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STOP CHINCH BUGS

***Build
Barriers***

To save your corn...

PREPARE IN ADVANCE— Watch grain fields for signs of infestation. Get the base of the barrier ready well before migration starts — 10 days to 2 weeks is not too early.

BE PROMPT— Complete the barrier as soon as the bugs start toward the corn—don't even let them get to the first row.

BE THORO— Remove all clods and trash. Fill up cracks that could act as tunnels. Make good traps. Don't let dead bugs fill postholes—keep them cleared out. Patrol and repair the barrier regularly. Don't slop creosote or waste toxic dust.

The protection a good barrier gives an acre of corn will more than pay for the cost of its construction and upkeep.

STOP CHINCH BUGS: Build Barriers

By G. C. DECKER, J. H. BIGGER, and H. B. PETTY¹

MILLIONS OF DOLLARS' worth of crops can be lost by Illinois farmers in years when chinch bug infestations are acute. Much of this loss is needless. The time to get these bugs is usually in late June and early July. This is when the hordes of first-generation bugs, hatched in fields of small grain and most of them still without wings, crawl to nearby cornfields.

Creosote barriers, built a short time before the migration of these wingless bugs begins and kept up as long as it continues, will keep the bugs out of the corn and guide them into traps. Once trapped, they are easy to kill. Toxic-dust barriers require no traps, for the dust will kill all bugs that come in contact with it. But no matter what material is used, a barrier must be well made and properly maintained if it is to do the job of killing the bugs.

While heavy infestations require a substantial type of barrier for control, light to moderate migrations can sometimes be checked by running lines of a repellent material on smooth ground, as described on page 14.

CREOSOTE-FURROW BARRIER

The creosote-furrow barrier has been used by Illinois farmers for the past twenty-five years and has proved its value in many outbreaks of chinch bugs. The foundation for the barrier is a furrow plowed across the line of travel. A line of creosote is run along the furrow ridge, and traps, consisting either of postholes (*Fig. 1*) or dust patches, are made at the base of the furrow slice.

Less than 1 percent of the bugs in an infested field will willingly cross this kind of barrier when it is well built and properly maintained. The smell of the creosote turns them back.

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Creosote-furrow barriers have proved their worth many times. A furrow is plowed across the line of travel and creosote run along the furrow ridge. The bugs are killed in posthole or toxic-dust traps. (Fig. 1)

Building the ridge. It is best to plow the furrow at least a week before migration is expected, so that the soil can settle.

The edge of the field, just outside the first corn row, is a good place for the furrow. Extend the furrow at each end of the field, or better still, curve it outward so as to turn the bugs away from the corn. Set the plow deep enough to make a ridge 6 or 8 inches high and throw the soil toward the corn.

Just before the bugs start to migrate, use a harrow or plank drag to smooth and pack the soil on the ridge. Remove all clods and trash. Finish where necessary with the back of a shovel or other appropriate tool. Give a narrow strip about 2 inches wide at the brow of the ridge special attention; it will be the base for the creosote line.

Making the traps. As previously stated, traps may be postholes or dust patches. If they are to be postholes, dig them at the base of the furrow slice. Their spacing and depth will depend on the abundance of the bugs and how rapidly they advance. It is

usually a good plan to start with holes about 2 rods apart and 15 to 18 inches deep. The holes must be flared at the top and the edges kept smooth and dusty.

If the traps are to be dinitro dust, make them *after* the creosote line has been run. Then sprinkle *irregular* patches of dust about 6 inches across and 2 rods apart beside the creosote line.

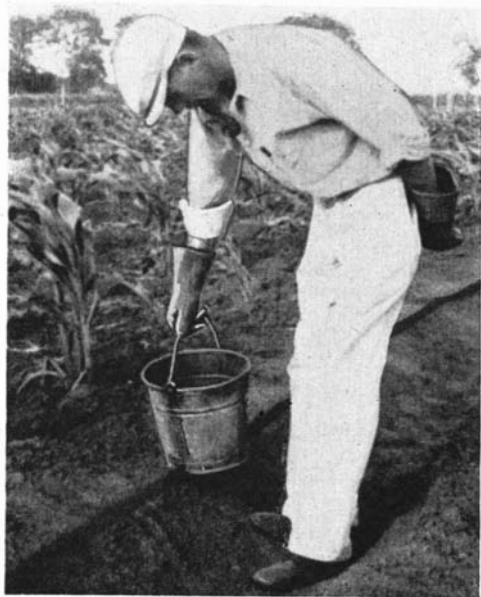
CAUTION: Don't spread the dust thick enough to make it a physical barrier to the bugs. Such an obstacle will merely stampe them across the creosote line.

Applying creosote. As soon as the chinch bugs begin to move to the corn, put the creosote on the previously prepared ridge.

To make a good applicator, punch a hole with a 6- or an 8-penny nail in the side of a 12- or 16-quart galvanized bucket. Place the hole about an inch from the bottom and under the point where the bail is attached (*Fig. 2*).

Make the line by running a stream of creosote on the previously prepared strip at the brow of the ridge. A line $\frac{1}{2}$ inch wide is sufficient. Curve the line down the ridge to the edge of the postholes and then back up to the brow of the ridge (*Fig. 1*). Be careful to keep the line straight and even. *Don't spill creosote on the bug side of the line. If any should be spilled, rebuild the affected portion of the line, digging out the dirt if necessary.*

Maintaining the line. The line of creosote usually needs to be renewed once a day as long as large numbers of bugs are on the move. When renewing it, be



A 12- or 16-quart galvanized bucket makes a good creosote applicator. (Fig. 2)

sure to run the new line directly on top of the old one. To prevent leaves and trash from acting as bridges for the bugs, remove such litter at least once a day. It may also be necessary to clean out the holes frequently.

During periods when the bugs are moving rapidly and the creosote is drying extremely fast, the line may have to be renewed more than once a day. Under these conditions it may also be desirable to dig more postholes.

Killing the bugs. Be sure to kill the bugs trapped in the postholes. You will get most of them by putting 1 or 2 tablespoonfuls of kerosene, calcium-cyanide flakes, or dinitro dust in the holes.

Since the dinitro dust used in dust traps kills the bugs, dust traps need only to be well kept up.

Creosote will burn the skin. Creosote is a powerful irritant which will burn or blister. During each chinch bug outbreak, a number of men have received painful and sometimes serious creosote burns.

When handling creosote, wear rubber gloves or protect your skin with a film of oil or grease. Always open creosote barrels or containers with great caution.

CREOSOTED PAPER-FENCE BARRIER

The paper-fence barrier is a 4-inch strip of creosote-soaked paper placed in the ground so as to leave 2 inches above and 2 inches below the surface (*Figs. 3 and 6*).

This barrier is probably the cheapest and the most effective of the creosote barriers, requiring only about half as much creosote as the creosote furrow. It is less easily bridged by straws, leaves, and other litter than the furrow and requires much less attention and labor. Moreover, the part of the paper that projects above the ground forms a physical barrier which tends to keep stampeded bugs from crossing the line and which prevents gusts of wind from carrying them over it.

Kinds of paper to use. Four kinds of paper can be used for this barrier: red rosin paper (30- to 40-pound); chipboard or strawboard (20- to 40-point thickness); single-faced corrugated paper (with insoluble glue); or tarred felt (15-pound, not asphalt



The paper fence is the most effective, least expensive, and most easily maintained creosote barrier. A 4-inch strip of paper treated with creosote and set on the furrow ridge stops the bugs. Note that the traps are postholes, but dust patches might have been used. (Fig. 3)

treated). Altho not necessarily the best choice, red rosin paper has the advantage of being available at most lumber yards.

Cutting and soaking paper. Cut the rolls of paper into 4-inch strips with a power saw, a hand saw, or a special paper cutter. Each roll as purchased will make nine 4-inch rolls.



The flared and dusted edge of this posthole and the lines of creosote to direct the bugs into it make this a good trap. (Fig. 4)

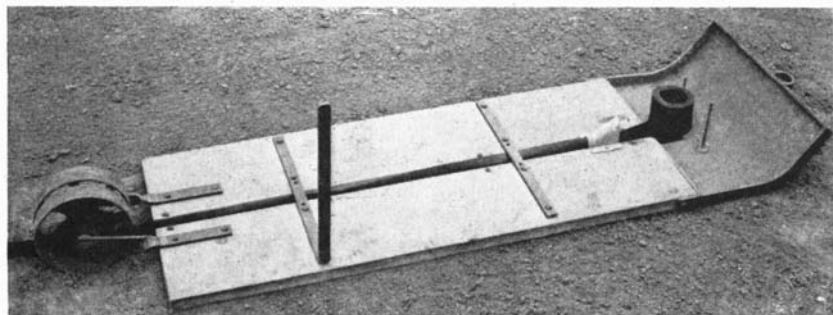
Creosote that meets the specifications of the American Wood Preservers' Association is best for chinch bug barriers. About 50 gallons are needed for an 80-rod line. Your farm adviser can tell you where to get it.

Put the 4-inch rolls in a bucket, barrel, or tub. Cover them with creosote and let them soak for about 24 hours. Then hang them above the container in which they were soaked so that the excess creosote can drain off. Let them drain 1 to 4 hours.

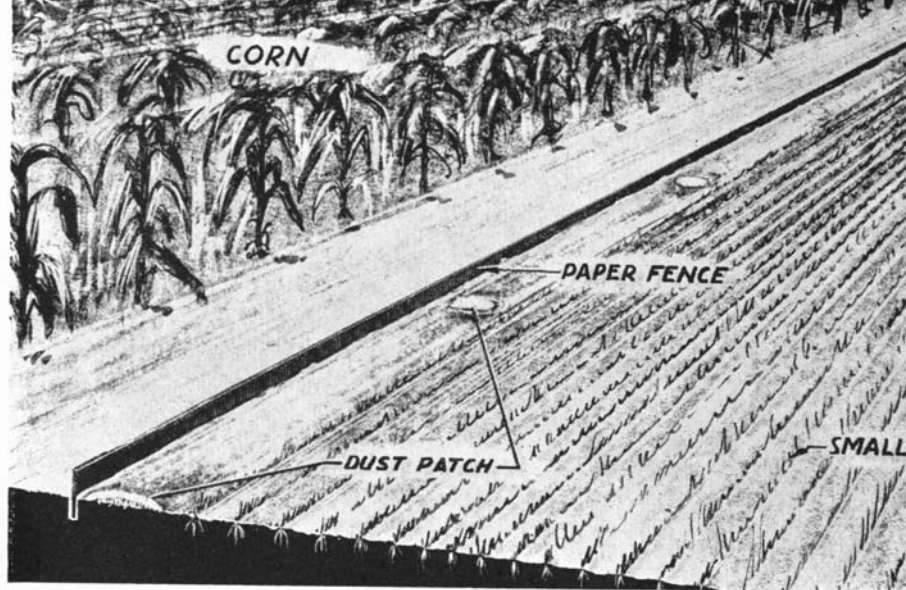
Building the paper fence. First clear all vegetation and trash from a 3- or 4-foot strip of ground between the infested grain and the corn. Then till and level it.

The paper fence itself may be built either on a ridge or on clean, level ground. Ideally, it should be built on a ridge (*Fig. 3*); but making a ridge requires considerable labor. Also, if the soil is not packed firmly and kept the same height on both sides of the paper, the fence may collapse. Therefore, under most circumstances it is probably best to put the fence on level ground (*Fig. 6*).

How to put up the fence will depend on the tools at hand and the nature of the soil. In Iowa, farmers are enthusiastic about homemade machines (*Fig. 5*) for setting the paper in the ground and are making extensive use of them.



This paper-laying machine can be made at home. With it and a team or tractor, two men can lay 80 to 160 rods of barrier an hour in almost any reasonably well-prepared soil. (*Designed by Iowa Station*) (Fig. 5)



This is the most practical paper-fence barrier. The treated paper is set in a narrow trench on clean, level ground. Dinitro dust patches make the best traps because the dust kills all the bugs that touch it. (Fig. 6)

If a paper-laying machine is not available, use either a wheel-hoe, a garden cultivator, a corn cultivator with all shovels except one removed, or a small plow to open a narrow trench down the center of the previously prepared strip of soil. Unroll the paper and put it upright in the trench. Then pack the soil firmly and evenly on both sides of the paper, leaving 2 inches of paper above and 2 below the ground. Firm and even packing keeps the fence from collapsing; therefore variations in the height and firmness of the soil must be avoided.

(It will be easier to lay the paper if two men do it, one unrolling the paper in 40- to 50-foot stretches and holding it in place while the other rapidly but carefully packs the soil on either side of it.)

Renewing the creosote. Once in place, the paper, without further treatment, should repel the bugs for two or three days, the exact length of time depending on prevailing temperatures. If the weather is very hot, put a little creosote on the paper every day.

Apply the fresh coat of creosote to the paper with a bucket in which a hole has been punched (*see page 5*) or with a device

like that illustrated in Fig. 7. Put it near the top edge, being sure that the creosote does not dribble on the soil on the bug side of the fence, for the spilled creosote will stampede the bugs and reduce the efficiency of the barrier. The creosote can be applied on either side of the fence. An advantage in applying it on the corn side is that there will then be no spilled creosote on the other side to stampede the bugs.

One or two gallons of creosote is enough to recoat a quarter-mile of paper fence.

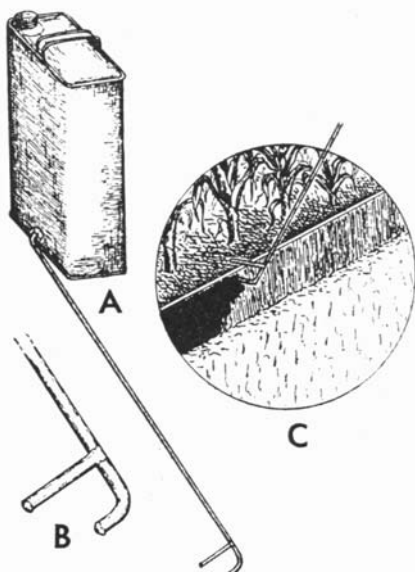
Postholes or dinitro dust patches (Figs. 4 and 6).

These are just as necessary to an effective paper-fence barrier as to a creosote-furrow barrier. (For directions for making them see pages 4 and 5.)

TOXIC-DUST BARRIERS

The toxic-dust barrier is the newest development in chinch bug control (Fig. 8). It consists of a continuous band or line of dust, made by mixing rather small quantities of a very powerful insecticide, usually dinitro dust, with a suitable carrier such as pyrophyllite. Its success depends not on its ability to repel bugs but on its poisonous properties. The poison is so strong that it will kill all chinch bugs coming in contact with it.

Dust barriers have increased rapidly in popularity since first used in Illinois in 1940. They are great savers of time and effort. The preparation of the base takes less time and care than does that of a ridge; they can be repaired quickly, and they are practically sure to destroy the bugs.



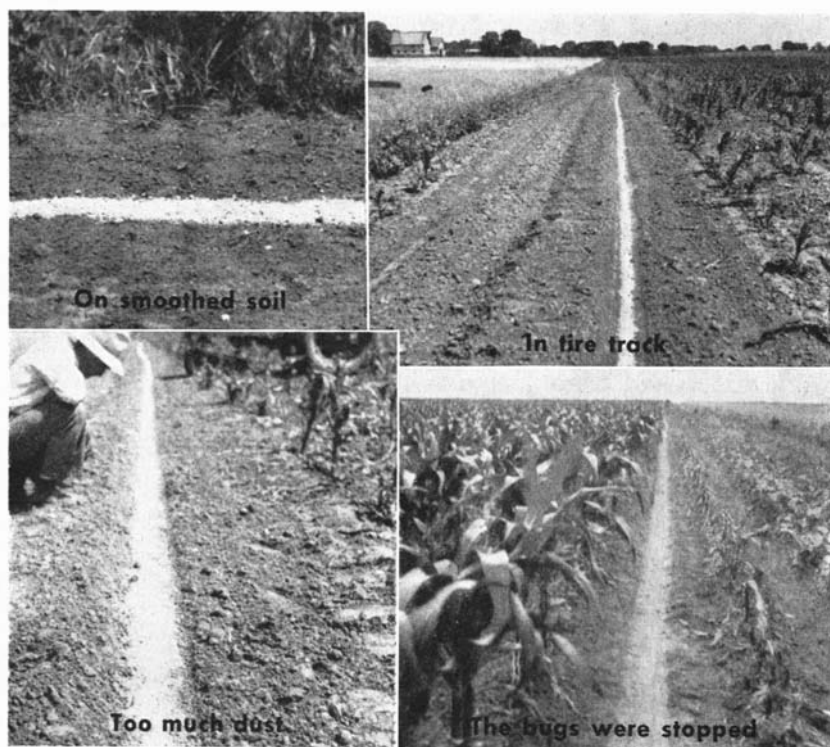
A handy device for recoating a paper-fence barrier: (A) flexible copper tube attached to a tin can; (B) guide attachment at end of tube; (C) the device in use. (Courtesy Iowa Station) (Fig. 7)

Because they do kill the bugs, dinitro barriers have an enormous advantage over other barriers. Faulty use of postholes in creosote barriers or failure to use a material that will kill the bugs has often let millions of them live long enough to develop wings and fly into the corn.

Dust barriers, however, have two disadvantages. The materials cost more than those for creosote barriers, and moderate rains or winds will damage or even completely destroy them.

Preparing to lay the barrier. For the most durable and effective barrier, lay the dust line in a groove $\frac{1}{2}$ inch deep on the previously tilled and smoothed ground between the corn and the small grain.

Make sure the groove is shallow. Dust lines laid in deep depressions may be covered by drifting soil or washed out by



Dinitro dust makes the best barrier. It saves time and labor and kills all the bugs that touch it. The line should be light and continuous and laid in a very shallow groove on smooth soil.

(Fig. 8)

light to moderate showers. When laid on smooth ground or ridges, they may be blown away in a short time.

In soft or somewhat loose soil a suitable groove for the dust line can be made by dragging a partly filled 10-gallon milk can or other suitable object the length of the strip. On firm soil, drive a truck or a tractor with smooth tires the length of the strip, using the tire track for the dust line. Remove all clods, trash, sticks, and leaves from the groove before laying the dust.

Laying the barrier. It is best to apply the dust when the soil is dry. Run a light, continuous line of dust in the groove, using any means at hand. One-fourth to $\frac{1}{2}$ pound of dust to a rod of line is usually enough. Be careful to see that the line is unbroken—it need not be straight nor uniform in width and thickness.

Since the amount of dust needed per rod will vary with the weather and the number of bugs, the first applications must be light. Otherwise it will take more than 100 pounds of dust (amount usually allowed) to build and maintain an 80-rod barrier, for a wind or rain storm may destroy the line any time.

Maintaining the barrier. Patrol the barrier daily, removing sticks, leaves, and other materials that bridge it and patching any holes.

How to make a dust applicator. To make the best and handiest applicator, cut a hole about $1\frac{1}{4}$ to $1\frac{1}{2}$ inches in diameter in the center of the bottom of a gallon oil can. Solder a tube of sheet metal into this hole (*Fig. 9*). Make an agitator having a sharp loop and a crank-like handle. Insert the agitator in such a way that the loop rests on the bottom of the can and the handle will rotate. Now mount the can on runners. When using, keep spout close to the ground so the wind will not blow the dust.

To make a usable applicator, remove the valve from a horn seeder and tie the horn securely into the end of the bag. When using, keep the spout near the ground and the bag tightly closed. Take special care to protect yourself from contact with excessive amounts of dust (*see next page*).

(To convert tennis court markers into fairly successful dust applicators, equip them with larger wheels to get the feed a little farther above the ground. Also put some kind of shield on them to keep the wheels from throwing clods over the line.)

Several less satisfactory applicators have been tried, such as sprinkling cans, garden seeders, or fertilizer attachments on corn planters, but they are not recommended. A simple, efficient applicator is greatly needed. The farmer who develops one will render his fellows a valuable service.)

Do not inhale dinitro dust. Dinitro dust will injure the lungs. *If it has to be handled frequently*, protect your lungs by wearing a regular dust respirator such as grain-elevator men use, or make a mask of a damp sponge. If neither is at hand, tie a handkerchief over your nose and mouth. Water will remove the yellow stain it leaves, but it is best not to get the dust on the skin, for it is likely to cause irritation.

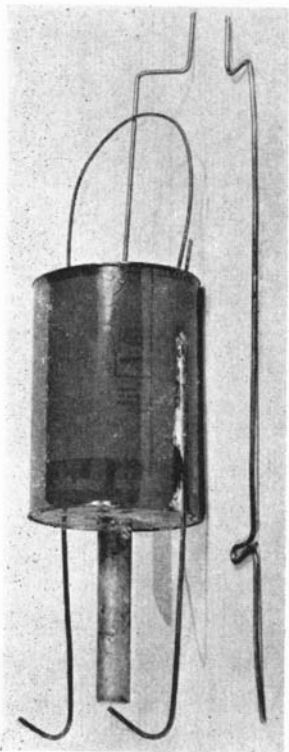
If this dust is handled only occasionally, the use of ordinary care not to breathe much of it will probably be protection enough.

Keep animals away from dinitro dust. Dinitro dust will poison animals. Keep them away from it. Excessive amounts of it in barriers will harm stock which may accidentally get to it.

EMERGENCY BARRIERS

If chinch bugs are not discovered until they are on the move, it may be necessary to resort to a temporary type of barrier that can be made quickly. There are two kinds of such barriers—the common dust barrier and a line of some material that will turn the bugs back.

Old-fashioned dust barrier. In dry weather and in most soils the old-fashioned dust barrier will stop chinch bugs. It can be



A good dust applicator can be made from a gallon oil can. (For directions, see page 12). (Fig. 9)

built quickly in dry ground. Simply plow a dead furrow, throwing the soil both ways. Then keep dragging a log, a partly filled milk can, or a plank back and forth in the furrow to maintain a very fine, deep dust mulch on the sides and bottom of the furrow.

The success of the dust barrier depends on this hot dry mulch. The bugs are so dried in it that they die, or they are killed by the grinding action of the drag.

When properly kept up, these dust barriers are almost impassable, but they have two serious drawbacks: (1) they need almost constant attention, and (2) light showers may destroy their effectiveness, while after heavy or persistent rains several acres of corn may be lost before a mulch can be worked up again.

Repellent lines. Lines of coal tar, gas tar, road oil, or creosote laid on the ground will serve as temporary barriers while better and more permanent barriers are being built. To make them, simply run a line of the material on perfectly smooth ground along the edge of a road, a lane, or the edge of a field.

If chinch bugs are moving only in light or moderately heavy numbers, a line of one of the above materials may be enough to stop them.

WORTHLESS BARRIERS

Narrow strips of soybeans or other non-grass crops, sometimes regarded as chinch bug barriers, will not stop or control migrations. The bugs will move thru these strips almost as fast as they would travel over bare ground.

Neither will cutting two or more rows of standing corn and piling the fodder in a continuous windrow along the edge of the field block or trap the bugs. They do not gather there and die, tho the cast skins under the fodder are sometimes mistaken for dead bugs.

Likewise, lines of kerosene, crankcase oil, or salt will not hinder migrations of these bugs.

SPRAYING AND DUSTING PLANTS

Spraying is not practical on a field scale since it would cost from \$20 to \$30 an acre. But where large numbers of bugs are concentrated on the outer rows of corn (*see Fig. 10*) it may be worth while to use a spray.

A heavy infestation like this can be prevented. If it does occur, the corn can often be saved by immediately spraying or dusting the infested plants. (Fig. 10)



To make a good spray, dissolve 1 ounce of any good laundry soap in a gallon of water and add $\frac{1}{2}$ ounce of 40-percent nicotine sulfate. For larger quantities, dissolve 3 pounds of laundry or potash fish-oil soap in each 50 gallons of water and add 1 quart of 40-percent nicotine sulfate. All bugs wet by this spray will be killed. But the corn will not be hurt unless the spray is applied in considerable amounts to the whorl of the plant (*the upper part of the plant where the leaves are unfolding*).

Poison dusts that kill by contact may sometimes be used instead of sprays. A dust containing 2.4 percent of nicotine will not injure the plants. It can be bought ready to use or made at home. To prepare it, put 47 pounds of hydrated lime and 3 pounds of 40-percent nicotine sulfate in a container that can be closed tightly. Close the container and mix the dust thoroly. Keep tightly covered when not in use.

Dinitro dust can also be used. Apply it lightly to the lower parts of the plant. Do not let it get on the upper and more tender leaves. If applied according to these directions, it will kill most of the chinch bugs without causing serious injury to the plants.





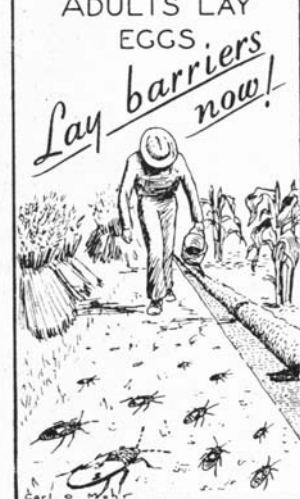




New dust being tested. Preliminary experiments with a new insecticide containing 10-percent ground sabadilla seed¹ have proved very successful, tho the experiments have not yet gone far enough to warrant recommending it for general use. The results do, however, justify recommending that hybrid-seed producers and other growers in a position to use it test it on a rather wide scale.

The dust appears to be highly toxic to chinch bugs at every stage of their development, and there is thus far no evidence that it damages the corn. The demand for such an insecticide is widespread.

Like dinitro dust, sabadilla dust is an irritant which must be handled carefully. Follow the directions given on page 13 for dinitro dust.

¹The names of dealers who can supply the dust will be furnished upon request. Address ILLINOIS NATURAL HISTORY SURVEY, Urbana.

WHERE TO LOOK FOR CHINCH BUGS

<p>WINTER MONTHS ADULT BUGS HIBERNATE IN BUNCHGRASS AND SIMILAR COVER ALONG SOUTH SIDES OF WOODS AND HEDGES AND SOUTH SLOPES</p> 	<p>APRIL BUGS FLY TO SMALL GRAIN</p> 	<p>MAY BUGS LAY EGGS • FIRST BROOD YOUNG HATCH</p> 	<p>JUNE YOUNG AND OLD IN SMALL GRAIN • SOME MOVE TO CORN • OLD BUGS DIE</p> 	
<p>JULY FIRST BROOD ADULTS & YOUNG MOVE TO CORN • ADULTS LAY EGGS</p> <p><i>Lay barriers now!</i></p> 	<p>AUG SECOND BROOD YOUNG AND ADULTS IN CORN</p> 	<p>SEPT SECOND BROOD ADULTS BEGIN TO FLY TO WINTER QUARTERS</p> <p>SOME YOUNG BUGS STILL IN CORN</p> 	<p>OCT MAIN MIGRATION TO WINTER QUARTERS</p> 	<p>NOV BUGS IN WINTER QUARTERS</p> 

Only when chinch bugs are migrating from small grain can enough be killed or diverted to help save a threatened corn crop