
Boys' Agricultural Club Work

Suggestions to Club Members, Concerning Crop Growing.

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Co-operative Extension Work in Agriculture and Home Economics, Agricultural and Mechanical College of Texas and U. S. Dept. of Agriculture Co-operating.
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Suggestions have been previously given concerning the field selection of planting seed, fall preparation of seed bed and seed testing. The object of this bulletin is to furnish general suggestions for the remainder of the season.

Bear in mind that the writers have endeavored to give only such suggestions as are applicable to all club members; yet it is possible that in some instances some of the suggestions will not apply, due to local conditions.

It has been said that the great general, Napoleon, always won his battles before firing a gun. It is meant by this that he planned his campaign so scientifically that defeat was almost impossible. The same thought may be applied to growing a crop. The success of your crop may be determined largely by your plans. If your seed bed has been well prepared, contains a large store of moisture and good field-selected seed with strong sprouting power is planted, there is not much probability of a failure, provided good principles of farming are adhered to the remainder of the season.

Your attention is directed to the suggestions given on the following pages pertaining to planting and spacing, fertilizers, pests, and cultural methods. Read these suggestions carefully.

PLANTING AND SPACING CORN, KAFIR, AND PEANUTS.

By A. B. Connor, Agronomist in Charge, Texas Experiment Station.

The manner in which the crop is planted and the spacing of the plants will have much to do with the yield secured. No other op-
eration in the growing of the crop except, possibly, that of preparing the soil, is of such great importance. Seed may be planted too early or too late, too thick or too thin for the best yields. Early plantings nearly always produce best. However, care must be taken not to plant the crop so early that the seed will rot in the ground or the plants be injured by cold weather. Seeds placed in cold, wet soil find conditions unfavorable for sprouting and consequently their coming up is delayed for a long time—or the seeds eventually rot. Some seeds, such as corn, can be planted with safety in colder soils than such seeds as cotton or peanut. Most crops should not be planted until the soil is thoroughly warmed by the sun's rays. However, corn may be planted at the first indication of continued warm weather. Kafir and peanuts should never be planted in cold soil. Plant plenty of seed to the acre, and in such a way that the crop can be thinned to the desired stand. If no more seed is planted than required for the proper stand and any part of it fails to come up, the seeding rate will be too thin and the yield lowered.

Corn is generally planted in Central Texas during the last part of February. If weather conditions are unfavorable, early March plantings will likely produce well that season. The South Texas corn crop may be planted about ten days earlier than that in Central Texas; whereas, the North Texas corn crop may be planted ten days later. Do not plant in the face of unfavorable weather conditions. It is better to delay planting until the soil is in the proper condition. Soils that have been prepared early and have not been allowed to crust or bake will warm up more quickly than soils without this treatment.

If corn is planted in check-rows, that is, with hills an equal distance apart each way, and six or eight seeds placed in one hill, a perfect stand will be assured. Furthermore, the corn may be cultivated in either direction and much work with the hoe saved. The hills may be 3x3 feet apart each way or 3 1-2x3 1-2 feet apart each way. Seeding rate tests conducted at the Main Experi-
ment Station at College Station show that on medium rich soils in this section single plants spaced 3x3 feet apart on the land will give the best yields. On thinner soil the hills should be spaced wider apart and on richer soils closer. If the 3 1-2x3 1-2 feet space is used, leave only one stalk to the hill. In thinning this corn, take out all but three vigorous plants in each hill when the corn is three inches high, and before the corn is over six inches high all but the most vigorous plant should be removed from each hill. Early planted corn should be planted shallow, as it will then get the benefit of the sun's heat, which aids in sprouting. Deep planting in a cold soil is almost certain to result in a poor stand. If the soil has become crusted or compacted by a rain between the time of planting and coming up, the field should be cultivated as soon as the young plants will allow cultivation. This early cultivation will allow air and sunlight to penetrate the soil and will aid in giving the young plants a good, vigorous early growth.

Kafir seed cannot be planted with safety in cold soils, and therefore the time for planting is later than the time for planting corn. In Central West Texas the kafir may ordinarily be planted with safety during the latter part of March or the first of April. In the lower Panhandle, April 1 to April 15 is a good time for planting, while in the upper Panhandle planting should be made somewhat later than this. In Southwest Texas, planting may be made during the first part of March. Kafir seed are much more hardy to cold, however, than milo or feterita seed, and the young plants are able to push their way through a rather thick soil crust. If rain occurs between the time of planting and the time of coming up, it is well to safeguard against a possible poor stand by dragging the rows with what is termed a "scratcher," made by driving nails in a round piece of timber about five or six inches in diameter and thirty inches long. The nails are driven all around the timber so that when it is dragged lengthwise down the row it scratches the surface of the ground and breaks the crust, no matter which way it turns over. This will help you get a good
stand from early planted kafir when otherwise it might be necessary to plant over. If the drill furrow is opened and the seed placed on firm soil with a soil covering of, say one inch, the conditions are ideal for quick sprouting. Use only seed of the very best quality, preferably those that have been threshed out with a flail. Before planting time place the seed in a tub of water and skim off all the trash, hulls and light seed that float. Pour off the water and dry the heavy seeds that are found in the bottom. In doing this you will discard many seeds that would not sprout or that would produce weak plants. The planting seed will be uniform in size and free from any hulls, trash or other material that might cause your planter to sow the seed scatteringly. Plant the seed so as to have individual plants eight to ten inches apart in rows three and one-half feet wide. This will require not over four pounds of good seed. In extremely dry sections the seeding rate should be thinner than this and in sections where plenty of rainfall is had kafir may be planted thicker than this. Results of experiments indicate that plants eight inches apart in rows three and one-half feet wide will give the largest yield. Kafir, like corn, should be cultivated early so as to allow a quick, early warming of the soil and vigorous growth of the young plants.

Peanuts should be planted only in thoroughly warm soil. Level planting is best if the soil is well drained. If the soil is not well drained, the land should be ridged or bedded. The nuts may be planted either with or without hulling. If the nuts are hulled, the coming up will be hastened somewhat. Quick sprouting can be had by soaking the nuts in warm water just before planting. Peanuts should be planted only deep enough to prevent the soil drying out before the seed has absorbed the needed moisture for sprouting. Peanuts are generally planted in rows thirty or thirty-six inches apart and with plants eight to ten inches apart in the row. This will require about one and one-half bushels of unhulled or little less than one-half a bushel of hulled seed to the acre. The stand of peanuts is frequently
injured by rodents that burrow in the ground and eat the seed before they have sprouted. This can be avoided by soaking the peanuts in a solution made by shaving one pound of laundry soap into a gallon of boiling hot water. When the soap is dissolved, add two gallons of kerosene and mix thoroughly. It will require very vigorous work to mix the kerosene and soap emulsion unless a spray pump is used, in which the nozzle is turned back into the bucket. Use one gallon of this mixture with four and one-half gallons of water. Soaking peanuts in such a solution will protect the seed from mice and other rodents after planting. Like other crops, early cultivation will be very helpful in giving the young plants vigorous early growth.

FERTILIZERS.

By Dr. G. S. Fraps, State Chemist, Texas Experiment Station.

Fertilizer for Corn.

Well rotted barnyard manure, as a rule, gives better results on corn than any commercial fertilizer. From five to twenty loads per acre may be used, but ten loads is a fair application. If only a small amount is used, it may be placed in the furrows and bedded on. If a large quantity is applied, it is best to spread broadcast soon after breaking and harrowed under or placed on the land before breaking and turn under. If the manure is not well rotted, it may fire the corn, especially if the season is dry or the land is broken too late in the season. Manure should not be used where the land already produces a large stalk, but does not fruit well, as the tendency would be to increase the size of the stalk. In our co-operative fertilizer experiments with corn, manure produced a grain of about eight bushels of corn per acre. In absence of manure legumes should be grown and either turned under or grazed off.

Acid phosphate is an excellent fertilizer to use where the land produces a good growth of stalk, but does not produce sufficient fruit. The amount used should be 75 to 150 pounds per acre. A good application is 100 pounds to the acre. Acid phosphate should
be applied in the row and mixed with soil or have some dirt thrown back on it before the seed are planted.

Where the land is somewhat poor and does not produce a good growth of stalk and grain, a mixture of acid phosphate and cotton seed meal gives best results. The proportions best to use vary with the different soils, but a good mixture consists of equal parts of acid phosphate and cotton seed meal. The amount to apply also depends upon conditions, 100 to 300 pounds being used. A good application for profitable results is 150 pounds per acre, but if large yields are desired and the season gives promise of supplying the water to the growing crops, larger applications of the mixture may be used. The fertilizer should be applied in the furrow before planting and care should be taken that some dirt is thrown on it so that the seed corn does not touch the fertilizer. Otherwise, the decay of the cotton seed meal is pretty sure to kill some of the corn.

The results with the fertilizer will depend upon the season, and if the season is favorable, good results will be secured. If the season is dry, better results are more likely to be secured with the acid phosphate than with the acid phosphate mixed with cotton seed meal. Manure which is not well rotted is also not a good thing to use when a dry season may be expected. Large applications of fertilizer are not likely to be profitable on corn unless the season is very good so that the corn does not suffer from dry weather, which usually comes about the time of tasseling.

Fertilizer for Peanuts.

For peanuts on good land in good condition, no fertilizer whatever need be used. For poor land, the only fertilizer suggested is acid phosphate at the rate of 100 pounds per acre, applied as directed above for corn. Peanuts have the power of taking some of their fertilizer from the air, namely, the nitrogen. The nitrogen is the substance supplied by the cotton seed meal mentioned above in connection with corn. The peanuts can get this nitrogen from the air and
the corn cannot, and the peanuts, if turned under or grazed off will thus furnish fertilizer for the corn.

**Fertilizer for Grain Sorghums.**

We are not, at present, advocating the extensive use of fertilizer for grain sorghums. Some of the soils where grain sorghums are grown are not very rich in plant food, but the plant food seems somewhat easily taken up. Those who wish to try a fertilizer could use it under the same conditions as those mentioned under corn, using, however, only moderate applications of cotton seed meal or not to exceed five tons of manure.

For further information concerning fertilizers, write to the Director of the Experiment Station, College Station, Texas, for Bulletin No. 167, entitled, "Commercial Fertilizers and Their Use."

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**PESTS.**

By Dr. F. H. Blodgett, Plant Pathologist, Extension Service.

Pests of forage crops are of two classes: insects and fungi. Insects may injure crop plants either by destroying the tissues, as in the case of caterpillars or "worms" and grasshoppers; or by sucking the juices, as in the case of the chinch bugs and plant lice. The treatment for the first group consists in poisoning the food material so as to produce death from the poison taken into the stomach along with the plant tissues. The second group of insects, which don't bite or chew part of the plant, have to be killed by some solution which produces its effect through contact. The standard poisons are either lead or copper arsenic compounds, while the standard contact solution is kerosene emulsion or some other strong soap solution. Lead arsenate is the best of the arsenic preparations and should be used in the paste form diluted to a smooth wash and used at the rate of from 1 to 2 1/2 pounds to 50 gallons of water. It is often added to Bordeaux mixture or other solutions being applied to control plant diseases, so that a single application accomplishes a double purpose.

The kerosene emulsion is made by first
forming a soft soap by boiling 1 pound of hard soap of some cheap brand in a gallon of water. After this has been boiled for a few minutes, the kettle should be removed from the fire and two gallons of kerosene added to the soap solution. This material should then be thoroughly mixed, preferably by churning with a spray pump, until a smooth white solution is produced, which is the "stock solution." In using, this "stock solution" is diluted by adding 1 gallon of the stock to 10 gallons of water. It should be supplied with a spray pump in such a manner as to strike all the insects present on the plants, especially care being taken to reach the underside of the leaves, since it is in such protected places that the sucking insects usually gather.

The chinch bug is one of the worst of the insects attacking forage grain crops. The kerosene emulsion may be used against this insect. The spraying should be directed toward the base of the corn or sorghum stalks where the insects are most likely to be present in the early part of the season, each hill being thoroughly dampened by the solution before the next one is attended to. In the case of corn and grain sorghums, the leaf sheath should receive considerable attention, since the insect tend to hide within the sheath and there attack the tender tissues of the main stem. The kerosene emulsion will not ordinarily do any injury to the plants, even if applied in sufficient abundance to fill the space enclosed by the leaf sheath.

Another insect which is likely to cause much trouble in the sorghum fields, especially in the eastern half of the state, is the "sorghum midge." This is a minute fly, scarcely an eighth of an inch across the wings, which lives in the growing heads of the various members of the sorghum family, laying its eggs within the scales of the young blossoms where the young, upon hatching, secure sufficient nourishment from the juicy tissues of the developing seeds to enable them to complete their life history in this protected situation. The first brood of these insects ordinarily develops in the Johnson grass or other semi-wild varieties of the sorghums, and, from such volunteer
growths, spread later to the more valuable sorghum fields. There is little that can be done to check the activities of this pest when once present, but a considerable degree of control can be secured by careful removal and burning, preferably in late fall, of all volunteer plants and scattered heads of sorghum which might furnish the midge a breeding place. This will destroy the hibernating insects while in this dormant state and reduce the supply from which the first brood may be developed. The wild Johnson grass along the road sides and turning rows, stray plants of grain sorghums from previous seasons, and other plants of this character, growing here and there over the farm, are the very ones which will be first attacked by the midge and from which the valuable crop will become infested. By the removal of these waste plants, the development of the first brood of insects is considerably interfered with and the supply of egg layers for later injury correspondingly decreased. There is no way of treating these insects with kerosene or other solutions, since the scales about the individual blossoms in the sorghums all fit too closely to admit the spray solution in sufficient quantity to accomplish any appreciable result.

Caterpillars of various kinds are likely to make their appearance in the grain field, especially the striped worm, known at different times of the season as the "corn worm" and "cotton worm." This worm is rather generous in its diet and is likely to attack any crop which offers the necessary degree of tenderness for its requirements. The worm feeds on the young corn and transfers later to cotton or tomatoes, eating the tender leaves during the earlier part of the season, but, after the ear has already formed on corn, manifesting a decided preference for the young ears. The interval from egg to adult is just over one month, and in this portion of the South, there may be as many as five broods during the year. The first broods feed on corn and similar plants, while the later ones appear in the fall as the "cotton leaf worm." In this latter stage the pest can be considerably checked by dusting the cotton plants with a mixture of 1
pound of Paris green to 20 pounds of flour or plaster carried in bags hung to the ends of a pole carried across the saddle as one rides through the field, row by row. In this way the supply of adults may be greatly diminished toward the close of the season and the number of worms which may pass the winter in the soil will be greatly reduced if the cotton fields are systematically poisoned during the fall. There is little opportunity for controlling the worm while it feeds on corn and other grain plants, since it usually burrows into the unopened leaves or into the ear; thus is beyond the reach of poisons applied to the surface of the plants. The best method of control is, therefore, to kill the worms of the fall broods while they are feeding upon the cotton plants, which can be readily poisoned as indicated.

The peanut is subject to very few insects, plant lice and grasshoppers, probably, being the most serious. Remedies for the plant lice have already been suggested, while for grasshoppers the bran mash is probably as efficient as any treatment that can be given. This mash is prepared from 40 pounds of wheat bran, 2 quarts of cheap molasses, 1 pound dry lead arsenate, and enough water to make the whole thoroughly damp. In preparing this, the arsenate should first be mixed with the bran while dry. The molasses should be mixed with 1 gallon of warm water and then poured over the bran and arsenate while stirring thoroughly, and sufficient water added, finally, to make the whole mass wet enough to form into balls or wads. This mash is best applied in the early evening along the rows adjacent to the grass land or other areas from which the grasshoppers seem to be invading the cultivated field. The grasshoppers ordinarily feed most actively in the early morning, and by having the bran available for them, even before it is warm enough for the grasshoppers to fly, large numbers are likely to feed and be disposed of while they are crawling about on the ground.

The forage grains under consideration are subject to a series of diseases which bear the uniform name of "smut." The diseases which are included under this name are
characterized by the formation of masses of black dust in the place of the grain in the ear or head, or by the development of similar dust masses in the tassel or corn, and occasionally at other points on the plants. There is no treatment for the smut in corn except the removal, as soon as sufficiently developed to be recognized, of any leaves, ears or tassels from the corn field which may show the white "smut blisters," which later turn black and burst open. In this way, the supply of spores from which the crop of the next season may become diseased will be removed and the damage to that crop correspondingly diminished. This treatment also holds good for the head smut of sorghum, which has a similar behavior.

The smut of the small grains and the kernel smut of the sorghum can be materially checked by soaking the seed in formalin solution, which will kill the spores which are likely to adhere to the surface. The solution is prepared by adding one pint (1 pound) of formalin, often called "formaldehyde," to 30 gallons of water. The seed to be treated should be in coarse sacks so that the solution can readily mix with the seed and are left to soak in the solution for one hour. The sack containing the seed should occasionally be churned through the water so that all parts of the contained grain will come in contact with the solution. After soaking an hour, the sacks should be removed and allowed to drain until dripping nearly ceases; then the contents should be spread on a clean wagon cover or other surface which has itself been treated with formalin solution in case there is danger that the cover has been exposed to smut spores. The grain can be planted as soon as sufficiently dry, but care should be exercised to avoid reinfection by the smut spores; especial care being taken to have the planting machinery thoroughly clean and disinfected. This can be accomplished by washing out the seed box with formalin solution of double the strength used for soaking the seed; that is, 1 pint to 15 gallons of water. This will probably reach any spores that may be caught in the cracks and elsewhere in the box so that the cleaned seed will not become
reinfested in the process of planting. This same treatment holds for other smut and for the stinking smut of wheat, which are the more common forms on the small grains.

There are a few other diseases besides the smut which are of serious abundance in such grain crops as would be used for pig forage. The rusts of the small grains, though serious, are not likely to be of importance in this connection, since the small grains themselves are little used as hog pasture. The peanut, which is recommended elsewhere in this bulletin, is fortunately subject to very few diseases except when planted on soils infested with root rot diseases of cotton and alfalfa. Occasionally nematodes or root worms are found on the peanut. In neither of these troubles due to soil pests is any treatment of value. This is largely due to the fact that an immense mass of soil would have to be treated in order to secure any result, and this is impractical for field crops. Fortunately, however, both the root rot and the minute root worms have to develop in plants having certain types of roots and are not able to thrive on plants having slender, fibrous roots, such as the small grains. The treatment, therefore, is to change land at least every other year, putting on the land infested with either of these pests such small grains as are suited to the particular community.

While there are other insects and diseases which are likely to occur on the forage crops used by the pig clubs, those mentioned are the ones which are most likely to be present to a serious degree and in most localities of the state where the crops are grown. The insects other than those named can usually be controlled by remembering the principles pointed out in an early paragraph; that insects like grasshoppers and worms which eat can be reached by arsenic poisons, while the others are chiefly controlled by kerosene preparations. In regard to other diseases than the smuts and root troubles, there are few which are likely to prove serious except under some unusual conditions.

CULTURAL METHODS.

The primary objects of cultivation are (1)
to prevent the evaporation of moisture from the soil, (2) to prevent the growing of weeds and grass, and (3) to permit air to enter the soil. It is wrong to assume that when a crop is free of weeds and grass, it does not need cultivation.

In cultivating crops, care should be exercised so as to not injure the roots. Corn and grain sorghums (milo, feterita, and kafir) roots are subject to injury by cultivation, due to their nature of growth. A plant's roots are its only means of securing food on which it grows from the soil. We may consider roots as the teeth of the plants. The root gathers the food.

A boy with part of his teeth knocked out has trouble in eating properly a sufficient amount of food. A plant has the same trouble with a part of its roots cut off or bruised. Doubtless you would be surprised at the amount of roots that a plant has, especially corn. Pull up a stalk of corn some time and examine its root development. It was found at the Minnesota Agricultural Experiment Station that corn roots had penetrated the soil 12 inches deep and had spread laterally 18 inches eighteen days after planting.

The same general principles of cultivation apply equally to corn, milo, kafir, feterita, peanuts, etc. As a rule, it is best to run a weeder or section harrow diagonally across the rows before the plants are up. This will kill the first coat of weeds that have sprouted and will ordinarily delay the first plowing a few days. If a second coat of weeds get started before the plants get far out of the ground, harrow again before the first cultivation or plowing.

The first cultivation or plowing should be the deepest. Ordinarily the depth should vary from 3 to 4 inches. All other cultivations should be shallower. By making the first cultivation deep, it will cause the roots to begin developing below the plowed soil and then, by making the other cultivations just a little shallower each time, the roots will never be disturbed. The cultivations in the dry sections of the state should be a little deeper than in sections where there is a greater rainfall.
Cultivate after each rain in order to make a mulch to conserve the moisture. In case of no rains, cultivate at least every ten days. The “mulch” is the coat of loose, plowed dirt on top. Avoid plowing when the ground is too wet. As a rule, in the dry sections, the shallowest cultivations should never be less than 2 1-2 to 3 inches, and in other sections with greater rainfall, 1 1-2 to 2 inches. In extremely late cultivation, it may be necessary for the cultivation to be shallower than the depths mentioned.

When laying by, the ground should be left as near level as possible, with plenty of loose dirt in the middles. As a rule, crops are laid by too early. It is best to continue to cultivate corn until the silk begins to appear, and often later, in case of hot, dry weather.

In the cultivation of peanuts, it is important to keep the soil well pulverized close to the plants. This will permit the little fruit stems or pegs to enter the soil.

When in doubt about any special problem with your crop, it will be well for you to call on your county agent for advice and suggestions.