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FACT SHEET

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INSECT AND MITE PESTS OF FIELD CORN

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Corn acreage in Texas is increasing. Irrigated corn acreage increased from 602,000 acres in 1966 to more than 1,100,000 acres in 1975. Therefore, corn insect pest control is becoming increasingly important.

With the expansion of an agricultural crop, insect and mite pests and their damage generally also increase. Although use of pesticides cannot be eliminated, every effort must be made to use them in an economical and scientifically sound manner. Along with using the lowest possible effective dosages of pesticides, and using them only when needed, other important control procedures include various cultural practices, biological control methods and planting resistant varieties. The development of resistant or tolerant varieties may hold the greatest promise for corn insect control in the future. In any case, an effective pest control program is an integrated program based on cultural and mechanical practices as well as the use of pesticides.

Numerous arthropods (insects and mites), both harmful and beneficial, are commonly found in corn. But only the southwestern corn borer and certain spider mites (primarily the Banks grass mite) are of major concern at this time.

Southwestern Corn Borer

The southwestern corn borer was first found in the United States in 1913. It spread north and east from Mexico into the Texas Panhandle, and was established in Colorado, Kansas and Oklahoma by 1931. It has become the major pest in irrigated corn growing regions of Texas, especially in the High Plains.

Description

The eggs are elliptical to oval, flattened, slightly convex on the upper surface, and translucent white when first laid. They are quite small and average 1.2 to 1.6 mm in length by 0.8 to 1 mm in width. The borer lays its eggs in chains or groups that overlap much like fish scales or roof shingles. Eggs may be found in groups of two to 50 or more, but generally average four or five per group. The color and appearance of the eggs change as the incubation period progresses. Three parallel rows of reddish-orange lines appear prior to hatching, and the color changes to yellow, orange-yellow or reddish-brown before hatching.

After the eggs hatch, the small larvae closely resemble the full grown "worm," which is from 1 to 1¼ inches long and dull white or yellowish-white in color. The larvae also have a regular pattern of dark brown polka dots which generally disappears in the creamy yellow overwintering form.

The mahogany brown pupae are slightly shorter than the larvae. They are normally found within the corn stalk during the summer, and in the crown of the plant just below the soil surface in the spring.

The moths are from 3/5 to 3/4 inch long with a wing spread of 1¼ inches. They are solid white to pale yellow and fold the wings about the body when at rest. A characteristic snout extends from the head.

Life Cycle

The southwestern corn borer overwinters as a full-grown larvae and usually hibernates at or near the base of the plant crown. The hibernation site is in a "tunneled out" area within the plant. The upper part of the tunnel is closed with a tough silken plug for protection. In the spring the borer extends its tunnel to the outer wall of the crown, leaving a thin covering which the moth can easily push aside. Pupation then follows, and the moth soon emerges from the stub of the stalk. Mating occurs within a couple of days and eggs are glued to the plant, usually on the top side of a leaf about half way up the stalk. The eggs hatch within a few days, depending on the temperature.

Developmental Periods

Stage	Average no. of days
Egg	5
Larva	25
Pupa	10
Adult	5

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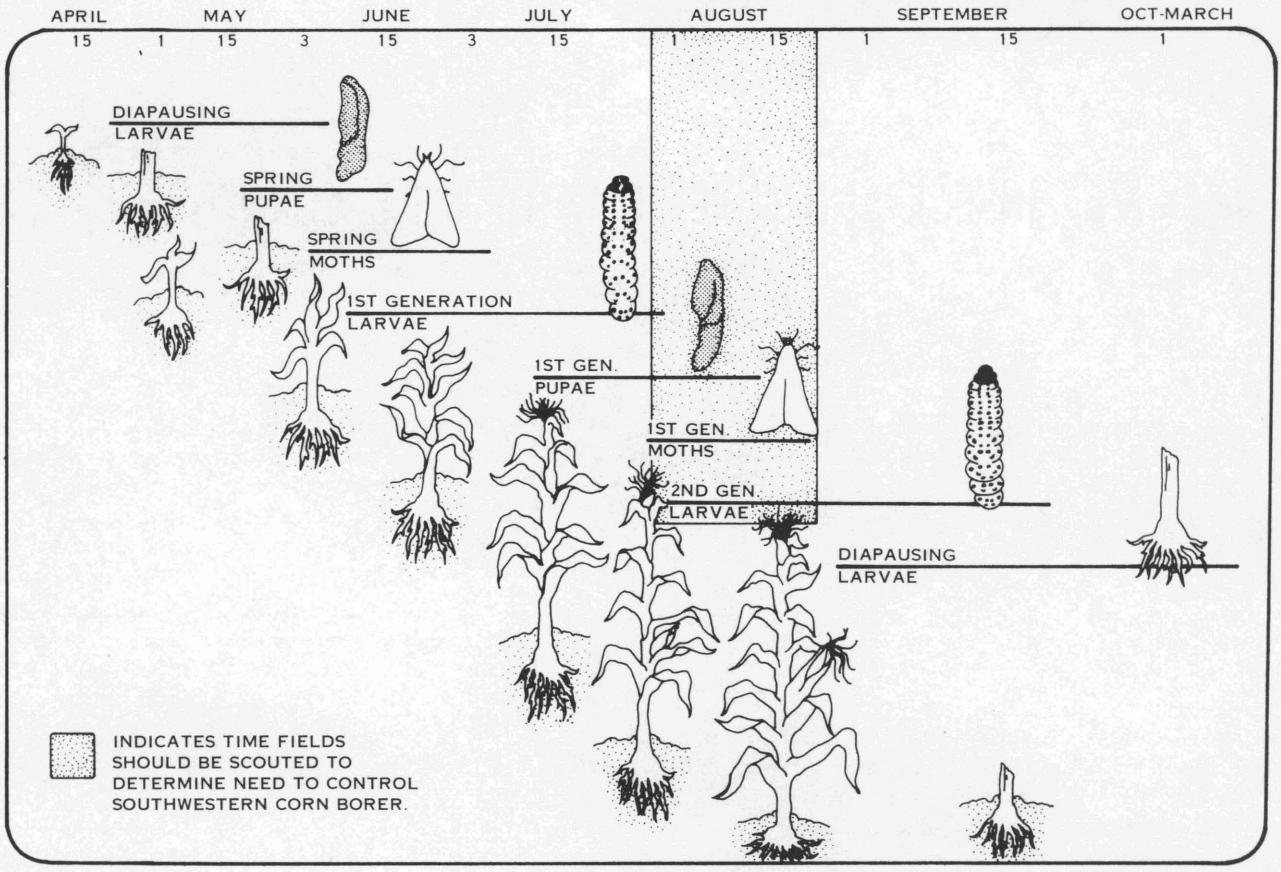
SEASONAL HISTORY OF THE SOUTHWESTERN CORN BORER ON TEXAS HIGH PLAINS



Control

Cultural practices play a critical role in managing the southwestern corn borer. Fall or winter stalk destruction through double disking, chiseling and deep breaking destroys the plant crown and increases overwintering larval mortality.

When stalks are grazed out, some type of cultivation is still necessary. The earlier this is done in the winter, the more adverse effect it will have on overwintering borer populations. Tilling as late as February on the High Plains will greatly reduce overwintering populations. To obtain maximum benefits, however, tilling should be done on an areawide basis to reduce the total population in an area and to counteract infestations resulting from moth migration. Corn planted early is less susceptible to plant lodging caused by the corn borer, and often escapes heavy borer populations. A reasonable plant population (22,000 to 24,000/acre) to ensure large, healthy stalks, along with proper fertilization and adequate irrigation, will help prevent lodging of borer-infested stalks.

Crop rotation, the use of early-maturing varieties, and early harvest with equipment designed to pick up lodged stalks are the most effective practices in avoiding yield losses from the borer. In fields which suffer fairly heavy infestations, lodging and yield loss can be avoided by early harvest. Most lodging occurs when harvest is delayed until late in the fall and infested plants are subjected to wind and rain that eventually cause the stalks to break.

Several beneficial insects, including predators and parasites, play an important part in controlling southwestern corn borer populations. Some of the more common predators include both the larval and adult stages of the lady beetle, the larvae of the green and brown lacewing, the flower bug, several members of the assassin bug group and a large number of spiders. Little information is available on the various important parasites, although one of the *Trichogramma* wasps does attack corn borer eggs. Dipterous "scavenger" larvae frequently have been found in conjunction with overwintering corn borer larvae.

Much data have been collected in Texas during the past several years on chemical control of the southwestern corn borer. *Tests conducted in the Texas Panhandle generally have given sporadic results, and treatments applied before mid-July or after mid-August have generally proved ineffective.* Timing of insecticide applications is extremely critical, since little control will be obtained after the borers have entered the plant. Chemical application generally is not needed until egg masses and larvae of first generation moths appear in mid-July and early August. The need for treatment should be based on the presence and abundance of egg masses or young larvae, as determined during field inspections.

Insecticides should not be applied even in July on the High Plains until at least 35 percent of the stalks are infested with egg masses or young larvae. On late-planted corn, treatment should be initiated at a lower infestation level. If the decision is made

to treat, a maximum of two applications applied at a 10- to 14-day interval should give the most economic control. Base the need for a second treatment on plant infestation levels. If borers have already entered the stalk, it is doubtful that any economic gain will be obtained by treatment. Please refer to Table 1 for chemicals which are registered for corn borer control.

Level of infestations can be determined by carefully checking *each field*. A minimum of ten plants should be examined at each location, and at least five locations should be checked in each field of 50 acres or less. On larger fields, additional checks are suggested. Carefully observe the leaves, top and bottom, at about ear height. Some of the plants should be checked thoroughly. Refer to the section on "Description" for information on identifying egg masses and young larvae.

Spider Mite Complex

Several species of mites readily attack corn. The Banks grass mite is the predominate species, and was first reported in the Texas Panhandle in 1954 on wheat and grain sorghum. Serious damage to corn was first observed in 1967. Since that time frequent outbreaks have occurred on both grain sorghum and corn. Although mites are observed earlier in the growing season, population increases generally occur after the tassel stage of plant growth. Initial infestations appear on the lower leaves. If the infestation is heavy the lower leaves may be killed and the mites will move up the plant.

Description and Life Cycle

Eggs of the Banks grass mite are laid on the leaf in webbing which the mites produce. The eggs are spherical and about 1/4 the size of the adult, or about half the size of a period in ordinary newsprint. They are transparent to pearly white when first laid, but gradually change to a straw yellow. The eggs hatch in 3 to 4 days under optimum conditions, but several weeks may be required when cool, moist conditions exist.

The small, six-legged larvae are light colored when first hatched but become dark green as they feed. After several days they molt (shed outer skin) to the eight-legged nymphal stage and feeding continues. After two additional molts, the mites emerge as adults. The males are smaller than the females. Mating occurs soon after the females emerge. Both males and females mate more than once. The females lay an average of one egg per day for approximately 48 days, although egg laying may last as long as 80 days.

Minimum developmental time from egg to adult is 8 to 10 days with favorable (hot, dry) conditions. In addition to corn and sorghum, these mites are found on small grains and numerous grasses. Wheat is the main overwintering host in the Texas Panhandle.

Control

Numerous beneficial insects feed on both mites and mite eggs, and while they do not always hold mite populations in check, under favorable conditions they can greatly reduce the populations. The most common predators include predacious thrips, predacious mites, lady beetles (larvae and adults), lacewing larvae and Orius or flower bugs. Weather is the most effective control. Hard, driving rains or a period of cool, wet weather will greatly reduce mite populations.

The use of pesticides for corn borer control may significantly reduce beneficial insect populations and "release" damaging mite populations. Some pesticides appear to stimulate mite reproduction and cause population increases. If damaging mite populations do occur chemical control may be necessary. Precise economic thresholds for mite damage have not been established. When mites and webbing are easily found in the middle third of the plant, with visible damage (silver mottling) on the leaves, controls should be initiated. However, after corn reaches the hard dough stage there is little economic advantage to be gained from using pesticides. And in some areas mites have become resistant to pesticides. For more information on chemical control, refer to MP-339, *Suggestions for Controlling Insects and Mites on Corn, Sorghum and Small Grains* (Texas Agricultural Extension Service), or refer to the insecticide summary in Table 1.

Other Pests

Certain other insects do attack corn in Texas. The *corn earworm* and the *fall armyworm* are responsible for both leaf ragging and grain damage.

The corn earworm is well known to corn growers when found in the ear. However, when found on other parts of the plant it may be mistaken for another insect larva because of color variations. Corn earworm moths deposit eggs on the leaves, tassels or silks, and the newly hatched larvae begin to feed almost immediately. Whorl feeding often occurs, but larvae seldom reach the growing tip of the plant. Chemical control of this pest is difficult and not recommended. Numerous predators and parasites commonly attack the corn earworm.

The fall armyworm is often mistaken for the corn earworm. Grain and forage yields generally have not been increased by the use of insecticides against this pest. Early plantings of corn have fewer corn earworms and fall armyworms than late plantings.

There are three species of *rootworms* that damage corn in the United States, and all three species are known to occur in Texas. Economic damage has been limited to the northern Panhandle, and has been primarily caused by the western corn rootworm. At the present time only isolated areas have had rootworm problems, but with the continual increase in corn acreage severe problems may eventually develop. Crop rotation will help reduce this problem if it develops.

Grasshoppers occasionally cause leaf damage. The *seed-corn beetle,* as well as *wireworms* of various species, often damage newly planted seed. Numerous *armyworms* and *cutworms* may thin stands during certain years. *White grubs* are a problem in some areas. The *corn leaf aphid* is present every year but no economic losses have been known to occur in Texas.

FIELD CORN

Pest	Insecticides (listed alphabetically)		Days from last application to		Remarks
	Toxicants per gallon or pound	Concentrate per acre	Harvest	Grazing	
Southwestern corn borer					Topical application. Broadcast by air or direct granules or spray into whorl and/or leaf sheath area with ground equipment. Apply when second generation eggs begin to hatch. See page 2 to determine need for and timing of applications.
	A. Carbaryl (Sevimol-4®)	1 ½ qts.	0	0	**Carbaryl** — Application to the tassel area of the plants during the pollen shed period will seriously reduce bee populations.
	B. Carbofuran (Furadan® 10G)	10 lbs.	0	0	**Carbofuran** — Do not make foliage application if more than 1.0 lb. actual carbofuran was applied at planting. Do not make more than two foliage applications per season.
	C. Diazinon® (14.3 % G)	7-14 lbs.	0	10	**Diazinon** — Temporary spotting of foliage may occur following application.
Spider mite complex					Size and maturity of plants will dictate the need for application. Research has shown no yield increase or reduced lodging following treatments in the hard dough or later stages of plant growth. Erratic control with all recommended materials has been experienced in some areas of Texas. Thorough plant coverage is required.
	A. Carbophenothion (Trithion® 4 lbs.)	1 pt.	21	21 See remarks	**Carbophenothion** and **phorate** — Apply only once per season.
	B. Diazinon® (4 lbs.)	1 pt.	0	0	
	C. Disulfoton (Di-Syston®)				**Disulfoton** — Do not apply more than twice per season regardless of method of application. Use granular formulation as whorl application only. Rates based on 40-inch rows.
	(6 lbs.)	⅔ pt.	28	28	
	(15 % G)	3 ½-4 lbs.	40	40	
	D. Ethion® (4 lbs.)	1 pt.	50	See remarks	**Ethion** — Do not apply more than once after ears form. Do not feed treated forage to livestock. Has been effective only in South Texas and Gulf Coast areas.
	E. Parathion (4 lbs.)	½-1 pt.	12	12	**Parathion** — Two or more applications may be required.
	F. Phorate (Thimet® 15 % G)	5-6 lbs.	30	30	**Phorate** — One application per season. Do not apply under prolonged drought conditions.
	G. Sulfur (50 % dust)	30-35 lbs.	0	0	**Sulfur** — This is the only material which has been partially effective in the Trans-Pecos area of Texas. Thorough plant coverage is required.

The original manuscript for this publication was prepared by B. C. Clymer, former area Extension entomologist, Amarillo; and Norris Daniels, associate professor, Texas Agricultural Experiment Station, Bushland, The Texas A&M University System.

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