

A Survey of Orthopteran Populations in College Station, Texas

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Abstract: Many Orthopteran species are considered pests because they have the ability to cause considerable crop damage. A basic survey of the order Orthoptera in this area is beneficial to the agricultural industry because of the threat they pose to crops. Orthopterans for this survey were collected at Lick Creek Park in College Station, Texas, an area adjacent to grassy farmland. The collected specimens were separated and categorized by suborders, families, and subfamilies using a dichotomous Orthopteran key as a reference. A majority of the specimens collected belong to the subfamily Melanoplinae. Surveillance of the Orthopteran population during the harvest season in College station, an agriculturally active area, is crucial because Melanoplinae are one of the largest subfamilies under the Order Orthoptera and contain some of the worst Orthopteroid crop and grassland pests.

Keywords: Crop pests, Orthoptera, pest management, Orthopteran survey

Orthoptera is an insect order that undergoes hemimetabolous development, which is also known as incomplete metamorphosis. Orthopterans have a generally cylindrical body with saltatory hind legs evolved specially for jumping large distances. They have mandibulate mouthparts and large compound eyes that help them when feeding in grasslands. In farmland areas, many Orthopteran species are pest that cause a lot of crop damage. According to Purdue University's Field Crop Integrated Pest Management

Department, damage left by grasshoppers appears as ragged holes left in leaves and crops. Information on the University of Illinois's crop science extension and outreach page tells us, for example, that just 17 grasshoppers per square yard in a 40-acre hay field can potentially devour up to one ton of hay per day. They are nondiscriminate feeders and will feed on crops, fruit crops, flowers, and shrubs. Tree crickets and mole crickets are additional examples of Orthopterans that cause crop and farmland damage.

The suborder Ensifera consists of about 13,000 species of long-horned Orthoptera and includes insects in the families Gryllidae, Prophalangopsidae, Stenopelmatidae, Gryllacrididae, Cooloolidae, Tetrigidae, Rhaphidophoridae, Schizodactylidae, and Tettidoniidae (Gwynne, 1995). Based on the habitat in College Station, Texas and the common species found in this area it was expected that specimens from Gryllidae (crickets), Tettigoniidae (Katydids, Long-horned grasshoppers), and Tetrigidae (pygmy grasshoppers) would be collected. Some features to help with identification include thread-like antennae with more than 30 segments and a tympanum located on the front tibia. Female Ensiferan's typically have an elongated and blade-like ovipositor. Ensiferans are distributed all around the world and typically eat vegetation, although some species are predatory. The preferred environment of this suborder is cool, dry temperate regions.

The second suborder under Orthoptera is Caelifera, which consists of short-horned grasshoppers and contains about 11,000 species within 20 families (Grimaldi, 2005). The families we expect to collect from this suborder are Acridinae (silent slant-faced grasshopper), Gomphocerinae (slant-faced grasshoppers), Melanoplinae, (spur-throated grasshoppers) and Oedipodinae (band-winged grasshoppers), Romaleinae (lubber grasshoppers). Some features to help with identification of Caelifera include antennae that are shorter than their body and the tympanum is located on the sides of their first abdominal segment. Females are typically larger than males in size and bear short ovipositors. Most members of Caelifera will eat from multiple host plants

in one day and are distributed worldwide mostly in areas of grass and farmland. This survey was conducted to get an estimate of species variety as well as numbers of male and female Orthopterans present at Lick Creek Park.

Materials and Methods

Specimens for this survey were collected at Lick Creek Park in College Station, Texas between the hours of 12:00pm and 3:00pm on November the 8th 2014, the average temperature that day was 72°C. Grasshoppers were collected by hand or with a net using the sweeping technique. The specimens were placed into homemade kill jars that were created using mason jars (Ball Brothers Glass, Broomfield, Colorado) containing cotton balls (Curad brand, Medline Industries, Mundelein, Il) soaked in ethyl acetate (Equate acetone-free nail polish remover, Wal-Mart, Bentonville, AR). Insects were placed inside kill jars and transported for later preservation and identification. The specimens were separated and categorized into suborders, families, and subfamilies by referencing The Peterson Field Guide to Insects by Donald Borror & Richard White, and The Field Guide to Insects of North America by Eric Eaton and Kenn Kaufman as dichotomous keys.

Results

Fourteen males and nine females belonging to the subfamily Melanoplinae were collected, fifteen males and two females of the subfamily Gomphocerinae were also collected and finally, eight males and five females of the family Tettigoniidae were collected.. 2 specimens of the

subfamily Gomphocerinae were collected but were not included in the graph because their sex could not be determined. The hypothesis that specimens from Melanoplinae, Gomphocerinae, and Tettigoniidae would be found were

confirmed although we did not find any specimens from the suborders. The hypothesis that specimens belonging to Gryllidae, Tetrigidae, Romaleinae, Oedipodinae, and Acridinae would be collected was disproven.

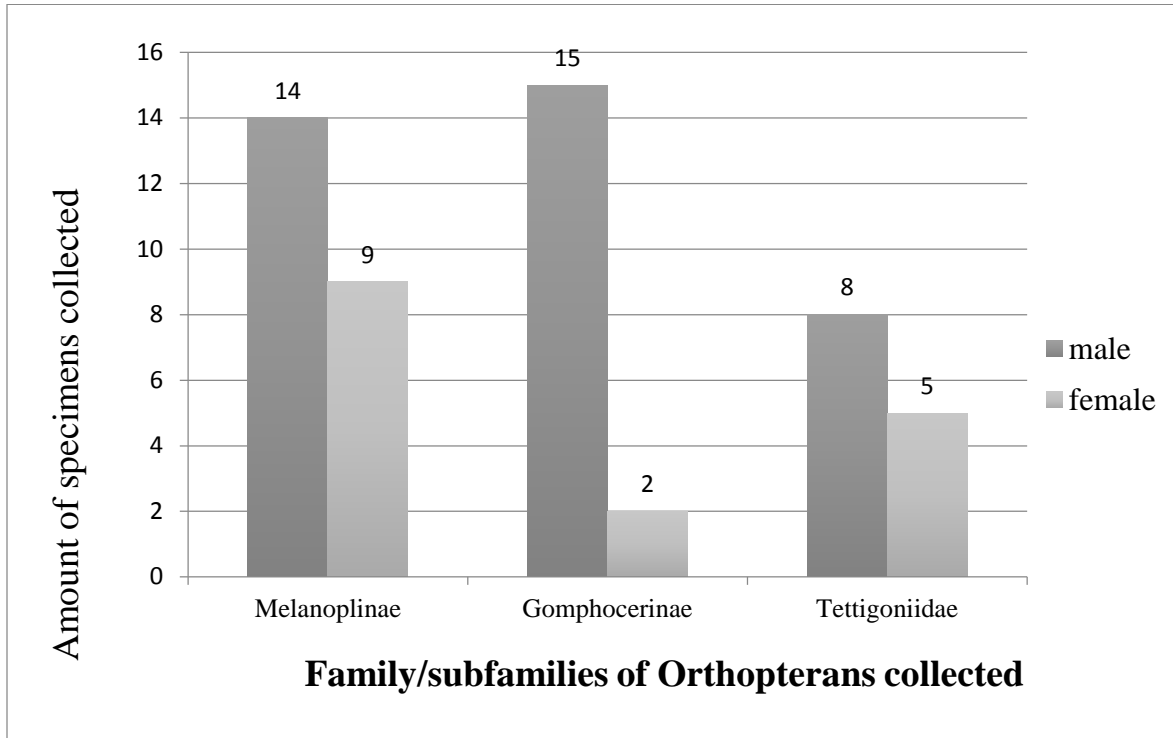


Figure 1: Chart showing the amount and sex of the Orthopterans collected at Lick Creek Park in College Station, Tx on 11/08/2014.

Discussion

Most of the Orthopterans collected belonged to the subfamily Melanoplinae. Melanoplinae is one of the largest subfamilies of Caelifera so their abundance is expected especially because Lick Creek Park is adjacent to farmland and Caeliferans prefer a grassy habitat.. Currently no other information is available regarding a

generalized survey of Orthoptera in the Lick Creek Park area to compare this one to. An improvement to this study would have been to have collected over a period of multiple days instead of in one single day in order to get a better representation of what insects are actually present. Another improvement would have been to have collected at night and during the day to get a proper representation of what nocturnal species occupy Lick Creek Park. Some of the

specimens that were not collected, but were expected to be, could have been scarce due to the season, the time of day, and the collection methods. This data is a useful starting point for future surveys in this area to help give those in the agricultural industry an estimate of how much potential danger is posed to their crops. An estimate on the effects that temperature have on the

longevity of Orthopterans would be a useful direction for further research to help determine how late into the year they can cause potential crop damage and to which crops specifically. It would be helpful to see the rate at which these populations mate and reproduce in order to determine how quickly their Populations can increase in order to prevent any invasive species on local crops.

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