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A Few Important Chinch Bug Remedies.

C. P. GILLETTE.

A wet backward spring and well distributed summer rains have saved Iowa from extensive chinch-bug losses this year. The bugs have been reported, however, in injurious numbers over limited areas, in various parts of the state. There probably is no year when there are not bugs enough in many localities to do much harm, if the climatic conditions are favorable, and, as we have no way of knowing when a chinch-bug year is coming until it is upon us, it is exceedingly important that some systematic method of combating this evil be fixed upon by the farming communities.

Many remedies have been recommended by entomologists and practical farmers that have proven useful but, in the limited space for the present article, I shall confine what I have to say to a few of these remedies that are in the hands of every farmer and which, I may say, I believe are alone sufficient to keep this, worst of enemies to western agriculture, under subjection. First and most important of these remedies I believe to be

PLOWING.

I have found that by burying the bugs at different depths in loose earth that all that are buried to the depth of seven inches or more never came to the surface again. Those that were buried five inches were nearly all found, ten days after, exactly where they were buried, although a few of the larger ones came to the surface during that time. Those that were buried only three inches were nearly all found on the surface at the end of twentyfour hours. Then, in order to make plowing an effective remedy, the furrow must be cut, at least, six inches deep, and, if the plowing is not too hard, an inch or two more might be advisable.

Plowing may be resorted to early in the summer wherever the bugs are found first injuring the crops, which is usually along the borders of the fields or on a high sandy spots where the ground is dryest. If the growing crop is heavy enough to interfere with the plowing, it may first be cut and removed.

When crops of wheat, barley, oats and other grain are harvested, the stubble should always receive a careful examination, and if the bugs are found in any considerable numbers, the ground should be turned over at once as the bugs are very small at this time and will be very easily destroyed in this manner.

A good illustration of the benefit to be derived from such treatment was had on the Experiment Station grounds this summer. Several plots of experimental wheat joining a sorghum patch, were badly infested with young bugs at the time of cutting the grain. Immediately after cutting the wheat, the ground was plowed and harrowed. The few bugs that escaped from the plowed ground went into the sorghum and for a time it was noticeable that the outer two or three rows had more bugs than the rest of the patch but they did not accumulate in numbers sufficient to apparently injure the sorghum. Near by this sorghum patch was a field of winter rye sowed in the spring that was similarly infested with the bugs. On one side of this rye as a field of Golden millet that had made a rank growth and was almost entirely free from chinch-bugs. The rye was cut early in July and the bugs fed for a time on the grasses that were growing among it, but, when these were sucked dry, they began their march on the millet. On the 5th of August it was noticed that a strip of this millet, about one rod wide bordering the rye had nearly every spear loaded with bugs and the leaves were already turned brown as if parched by heat and drowth. A harrow was run over the infested strip which was immediately plowed and rolled. Three weeks after plowing the millet was cut and up to that time there was no farther evidence of the chinch-bug injury to the crop. To be sure the bugs could be found in the millet immediately adjoining the plowing but they were not numerous.

If it is expected in the spring that work will be too pressing at the time of harvest to admit of so much plowing, fields of grain should be surrounded with strips of millet about one rod in width on which the bugs will accumulate when migrating from the grain. Outside of this strip there should be a furrow or two plowed, the furrow being thrown into the field, to keep the bugs from leaving the strip. After all seem to have left the stubble and to have gathered on the millet, the latter may be cut and saved if it is worth it and the strip plowed, dragged, and thoroughly rolled as quickly as possible. Rolling should always follow dragging if possible as it packs the surface and makes it more difficult for the bugs to escape.

Plowing in fall. Plowing in the fall can be advantageously resorted to wherever the bugs are numerous. It will often be found advisable to scatter about such a field a good deal of rubbish in way of straw, cornstalks, manure, and the like in order to accumulate the bug as much as possible before plowing.

How to plow. In order that the plowing should be most effectual the surface of the ground must all be thrown into the bottom of the furrow. This is a very important matter and I know of no way that it can be so effectually done as by the use of a jointer on the plow. This is a tool very common in the East, but, I am sorry to say, I have not yet seen one in Iowa. A jointer is a

little plow that is fastened to the beam of the large plow exactly like a coulter, and is so set as to turn a little furrow an inch or two deep from the inside edge of the large furrow throwing it into the bottom of the furrow in which the horse walks. By the use of the jointer the bugs that would be on the upper edge of the furrow as it is turned over are all thrown to the bottom and buried deep. Jointers can be obtained through any dealer in agricultural implements.

BURNING.

In many of the above cases, burning may be resorted to instead of plowing. For example, plowing may be dispensed with when wheat or other stubble is dense enough and dry enough to burn over the entire field, or, if preferred, dry straw may be scattered over the strip of millet on which the bugs have accumulated and the whole burned. Again, the bugs may be found in the fall of the year, to be numerous in a field, that it is desirable to save for hay or pasture the following season. In such a case, a great many of the bugs may be destroyed by putting straw or other inflammable material, under which the bugs will accumulate, on cold nights, in windrows across the field to be burnt, late in the evening or early in the morning, when the bugs are under it for protection.

SHADING THE GROUND.

Third in importance among these remedies, I would mention that of growing grain and grasses that are vigorous and will put forth the greatest expanse of leaf surface to shade the ground. Every one who is familiar with the chinch bug, knows that wet seasons are unfavorable for their increase, by destroying great numbers of the eggs and young bugs. A dense growth of leaves will lower the temperature near the surface of the ground, and produce a moist stagnant condition of the atmosphere about the roots of the plants, that is unfavorable for the development of the bugs. Several good illustrations of this fact were had on the Station grounds this summer, the most striking of which was among experimental plots of millet. In one place two varieties of Russian millet, were grown side and side with German or Golden millet. The Russian varieties grew feebly, while the German millet grew very rapidly and sent out numerous broad leaves that entirely shaded the ground. Early in July, the bugs were found in large numbers on the Russian varieties, and in a short time every stalk was parched and dry. But when the bugs were most numerous on these varieties, no bugs could be found in the dense German millet growing beside it, nor did they go into it until the Meadow Fox-tail and other wild grasses gave out.

In order to have this shady condition of the surface of the ground, the soil must be in condition to grow vigorous crops. This in many cases, will

mean more manureing and less frequent cropping. It will also be found important to get the spring crops in as early as possible so they can get up and shade the ground before the young bugs hatch out.

NEAT FARMING.

The last of these remedies to which I wish to call especial attention, is neat farming. It is evident that all the chinch-bugs present during any season are descendants of those that lived over the preceeding winter in protected places. Such places are afforded wherever there is rubbish, under which they can crawl. Such rubbish usually consists of old corn stalks, stack bottoms, straw, old stubble, peices of boards and the like. So far as possible, everything of this sort that can give shelter to a bug, should be got together in a compost heap or piled and burned.

In recommending these remedies, I do not wish to be understood as ignoring the use of kerosene emulsion, coal tar, gas lime, or other destructive or preventive measures that have been found useful in combatting this great enemy to western agriculture. On the other hand, I wish to urge every farmer to try that remedy first, that may seem to him in his special case, to be most practical. I must say, however, that after experimenting with many remedied, I am of the opinion that those above mentioned, are the most practical ones to put into the hands of the farmer.

Unity of Action:—Whatever remedy is adopted for the destruction of the chinch bug, there must be a combined effort on the part of the people throughout an entire neighborhood, if anything like the best results are obtained. When this is done in a few localities, other neighborhoods, seeing the good results, will follow one after another, until the majority of the farmers of the state are in line, when we may hope to see laws enacted that shall convict a man of criminal negligence, who allows the chinch bugs on his premises to increase to injurious numbers, without doing all in his power to stamp out the monstrous evil before it spreads to injure the crops of his neighbors.

RECAPITULATION.

To recapitulate the foregoing, we would say,—use the plow freely whenever the bugs can be turned under in large numbers. Use a jointer on the plow and follow with the harrow and roller, if possible.

Fire may take the place of plowing, when stubble will thoroughly burn, where the bugs can be accumulated on small areas and covered with straw, or where bugs can be induced to gather under straw or other inflammable material late in the fall protection.

Extra pains should be taken to keep the soil rich and to sow early, thrifty growing varieties of those crops that the bugs attack.

Keep all rubbish picked up that can furnish winter protection for the bugs.

A REQUEST.

I wish to request the people of that state, to keep me informed in regard to injurious or beneficial insects that come under their observation. I shall always be glad to receive letters of inquiry concerning insect injuries and will in reply to such inquiries, recommend the best remedies known to me. It is through the personal correspondence of the people of the state, that I can best be informed as to the lines of experimental work that are most needed in my department. These queries and replies may be made personally or through the leading agricultural papers of the state.

If insects are sent, they should be put in a tight box. No holes are needed in the box to admit air.