The Alfalfa Field as a Study Area for Students in Entomology

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For several years I have taken classes in a course in Field Crop Insects on field trips where they could study live insects and the damage they do to some of our major farm crops grown in Oklahoma. Each crop must be studied differently. For alfalfa, I have found the best procedure is to have each student take 50 sweeps with a standard sweep net and then empty the contents into a large-mouthed jar where the insects are killed with fumes from a bit of cotton saturated with a few drops of carbon tetrachloride. It takes only about 15 minutes to make such a collection. The alfalfa must be reasonably succulent. If the field has been mowed, few insects will be collected. On the Agronomy Farm near Stillwater, collections have been made in late September and early October for this class, and from early April to mid-May for a class in Insect Ecology.

Between these times, the field can be sampled by digging up a plant or two along with some soil and trash and placing this material in a paper sack for later study. One such sample is taken for each student.

I know of no other crop which has such a large population of insects with so many species represented. It is amazing that the plants usually show so little damage.

In making the study, each student keeps his catch separately and analyzes the results. One of the results of such a laboratory is that it can be demonstrated to the class how much variation there is in the distribution of insects throughout the field.

Secondly, the figures can be adjusted to a basis of numbers of insects per acre. By using a net with an opening diameter of 13 inches and with a 30-inch handle, 50 sweeps sample an area of one square meter. As there are 4,070 square meters in an acre, it is possible to estimate the minimum number of insects per acre. Most students are astounded when they reach these figures. It is more impressive than to tell them about the great number of insects there are in the world and on one crop in particular.

Thirdly, the students can collect in this short time insects in many orders and families. As an example, this fall I collected in a 50-sweep sample insects in the orders Hemiptera, Neuroptera, Coleoptera, Homoptera, Orthoptera, Diptera, Lepidoptera, and Hymenoptera. In these 8 orders, there were at least 30 families represented. The number of species was of course even greater.

Fourthly, the students can quite often see two stages of the same species and can therefore learn a little about insect life history.

Fifthly, students can classify the species as to harmful or beneficial kinds and can therefore learn something about the struggle for survival. Of course, their figures are very general, but there is no doubt about the predatory habits of lady beetles, lacewings, nabids, the assassin bugs, and the parasitic Hymenoptera. We also include spiders in our population counts.

Sixthly, there is the relative abundance of the different species and their possible benefit or harm to the crop. For example, the convergent lady beetle count this fall was estimated to be 118,000 per acre. In Oklahoma, these beetles have been purchased by farmers at $15 to $20 per gallon.[1] A gallon contains an estimated 135,000 beetles. The recommended

[1] In a recent article, Acco Press, Jan. 1954, page 2, price quoted was $8.00 a gallon.

rate for release in a crop is one gallon per each 10 acres or 13,500 beetles per acre. On this basis, there was about 0.87 gallon of these beetles per acre in this field. As it was 10 acres in area, the value of the beetles was $69.60 at current rates. Incidentally, there were no aphids collected in this field. Could there have been a relationship between this lack of an aphid infestation and the presence of such a large number of lady beetles? I am inclined to think so, since in most years, aphids can be collected in the fall from alfalfa fields. Tarnished plant bugs and a species of tree hopper were very abundant in this field. Both are highly injurious to alfalfa. Here, again, the students can see how one predator is so highly selective that it does not control certain harmful species.

During the spring, a class in Insect Ecology set up a project in an alfalfa field. Starting with soil and trash samples in March, they continued sampling the field at regular intervals throughout April and early May. In this way, they saw the changes in population of various species, and could observe the natural control of an injurious population of aphids by predators.

Another group took samples before and after cutting the first hay crop and saw the effect of this on the various species.

I do not suggest that students in an introductory course in entomology use this approach entirely as a means of making a collection which should include all of the more common orders. For one thing, most of the species are small, and it would be difficult for the beginning student to classify them without the use of a stereoscopic microscope. Unless the laboratory is equipped with these instruments, students would be handicapped. Of course, there are also many orders which could not be collected in this habitat.