The farmers of Missouri have suffered much from the ravages of insects in the past two years. The summers and winters have been favorable for the pests and the farmers have suffered the consequences. Corn growers have lost heavily due to the work of the ear-worm and other pests and the wheat growers have had fall armyworm, Hessian fly and chinch-bug to contend with. The one insect of vital importance to the farmers of Missouri this year, however, is the latter insect—the chinch-bug. It seems certain to destroy much of the wheat and a great deal of corn in the badly infested counties of the state this year. The loss to agriculture is sure to amount to millions of dollars in this state alone.

History and Distribution.

This pest is a native of the central states and has repeatedly caused trouble. Even the younger generations of farmers can recall former appearances of the chinch-bug. Like most of our insect pests it is destructive for a few years and then it seems to disappear for many years. In reality it is with us all the time though in reduced numbers and when a few seasons come which especially favor it, it becomes a scourge for three or four years. Seemingly the re-appearance of the pest as a scourge is associated with the periodical droughts. Past records also show that it tends to move eastward. It usually first appears as a pest in Kansas and in a year or two begins to attract attention in Missouri, and later in the states east to Ohio.

Records of Present Outbreak.

This is the third year the present outbreak has attracted attention in Missouri and even four years ago it was at work in Kansas. Two years ago it was scarce though in some cases it did injury to wheat in the west central counties of this state. Last year it had advanced across Missouri and was attracting attention in Illinois. The main injury last year was in the west central counties though some occurred in central and north central counties. The records received so
far this spring seem to show that the heavy loss again is to occur in west central and central Missouri though later it will probably be found troublesome over much of the wheat belt of the state.

*Development and Life Cycle.*

The chinch-bug lives through the winter as the mature insect in open fields and meadows which are heavily covered with sod and trash, in woods under the leaves, in corn shocks, in straw, weedy fence rows and other protected places. With a mild winter like the past, practically all of the chinch-bugs live through and are ready to fly in search of food in early spring. They usually first attack wheat though not infrequently they will injure the early corn. These winter-over adults suck sap from the plants for a time and then begin to lay small eggs at the base of wheat plants and from these hatch small active red bugs which also begin sucking sap. As a rule, these young bugs are just about mature when the wheat is cut and being deprived of the sap of wheat plants, they move on foot to corn fields, meadows and other growing crops. Those which reach corn soon complete their growth and lay eggs for a second brood of young which feed on the sap of corn and mature and later go into winter quarters.

*What Can Be Done Now?*

The discouraging part of the whole chinch-bug situation at this time is the fact that the farmer is almost helpless and must stand by and see the pest destroy his wheat. An insect scourge like this is represented by millions and millions of individuals scattered over thousands of acres and any attempt to spray or apply other materials artificially for the destruction of such a pest is out of the question. When they are found collected together in armies as during the mid-summer migration or while in winter quarters we can hope to do something but at this season little can be done.

Some recommend the use of certain crops as cane, clover, flax, etc., for the purpose of repelling the bugs or killing them when they feed on the sap of such plants. These are largely notions and will help but little if any. The chinch-bug will not feed on clover and other legumes but will attack wheat, timothy and other food plants which may be growing with clover. There are a number of plants which are not attacked by the chinch-bug but we have no records to show that such plants will repel them. The chinch-bug is a lover of dry sunny weather and any crop which covers the ground and keeps it shady and moist will prove unfavorable for the bug. Cowpeas planted in corn may help some in this way.

*Chinch-Bug Disease.*

A number of years ago when out-breaks of chinch-bug occurred throughout this section of the country a parasitic plant which produces the characteristic chinch-bug disease was heralded as a sure remedy for this scourge. In fact a number of the states did considerable work growing and distributing it to various sections of the country. Since more careful observations and experiments have been carried on, it has been found that the disease is carried over as spores in all soils and the artificial distribution of a few dozen diseased bugs does not help to increase the number of spores in any particular wheat field.
On this account any effort to grow and distribute it is simply time and energy wasted. The parasitic plant develops and attacks the chinch-bug only under certain definite favorable conditions and it is impossible for man to provide these conditions out in the field and consequently the spores which he scatters artificially will simply remain dormant the same as those already in the soil until nature provides the proper growing conditions for them. Whenever those conditions are provided, the spores already present in all soils will begin to sprout and attack the chinch-bugs. One can provide the necessary artificial conditions by enclosing chinch-bugs in a tight jar or can and cause the disease to begin its work, but as soon as these are spread to the open fields the spores again become dormant until the conditions throughout the field are proper for them to continue to grow. A number of samples of chinch-bugs, which, within the last two weeks, have been received at the office of the Experiment Station, were enclosed in tight cans and bottles and the disease was found on the bugs. Small amounts of soil and wheat were enclosed in the containers along with the bugs and the temperature and moisture inside was right so that the dormant spores in the enclosed soil developed and began attacking the chinch-bugs. Under these conditions it is absolutely futile for any farmer to build up any great hopes on the chinch-bug disease.

This disease did not help to check the pest during the past two summers but it will probably help some this summer especially if conditions are right, for the chinch-bug scourge will most certainly reach its climax of development in Missouri this year and begin to decline and that is the time this disease works to best advantage.

**Barriers.**

The latter part of June or early in July the chinch-bugs are obliged to search for a new supply of food and as most of them are yet without wings they migrate on foot, so that barriers placed around the infested fields help greatly. There are two good types of barriers, the dust and the oil or tar barriers. The aim is to destroy as many of the bugs of the first brood as possible and prevent them from getting into other crops to rear the second brood which lives through the winter.

*Dust Barriers.*—The dust barriers are very effective and easily maintained so long as rain does not interfere. The plan is to keep a supply of fine, dry, hot dust over which the bugs attempt to crawl during the hot part of the day. The heat destroys many and the fine dust closes the breathing pores and smothers those not overcome by the heat.

A dust barrier can be made by plowing a strip ten or fifteen feet wide and thoroughly working it until a fine dust mulch is formed. It is best to plow the strip before the ground gets too dry and hard and then be ready to work it into a fine dust when the bugs begin to migrate. During the migration period, which may last from one to two weeks, it is necessary that a weighted brush, harrow or other device be dragged back and forth over the dust strip to keep the dust stirred up from about ten o'clock until four in the afternoon when the bugs are most active.
Another simple dust barrier is made by plowing a deep ditch throwing the dirt both ways and then drag a log back and forth so as to produce a bed of fine dust in the bottom. This makes an excellent barrier and few bugs will cross it, if the log is dragged back and forth during the hot part of the day.

Oil or Tar Barriers.—Dust barriers are all that we need during dry weather but in case of rain we must establish an oil or tar barrier. A thick, viscid road oil similar to No. 7 of the Standard Oil Company gives even better results than the tar. Before applying the oil a low well packed ridge should be made. Then by using an ordinary spring-ling can with the sprinkler removed, or better still by attaching a hose to the barrel of oil one can run a narrow line of the oil along the ridge. This line must be kept fresh by adding more oil from time to time. At first it may be necessary to apply the oil twice a day but later only once in two or three days. The line of oil should not be more than an inch wide. Post holes every rod or so on the side of the line next to the infested field will help to trap the swarms of migrating bugs, where they can be killed by means of a little coal oil. A mile of this type of barrier can be maintained throughout the migration period for less than $5.00. A barrel of this will cost about $3.00 and every farmer should have a barrel of it on hand. The oil or tar barrier repels the bugs and as they run along the line they tumble into the post holes.

Winter Burning.

If farmers will co-operate in fighting the bugs with the barriers during the summer, few will succeed in reaching corn or other crops and those can be killed by sprinkling them with strong soap suds or tobacco tea or by burning with a flame. But where careful summer work is not done swarms of bugs will be collecting during the fall in meadows and pastures in bunch grass and other grasses and sedges, under leaves and other protection. All such harboring places should be burned over in the early winter when it is dry and the wind is not too strong. This does away with the swarms which fly to wheat in the spring.

Co-operation.

The farmers in the chinch-bug sections cannot hope to check the ravages of the pest until they unite and co-operate in fighting the pest. The pest migrates on wing in the fall and in the spring so that farms completely freed from the pest will be overrun the following spring. Careful co-operation and an earnest effort to control the pest while migrating in mid-summer and when it is collected in winter quarters is necessary to prevent further damage next year. The losses of last year and the losses sure to occur again this year are certainly discouraging but they should help to spur on each and every farmer in the infested sections to do all in his power to prevent a repetition of such damage next year. The Missouri College of Agriculture, Columbia, Mo., will be glad to supply information and to assist in every way possible.