# No-Till Demonstrations in North Alabama

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Although no-till and reduced tillage planting techniques were commonly used in some areas of the Southeast at least 20 years ago, these practices were never widely adopted in north Alabama. This region has traditionally relied on cotton production as one of its major farm enterprises. Intensive seedbed preparation and clean cultivation have always been considered necessary for efficient cotton production, and this attitude has apparently influenced other crop production practices in the cotton growing regions. This may explain the infrequent use of no-till planting, even with crops for which the practice is well adapted.

The Tennessee Valley Authority (TVA) has a long history of demonstrating improved agricultural practices to farmers in the Tennessee Valley and elsewhere in the United States. In late 1982, agronomists from TVA met with agricultural extension agents from several northwest Alabama counties and developed plans to conduct a series of 7½ to 10-acre no-till planting demonstrations with crops commonly grown in the area. From the TVA viewpoint, the objectives of the program were: (1) to gain experience in no- till crop production in north Alabama; (2) to demonstrate the practice to farmers; and (3) to help county agents with their educational programs on no-till crop production.

To minimize the risk to participating farmers, TVA and the county agents agreed to assume most of the costs of the demonstrations. The herbicides, tractor, no-till planter, and operator were supplied by TVA. The county agents selected participating farmers, approved the demonstration sites, took soil samples, supplied the fertilizer, and coordinated the planting schedules. Participating farmers were responsible for supplying the land and getting the seed. Some seed was bought, but some was donated by seed companies. At the end of the growing season, the TVA agronomists measured crop yields.

The proportion of crops planted varied from year to year depending on farmer interest. The 1983 demonstrations included only corn and soybeans. Because there was increasing interest in grain sorghum production in the Tennessee Valley, the no-till demonstrations for 1984 and 1985 included several grain sorghum plantings.

Several kinds of soil covers were used on the demonstration fields. Corn was successfully planted in tall fescue sod, crimson clover, and in corn or soybean stubble. Full season soybeans and grain sorghum were usually planted in corn or soybean stubble, while doublecropped plantings were made in wheat stubble directly after combining. Very successful sorghum plantings also were established in killed crimson clover.

Fertilizer, if needed, was applied broadcast preplant. Herbicides were applied at planting in 20 gallons of water per acre through a boom mounted directly behind the planter units. A four-row John Deere Max-Emerge® planter was used. Herbicide mixtures used for each crop are shown in Table 1.

In a few instances where johnsongrass or marestail were present, Roundup® was used instead of paraquat, and some of the soybean fields were given a followup treatment of Basagran® to control cockleburs.

Although rainfall wasn't recorded at the site of each demonstration, rainfall data from Muscle Shoals (Table 2) show that only 1985 had reasonably good rainfall distribution during the critical part of the growing season. Moisture was limiting from mid-July through mid-September in 1983; several times from late May through September in 1984; and in April and parts of May, June, July, and August in 1986. The drought effects are reflected in relatively low crop yields for all years except 1985. The lowest yields in the dry years were produced at locations where there was very little or no midsummer rainfall, while the best yields were obtained where heavy summer showers occurred at the right time.

Summaries of yield data from all the corn, soybean, and grain sorghum demonstrations are shown in Table 3. In one 1983 demonstration, corn planted in crimson clover yielded 66 bu/acre without extra nitrogen. A planting in tall fescue sod yielded ?2 bu/acre where all the sod was killed, but failed to yield anything in a part of the field where the sod was killed in 18-inch strips over the row. The third corn demonstration in 1983 was planted in early April when it was too wet for conventional tillage and yielded 91 bu/acre, but a nearby conventionally tilled field couldn't be planted until about 2 weeks

Table 1. Herbicides used for no-till plantings.

| Crop | Herbicide mixture' | Rate, pint/A |
|---|---|---|
| **Corn** | **atrazine 4L** | **2** |
| | **Lasso 4EC®** | **4** |
| | **paraquat** | **1.5** |
| **Soybeans** | **Lasso 4EC®** | **4** |
| | Lorox L® | 2 |
| | **paraquat** | **1.5** |
| **Grain sorghum** | **atrazine** | **3** |
| | **Dual 8E®** | **1.5** |
| | **paraquat** | **1.5** |

**'A non-ionic surfactant was used with all herbicide mixtures.**

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Table 2. Growing season rainfall at Muscle Shoals, AL.

| | | Rainfall, inches | | | |
|---|---|---|---|---|---|
| | | 1983 | 1984 | 1985 | 1986 |
| March | 1-15 | 3.3 | 1.9 | 0.0 | 2.3 |
| | 16-31 | 1.4 | 3.7 | 2.3 | 1.4 |
| April | 1-15 | 10.3 | 1.6 | 1.9 | 0.0 |
| | 16-30 | 2.2 | 2.6 | 2.6 | 0.4 |
| May | 1-15 | 1.7 | 5.9 | 3.5 | 1.1 |
| | 16-31 | 9.8 | 1.3 | 1.4 | 4.4 |
| June | 1-15 | 2.7 | 0.0 | 0.3 | 6.6 |
| | 16-30 | 4.7 | 1.6 | 2.6 | 0.8 |
| July | 1-15 | 2.3 | 0.8 | 2.2 | 2.4 |
| | 16-31 | 0.9 | 2.3 | 3.0 | 0.0 |
| Aug. | 1-15 | 0.8 | 1.2 | 2.6 | 0.7 |
| | 16-31 | 0.3 | 0.7 | 7.7 | 3.3 |
| Sept. | 1-15 | 0.6 | 0.1 | 0.2 | 3.7 |
| | 16-30 | 2.1 | 0.0 | 1.7 | 2.0 |
| TOTAL | | 43.1 | 21.9 | 32.0 | 29.1 |

later and yielded very poorly because of midsummer moisture stress.

Soybean yields were extremely variable in 1983 because most late summer rain came as local showers. One field, which yielded only 5 bu/acre, received no rain between planting and harvesting. On three farms where side-by-side comparisons were possible, two no-till plantings were higher yielding by an average of 8 bu/acre, while no-till and conventional yields were similar at the third location. Corn and soybean yields were low in 1984 because of poor moisture conditions after mid-May, while grain sorghum yields were only a little helow average. Where comparisons were possible, conventionally planted soybeans were better than no-till soybeans once and poorer than no-till soybeans in another demonstration. In one tillage comparison, no-till sorghum yielded 9 bu/acre more than conventionally tilled sorghum.

Table 3. Summary of no-till demonstrations with corn, grain sorghum, and soybeans.

| Crop | Number of demonstrations | Yield, bu/acre | |
|---|---|---|---|
| | | Average | Range |
| | *1983* | | |
| Corn | 3 | 76 | 66-91 |
| Soybeans | 7 | 25 | 5-38 |
| | *1984* | | |
| Corn | 4 | 63 | 44-76 |
| Soybeans | 7 | 17 | 7-26 |
| Grain sorghum | 4 | 77 | 72-82 |
| | *1985* | | |
| Corn | 6 | 118 | 47-186 |
| Soybeans | 4 | 29 | 18-46 |
| Grain sorghum | 10 | 86 | 59-130 |
| | *1986* | | |
| Corn | 2 | 61 | 60-62 |

Soil moisture conditions in the region were generally good throughout the 1985 growing season, and no-till demonstrations produced good to excellent yields except in a few locations where weed control was poor. One corn planting yielded poorly because of competition from uncontrolled fall panicum and localized moisture stress, while another corn demonstration was damaged by heavy johnsongrass competition. One soybean planting suffered severe competition from uncontrolled marestail.

In 1986, two corn demonstrations were conducted in a county which had not yet participated in the no-till demonstration program. Although good stands of weed-free corn were established, midsummer moisture stress reduced yields to only about 60 bu/acre.

The experiences gained in this series of demonstrations emphasize the need to select against weed problems when choosing fields for no-till planting. Although this may be difficult for county agents and research workers to do on private farms because of a lack of knowledge about individual fields, most farmers should know what weed problems exist on their own fields.

High yields of corn are difficult or impossible by no-tilling on johnsongrass or bermudagrass-infested fields because of a lack of selective herbicides; grain sorghum can't be produced at all. However, soybeans can be successfully produced in such a situation because several chemical grass-control options are available. Conversely, a heavy infestation of cockleburs or other broadleaf weeds can more easily be controlled in no-till fields if corn or sorghum, rather than soybeans, are grown.

The type of weeds present should also influence the type of burn-down herbicide which is used. Tough perennial weeds such as marestail must be treated with Roundup® rather than paraquat, which is adequate for easily killed annual weeds.

No-till planting is effective in controlling soil erosion under a wide range of conditions. It often allows earlier planting in wet springs, and it can be a cost-saving method of crop establishment. However, no-till is not a substitute for good management practices, and it will not be an effective crop production tool with poor management.