, shady places under rocks, decaying organisms, tree bark, or logs. They feed primarily on decaying vegetation helping with the decomposition but will occasionally feed on living plants. These living plants can be crops such as corn, wheat, oats, barley, and vegetables which are Earwigs favorite. European Earwigs also will eat the live or dead insects. (Cave, Rob et al. 2002)  **Identification:**  The first thing to identify an insect is to count the number of legs and to see if they have a head thorax and abdomen. The Taxonomy is Kindom: Animalia, Phylum: Arthropoda, Class: Insecta, Order: Dermaptera, Family: Forficulidae, Genus: Forficula, Species: Auricularia (Writer,Staff.2014). To identify an adult earwig, it is usually dark brown or reddish brown in color 13-14 mm in length with pitchers called cerci on the tail end used for defense. When used in defense the cerci is twisted or over head to fight another earwig. The male cerci are strongly curved and in the females, they are curve only slightly, but more round and less fierce unlike the male. The head is about 2.2 mm in width, with one pair of antennas and the hind wings folded under the forewings. When seen flying it is usually not that often but these insects jump from higher up flying down. The stages are egg, larva, pupa and adult but going to the nymph stage, the earwig increase in size with maturity, with the cerci are present growing in size with each molting. The body darken and will change from grayish brown to darker brown, with the legs staying grayish as the nymph ages. Young nymphs are guarded by the mother earwig. The nymph develops underground in small burrows tended by the female. The mother earwig will have one generation annually due to colder climates. Otherwise more could be produced, with the eggs are deposited in late winter and ideally eggs will hatch in May. The egg look pearly white in color and oval like an egg. The egg measures 1.13 mm in length and 0.85 mm in width. These eggs will absorb water and doubles in volume before hatching. Eggs are deposited in a cluster ranging from 30 to 60 eggs in the first cluster. The second cluster if in a warmer climate produce half as many eggs. Duration of the egg stage averages 72 days. The second batch will only be 20 days to hatch do to many variables such as weather and climate. The females will keep mold from developing on the eggs and will guard their eggs from other predators such as other earwigs (John, L.2010).  **Habitat:**  The habitat earwigs prefer is to live outside in a damp dark place. They like to be under debris and will come out at night to eat. Earwigs scurry around at night, searching for other insects or plants on which to feed. They are often attracted to lights and can be found in large groups at night. They will sit in large numbers under the nightlights. During daytime hours, they prefer to hide under trash, under boards, in mulch, and just about any concealed place that is cool and moist. This will change as the earwig changes as it ages as it will like higher and drier climates. They do not prefer to reproduce indoors, but prefer laying their eggs deep in the soil. The habitat earwigs like are fertile soils where produce is being made and where there are other insects because they have such a broad range of food they will eat (Norbert 2016).  **Reproduction:**  The reproduction cycle starts when the earwig become an adult. The earwig becomes mature in autumn when it is ready to mate. In the spring, the adult female earwig deposits about 50 eggs in a spot in the soil. The female can lay up to 300 eggs at one time in clusters in several cavities. The female will protect the eggs and will continue to protect her babies until she dies or until after her babies first molt. If the female dies before the babies hatch the babies will eat the female. once the babies are on their own they go through several instars until they reach full maturity as adults. Both adults and eggs overwinter in the soil, and there is usually just one generation per year.  A stage called polygamous in September to October is followed by a monogamous phase starting around November when females and males pair up to mate. They retreat into small cavities where they live for the winter after mating in the early fall. After November, the female deposits on average 40 eggs. The max would be 60 eggs into the cavity. The number of eggs is correlated with the weight and size of the female. Once the eggs are laid males are kicked out of the nest by the females. The duration of the egg stage lasts about 56-85 days. The health of eggs all depends on how well the female earwig will take care of her eggs and the size of the earwig to fight off predators. Depending on many factors such as climate conditions. In April to May the first and second instars are still protected by the female. Then the second and third instars inhabit moist and humid places on the ground but the fourth and fifth larval stages prefer elevated and dryer places such as trees. The first instar is roughly 18-24 days, the 2nd instar is 14-21 days, when the 3rd instar is almost the same with 15-20 days. The 4th instar same as the 5th instar. One of the draw backs only adult earwigs over the winter or cooler weather the older adult earwig will survive the change. This is because the adults are more durable and have more reserves. There is also less food during the winter such as insects and plant life (Norbert 2016).  **Damage:**  It is unsure what the economic thresh hold is due to the fact they cause damaging to vegetables and flower crops by eating the fruit and leaves of the plant. The reason the economic thresh hold is hard to determine is because they also eat bad insects and usually they are not an issue. Most of the damage is caused by external feeding. Earwigs feed on tender plant parts often the younger and newer leaves causing deformities in crops. In corn (Zea mays) they feed on kernels but more of the damage is caused by feeding on the silks. If an insect feeds on the silks the result will be kernels incorrectly filled out. Sugar beets and mangles are damaged by the insect feeding on both the roots and leaves. In cabbage varieties are prone to be affected by earwigs through direct feeding on the leaves eating their way tunneling into the cabbage head, spoiling the whole crop. Once inside the plant, the earwig will hide and feeding inside the plant. Some more crops affected are peas, beans, tomatoes, and potato plants. Major damage to the seed is said for cabbage, carrot and cucumbers. In flowers the people will notice deformed blossoms and leaves ate on. The earwigs usually have a bad smell, people become annoyed by their presents. Injury on the plants are described in the form of numerous small holes. These small holes are on the foliage and flower petals may be completely ate by the insect. The European earwig consume other insects is important in offsetting their reputation as a crop pest problem. These insect predator aid in the places of pear and apple orchards. They have been shown to feed on pests like aphids, scale insects, psyllids, and midges. Which can be a serious problem in the orchards. Some places will create shelters where earwigs can avoid predicters such as birds (John, L.2010).  **Management Control:**  One of the first Things to for management control is to sample the population. Monitoring can be done with baits and traps. To trap the European Earwig, wheat bran or oatmeal can be used to lure them in when during the night when they are most active. Once the problem been identified there are some different options to be used. The first one is cultural for residential property or in small gardens. Continues trapping can be used to reduce earwigs. Boards placed on the soil will attract earwigs seeking protection, but a board with holes with tight cracks to squeeze in would be preferred. Earwigs also love wood shavings that could attract them. Another way to trap earwigs is to used wet newspaper and check it in the mornings. There are many natural enemies and biological control could be used. One is the European parasitoid (*Bigonicheta spinipennis)* it is a parasitize to 10-50% of the earwigs. Another is a fly *Ocytata pallipes* that preys on the eggs and nymphs. Fungi is one of the leading battles the female has to put up with. The female will always clean and remove the eggs as she guards them, eating the bad eggs. The *Erynia forficulae* and *Metarhizium anisopliae* infect earwigs as the fungi.Insecticides and baits containing chemicals can be used to eliminate the earwigs. If used wheat bran flakes or oatmeal plus the chemical. Commercial products are not speculated for the earwigs because they hardly a problem. Bait is more common and the bait will have more results if applied in the evening to lure the insects in. One of the best method of controlling earwigs inside of the home is to vacuum the insect up, but the vacuum might have a bad smell because earwigs have a smell to them. If the earwig becomes a true problem in around the home, insecticides like permethrin sold under a variety of names such as cyfluthrin with the brand name of Bayer or Tempo for commercial applicators. These Ortho products should be applied around the outside of the house. Always used a certified exterminator when dealing with chemicals (John, L.2010).  (1) Adult European earwig male; (2) tip of abdomen of male with short, sharply curved forceps; (3) tip of abdomen of female earwig.  **Work Cited**  Cave, Rob et al. 2002. International Wild Life Encyclopedia Third addition. P.738 Found at:  https://books.google.com  Writer, Staff. Insect identification for the casual observer. 2014 Found at:  http://www.insectidentification.org  [John L. Capinera](http://entnemdept.ufl.edu/cv/people/capinera/), University of Florida. 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