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EXTENSION DIVISION

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**THE GREEN BUG**

(*Toxoptera graminum* Rond.)

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**PRESENT CONDITIONS AND EXPECTED CONDITIONS**

**Present Conditions**

In some localities the wheat has been damaged to such an extent as to make it unprofitable as a crop.

In general the wheat is not sufficiently damaged to prevent profit.

If, when the winter weather breaks, we have a spring with temperature ranging not lower than 50° F., mean, the prospects will be in our favor because the parasites will control the green bug before it can become serious.

If, when cold weather breaks, the temperature fluctuates above and below 50° F., mean, the green bug will do severe damage because the parasites will be more or less inactive and unable to multiply rapidly. The green bug, under such conditions, will be able to develop and spread rapidly.

**Methods of Control**

There is no artificial application in the form of a chemical lotion or mechanical contrivance of any kind that is effective in controlling the green bug that will not injure the crop infested by it.

Wheat, rye, oats and barley are the chief food plants of this insect, and when the infestation is sufficiently severe to make a showing of damage, the best thing to do is to plant these fields to some other crop.

In order to make a wise decision as to whether much damage is likely to result to an infested crop or not, it must be considered that the root system of the plants is damaged equal to the apparent damage shown by the yellow and reddish-yellowing of the foliage. Ordinarily the root system of young wheat is not injured if the leaves are bitten off by animals. However, the wheat is affected quite differently by the sucking effect of the green bug, because, as much root injury is brought about, as is noticeable on the green leaves; and this injury is permanent. No secondary growth will occur.

In spite of the fact that experiments made by harrowing, brushing, dragging, packing and rolling infested wheat fields during the green bug outbreaks of 1903-4 and 1907-8 were to no effect, there are some farmers trying to believe that some of these methods are really effective. More drastic mechanical methods than these and, in addition to these, were put to the test in our experience and found to be ineffective. The more drastic methods referred to were experiments with hot water and steam sprays of intense heat produced by the aid of steam traction engines and blow torches.

There is absolutely no known artificial method of controlling these pests except through the art of starvation, and this means the destruction of their food plants.

There is a natural method of controlling them, but this can only be brought about through the rapid development of parasites, of which there are about twelve or fifteen species, commonly known as lady bugs, lace-winged flies, syrphid flies and wasp or bee-like parasites. This group of insects does not bring forth young in a live stage as do the green bugs, but lays eggs. This difference in the method of reproduction is of great significance since the parasites cannot hatch from the egg except in warm weather. The green bug, however, can reproduce during very cold weather as well as during warm weather. The significance of these different methods of reproduction has a remarkable bearing on the probable damage that may be done by the green bug. None of these parasites, however, can either multiply or feed on the green bugs unless the weather is sufficiently warm for their activity and egg hatching. A mean temperature of 50° F., or higher, is necessary.

Sometimes the parasites are not present in or near green bug infested fields. Under such conditions the green bug can flourish as long as it has food material. Experiments have been tried relative to the introduction of parasites into fields where there were none, from localities where they were abundant. Some authorities considered that a great deal of benefit resulted. Others, however, doubted this. I believe that they have been responsible for holding the green bug under subjection. And I also believe that in case they are not present in green bug infested localities, it will pay to transfer them to such localities, provided they are in such abundance in other localities as to enable one to obtain them in a practical manner. (See Bulletin of University of Kansas, Vol. IX, No. 2, pp. 13-30.)

The lady bug (*Megilla maculata*) is more generally prevalent now in Oklahoma than during the beginning of the green bug outbreak of 1907-8.

### Yellow Areas in Wheat Fields

When the wheat is green and beginning to cover the ground, the infestation by green bugs generally becomes conspicuous in "spots", i. e., small areas from 2 or 3 feet to 50 or 100 feet in diameter will begin to turn yellow. Death of the plants generally begins at the center of these circles and extends outward. Sometimes the "spots" become confluent, or, in other words, meet each other. Such conditions as the coming together of these spots indicate that the wheat crop cannot be profitable, and some other crop should be planted. After preparing the seedbed, any crop except barley, rye or oats will be safe.

### Burning the Yellow Spots Not Advised

The green bugs in an infested field are most numerous around the border of the "spots". They leave the dying plants and move out to the edge of the green wheat. They are thickest their enemies collect and multiply most rapidly. Consequently it is an advantage to the green bugs in general to have these yellowing areas burned because the enemies are caught in their primary development, and other green bugs, which are always generally disseminated through the fields at such times, escape that would otherwise be killed later by the parasites developing in the "spots" mentioned.

#### January, 1916

The present area of infestation is general throughout Oklahoma, Northern Texas (Grayson county) and Southern Kansas. It is also present in Tennessee and New Mexico. Some damage has already been done in Oklahoma. The area of infestation generally proceeds northward much more rapidly than east or west on account of the prevailing winds. The insects scatter or disseminate mainly in the fall and spring, but especially during the spring, with the prevailing balmy winds from the south, provided an infestation is present in the South. The starters for a new infestation, No. 2, for instance, may be carried by the wind to a point fifty miles north of a given infestation, No. 1, in a single day. Within about two weeks a point, No. 3, fifty miles north of No. 2, may become infested by forms originating at No. 2. Two weeks later point No. 4 may become infested from bugs arising at point No. 3. It seems that infestations starting in the South proceed northward in this manner rapidly, and also to the east and west, but not as rapidly as northward.

#### Peculiarities of the Internal Parasites of the Green Bug (*Lysiphlebus tritici*)

Parasites do not disseminate to any extent independently. Since, as we previously stated, the parasites require warmer weather for development than the green bug, it is clear that green bug infestations become established that are free from parasites, although the latter may be present in the original infestation. As soon as the weather permits the parasites to become active at point No. 1, for instance, green bug infestation is likely to extend from 200 or 300 miles north. Meantime there is a continual dissemination of green bugs northward from the original infestation, as previously mentioned, and in this the parasites are carried. Broods of them go the same as described for the green bug, except that they are carried in the bodies of the green bug.

When the green bug in the original infestation is controlled by the parasite, control will begin in a wave to the northward.

#### Life History and Habits

One week is the average time required for the green bug to become full grown. At this age it begins to bring forth its young alive.

The average length of life in summer is thirty-six days.

The average number of young produced is fifty-six.

During the first seven days of life some may acquire wings. Those that do not develop wings before they are a week old will never develop them. These two forms, the winged and the wingless, are both generally present.

New infestations are nearly always started by the winged forms. When their food material is being destroyed by them, more of the young will develop wings than when the food is rich and juicy.

In addition to the above forms mentioned as bringing forth their young alive, there also occur other forms (generally late in the fall) which lay eggs. When the egg-laying forms appear the male form also appears and fertilizes the egg-laying forms. The male form is present at no other time. The forms producing young alive do not require the services of the male and are never fertilized, yet they produce young with remarkable rapidity.

The eggs are laid on the leaves of the wheat and hatch the following spring. In case the winter is sufficiently cold to destroy all the live green bugs, the eggs will carry the infestation over winter and start it by hatching the following spring the same as other insect eggs.

The forms hatching from the eggs are known as "stem mothers" and produce young alive.

The most difficult time for the green bug to survive is from wheat harvest time until wheat is germinated. If there is plenty of volunteer wheat present during the summer it is a great benefit to the green bug.

#### **Some Ways of Identifying the Green Bug**

1. Send a hill of infested wheat to the College.
2. Show specimens to a county agent.
3. Examine wheat for small green lice. If they are found congregated in large numbers, ten to fifteen on a single leaf of wheat, it is almost safe to conclude that it is the green bug.
4. Look for the winged forms of the lice. Four wings will be present, and when not in use will have the upper edges together, and the lower edges will be each side of the body in the shape of an ordinary house roof. Remove and examine one of the front wings closely. Notice a large vein extending from the base of the wing to near the tip end. From this vein four narrow veins arise. One of them is definitely y-shaped in the green bug. The two branches of the y extend to the outer margin of the wing. With nearly all other plant lice found on small grains, there are three branches to the y instead of two.