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HOW TO GROW NO-TILL COTTON

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INTRODUCTION

Corn, sorghum, and soybeans have been successfully planted no-till for years with comparable yields to those produced with conventional tillage. Cotton, on the other hand, has continued to be grown with the field being plowed and cultivated extensively. Research at the Milan Experiment Station has shown that cotton can be raised no-till without a decrease in yield. The 1985 Farm Bill stipulated that soil loss be reduced. Farmers with highly erodible land should consider no-till cotton as an alternative when developing compliance plans. This technical note is to provide information covering the basics of no-till cotton.

FIELD EVALUATION AND SELECTION

Many farmers when planting no-till for the first time will try it on their poorest land. Their reasoning is that if no-till does not work, the loss will not be too great. When the crop does not meet their expectation, they give up and fail to try it on their better soils. Therefore, field selection is an important part in no-till cotton.

Evaluating a field for no-till cotton production is similar to evaluating one for conventionally tilled cotton with some exceptions however. This should be done in the fall after soil tests results have been received. Results should indicate that P and K levels are at least in medium levels. Fall applied lime (if needed) will be dissolved by spring resulting in better utilization of nutrients by the cotton plant. Soil pH problems below 6" of the surface will require deep placement, therefore, tillage may be necessary. Farmers should also check for hardpans. This can be done by using a soil penetrometer or a push rod. Checking should be done when the soil is at field capacity (soil is saturated). Any resistance down to the 10" depth could limit lint yields. If a hardpan does exist, the soil should be subsoiled or paratilled to a depth of 10-12". Using a paratill plow will leave more residue on the surface. Fields with perennial weeds should not be planted no-till if the system is designed to be totally dependent upon chemicals for weed control.

Ruts may be left by pickers during wet harvest seasons. This may require rehipping to prepare a smooth surface for planting. Any fall destruction of cover may require a cover crop to offset the loss of cover.

EQUIPMENT

With the increased popularity of conservation tillage many equipment companies have manufactured implements especially for no-till systems. Careful consideration should be given to the purchasing of any new equipment.

A planter is the most important tool that a farmer will buy. Any problems that occur at planting may never be corrected during the year. Therefore, the planter should be able to plant on most soil types and moisture conditions, and through heavy residue cover. Planting depth should be adjustable. The planter should have a colter and/or trash sweeps, fungicide/insecticide hopper box, and spray tip attachments. When planting on old rows, markers are not needed. When planting in heavy residue, adjust markers to cut a furrow enough to follow but not enough to form a trench which would catch water in heavy rains. Extra weight may be needed in certain conditions.

Cultivators are being made to till soils with heavy residue. This is important because the residue may interfere with the sweeps. Cultivation increases water infiltration and supplements chemical weed control. However, with proper use of herbicides and field selection this may not be necessary. Soil loss increase due to cultivation should not be a concern due to the stirring of cover and possible increase in water infiltration. Some adjustment in row arrangement should be considered on sloping land if cultivation is planned.

For chemical weed control, equipment used in conventional tillage systems can be used for no-till. This reduces extra expenses of purchasing new applicators when converting from one system to another. Lay-by rigs and cultivator-mounted sprayers without sweeps may be used to apply postemergence herbicides. With less weed seed germinating only one or two postemergence applications may be necessary.

COVER CROPS

Cover crops may be recommended in certain situations and conditions where more soil erosion control is warranted. They may also be grown to stablize newly developed rows on land not prone to erosion. Basically there are two types of cover crops: legumes and nonlegumes. Legumes such as crimson clover fix nitrogen in addition to providing canopy cover. Nonlegumes like wheat and rye tend to provide more fall canopy cover and are cheaper to plant.

Crimson clover and hairy vetch require adequate amounts of P and K. Soil pH should be at least 6.0 for best performance. Therefore, soil testing is essential. Wheat and rye should be

fertilized with 20-30 lb N/acre at planting. In dry years when cotton may not have taken up all the applied N, this additional N could be omitted.

Seeding rates are 15, 20, 60, and 60 lb/acre for crimson clover, hairy vetch, wheat, and rye, respectively, when drilled. These rates should be increased to 20, 30, 90, and 90 when these cover crops are broadcast planted.

A study conducted at the Jamie L. Whitten PMC showed that no fall tillage is necessary when the cover crops are drilled. Canopy cover of two legumes and two grasses was comparable when the cover crops were planted following disking once, chiseling once, paratill plowing, or directly into the stubble. A light disking is recommended when cover crops are broadcast planted.

Delaying burndown of a cover crop can lead to problems at planting. Therefore, cover crops should be killed at least 2-3 weeks prior to planting. In some cases where canopy cover is sufficient and planting time is near, cover crops can be killed early at a lower herbicide rate, thus reducing production costs. Waiting until clover starts to bloom, vetch reaches its maximum growth stage, and wheat and rye begins to joint will require higher herbicide rates and may need additional applications.

PLANTING

Planting cotton no-till should be done when soil temperature at the 2" depth at 8:00 a.m. reaches 68 degrees F for three consecutive days. Cool soils will hinder germination and reduce seedling vigor.

Coulters should be set to cut 1" deeper than planting depth. If trash sweeps are used, adjust to cut just enough to allow proper seeding depth. If too deep, water and chemicals will accumulate in the drill, thus reducing plant stands. Avoid placing the seed too deep just to reach moisture. Planter speed should be four to five miles per hour depending upon surface cover conditions, planter performance, and surface roughness.

Insecticides and fungicide should be added at planting. Use recommended rates of each chemical.

When planting on old rows, the cotton stalks that were clipped short may punch holes in the rubber depth gauge wheels. Therefore, in future years, clip cotton stalks to a 6" height.

Many soils require planting on raised beds. Cultivate during a growing season once or twice throwing soil to the drill, thus forming hipped rows for the next planting.

Plant the normally recommended varieties. Research at the Milan Experiment Station has shown no differences in grades, length, or micronaire values between planting cotton no-till and conventionally. Cotton should be planted by seeds per foot of row and not pounds per

acre. For no-till cotton plant 3-4 seeds per row foot (80-percent germination). Purchase seeds that have high vigor test results.

HERBICIDES

When using a cover crop, apply burndown herbicides two to three weeks prior to planting. This will increase soil temperature, conserve soil moisture, and reduce insect damage better than if the chemicals were applied at planting. If perennial weeds or mares tail are present, use Roundup in 10 gallons water per acre (gpa). Rates for grasses, legumes, and native cover are 1.0, 2.0, and 1.0 lb ai/acre, respectively. These may be adjusted according to the farmer's experience. If Gramoxone is used, thorough coverage is a must and apply 0.6-0.9 lb ai/acre in 20 gpa. A second application may be necessary for some species.

Add 0.5-percent nonionic surfactant by volume to both chemicals for enhanced activity. Legume response to Roundup may be slow but plants should be completely killed when cotton emerges.

Dual or Prowl may be used with Cotoran or Zorial for preemergence weed control (broadcast application). Wheat planted in fields sprayed with Zorial may show signs of leaf chlorosis during the winter months. However, this effect is only temporary and the wheat will fully recover. Wheat should not be planted where Command has been applied during the preceding 12 months or stands may be reduced or lost. Gramoxone added to these chemicals will help control emerged weeds. Postemergence herbicide application methods can be made the same as in conventionally tilled cotton. During unusually dry periods or when greater-than-label rates of herbicides occur, carryover which may cause harmful effects to a planted cover crop may be created.

Recent developments in herbicide chemistry, equipment design, and plant genetics has allowed for more use of over-the-top and non-selective chemicals. Previously, only Cotoran and/or MSMA were applied over cotton but then only in salvage situations. Then came the grass herbicides like Fusilade and Poast. Staple, a new compound scheduled for release in 1996, will provide some control of problem broadleaf weeds. Non-selective herbicides like Gramoxone and Roundup can now be applied using a hooded sprayer. This implement sprays weeds in the row middle while preventing drift to the crop. One cotton variety has been bred to be resistant to the herbicide Buctril which permitted some producers to better control broadleaf weeds in some areas.

FERTILIZATION

Apply lime as necessary in the fall following soil test recommendations. Phosphorus and potassium may be applied broadcast prior to planting. Spring fertilization reduces P and K losses due to water runoff.

Nitrogen may be surface applied or knifed 2" deep into the soil. If large amounts of residue are present split applications are preferred. Surface applications of urea-based fertilizers may result in large losses of N due to volatilization unless rain or irrigation occurs with three days of application. Knifing fertilizers will result in little or no soil disturbance and reduces adsorption of the fertilizer by crop residue. Equipment adaptation (rolling coulters) may be needed in front of the knife shank.

INSECT CONTROL PROGRAM

As mentioned earlier, an insecticide should be applied at planting. After cotton emergence, fields should be checked for thrips and aphids. Insect pressure has not been higher for no-till cotton when compared to conventionally tilled cotton. No-till cotton should be checked on a regular basis.

ECONOMICS

With less equipment required and less trips across a field, expenses for producing no-till cotton should be less than for conventionally tilled cotton. However, the determining factor is yield. Farmers may not be willing to sacrifice equipment expenses if yield is going to be reduced. If properly managed, no-till cotton yields will equal yields of conventionally tilled cotton. Even if no-till cotton yields are somewhat lower the farmer must look at the long term benefits of producing cotton no-till. Also, no-till should be compared for erosion control effectiveness with systems requiring mechanical structures such as terraces.

NOTE: Mentioning a trade name of a product does not imply endorsement by the USDA Natural Resources Conservation Service (NRCS).