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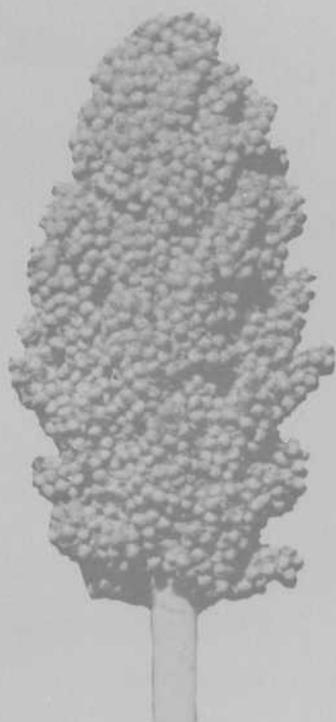
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Grain Sorghum
Insects
and
Diseases



Circular 225

Agricultural Extension Service, University of Arizona, Tucson

Be sure to see your County Agricultural Agent about sorghum
disease problems.
You may wish to get a copy of Circular 218, "Sorghum in Ari-
zona "

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Grain Sorghum Insects and Diseases

By J. N. Roney, Extension Entomologist
And Ivan J. Shields, Extension Plant Pathologist

Insects

Generally speaking, insects did not concern farmers growing grain sorghums in Arizona until recent years

Now they are causing injury from the time the seeds are planted until the seeds have passed the late dough stage

Lesser Corn Stalk Borers, Cutworms, and Darkling Beetles

Poor stands of grain sorghums can result from injury caused after planting by lesser corn stalk borers, cutworms, and darkling beetles

The lesser corn stalk borer causes the greatest injury. This small bi-colored worm appears in the tender stalk of the young seedling and cuts off the growing tip, thus killing the plant.

Dr Lemac Hopkins of the University of Arizona Agricultural

Experiment Station found that eggs were deposited at ground level as well as on the sides of the small plant. His results indicate that the insect may be partially controlled by dusting the row just after planting, and again when the plants are very small. More work is needed before exact recommendations can be made.

Some work indicates that seed treatments with certain insecticides may help control this pest.

For specific information on the use of insecticides for the control of the lesser corn stalk borer contact your County Agricultural Agent.

Usually a dusting of DDT, toxaphene, or chlordane will control cutworms or darkling beetles. Apply the dust when the insects first appear or when you know that the worms are present.

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Beet Armyworm, Yellow Striped Armyworm, Fall Armyworm, and Several Webworms

The beet armyworm, fall armyworm, and several webworms quite often attack grain sorghums shortly after they emerge from the soil, when the plants are only a few inches in height. They will crawl into the whorl of the plant at times. Once in a while they may also cut plants off just above the ground level.

When these insects start destroying plants, it is time to start control measures. Use a dust mixture

of 15% toxaphene and 5% DDT, applied at the rate of 15 to 18 pounds per acre with ground equipment. If a spray is used, attempt to apply 3 pounds of toxaphene and 1 pound of DDT in 4 to 6 gallons of water per acre. If only the beet armyworm is involved, a 10% DDT dust will give the desired results.

Watch for the presence of these insects and control them when they appear.

Southwestern Corn Borer

The southwestern corn borer has done great damage to grain sorghums in Maricopa, Pinal, Pima, and Cochise counties. It causes the greatest injury to late-planted sorghums, and where sorghum or corn was planted the previous season.

This is a small dirty-white worm, with black spots on its body. Best controls are secured by plowing the field so that the tips of the roots are thrown out on top of the soil where they can weather. The small worms

or larvae spend the winter in the growing tips. In the late spring they pupate and the moth emerges. The moth lays eggs in batches on the corn.

One corn stalk may contain several worms. These will injure the stalk to such an extent that a slight breeze will cause it to fall over. The worms also bore into the ears and destroy many would-be ears.

There is no insecticide control at the present time.

Spider Mites

Several species of spider mites have caused serious damage to some varieties of grain sorghums

in Maricopa, Pinal, and Yuma counties some years. The most severe infestations showed up in

Maricopa county on Martins Combine. However, several other varieties showed some injury.

Usually an application of about

30 pounds of dusting sulfur per acre will give good control. When the dusting sulfur fails, use an application of 25 pounds per acre of 3% aramite dust.

Flea Beetles

A small black flea beetle sometimes appears when the grain sorghums are about 6 to 12 inches in height. These beetles can destroy a planting within a few days if they are not controlled.

An application of 10% DDT dust applied at 20 pounds per acre with airplane or ground equipment will give good controls. If the infestation is very heavy, a second application about 7 days after the first may be necessary.

Stink Bugs

Several species of stink bugs cause severe injury to heads of grain sorghums in all parts of Arizona. They seem to attack all varieties of grain sorghums. Greatest injury occurs if the bugs appear when the heads are in the milk or dough stages. Sometimes the adult insects deposit a small mass of eggs on the sheath or head of the sorghum plant.

These small insects may destroy a complete head, or only a part of the head. If you go into a field and find 10 to 12 heads infested out of 100 examined at 5 widely distributed points, you are ready to start

controls. Best results can be secured with a dust mixture of 2% gamma isomer benzene hexachloride, 5% DDT, and sulfur. Apply at the rate of 20 to 30 pounds per acre.

If the land will be planted in root-crop vegetables within the next 5 years, do not use the benzene hexachloride mixture. An alternate dust may be a mixture of 15% toxaphene and 5% DDT dust applied at the rate of 20 to 30 pounds per acre.

Stink bugs can do a great deal of damage, so control them if they appear in injurious numbers.

Cotton Bollworms

Cotton bollworms or corn earworms can destroy many sorghum seeds, especially when the heads are in the milk or dough stages. It is wise to look at 100 heads at several points in a field. If you find more than one worm per head at 10 to 12 heads, it is time to start

control measures.

The dust mixtures suggested for stink bugs will give controls. However, if only the bollworms are present, you may use 10% DDT dust at the rate of 20 pounds per acre. Usually one application will give the desired results.

Aphids or Plant Lice

Aphids or plant lice quite often frighten farmers by their presence! After sorghum plants are two feet high, aphids usually will not cause any economic injury. Recently, one planting in Cochise county was severely injured by aphids when the plants were about 14 to 18 inches in height.

An application of 2% or 3% gamma isomer benzene hexachlor-

ide dust applied at 20 pounds per acre will give good control. Determine if aphids are injuring the plants by watching the growing tip. If the growing tip is green, there is no economic injury to the plant.

Always check with your County Agricultural Agent on insect-control problems.

Diseases

Diseases of sorghums have not been a major problem in Arizona in recent years. Most of the sorghum varieties grown here are resistant to one or more of the more common diseases.

Isolated instances of disease

buildup have occurred, however. In most cases these problems can be taken care of with a disease-control program.

Here are a few suggestions which will prevent or reduce sorghum disease problems.

Disease Control Program

1. Grow Disease-Resistant Varieties.

No one variety is resistant to all diseases. Select the variety which is resistant to the sorghum diseases common in your area. (See the table on page 7.)

2. Plant Certified and Treated Seed.

Certified seed will give you a good germination percentage. It is selected for low incidence of seed-borne diseases. Seed treated with a good fungicide will not be as likely to rot, and will produce a better

stand. It also eliminates the diseases which are carried on the seed.

3. Rotate Crops.

Rotation with crops not susceptible to sorghum diseases should be practiced where possible. The disease will build up in fields where sorghum follows sorghum.

4. Plow Under All Crop Debris.

Old, diseased stalks and heads can carry over disease from harvest to planting. By turning under the old crop, much of the disease is eliminated.

Disease Resistance or Susceptibility of Sorghum Varieties

| Sorghum Diseases | More Resistant* | More Susceptible |
|----------------------|--|---|
| Milo Disease | Forage Sorghums D.D. 38 Milo D.D. Yellow Sooner Milo Plainsman Martins | Most other varieties of Milos |
| Charcoal Rot | Most Forage Sorghums Atlas Sorgo (most varieties) Kafir (most varieties) | Most Grain Sorghums D.D. Yellow Sooner Milo Early Hegari |
| Fungus Leaf Diseases | Early Hegari Kafir (most varieties) Tift Sudan | Sudan Grass (All common strains susceptible) |
| Bacterial Disease | Leoti Sorgo Tift and Sweet Sudan | Sorgos |
| —Bacterial Stripe | Grain Sorghums Sudan Grass | |
| —Bacterial Streak | Kafirs | |
| Head Smut | Most Milos | Most Sorgos |
| Covered Kernel Smut | Early Hegari | Leoti Sorgo |
| Loose Kernel Smut | Kafirs | Feteritas |

*Resistance to disease often runs out unless a continued program of selecting for disease resistance is maintained.

Seed Treatment

Proper seed treatment of sorghum will improve germination and stand. Treat sorghum seed before planting. The presence of the fungicide on the planted seed reduces rotting of the seed and

“damping-off” of the seedling. In addition, smut spores which are often present on the seed, will be killed by seed treatment.

Several of the organic sulfur dusts such as Arasan, Arasan SFX,

and Teresan are being used for seed treatment with good control of smut and other seedling damage in addition to reduction of damping-off. The sulfurs have the advantage over the organic mercury dusts of being less toxic to the seed in cases of overdosage. Also they are less toxic to humans.

The organic mercury dusts such as new improved Ceresan and Ce-

resan M also will give good results if the correct amount is used and if the seed is planted in a few days after treatment.

Seed treatment can be done inexpensively at home. (**Directions and precautions on the label should be followed.**) Many of the seed handlers will treat the seed at a nominal fee upon request.

Seed and Seedling

Emergence of the seedlings is greatly retarded, and stands are reduced by soil temperatures below 70 degrees F. at planting time. If germination is not prompt the seed will rot.

Those seedlings which are not

growing vigorously may be attacked by several of the fungi in the soil and the plants may be weakened or killed. When early planting is necessary, high-quality, treated seed is of utmost importance.

Head Diseases

Three diseases of sorghum heads may be found in Arizona sorghum

fields: covered smut, loose kernel smut, and head smut.

Loose and Covered Kernel Smut

Field Symptoms:

Loose and covered smut are somewhat similar in appearance. The kernels are replaced with a dark brown to black mass of spores.

Loose kernel smut may cause some stunting of the plant. In some varieties it will induce excessive side branching. Galls are formed in place of the kernels which are long and pointed.

The surface membrane of the gall soon breaks and the spores are allowed to be carried away by the wind leaving the long and pointed supporting core. This projection persists and is a distinctive symptom of this type of smut.

Covered kernel smut causes much less, if any, stunting of the plant. Usually all of the kernels of a smutted head are affected. Smut

galls form in place of the kernels and are nearly the same size as the seed. These galls break upon drying or during threshing, and the spores are spread to the healthy seed.

Control

Seed treatment, planting only

smut-free seed, or growing resistant varieties are possible means of control. As smut-free seed cannot be guaranteed and resistant varieties are not available in all types, seed treatment is the most logical means of control for both of these smuts.

Head Smut

Field Symptoms:

In head smut, the entire head is smutted instead of the kernels only. When the smutted head emerges, it appears smaller than a healthy head. A gray membrane covers the mass of smut as soon as it emerges from the boot. This membrane soon weathers away and the spores are allowed to escape. This leaves a stringy mass of remaining wood fibers of the head.

The spores infest the soil and may remain alive for several years. As seed is planted in the infested soil, the germinating smut spore

can infect the seedling as in loose and covered kernel smuts.

Control

A field infested with head smut should not be planted to susceptible varieties of sorghum for at least three years. In case of a light infestation, removing smutted heads by hand before spores are scattered, and destroying them by burning has been effective in controlling head smut.

Seed treatment is not effective. Most milos are resistant to this disease and most sorgos are susceptible.

Stalk and Root

Milo Disease or Periconia Root Rot

Milo disease, formerly called pythium root rot, is potentially the most serious disease of sorghum. It attacks the roots and base of the crown, and has been frequent in certain areas of Arizona. However, many sorghum varieties now grown are resistant to this disease.

Field Symptoms:

The first noticeable symptom of milo disease is a stunting of the infected plants followed by a roll-

ing, yellowing, and drying of the leaves. The leaves appear as though injured by excessive alkali or drought. The stunted plants usually fail to head and in some cases may die.

Small rootlets are the first to be invaded. Brown to red lesions and a watersoaking of the tissue are the early symptoms. Later, the larger roots and the crown are infected. The crown interior becomes a dark

red to purple in color. This discoloration is very striking when the diseased stalks are split longitudinally at the base.

Control

1. Resistant varieties.

Most sorghum varieties show some resistance to milo disease and will succumb only under poor growing conditions. D.D. 38 milo, D.D. yellow sooner milo, plains-

man, caprock, and martin are all resistant. Proper fertility and adequate irrigation should be maintained.

2. Crop Rotation.

Milo disease can survive in the soil for several years, so a short crop rotation offers small hope for control. A three to five year rotation program would be a good practice in combating this disease.

Charcoal Rot

Charcoal rot has been observed in Arizona sorghum fields. It rarely causes much damage, but may do so under certain poor growing conditions.

Field Symptoms:

The disease may cause damping off of the seedlings, black or brown lesions on the fibrous roots, and rotting of the base of the stalk of sorghum, as it nears maturity. The later stages of the disease will give the base of the stalk a shredded appearance, weakening the tissue, causing the stalk to lodge. The stalks may die prematurely, decreasing the yield and quality of the grain. Frequently, the diseased stalks will become blackened with the resting bodies of the fungus, called sclerotia.

The resting bodies, sclerotia, will carry over to the next crop on old

diseased stalks and roots. The sclerotia may germinate when the next susceptible crop is planted and kill the seedling, or they may attack when the sorghum is nearly mature.

Control

Charcoal rot appears to be more severe in land that has been continuously cropped to sorghum. The most severe damage usually occurs when the plant is stressed, about the time the seed sets. In this case, lodging occurs during the milk stage of the grain.

Sufficient moisture either by irrigation or rainfall greatly reduces the damaging effects of this disease. Most forage sorghums including atlas, sorgo and kafir varieties are resistant and most grain sorghums including D.D. yellow sooner milo and early hegari are susceptible.

Stalk Rot

Field Symptoms:

Stalk rot appears to result from infection by any one of several of a group of fungi. Under proper conditions the organisms gain entrance into the stalks, and the pith

is attacked and rotted.

The affected stalks usually are unable to develop normal heads, thus yield is reduced. The stalk generally breaks at the point of rotting and lodging occurs.

Quite often one or several of the stalk rot organisms will be present in conjunction with milo disease or charcoal rot. This not only makes diagnosis difficult, but causes considerable damage to the sorghum crop.

Control

No sure control measures are known for stalk rot.

Apparently an injury to the roots

or stalk encourages the infection. Therefore, insect control and care in field operation should aid in checking this disease. **Any condition which places the crop under stress allows the disease to do greater injury.**

Crop rotation has helped in a number of instances. Varieties resistant to this disease are being developed, but none is now available.

Weak Neck

In certain varieties of sorghums, a breaking of the upper part of the stalk occurs allowing the matured head to lodge. This "weak neck" appears to be more of a mechanical breakage and not caused by any one disease organism. In some cases there is a weakening or decay of the tissues just above the top node or joint of the sorghum stalk.

Data from experiments conducted by the Agricultural Experiment

Station of the University of Arizona in 1953 indicated that a higher percentage of breaking-over of the heads occurred in the later planting dates.

A less brittle or more sturdy stalk would support the matured head until the grain is dry enough to store. Earlier planted sorghum in the 1953 tests apparently developed a more sturdy stalk, results have shown.

Leaf Diseases

Helminthosporium Leaf Blight

Helminthosporium leaf blight occurs on most sorghums in Arizona. It also appears on sudan grass, Johnson grass, and corn.

Field Symptoms:

This fungus may cause seed rot and seedling blight, especially in cold or very wet soils. The infected seedlings may die or develop into stunted plants.

Small reddish-purple or yellow-

ish-tan spots usually develop on leaves. As leaf elongates the spots also become longer and may unite with adjacent spots to kill large areas on the leaf. The center of the elongated spots is usually gray or straw colored.

In severe cases the plants may appear burnt or frosted. Spores are carried on the seed and on dead plant material on or in the soil. The spores are scattered by wind.

and rain and in warm and humid weather the disease spreads rapidly.

Control

The development of resistant sorghum varieties appears to be the only hope in controlling this disease. Early hegarı and most varieties of kafir are resistant. In sudan, all commercial strains are

highly susceptible to the disease. Tift sudan, which is a result of crossing with resistant varieties of sorghum, shows some resistance.

Crop rotation is not an effective means of control because the fungus lives in the soil several years. Seed treatment may prevent some seedling infection and spread of the disease to new areas.

Bacterial Stripe and Bacterial Streak

Bacterial stripe and bacterial streak are two bacterial leaf diseases which occur with some regularity in Arizona sorghum fields.

Field Symptoms:

Bacterial stripe is the more common of the two diseases and will attack grain, forage, and sweet sorghums; also sudan grass and Johnson grass. It will show up as stripes on the leaves with blunt or jagged ends.

The red color which varies with the varieties is continuous throughout the lesion. The stripes may vary from less than an inch in length to more than a foot.

Bacterial streak which also occurs in the sorghums and Johnson grass will first appear as water-soaked streaks at any stage growth of the plant. Soon red-brown margins or blotches of color appear in the streaks. This is followed by the whole affected area becoming

red. Occasionally these streaks broaden and tan centers appear. Bacterial ooze will dry on the surface and appear as white or pale yellow scales.

Control

The bacteria are born on the seed coat and in crop residues. These bacteria are spread by wind, water, and insects to the leaves of sorghum plants where they enter injuries and the breathing pores (stomata).

Seed treatment will control the disease on the seed. Turning under the last year's crop, or crop rotation will reduce the disease carry-over, providing the surrounding Johnson grass is controlled.

The grain sorghums as a group are resistant to the bacterial diseases and the sorgos are susceptible. Tift and sweet sudan and leoti sorgo also are resistant.

Chlorosis

A chlorosis or yellowing of sorghum has occurred in portions of certain fields to cause reduced growth. In some cases this appears to be an iron chlorosis, as a definite greening is obtained from a ferric

sulfate and citric acid spray. Whether sufficient response can be obtained by several spray applications to make this practical is yet to be determined. Further tests are needed.