

AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
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DEPARTMENT OF ENTOMOLOGY

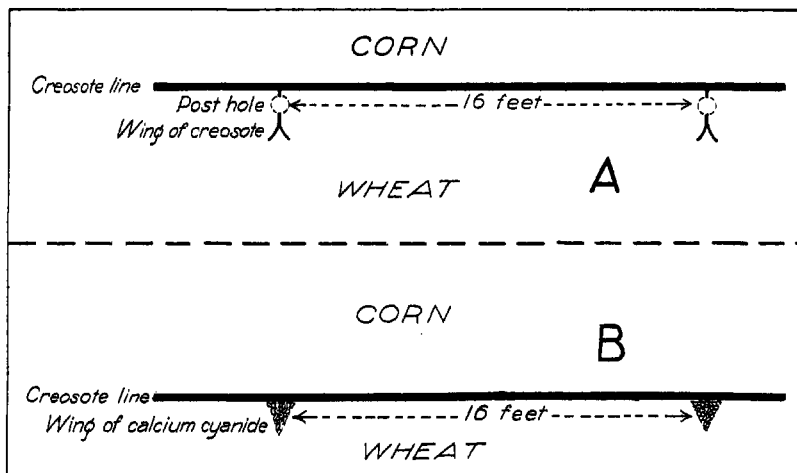


Fig. 1.—Diagrams showing types of creosote barriers. (A) Creosote-posthole barrier. (B) Creosote-cyanide barrier.

CHINCH BUG BARRIERS FOR KANSAS CONDITIONS¹

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The problem of chinch-bug control in corn and sorghum fields is entirely one of prevention. Once the bugs become established in these fields, there is no practical method of combating them. It is, therefore, essential that the bugs be stopped before they reach these fields. This can be done successfully and economically by the use of barriers between the small grain fields and the fields of row crops. Many types of barriers have been recommended for the control of the chinch bug in past years.

During the season of 1924, the Kansas Agricultural Experiment Station conducted a number of extensive barrier experiments. The

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results of these tests showed that the creosote-posthole barrier was the most practical and most efficient under all conditions encountered. Tar barriers also gave good protection, but were somewhat more expensive and required more time. (Fig. 1.) The dust barrier, because of certain limitations, should be recommended only as an emergency or secondary barrier. This circular describes the construction and operation of these barriers during the migration period of the young chinch bugs.

THE CREOSOTE BARRIER

Extensive experiments during the migration period of 1924 demonstrated that the creosote barrier was the most practical and efficient type of chinch bug barrier for Kansas conditions. The use of creosote as a barrier material was developed in Illinois, and the methods of using it in Kansas are, with slight modifications, similar to those recommended in that state.

The creosote barrier is made by plowing a furrow between the infested and noninfested fields, the dirt being thrown away from the former field. A line of creosote from one-half to three-fourths of an inch wide is then poured near the top of the ridge on the side nearest to the noninfested field. The creosote is best applied from a gallon bucket having an eight-penny nail hole in the center of the bottom. By using a long wire bail, the operator can walk along the barrier, directing the stream of creosote on the desired line. (Fig. 2)

Creosote can also be poured from a sprinkling can, the nozzle of which has been removed and the opening partially closed with a wooden plug. (Fig. 3.) This method, however, requires a little more time, since the operator has to stoop over while pouring the material. In using creosote, it is necessary that the line be renewed daily during the period of heaviest migration. Since the bugs usually do not begin moving until about 3 o'clock in the afternoon, it is not necessary to apply the creosote until shortly before the daily migration starts. Each application should be made along the same line, since the efficiency of the barrier increases with the number of applications.

Creosote is merely a repellent agent and does not kill the insects. The bugs, on approaching the barrier, are repelled by the odor, with the result that they turn and follow along the line. Two methods may be used for killing the bugs as they travel along the barrier. The most effective one is to dig postholes at intervals of

about a rod. These holes should be about 12 inches deep and the rims flared somewhat. Wings of creosote should extend at right angles out past the holes two or three feet in order to guide the bugs into the trap, (Figs. 1A and 2.) The bugs are killed by



FIG. 2.—A creosote-posthole barrier showing method of pouring creosote with a long-handled gallon bucket.

placing from one-fourth to one-half of an ounce of calcium cyanide in each hole daily.

The other method of destroying the bugs is to place wings or piles of flake calcium cyanide at right angles to the barrier line at intervals of 12 to 16 feet. These wings of cyanide should be triangular

in shape, the base resting on the line of creosote. (Fig. 1B.) From one to two ounces of cyanide should be used for each wing and must be renewed daily when the migration starts. This method gives good control when the bugs are small and when there is plenty of soil moisture and little wind, but is not satisfactory when there is a strong breeze or low humidity. This difficulty may be overcome to some extent by packing and sprinkling the soil before placing the cyanide.

Data on the cost of the creosote-posthole barrier were obtained in connection with the experimental work, and it was found that an efficient barrier could be constructed and maintained during a migration period of 10 days for approximately \$60 per mile. Under ordinary circumstances, a barrel of creosote is sufficient for each one-half mile of barrier. The cost per mile of the creosote-posthole barrier for a 10-day period in 1924 is summarized as follows:

Creosote, 2 barrels @ \$10 a barrel.....	\$20.00
Labor, 3 hours a day @ 25 cents an hour.....	7.50
Calcium cyanide, 100 pounds @ 18 cents a pound.....	18.00
Miscellaneous, plowing furrow, digging postholes, etc.....	12.00
Total	\$57.50

Where wings of calcium cyanide are substituted for the postholes, the expense will be somewhat increased and the efficiency reduced. The minimum cost of constructing and operating one mile of this type of barrier for 10 days in 1924 is itemized as follows:

Creosote, 2 barrels @ \$10 a barrel.....	\$20.00
Labor, 4 hours a day @ 25 cents an hour.....	10.00
Calcium cyanide, 210 pounds @ 18 cents a pound.....	37.80
Miscellaneous, plowing furrow, etc.....	7.00
Total	\$74.80

The efficiency of the creosote barrier with either postholes or wings of cyanide was demonstrated by the fact that not a single hill of corn or sorghums was killed in the barrier-protected fields, while on many farms in the vicinity, from 40 to 100 acres of unprotected row crops were destroyed. Careful counts and estimates showed that at no time did more than 1 per cent of the migrating bugs cross the barrier, and during most of the period less than one-tenth of 1 per cent succeeded in crossing. Some idea of the number of bugs along this barrier is indicated by the fact that more than 400,000 bugs were caught in a single small trap between two wings of cyanide during one afternoon. During the height of the migration, the bugs were passing a given point on the barrier at the rate of 3,800 per minute.

The advantages of the creosote-posthole barrier may be summarized as follows: (1) It is effective under all conditions and the cost is not prohibitive. (2) The labor item is reduced to a minimum. (3) Creosote will remain effective for a period of 24 hours, thus holding any migration that may take place during the morning. (4) Calcium cyanide in the postholes takes care of the prob-



FIG. 3.—Tar barrier showing method of pouring tar or creosote from a sprinkling can.

lem of destroying the bugs after they are trapped. (5) Creosote comes in convenient containers and is easily handled. (6) Creosote has many uses on the farm, so any material not used in chinch-bug control is not wasted.

THE TAR BARRIER

Tar has been used for many years as a barrier material in Kansas. It has always given very good control, and, during the past season, over a mile of this barrier was constructed and operated on the college farm. With the exception that the tar should be placed

on level, compact soil instead of on a furrow ridge, the barrier is essentially the same as the creosote barrier. (Fig. 3.) While this type of barrier is practically as efficient as the creosote one, it was found that it required about twice as much material. The effectiveness of this type of barrier depends to a large extent on its sticky nature and it, therefore, must be renewed more frequently. This is particularly true in the case of the bugs migrating in the morning. The fact that this barrier is on level ground, necessitates careful watching to prevent its being bridged over. Where creosote is not available, however, it is advisable to resort to the use of tar.

Data on the cost of constructing and operating the tar barrier show that it is a little more expensive than the creosote-posthole barrier. The following summary gives the cost of a mile of tar barrier for a period of 10 days:

Tar, 200 gallons @ 10 cents a gallon.....	\$20.00
Labor, 5 hours a day @ 25 cents an hour.....	12.50
Calcium cyanide, 100 pounds @ 18 cents a pound.....	18.00
Miscellaneous: Constructing barrier, digging posthole, etc.....	12.00
Total	\$62.50

THE DUST BARRIER

The dust barrier is one of the oldest methods recommended for checking the migration of chinch bugs. Its use, however, has been limited to dry weather and to soils which produce a fine dust. A light rain ruins a dust barrier, and the number of bugs that get across before it can be renewed may be sufficient to cause serious damage. This type of barrier also requires considerable labor in its construction and operation. Dust barriers were constructed at the college farm on two occasions during the past season and in both instances were rendered ineffective by rains within a few hours. In view of these facts, it is felt that the dust barrier should be recommended as a secondary measure, and that reliance should be placed on the creosote barrier.

Creosote suitable for chinch bug barriers may be obtained from the following companies: F. J. Lewis Manufacturing Company, Moline, Ill.; Pearson-Ferguson Company, 1402 West Ninth street, Kansas City, Mo.

Calcium cyanide is sold by: American Cyanamid Company, 1422 Saint Louis avenue, Kansas City, Mo.; Geo. C. Gordon Chemical Company, 1212-30 West Eighth street, Kansas City, Mo.; and the Pearson-Ferguson Company.

Tar may be obtained from almost any local gas plant.