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Sustainable Dryland Agroecosystems Management

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SUSTAINABLE DRYLAND AGROECOSYSTEMS MANAGEMENT[1]

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A Cooperative Project

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PROJECT HISTORY

The Dryland Agroecosystems Project was established in the fall of 1985 with the first winter wheat and corn crops harvested in 1986. The long-term research objectives are to provide producers with information that they can use to make management decisions under dryland cropping conditions as well as to learn more about soil quality and carbon sequestration parameters as impacted by intensive no-till dryland cropping systems in the semi arid environment of the west central Great Plains. Grain yields, stover yields, crop residue amounts, soil water measurements, and crop nutrient content have been reported annually in previously published technical bulletins. This publication covers the 2003, 2004, and 2005 research results. Common introduction and materials and methods sections are presented for these three years, while the production parameters mentioned above are presented by year, in three sections identified as Section A (2003), Section B (2004) and Section C (2005).

Results from past years have shown that cropping intensification, compared to traditional stubble mulch tillage wheat fallow, is feasible and profitable in this environment if managed under no-till or minimum-till systems. The range in cropping systems evaluated from 1986 to 1998 had intensive rotations like wheat-corn(sorghum)-fallow and wheat-corn(sorghum)-millet-fallow with traditional wheat-fallow as the standard of comparison. Intense rotations of wheat-corn(sorghum)-fallow and wheat-corn(sorghum)-millet-fallow more than doubled grain water use efficiency. Increased water storage as a result of adoption of no-till systems makes cropping intensification possible. The deletion of fallow, however, also increases the risk of water deficit for the following crop. It is a management tradeoff between intensive cropping systems that result in increased return and production under the traditional tilled wheat-fallow system where risk due to moisture stress (drought) is less. Government programs can affect management decisions greatly, particularly where producers have developed a good corn yield base.

Based on our findings with the intensive systems from 1985 to 1997 (12 cropping seasons), we altered the systems in 1998 to reduce the amount of fallow in our cropping systems. We now consider the 3-year (wheat-corn(sorghum)-fallow) system as the standard of comparison. These changes will be outlined later in this report. Unfortunately, shortly after we made these changes the region was hit with a drought. Some of the more intensive cropping systems have not been successful during the drought. Winter wheat planted after wheat, millet, or corn harvest the same year has suffered a high rate of crop failure or low yields due to lack of rain for germination and inadequate stored soil moisture due to the short time period available to store water from rain and snow.

New Research Sites:

The dryland agroecosystems project established linkage with the Department of Bioagricultural Sciences and Pest Management in 1997. We are now evaluating the interactions of cropping systems with both pest and beneficial insects at three new experimental sites. The new sites at Briggsdale, Akron, and Lamar also allow us to test our most successful intensive cropping systems at three new combinations of precipitation and evaporative demand and enable us to study insect dynamics as influenced by cropping system. We want to know if the presence of multiple crops in the system will alter populations of beneficial insects and provide new avenues of biological pest management of Russian Wheat Aphid in wheat as well as insect pests in other crops.

Adoption of Intensive Cropping Systems:

Producers in northeastern Colorado have been adopting the more intensive cropping systems at an increasing rate since 1990, until 2002, the first year of the drought. The drought that started in September-October of 2001 had a devastating effect on dryland crop yields in 2002, particularly summer crops. Corn is one of the principal crops grown in the more intensive systems; thus we use its acreage as an index of adoption rate by producers. Colorado Agricultural Statistic reported that there were only 55,000 acres of dryland corn harvested in 2002 (See table below) in Colorado. However, many thousands of additional acres were planted and not harvested. Since dryland corn is almost exclusively grown under no-till in a three or four year rotation, the actual acreage under intensive no-till dryland cropping systems is at least 3-4 times greater than the total dryland corn acreage. The average economic impact is an increased return to land, labor, capital, and management of $14.85/acre (Kann et al., 2002), under an "average" rainfall environment.

Dryland Corn Acreage in Eight Northeastern Colorado Counties and state total from 1971 to 2005.

Year	Eight NE Counties*	Total for State
	Acres	
1971-1988	21,200	23,700
1989	27,000	28,000
1990	26,000	26,000
1991	32,500	33,000
1992	48,500	50,000
1993	79,000	90,000
1994	92,500	100,000
1995	95,500	100,000
1996	104,000	110,000
1997	138,500	150,000
1998	191,000	240,000
1999	220,000	290,000
2000	198,000	340,000
2001	233,000	305,000
2002	50,000	55,000
2003	150,700	205,000
2004	183,700	325,000
2005	140,900	235,000

*Data from Colorado Agricultural Statistics (Adams, Kit Carson, Logan, Morgan, Phillips, Sedgewick, Washington, Yuma)

The drought has had a dramatic effect on producers' ability to operate under intensive no-till cropping systems management. After 2002, the dryland corn acreage increased to 205,000 in 2003, to 325,000 in 2004, and then decreased in 2005 to 235,000.

INTRODUCTION

Colorado agriculture is highly dependent on precipitation from both snow and rainfall. In the dryland environment each unit of precipitation is critical to production. At Akron each additional inch (25 mm) of water above the initial yield threshold translates into 4.5 bu/A of dryland winter wheat (12 kg/ha/mm), consequently profit is highly related to water conservation (Greb et al., 1974). These data point to the need for maximum precipitation use efficiency in this semi-arid cropping environment and the importance of this project to producers.

The dryland cropping systems research project was established in 1985 to identify systems that maximize efficient water use under dryland conditions in Eastern Colorado. A more comprehensive justification for its initiation can be found in Peterson, et al. (1988). A summary of our general understanding of the climate-soil-cropping systems interactions can be found in a recent publication by Peterson and Westfall (2004).

The general objective of the project is to identify no-till dryland crop and soil management systems that will maximize water use efficiency of the total annual precipitation and economic return.

Specific objectives are to:

1. Determine if cropping sequences with fewer and/or shorter summer fallow periods are feasible.
2. Quantify the relationships among climate (precipitation and evaporative demand), soil type, and cropping sequences that involve fewer and/or shorter fallow periods.
3. Quantify the effects of long-term use of no-till management systems on soil structural stability, micro-organisms and faunal populations, and the organic C, N, and P content of the soil, all in conjunction with various crop sequences.
4. Identify cropping or management systems that will minimize soil erosion by crop residue maintenance.
5. Develop a data base across climatic zones that will allow economic assessment of entire management systems.

Peterson, et al. (1988) document details of the project in regard to the "start up" period and data from the 1986-87 crop year. Previous year's results have been reported in CSU Agricultural Experiment Station Technical Bulletins that are available at the following web site: http://www.colostate.edu/Depts/aes/pubs_list.html. Other publications related to this project have been published by various graduate students, faculty, and post doctoral students: Wood, et al. (1990), Croissant, et al. (1992), Peterson, et al. (1993a & 1993b), Nielsen, et al. (1996), Farahani, et al. (1998), Peterson and Westfall (2004).

MATERIALS AND METHODS

From 1986 -1997 we studied interactions of climate, soils and cropping systems at three sites, located near Sterling, Stratton, and Walsh, in Eastern Colorado, that represent a gradient in potential evapotranspiration (PET) (Fig. 1). Elevation, precipitation and evaporative demand are

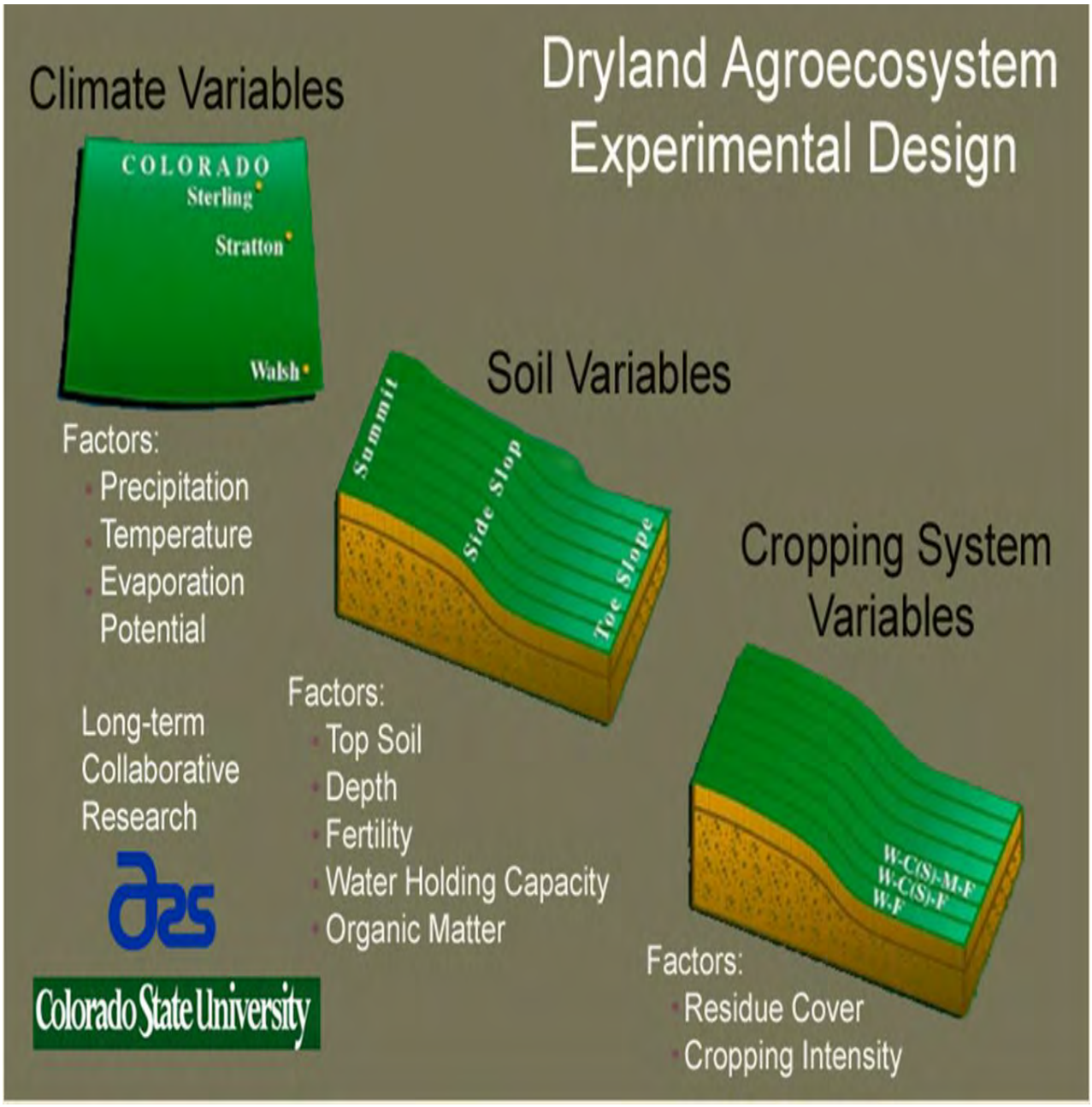
shown in Table 1. All sites have long-term precipitation averages of approximately 16-18 inches (400-450 mm), but increase in PET from north to south. Growing season open pan evaporation is used as an index of PET.

Table 1. Elevation, long-term average annual precipitation, and evaporation characteristics for each site.

Site	Elevation	Annual Precipitation[1]	Growing Season Open Pan Evaporation2	Deficit (Precip. - Evap.)
	--Ft. (m) --	---In. (mm) ---	---In. (mm) ---	---In. (mm) ---
Briggsdale	4850 (1478)	13.7 (350)	61 (1550)	- 48 (- 1220)
Sterling	4400 (1341)	17.4 (440)	63 (1600)	- 45 (- 1140)
Akron	4540 (1384)	16.0 (405)	63 (1600)	- 47 (- 1185)
Stratton	4380 (1335)	16.3 (415)	68 (1725)	- 52 (- 1290)
Lamar	3640 (1110)	14.7 (375)	76 (1925)	- 62 (- 1555)
Walsh	3720 (1134)	15.5 (395)	78 (1975)	- 61 (- 1555)

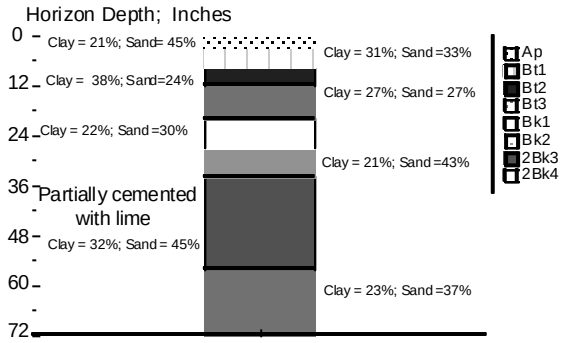
[1]Annual precipitation = 1961-1990 mean; [2]Growing season = March - October

Each of the original three sites (Sterling, Stratton, and Walsh) was selected to represent a catenary sequence of soils common to the geographic area. Textural profiles for each soil at each location are shown in Figures 2a, 2b, and 2c. There are dramatic differences in soils across slope position at a given site and from site to site. We will contrast the summit soils at the three sites to illustrate how different the soils are. Each profile was described by NRCS personnel in summer 1991. Note first how the summit soils at the three sites differ in texture and horizonation. The surface horizons of these three soils (Ap) present a range of textures from loam at Sterling, to silt loam at Stratton, to sandy loam at Walsh. Obviously the water holding capacities and infiltration rates differ. An examination of the horizons below the surface reveals even more striking differences.

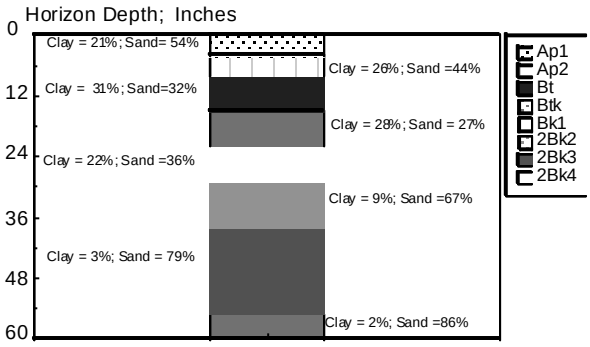


The summit soil profile at Sterling (Figure 2a) changes from a clay content of 21% at the surface (Ap) to 31% in the 3-8" depth (Bt1) to a clay content of 38% in the layer between the 8-12" depth (Bt2). At the 12" depth the clay content drops abruptly to 27%. The water infiltration in this soil is greatly reduced by this fine textured layer (Bt2). At about the 36" depth (2Bk3) there is an abrupt change from 21% clay to 32% clay in addition to a marked increase in lime content. The mixture of 32% clay and 45% sand with lime creates a partially cemented zone that is slowly permeable to water, but relatively impermeable to roots. Profile plant available water holding capacity is 9" in the upper 36 inches of the profile. This had limited crop production on this soil.

Sterling Summit Soil Profile



Sterling Sidelope Soil Profile



Sterling Toeslope Soil Profile

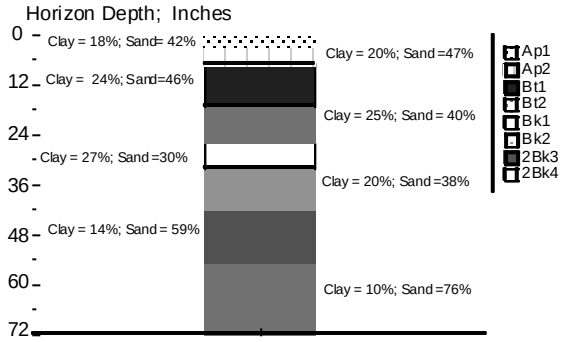


Figure 2a. Soil profile textural characteristics for soils at the Sterling site.

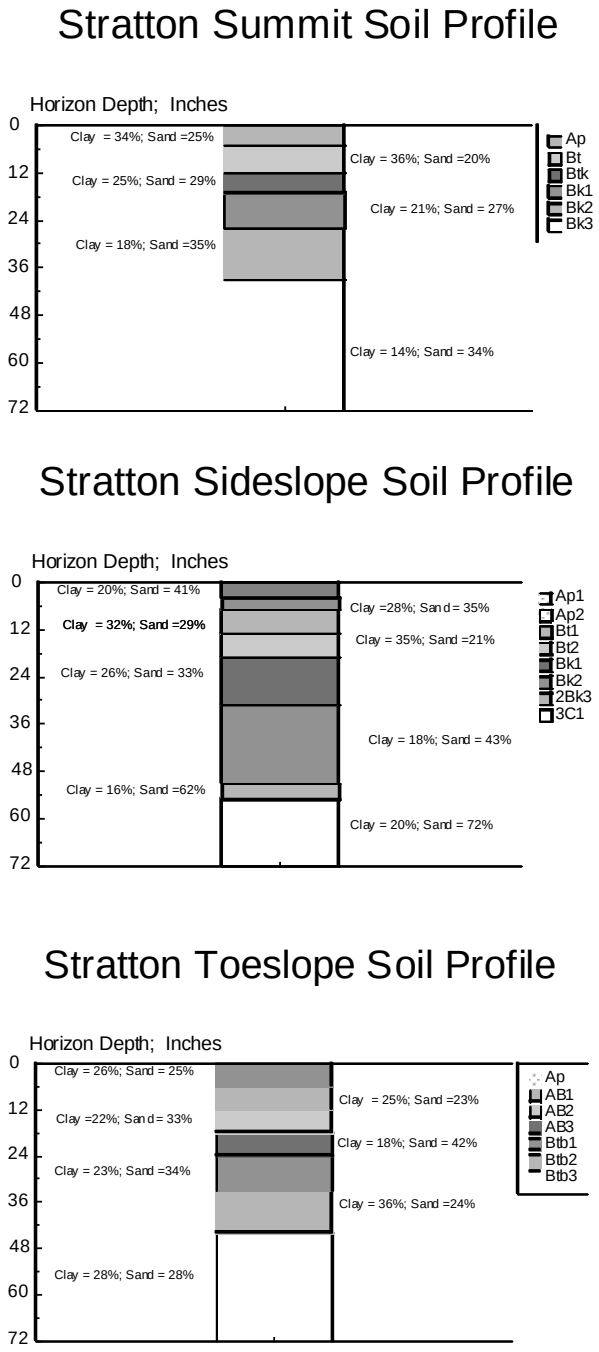
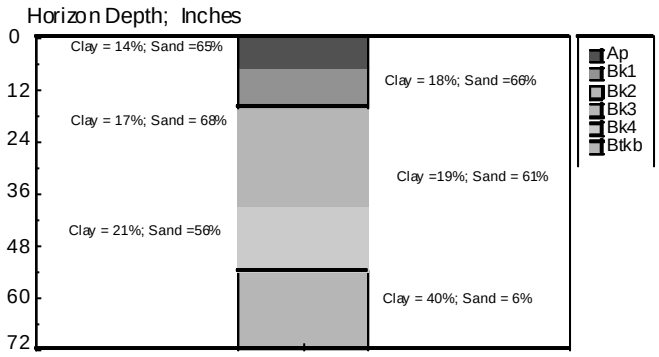
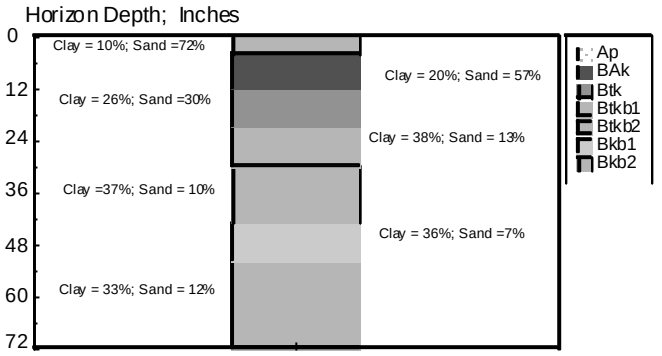


Figure 2b. Soil profile textural characteristics for soils at the Stratton site.

Walsh Summit Soil Profile



Walsh Sideslope Soil Profile



Walsh Toeslope Soil Profile

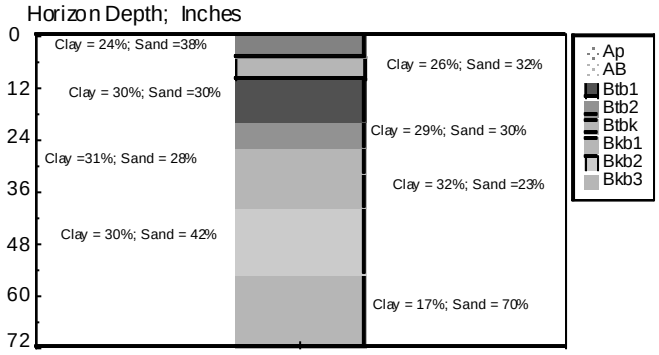


Figure 2c. Soil profile textural characteristics for soils at the Walsh site.

Cropping Systems/Management

The cropping systems that were in place in 2003-2005 at the original three experimental sites (Sterling, Stratton and Walsh) are outlined in Table 2a. One of the cropping systems is "opportunity cropping", which has the goal of producing a crop every year without fallow. The crops grown in this system from the initiation date to 2005 are shown in Table 2b. The cropping systems initiated in 1997 at the three new sites (Briggsdale, Akron, and Lamar) are shown in Table 2c. The cultivars planted, planting rates, dates and harvest information for 2003-2005 are summarized in Appendix Tables 1-3.

Nitrogen fertilizer is applied annually in accordance with the NO_3-N of the soil profile (0-6 ft), soil organic matter content before planting, and expected yield on each soil position at each site. Therefore, N rate changes by year, crop grown, and soil position and the N rates at Sterling, Stratton and Walsh are given in Appendix A Tables 4,5 and 6. Nitrogen fertilizer for wheat, corn, and sunflower was dribbled on the soil surface over the row at planting time at Sterling and Stratton. Zinc (1 lb/A) was applied to the corn with the P fertilizer. Nitrogen on wheat at Walsh was topdressed in the spring, and N was side dressed on corn and sorghum. The N source was 32-0-0 solution of urea-ammonium nitrate. The same procedures were used for fertilization at Briggsdale. However, at Lamar commercial applicators or large plot equipment is used to apply the fertilizer at these locations.

Phosphorus management is one of the experimental variables at Sterling, Stratton and Walsh. Consequently, P (10-34-0) was applied at planting near the seed. Phosphorus is applied on one-half of each corn and soybean plot over all soils, but applied to the entire wheat plot when a particular rotation is in wheat. The rate of P is determined by the lowest soil test on the catena, which is usually found on the sideslope position. This rate has been 20 lbs P_2O_5/A (9.5 kg/ha of P) at each site each year thus far. We changed the P fertilization treatment for wheat in fall 1992, so that the half plot that had never received P fertilizer in previous years receives P in the wheat phase of the rotation. This was required because low P availability was resulting in poor wheat stand establishment and low yields. Other crops in the rotation only receive P on the half plot designated as NP. Zinc (0.9 lbs/A) is banded near the seed at corn planting at Sterling, Stratton, and Briggsdale to correct a soil Zn deficiency.

Yields, Nitrogen, and Available Soil Moisture

Grain yields were determined using a small plot research combine. The center section of each treatment was harvested on each slope position. At maturity, meter row samples of each crop were collected and processed to determine stover (straw) to grain ratio. The stover (straw) and grain were processed and analyzed for total N using a combustion N analyzer.

Soil moisture measurements were taken at planting and harvest of each crop for each treatment and slope positions neutron-scatter technique. This timing also represents the beginning and end of non-crop fallow periods. Galvanized metal conduit was used for neutron probe access tubes and were installed, two per soil position, in each treatment at the Sterling, Stratton and Walsh sites. The access tubes were installed at the initiation of this study in 1987 and have not been moved since original installation. Available soil water and change over the growing season was calculated based upon the available soil water holding capacity for each treatment, depth and slope position.

SECTION A

2003 Results & Discussion - Agronomic Results

Climatic Data

Precipitation is the most limiting variable in dryland agriculture in Eastern Colorado. For the last six months of 2002, Sterling was near normal with 7.1 in, Stratton was well below normal with 5.5 in and Walsh was well above normal at 10.8 (Table 3a). Four of the 10.8 inches at Walsh was received in a two day period, August 28 and 29. Precipitation the first six months of 2003 was significantly above normal at all three sites with the greatest difference at the southern most site. Walsh was 183% of normal allowing it to recover somewhat from the below normal precipitation received the previous two years. Stratton was 138% of normal which also allowed it to recover slightly from the dry previous two years. For the last six months of 2003 the precipitation averaged across all three sites was 53% of normal with Stratton being the lowest at 43% and Walsh being the highest at 59%. Overall, for the two and a half years discussed in this bulletin, all sites were very dry. Dendrologists have stated that 2002 was the driest year in over 250 years. Precipitation during the growing season segment of the year for vegetative production (Sept-Mar) and the reproductive segment months of the years for corn and wheat from 1987-2003 for Sterling, Stratton and Walsh are shown in Tables 4a-c. The three newest sites, Briggsdale, Akron, and Lamar (Tables 5a-c) had similar rainfall conditions as the original sites from 1997 to 2003.

The last six months of 2002 had below normal precipitation at all sites. A two day period in August brought a significant amount of rain in short time periods resulting in significant run-off. For the first six months of 2003, all sites received above normal amounts of precipitation. Briggsdale and Lamar were only slightly above normal at 7.4 in and 7.7 in, respectively. Akron was 158% of normal with 13.8 in and by mid- June the rainfall had decreased substantially. For the last six months of 2003 all of the sites were 50% or less of normal. The Lamar site was the only one that received normal rainfall in the first six months of 2003.

Wheat Production

Wheat production at Sterling, Stratton, and Walsh was excellent due to the above normal precipitation during the January to June 2003 period (Table 6). Yields ranged between 38 to 61 bu/A at Sterling, 17 to 56 bu/A Stratton and 19 to 52 bu/A at Walsh (Table 6) with an average across all cropping systems and slope positions of 49, 34, and 30 bu/A at Sterling, Stratton and Walsh, respectively. With no fallow period where wheat followed a summer crop the yield was usually lower. Yields in the second year wheat [W(W)CM] and [W(W)SB] were good, but they were not as high as wheat grown after fallow (WCF). Lower yields would be expected under both circumstances since less time is available for soil moisture capture of the rainfall and snow melt.

Wheat yields where phosphorus (P) fertilizer was applied annually as compared to P that was only applied in the wheat phase of the rotation did not differ. This indicated that adequate P was available to supply the wheat plant even if it is only band applied during the wheat crop year.

Wheat yields were above average at Briggsdale and Akron but below average at Lamar. Wheat yields at Briggsdale averaged 39.4 bu/A across all treatments (Table 7). The precipitation received during the vegetative and reproductive growth periods of the wheat was below average. There are two possible reasons why the wheat yield was above average despite the below average precipitation. First, the significant rainfall received in August 2002 is not included in the growing season precipitation, but it played a significant role in proper stand establishment and keeping the crop healthy through the winter months. Second, the timing of the precipitation received during the first six days of June was ideal; it occurred when the wheat crop was undergoing anthesis—a critical period for the wheat crop.

Wheat grain yields at Briggsdale were significantly different with respect to cropping system. The yields in the Wheat-Millet-Fallow (WMF) rotation were 13 bu/ac lower than that of the Wheat-Fallow (WF) system. The wheat in the Wheat1-Wheat2-Corn1-Corn2-Sunfower-Fallow (WWCCSfF) system was not harvested in 2003 due to seedling dessication during the winter. The stored soil moisture was not great enough to support the crop during the dry winter months.

There was no difference in wheat yield with respect to Russian wheat aphid resistance among varieties due to the low infestation levels of the aphid at this site. The same relationship has been observed in previous years. As long as Russian wheat aphid pressure is low, this trend is expected to continue.

At Akron, wheat grain yields averaged 53 bu/ac. The varieties yielded 52.1 and 54.6 bu/ac for TAM 107 and Prairie Red, respectively. The wheat yields in the WF system were significantly less than the other systems, but the reason is not known.

The wheat yields at Lamar were very low, averaging 6.3 bu/ac. Wheat in the WSF system died during the winter, probably due to desiccation and was not harvested. The WF system averaged 11.2 bu/ac while the WCF system averaged 7.8 bu/ac.

Corn/Sorghum Production

Corn and sorghum yields were well below average at all sites in 2003. During the vegetative stage the corn plants were growing well, but by late tasseling in July soil water reserves were nearly depleted (Table 4a-c, 5a-c), and the plants were severely moisture stressed, resulting in poor yields.

Average yields across soils and rotations were 33 and 43 bu/A at Sterling and Stratton, respectively (Table 8). The high yields on the toeslope position at Stratton made the average yield appear better than the majority of the site area; excluding the toeslope yields in the average decreased the site average to 27.8 bu/A. The growing season precipitation at Walsh (Table 4c) was about equal to the long term average but the corn yields were low, averaging 33 bu/A (Table 8). Dryland corn is not well adapted to the Walsh environment because of the high ET rate and heat stress that can occur during the reproductive growth stage. Sorghum is a better adapted crop but yields only averaged 38 bu/A in 2003.

The responses to P fertilization from the annual application of P plots were 36.2 and 43.8 vs. 29.9 and 42.7 bu/A on the P only applied when planting wheat at the Sterling and Stratton sites, respectively (Table 8). The opposite relationship was found at Walsh. Over the years there has been no distinct increase in yield of corn when it follows wheat that has received P fertilizer.

Annual application of P to all crops in the rotation has not been advantageous over the years.

At Briggsdale the corn crop had a vigorous start due to the rainfall received in the spring. Corn was present in two phases of the WWC1C2SfF rotation (Table 7). The first corn was a conventional variety planted into wheat stubble which is the most common practice for dryland corn producers. The second corn (C2) in the rotation was planted into corn stalks that would usually have less stored soil water due to less time to accumulate soil moisture. We hypothesized that the yields from the corn2 phase would be equal or less than that of the corn1 phase. Although the corn2 yield (22 bu/A) was significantly greater than that of corn1 (12 bu/A) after wheat (Table 7), both corn crops would be classified as a crop failure.

At Akron, corn yields were well below average with yields averaging 24.1 bu/A, which is essentially a crop failure. Precipitation was 47% of average for the July through August period.

At Lamar, corn and grain sorghum were not harvested because of lack of rainfall. The precipitation was 42% of average for the July and August period.

Millet and Mung Bean Production

Millet yields at Sterling and Stratton were "respectable" in 2003, averaging 44 and 28.5 bu/A across rotations at Sterling and Stratton, respectively (Table 9). Millet growing season precipitation (May-August) was below normal at Sterling and above normal at Stratton (Table 3a). The reasons for the lower yields at Stratton are not known.

In our quest to try to find a summer legume that may be adapted to the Walsh environment we planted Mung Beans (B) in 2003 (Table 9). Production was very poor in both the WCB and (W)WSB systems averaging from 5.4 to 19.4 bu/a, averaged across cropping systems. The high summer temperature during pod fill was detrimental to production.

Millet stands were poor at Briggsdale in 2003 and so there was no harvest (Table 7). The millet was planted on 21 June into dry soil and at a shallower depth than desired. The millet was mixed with some forage sorghum seed. Some of the forage sorghum emerged in June however, the millet did not. After a rainfall event in late July, the millet emerged in early August along with a healthy crop of weeds, consequently the crop had to be terminated.

Proso millet yields at Akron were averaged 27.0 lb/A (Table 7). Rainfall received during the growing season was low. The plants were short, eight to eleven inches in height.

Sunflower

The sunflower yields were poor, 490 lb/A at Briggsdale (Table 7) because of the dry July through August period. The same situation existed at Akron with yields averaging 538 lbs/A (Table 7).

Residues

Residues present at wheat planting at Briggsdale ranged from about 460 lb/A to 2500 lb/A(Table 10). The highest residue levels were in the WF rotation. This is a carryover from the high straw yields in 2001. The lowest residue level was in the second wheat crop of the WWCCSfF system (277 lb/A). Based upon potential biomass production, this treatment would be expected to have the highest levels. However, the 2001/2002 wheat crop failed and the residue base was low prior to that wheat crop. The WMF rotation also had low residue levels due

to the millet crop failure in 2001. Residue levels at planting of corn, millet and sunflower were low, less than 1300 lb/A.

At Akron, residue levels (Table 10) have steadily increased in all plots with reduced or no tillage since the experiment was initiated. All plots were managed under no tillage the past season except for the conventionally tilled wheat-fallow plots, which produced only 223 lb/A of residue. The WCM system has shown the most dramatic increase with residues climbing to over 3,000 lb/A at wheat planting and over 2200 to 3200 /A at corn and millet planting, respectively.

At Lamar, residue levels were higher in the WF system than both the WSF and WCF systems. The percent area covered by residue in the WF system was also considerably higher than in the WSF and WCF systems

Nitrogen Content of Grain and Stover (straw)

The grain and stover straw from all plots at Sterling, Stratton and Walsh locations and treatments were analyzed for total N content on subsamples collected at harvest. The percent total N in wheat grain and straw from Sterling, Stratton and Walsh is presented in Tables 14 and 15. The overall average % N was 2.41 for grain and 0.79 for straw. The corn and sorghum grain and stover total percent N averaged over all sites and soils was 1.65 and 1.14 respectively (Tables 16 and 17). Data summarizing the millet grain N and millet stover and mung bean biomass N are presented in Tables 18- 19. Average percent total N for millet grain at Sterling and Stratton was 2.11 with straw N levels averaging 1.41. At the Walsh location mung bean was grown in place of proso millet. The total above ground biomass was sub-sampled at harvest and had an average % N content of 3.78.

Soil Moisture

Available soil moisture contents were measured at planting and harvest of each crop in 1ft depth increments at the Sterling, Stratton and Walsh locations. The soil moisture data for 2003 are presented in Tables 20-29. The amount of soil water used can therefore be determined by the change in soil water and adding the amount of rainfall that was received during the growing season.

2003 Results & Discussion - Entomological Data

Wheat

Insects are monitored throughout the growing season at critical growth stages–two to four times for each crop at Briggsdale, Akron, and Lamar.

Aphids:

At Briggsdale the wheat was sampled two times during the growing season. Aphid populations were very low in 2003 (Table 11). No aphids were found either by scouting or in Berlese samples. No symptomatic tillers were observed.

At Akron since 1996, no insect populations have reached economic levels. Wheat pests

were present below economically significant levels throughout the 2003 growing season (Table 11). Aphids and cutworms were the prevalent insect pests. Russian wheat aphids *Diuraphis noxia* Kurdjumov) per 50 random tillers did not exceed economic threshold. Few bird-cherry oat aphids *Rhopalosiphum padi* (Linnaeus). or greenbug *Schizaphis graminum (*Rondani) were found in these samples. Onion thrips *Thrips tabaci* Linderman were present throughout the growing season. Lady beetles and lacewings were the primary aphid predators encountered in wheat. Spiders have become much more common the past couple years, perhaps due to reductions in tillage At Lamar, Russian wheat aphid was the only aphid present. Few were observed in the plots during boot growth stage (Table 11). There was no significant difference in the number of infested tillers between the two cropping systems. However, there were more Russian wheat aphids in the susceptible variety under the WF system than in the WSF system.

As in previous years, aphid infestation levels at harvest in the WSF were higher than the WF system. The WCF system had higher infestation levels in the susceptible variety than WF but not in the resistant variety.

Brown Wheat Mite:

Brown wheat mite [*Petrobia latens* (Müller)] densities were moderate at Briggsdale. There were 256 mites/1.75ft^2 in the WF rotation and 86 mites/1.75ft^2 in the WMF rotation on 1 May (Table 11). The economic threshold has not been determined, however, mites did not appear to affect yields.

Brown wheat mite infestations at Akron were very low. Sixteen mites was the largest sample collected.

Although brown wheat mites were found in a few locations east of the Lamar site, none were found at this site during the sampling at boot growth stage. Therefore, this pest was not sampled.

Other pests:

Pale western cutworm, *Agrotis orthogonia* Morrison, was not detected at Briggsdale, however, army cutworms, *Euxoa auxiliaris* (Grote), were present at low levels in the in the WMF rotation (Table 11).

At Akron, pale western cutworms and army cutworm were present at slightly higher levels than the past few years. The highest count was five/ft^2, while the average was 0.7/ft^2.

At Lamar, both species were present at low levels. Pale western cutworm was found in both systems and in both varieties, however, army cutworm was not found in the WSF system.

Corn/Sorghum

No cutworm damage to corn was observed at Briggsdale in June. (Table 12). western corn rootworm, *Diabrotica virgifera virgifera* LeConte adults and corn earworm, *Heliothis zea* Boddie, were found feeding on ears at low levels, 0.15 and 0.10 per ear zone, respectively. No predators were found in the corn. Insect pests in the corn were present in greater numbers than the past couple years. One pale western cutworm and three army cutworms were detected. Greenbugs, bird-cherry oat aphids, and corn leaf aphid, *Rhopalosiphum maidis* (Fitch), and onion thrips were found at below economically significant levels. Dusky sap beetles *Carpophilus lugubris* Murray were observed feeding on ears.

At Lamar, sorghum and corn were not sampled due to lack of insect activity. Corn leaf aphid was observed in the sorghum at the 4-5 leaf stage. Corn earworm was observed in the in the few corn ears produced, but the crop was lost to cattle prior sampling.

Millet

The millet at Briggsdale was not sampled for insects in 2003. Due to a combination of dry soil and poor penetration of the drill, stands were very poor. Greenbug and bird-cherry oat aphids were observed in the crop below economic significant levels. Spiders were the main predators observed. In two minutes of observation in four separate locations the spider counts averaged one with a high of six. A few lady beetles were also present.

Sunflower

At Briggsdale, sunflowers were sampled three times during the growing season. Sunflower stem weevil, *Cylindrocopturus adspersus* (Leconte) and red sunflower seed weevil, *Smicronyx fulvus* Leconte, were present at harvest (Table 13). There were 22.5 stem weevil larvae per stalk at harvest, however, there was no significant lodging. Red sunflower seed weevil larval densities were very lowAt Akron, no insects were observed above established economic thresholds. One army cutworm was found. No aphids were present in this crop during the growing season Sunflower stem weevil caused five percent lodging. Sunflower moth, *Homoeosoma electellum* (Hulst), banded sunflower head moth, *Cochylis hospes* Walsingham, and red sunflower seed weevil densities were low to moderate. Sunflower heads and seeds were small. Predators were abundant, including 1.0 spider per plant and 0.5 lady beetles per plot.

SECTION B
2004 Results & Discussion - Agronomic Results

Climatic Data

The precipitation at the research sites in 2004 varied, but in general it was unfavorable for crop production. Annual precipitation was 90%, 57% and 120% of normal at Sterling, Stratton and Walsh, respectively (Table 30a). However, precipitation during the wheat vegetative growth period was 40% and 32% of normal (Tables 31a-b) and 80% and 62% during the wheat reproductive growth period at Sterling and Stratton, respectively. Precipitation during the vegetative growth period at Walsh was low (68%) but was 148% of normal during the reproductive growth period (Table 31c). Precipitation at Briggsdale, Akron, and Lamar was similar to other locations with only 53%, 46%, and 45% of normal during the winter wheat vegetative stage, respectively (Tables 31d-f). April through June precipitation, reproductive period, was much better at 80%, 105%, and 153% of normal at Briggsdale, Akron, and Lamar, respectively.

Summer crop production conditions also were variable across sites. Corn preplant precipitation, which controls stored soil water at planting, was lower than normal, 64% and 51%, at Sterling and Stratton, respectively (Table 31c); the growing season precipitation was 89% of normal at Sterling and was only 49% at Stratton. . Sorghum preplant precipitation was 73% of normal at Walsh while the growing season was near normal, 104% (Table 31c). At Briggsdale, Akron, and Lamar preplant precipitation was 55%, 54%, 71% of normal, respectively. The above average precipitation in May at Briggsdale provided very good planting conditions for the spring planted crops. The Akron and Lamar sites received less precipitation in May compared to Briggsdale, but they received more precipitation during the rest of the growing season.

Wheat production

Wheat production at Sterling and Stratton was very poor, particularly in those cropping systems where wheat did not follow a summer fallow period; this was due to the limited precipitation as discussed above. Wheat yields after summer fallow at Sterling in the WCF systems ranged between 28-34 bu/A, with the higher yields occurring on the toeslope positions that had receives some run-on water (Table 32). These yields are contrasted to the wheat crop failure in the WCM and (W)WCM systems and yields in the 9-18 bu/A range in the W(W)CM systems that did not have a summer fallow period prior to winter wheat planting. Wheat production failed at Stratton. The only cropping system that produced any yield was the WCF system on the toeslope soil position, where the soil is very deep, high in organic matter and receives run-on water. At Walsh the same relationship was observed. The system where wheat was preceded by summer fallow (WSF) produced wheat yields in the 17-29 bu/A range while those cropping where summer fallow did not precede wheat were essentially failures with yields less than 9 bu/A (Table 32).

Wheat yields where phosphorus (P) fertilizer was applied annually as compared to where

P was only applied in the wheat phase of the rotation did not differ.

Wheat yields were very good at Briggsdale averaging 34.5 bu/A in the least intensive cropping systems (Table 33). The most intensive system [W1(W2)S(C)SfF] was a complete failure. The yield in the WF rotation (47 bu/A) was 16.3 bu/A higher than that of the other systems.

At Akron, wheat yields were below average, and cropping systems where fallow preceded wheat yielded the most. Yields in the continuously cropped WCM system were about 50% of those systems where fallow preceded winter wheat.

At Lamar, wheat yields ranged from 7-14 bu/A (Table 33); the low yields were due to lack of precipitation. There were no consistent differences in wheat grain yields between the Russian wheat aphid susceptible and resistant variety due to low aphid infestation levels at any of three sites where the variety variable was tested. As would be expected, under drought conditions summer fallow reduces the risk of crop failure in this region. Under normal precipitation amounts and patterns, this situation is not true and cropping intensification results in increased net returns.

Corn/Sorghum

Corn yields at Sterling were very good ranging between about 50-75 bu/A, averaging 60 bu/A (Table 34), as driven by the near normal growing season and timely precipitation events (Table 31a). The side slope position had the highest yield with an average of 70 bu/A, averaged across cropping systems. The average yield across slope positions were highest in the WCF (averaging 64 bu/A) with the yields of the WCM and WWCM fallow cropping systems averaging about 57 bu/A. The Stratton site only received about 50% of the normal rainfall during the preplant and growing season (Table 31b). On the summit and side slope positions the yields ranged from 7-19 bu/A, which would be classified as crop failures (Table 34). The yields in the toeslope position were much higher, averaging 73 bu/A, where soils are deep, high in organic matter, and some run-on water is received. No valid conclusions can be made regarding cropping systems comparisons in this low yielding environment.

Sorghum yields at Walsh were very good ranging from 40-90 bu/A, averaging 60 bu/A (Table 34), which was the result of the excellent precipitation received during the growing season (Table 31c). The highest average yield, across slope positions, was in the WWSB system, which averaged 75 bu/A. Mung beans were not successful in 2003 and probably used little soil moisture which may have resulted in some stored soil moisture at sorghum planting which added to the available water for the 2004 sorghum crop. The WSF was the second highest yielding system with an average of 62 bu/A. The other two intensive cropping systems, OPP S and CC S, produced yields ranging from 49-53 bu/A. These systems are cropped every year and little stored soil moisture would be expected to be present at planting. Two cropping systems at Walsh included corn, WCB and CC C. The WCB system averaged 87 bu/A with over 100 bu yields on the toeslope soils, and the CC C system averaged 59 bu/A. Under normal precipitation conditions, dryland corn could be a viable crop in this environment. Inconsistency in precipitation patterns and amounts, however, make corn production a very risky system due to its higher production cost.

The corn at Briggsdale failed in 2004 due to drought (Table 35). The limited amount of

stored soil water in conjunction with the limited rainfall received resulted in no grain production. The corn plants grew to a height of approximately three feet and very few even tasseled. Corn yields have averaged 15.9 bu/A since the experiment was established at Briggsdale. This is well below the break even economic point which is approximately 50 bu/A. Corn production in this region under these climatic conditions does not appear to be a viable crop alternative. Grain sorghum also failed at Briggsdale in 2004.

At Akron, corn yields ranged from 45-58 bu/A (Table 35). Preplant precipitation was about 180% of normal and growing season precipitation was about normal (Table 31e). In August we received 2.85 inches of rainfall. Preplant precipitation at Lamar was 70% of normal while growing season precipitation was 134% of normal. We would have expected sorghum yields to be better under this growing season rainfall condition.

Hay Millet

No hay millet was harvested for forage this year at Briggsdale (biomass yields averaged 935 lb/A) because it rained in early September some growth occurred (Table 35). Over the life of the experiment hay millet has averaged 1,270 lb/A. This is the average of two very good years and zero yield for the other four years.

Proso Millet/Mung Beans

Millet grain yields at Sterling ranged from 24-36 bu/A (Table 36) with average June-August precipitation (totaled 8.3 in about 100% of normal) (Table 30a). At Stratton, June-August precipitation was 4.2 inches, about 50% of normal, and millet yields ranged from 2-12 bu/A, with the exception of the toeslope where yields were as high as 29 bu/A. Mung beans were planted at Walsh but the crop was a failure and no harvestable yield occurred.
Millet grain yield at Briggsdale was poor with the opportunity system yielding about 11 bu/A with crop failure in the WMF system (Table 35), which was caused by the low rainfall of 2.5 inches; 40% of normal between June-August. At Akron, millet yields also were poor with the WCM system yielding 14.5 bu/A, even though rainfall was 94% of normal. The millet plants were short (about 10 inches in height) and the heads were too close to the ground for swathing, and so a combine with a stripper header was used to harvest the millet. This technique worked well but some shattering did occur before harvest and probably contributed to the lower yield. Direct harvest of millet has its limitations, as is well known.

Sunflowers

Sunflowers did not produce seed at Briggsdale or Akron, due to the dry conditions and early season plant damage by rodents and rabbits. The sunflowers that did survive reached a height of approximately three feet and produced a few heads that were about four inches in diameter, of which only the outer inch of each head had mature seeds. Over the life of the experiment sunflowers have averaged 470 lb/A at Briggsdale. This average includes two years of crop failure.

At Akron three planting attempts were made, but ultimately the crop was terminated by

spraying with Roundup. Stand counts never exceeded four plants per 17.5 linear feet of row.

Residues

Residue samples at harvest and planting were not collected at Sterling, Stratton and Walsh in 2004. In about 1998-2001, depending on the cropping system, we reduced residue sampling intensity to every 3rd year in an attempt to maintain representative residue levels in the harvest area of the plots. Annual sampling was affecting the C return to the soil.

Crop residues were collected at Briggsdale, Akron and Walsh. Residue levels at wheat planning in fall 2003 ranged from 200-730 lb/A at Briggsdale (Table 37). The Wheat2 (second wheat crop in the cropping sequence) in the WWSCSfF rotation had significantly more residue than the WF rotation. The treatment with the most crop residues in the spring was sunflowers (Table 37, 1900 lb/A), which followed a 2003 corn crop. The treatment with the lowest residue level was grain sorghum at 600 lbs/A at planting. This crop followed a failed 2003 wheat crop. Crop residues at planting of the various crops at Akron were good, with the expectation of WF (Table 37). Residue levels were highest in the more intensively cropped systems. Residue levels at Akron have steadily increased in all treatments with reduced or no tillage until last year. The plots had no tillage in the past season except for the conventionally tilled wheat-fallow plots. Since 1996, there has only been tillage to incorporate herbicides in the sunflower rotations outside of the conventionally tilled plots. The WCM system has showed the most dramatic increase with residues reaching over 2000 pounds at corn planting.

Nitrogen Content of Grain and Stover (straw)

The grain, straw, and stover from all treatments at Sterling, Stratton, and Walsh were analyzed for total N content on subsamples collected at harvest. The wheat grain total N content averaged 2.68, 2.80, and 2.79 across slopes and rotations at Sterling, Stratton, and Walsh respectively (Table 41). Wheat straw N concentrations on average where 0.83 for Sterling and 0.62 for Walsh. These values are similar to what has been observed in past years. The corn grain and sorghum grain N values were also similar to what has been observed in the past with 1.75, 1.91, and 1.77 % N on average for Sterling, Stratton, and Walsh (Table 43). The corn stover N values were noticeably higher from the summit and sideslope landscape positions at Stratton (Table 44). These slope positions had poor corn yields which did not allow for the transfer of N into the grain. Millet grain N values averaged 2.39 % N for Sterling and 2.60 % N for Stratton which is approximately 35 % higher values than observed in previous years. The millet yields differences do not explain the high N content as Sterling had good yields and Stratton had poor yields. The millet straw and mung bean total N values are presented in Table 46. The millet straw % N numbers are 3 to 4 times higher than what has been observed in previous years with Sterling having 1.95 and Stratton having 2.42 % total N in the millet straw. Walsh had mung bean planted in place of the millet and had average biomass values of 1.80 % N.

Residual Soil Nitrate

Residual soil nitrate levels before planting wheat and corn and sorghum at Sterling, Stratton, and Walsh are presented in Table 47. The residual soil N levels for the wheat crop ranged from 76 to 248 kg N/ha in the soil profile across all sites and slope positions. In general the residual N levels where site, slope position and rotation dependent.

Soil Moisture

Available soil moisture contents were measured at planting and harvest of each crop at Sterling, Stratton, and Walsh. Soil water was measured by neutron thermalization method in the middle of 1 ft. depth increments down to 6 ft. The available water by depth increment for each crop from each phase of the individual rotations data are presented in Tables 48-67 along with the change in available soil water from planting to harvest.

2004 Results & Discussion - Entomological Data

Wheat

Insects are monitored at two to four critical growth stages in each crop.

Aphids:

The wheat was sampled three times during the growing season. Aphid abundance was low in 2004 (Table 38). Russian wheat aphid and other cereal aphids were found in all treatments on 5 April and 6 June. On 5 April only a few samples contained aphids, while on 6 April Russian wheat aphid averaged 5.5 per 50 tillers, which would be considered economically insignificant. Treatment and variety effects were not observed.

At Akron Russian wheat aphid densities approached economic levels (Table 38), although they did not exceed 289 per 100 tillers. Other cereal aphids (bird-cherry oat aphid and greenbug) and cutworms were the present, but not at damaging levels. Other cereal aphids were noticed in small numbers. More Russian wheat aphids were collected from the susceptible wheat variety on three of four sample dates, however, on 27 June twice as many were collected from the resistant variety. This may reflect late season immigration of biotype RWA2, which is virulent to the resistant variety used at Akron.

Onion thrips *Thrips tabaci* Linderman were found at low levels throughout the growing season. Lady beetles and spiders were the primary predators in the wheat. Lacewings were also observed. The no-till plots seem to be a favorable environment for the predators due to higher residue levels.

At Lamar, the only aphid observed was Russian wheat aphid. Few were observed in the plots during boot growth stage (Table 38). Cropping system did not affect aphid abundance, however, in the WF system there were fewer aphids in the susceptible variety. This may be due to the presence by biotype RWA2, which is unaffected by currently deployed sources of resistance.

Brown Wheat Mite:

Brown wheat mite, *Petrobia latens* (Müller), abundance was low at Briggsdale and Akron. The treatment/sampling date with the most mites contained less than 17 mites/1.75 ft.^{2} (Table 38). The number of mites required to reach an economic threshold has not been determined but it is much higher than this. The mites did not have an impact on yields.

Brown wheat mite was sampled at Akron with the Vortis sampler and with a wooden stake method. Both methods were variable and did not seem comparable. Thirty nine mites per plot was the maximum Vortis capture. Stakes seemed to have higher numbers during the middle of the day as compared to morning sampling. There were no predatory mites observed this year.

Other Pests:

Pale western cutworms *Agrotis orthogonia* Morrison and army cutworms *Euxoa auxiliaris (*Grote) were not present at Briggsdale in 2004, but they were present in the Akron plots at slightly higher levels than the past few years. A total of two pale western and 61 army cutworms, with an average of 0.6 larvae per square foot.

Beneficials:

No predatory insects were found at Briggsdale or Lamar during these time intervals. This is not surprising considering the low aphid abundance. At Akron, only the lady beetle, *Hippodamia convergens* Guérin-Méneville, was found in the plots this year. Overall, more *H. convergens* were found in the WSF system than in the WF system due to more lady beetles being found in the TAM 107 in the WSF system

Corn/Sorghum

No cutworms or cutworm damage were observed at Briggsdale on 14 June crop stress precluded further sampling.

Insect pests were more common in the corn than over the past couple years at Akron (Table 39). Two western bean cutworms, *Richia albicosta* (Smith), and one corn earworm, *Helicoverpa zea*. (Boddie) were collected from ears. Aphids collected included greenbugs, bird-cherry oat corn leaf aphid, but they were not at economically significant levels. Onion thrips, corn rootworm, *Diabrotica virgifera virgifera* LeConte, and dusky sap beetle, *Carpophilus lugubris* Murray, were also observed.

At Lamar, corn leaf aphid was observed in 4-5 leaf stage sorghum, but not however corn which was 100% infested with corn earworm.

Millet

No aphids were present in the hay millet and proso millet at Briggsale. Thrips were present with 36, 9, and 29 thrips/50 tillers on 12 July, 27 July, and 6 September, respectively. Thrips totals in proso millet were two and 68 thrips on 12 July and 6 September, respectively. The economic significance of this level of thrips is unknown. Greenbug and bird-cherry oat were observed at low levels at Akron. Spiders were the most abundant predator group, although a few lady beetles

also were present

Sunflower

A few sunflower insects were found at both Akron and Briggsdale, but none were of any concern (Table 40). Cutworms, stem weevils, seed weevils, and banded sunflower moth were found but in very low populations.

SECTION C

2005 Results & Discussion - Agronomic Results

Climatic Data

The annual precipitation was 65, 97 and 61% of normal at Sterling, Stratton, and Walsh, and 82, 115, and 115% of normal at Briggsdale, Akron, and Lamar in 2005, respectively (Tables 68a-b).

Precipitation during the wheat vegetative growing period (September-March) was 71, 81, and 60% of normal at Sterling, Stratton, and Walsh, respectively (Tables 69a-c) while during the wheat reproductive growth period (April-June) the precipitation was 100, 110, and 70% of normal. At Briggsdale, Akron, and Lamar the wheat vegetative growing season precipitation was 93, 98, and 140% of normal and 117, 126, and 124% during the reproductive growth period, respectively (Table 69d-f). Even though precipitation was greater in 2005 than in the previous two years, wheat yields were below expected levels. At Lamar precipitation was good for wheat production but issues with herbicide injury and Wheat Streak Mosaic Virus resulted in low yields.

Pre-plant precipitation for corn and sorghum in 2004-05 was 94, 62, and 75% of normal at Sterling, Stratton, and Walsh, respectively (Tables 69a-c), while during the growing season precipitation was 67, 108, and 65% of normal. During the preplant period for corn (sorghum) the precipitation was 80, 97, and 128% of normal at Briggsdale, Akron and Lamar, respectively, (Tables 69d-f), and 118, 137, and 120% during the growing season in 2005. The corn crop was damaged by very high temperatures during tasseling. Between 20 July and 20 August, there were 20 days where the maximum temperature exceeded 90 degrees. During October good rainfall occurred; however these events were too late to have a positive effect on corn and sorghum yields.

Wheat production

Wheat production at Sterling in 2005 was well below average in all cropping systems, and yields were very low in cropping systems that were not preceded by summer fallow. The average yield for the entire site was 16.8 bu/A (Table 70). The continuous cropping systems, WCM and (W)WCM averaged only 6.9 and 10.2 bu/A, across all slope positions. In 2004, the continuous cropping systems suffered a complete wheat crop failure. In 2005 the WCF system yielded an average of 21.9 bu/A, across slope positions. We are unable to explain why the

continuous cropped W(W)CM system averaged 28.3 bu/A, which was much higher than any other cropping systems at Sterling. In 2004 this system did not suffer a crop failure as some other systems did and yielded from 9-18 bu/A, depending on the slope position (Table 32). The yields at Stratton were poor, averaging 7.1 bu/A across the site. Wheat in the WCM and (W)WCM systems failed (Table 70), and the other cropping systems had low yields; the WCF averaged about 5 bu/A and W(W)CM about 10 bu/A. The low yields resulted from a dry late winter and a hard freeze on 12 May followed by hot weather between 20 May and harvest. Wheat yields at Walsh were much higher because of above average precipitation; the site averaged 38 bu/A (Table 70). The WCM, WCF and (W)WCM cropping systems yielded from 25-28 bu/A, averaged across slope positions, while the W(W)CM averaging 34 bu/A.

Wheat yields for the WF and WMF systems at Briggsdale averaged about 25 bu/A (Table 72), with the WCM system yielding about 10 bu/A more than WF. The (W)WSCSfF and W(W)SCSfF systems produced no grain. The intensive rotations at this location have produced grain about 50% of the time. Wheat yields at both Akron and Lamar were low and averaged 12 bu/A and11 bu/A at Akron and Lamar, respectively (Table 72). Precipitation at Lamar was favorable for wheat production but issues with herbicide injury and Wheat Streak Mosaic Virus resulted in low yields. At Akron the two systems with fallow preceding wheat (WF and WCF) yielded about 15 bu/A while those that did not include fallow, or the system with sunflower before fallow, averaged about 6.7 bu/A. Systems without summer fallow obviously have greater risk of crop failure during periods of low rainfall.

Corn/Sorghum production

Corn and sorghum yields in 2005 varied based on growing season precipitation, with Stratton producing the highest average yield of 32 bu/A, and Sterling averaging only 18 bu/A (Table 71). Growing season precipitation at Stratton was 108% of normal, while Sterling growing season precipitation was 67% of normal (Table 69a). The corn systems yielded about 32 bu/A at Stratton with the OPP systems yielding highest with 62 bu/A. The previous crop in the OPP system was millet at both Sterling and Stratton (Table 2b). At Sterling the very low yields on the summit soil position decreased the average yields. This soil on the summit position has a dense clay layer a few inches below the surface, which adversely affects water storage and precipitation capture during the growing season. Sorghum yields at Walsh were low; with all cropping systems producing an average of 17 bu/A (Table 71). No cropping system differences were evident.

Corn yields at Briggsdale were low, averaging about 13 bu/A; essentially a crop failure (Table 72). In 1999 corn at this site had an average yield of 62 bu/A. Since 1999 the yields have ranged from 0 to 16 bu/A. Obviously corn is not a good crop choice for this location. Precipitation was above average for the growing season at Akron, however intense heat and the cumulative effects of drought over the past several years caused low yields; 8 bu/A. Even though precipitation was above average at Lamar, the sorghum crop produced only 8 bu/A. Infestations of kochia, stinkgrass, spurge, and witchgrass are becoming more of a problem in sorghum every year. In the grazed plots, kochia infestations were reduced, but the stinkgrass and witchgrass pressure increased in the grazed treatments.

Barley production

Barley was grown at Briggsdale in 2005 instead of sunflowers and yields averaged 22 bu/A (Table 72). Given that the grain value of barley is lower than that of other grain crops like wheat, the barley crop was not profitable.

Millet production

Millet yields at Sterling in 2005 averaged 19 bu/A (Table 73). The June-September precipitation was about 60% of normal with only 2 inches in July and August (Table 68a). There were no significant differences in millet production between the WCM or WWCM cropping systems. Yields at Stratton were considerably better with a site average of 34 bu/A. The June-September precipitation at Stratton was 90% of normal. At Walsh the average millet yield was only 10 bu/A, with most of the production being achieved on the toe slope position soils. No cropping system differences were observed.

Hay Millet production

Hay millet was planted at Briggsdale in 2005, but the July temperatures of over 100^{o} F in combination with only 0.44 inches of precipitation resulted in a crop failure (Table 72). Over the years hay millet production has been successful only 33% of the time at the Briggsdale location.

Residues

Residue samples were pre-plant to wheat in the fall of 2004 where only taken at Walsh (Table 76a). The overall levels for all but the WSF systems were low and not enough to protect sandy soils. However the WSF system did produce adequate protection with 3 to 4 times the levels found in the more intensive cropping systems without fallow. The pre-plant wheat residues were taken at Sterling and Stratton in 2005 (Table 76b). These levels were more than adequate levels as they ranged between 1485 to 9665 kg/ha over both sites and slopes. In 1998, depending on the cropping system, we reduced residue sampling intensity to every 3rd year in an attempt to maintain representative residue levels in the harvest area of the plots. Plant residues were not collected in 2005 at Briggsdale or Lamar but were collected at Akron where crop residue levels have steadily increased in all plots under reduced or no-till management, with the exception of the 2003 crop year. Since 1996, the only tillage in the reduced and no-till systems has been the incorporation of herbicides preceding the sunflower crop. The WCM rotation has had the greatest increase in residue reaching > 1400 lb/A at corn planting. Residue levels decreased in the 2005 wheat phase of the WCSfF rotation because tillage was needed for weed control after the previous sunflower crop failed (Table 75).

Soil Compaction

The cropping systems site at Lamar includes a grazing treatment where half of the wheat plots are grazed in the fall or spring. This is a common practice in this area. Grazing can lead to soil

compaction, which in turn, can affect soil structure, soil erosion, and water infiltration rates. Estimates of the effects of cattle grazing on soil compaction have previously been measured using a drop cone penetrometer (Paul Ayers, unpublished data). A large value indicates less compaction because it indicates a greater depth of penetration into the soil surface. Soil compaction measurements were taken prior to grazing and after the cattle were removed.

All the fallow plots in both the WF and WSF systems had a reduction in compaction post-grazing (Table 74). This may have been a result of cattle 'trafficking' through the plots but not staying in the plots for grazing. Grazing increased compaction in the wheat plots in both systems. The greatest amount of compaction occurred in the sorghum plots, but that may have been an artifact of the method used to harvest the sorghum since the combine made three passes per plot for harvest.

Nitrogen Content of Grain and Stover (straw)

The grain and stover (straw) from all plots at Sterling, Stratton, and Walsh were analyzed for total N content on subsamples collected at harvest. The data summarizing these results are presented in Tables 77-82. Corn and sorghum grain levels where similar to previous years but the grain and straw levels for wheat where noticeably higher at Sterling and Stratton locations . Millet grain and straw total % N was noticeably higher at all locations.

Soil Moisture

Available soil moisture contents were measured at planting and harvest of each crop at Sterling, Stratton, and Walsh. The soil moisture data for 2005 are presented in Tables 83-92**.**

Results & Discussion - Entomological Data

Wheat

Insects were only monitored once for the 2005 wheat crop at Briggsdale on April 7th. No pest/predators were found.

At Akron, past insect populations have not approached economic levels until the last two years. Russian wheat aphids *Diuraphis noxia* Mordvilko (RWA) have become the most prevalent insects. Pests caught by sample date from the susceptible and resistant wheat varieties are shown in Table 102. All other wheat pests have been present in low numbers throughout the growing season. Bird-cherry oat aphids *Rhopalosiphum padi* Linn or Greenbugs *Schizaphis graminum* Rond, and Onion thrips *Thrips tabaci* Linderman were found in low numbers (Table 102). Ladybird beetles and spiders were the primary predators. Lacewings were also observed. The no-till plots seem to be a favorable environment for the predators due to higher residue levels. Army cutworms *Euxoa auxiliaris* Grote were present. Wheat-fallow had the highest average of one larvae per square foot on the 6 May sample date. Brown wheat mite *Petrobia latens* (Müller) infestations were very low. Heavy rains kept their populations down. There were no predatory mites observed.

At Lamar, no Brown wheat mites were observed in the wheat this year. There were no

pale western and army cutworm larvae found in any of the cropping systems. Beneficial insects observed were a few *Hippodamia convergens*.

Corn

The insects in corn at Briggsdale were monitored for cutworms in early summer; none were found. Table 103 provides a complete description of the pest and beneficial insects that were found during pollen shed and soft dough growth stages. The insect populations observed at these stages were low and cause of no concern for treatment.

At Akron, insect pests in the corn were not present at threshold levels. Those insects found below threshold levels were Western bean cutworm *Richia albicosta* Smith, Corn rootworm *Diabrotica virgifera* LeConte, and Sap beetles *Carpophilus lugubris* M. Aphid species present below threshold levels were Greenbugs *Schizaphis graminum* Rond, Bird-cherry oat aphids *Rhopalosiphum padi* Linn, and Corn leaf aphids *Rhopalosiphum maidis*. Onion thrips *Thrips tabaci* Linderman were also observed in low numbers.

At Lamar, in the sorghum and corn, there was not sufficient insect population that warranted intensive sampling. There were some early populations of corn leaf aphid, mixed with a few birdcherry oat aphids in the sorghum at the 4-5 leaf stage and the corn whorls at the 3-4 leaf stage. The other insect problem observed in the corn was an average of 70% infestation of corn earworm. There were no differences between grazed and ungrazed plots for corn earworm.

Millet

At Briggsdale, the hay millet was sampled two times, shortly after the boot and heading growth stages showing a small population of RWAs and greenbugs. A small population of grain aphids were found at heading.

Table 2a. Cropping systems for each of the original sites in 2003-2005.

Site	Rotations
Sterling	1) Wheat-Corn-Fallow (WCF) 2) Wheat-Corn-Millet (WCM) 3) Wheat1-Wheat2-Corn-Millet (WWCM) 4) Opportunity Cropping* 5) Perennial Grass
Stratton	1) Wheat-Corn-Fallow (WCF) 2) Wheat-Corn-Millet (WCM) 3) Wheat1-Wheat2-Corn-Millet (WWCM) 4) Opportunity Cropping* 5) Perennial Grass
Walsh	1) Wheat-Sorghum-Fallow (WSF) 2) Wheat-Corn-Mung Bean (WCB) 3) Wheat1-Wheat2-Sorghum-Mung Bean (WWSB) 4) Continuous Row Crop (Alternate corn & milo) 6) Perennial Grass*

*Opportunity cropping is designed to be continuous cropping without fallow, but not monoculture. See Table 2b for specific crops present each year.

Table 2b. Opportunity cropping history from 1985 to 2005 at the three original sites.

	Site		
Year	**Sterling**	**Stratton**	**Walsh**
1985	Wheat	Fallow	Sorghum
1986	Wheat	Wheat	Sorghum
1987	Corn	Sorghum	Millet
1988	Corn	Sorghum	Sudex
1989	Attempted Hay Millet	Attempted Hay Millet	Sorghum
1990	Wheat	Wheat	Attempted Sunflower
1991	Corn	Corn	Wheat
1992	Hay Millet	Hay Millet	Corn
1993	Corn	Corn	Fallow
1994	Sunflower	Sunflower	Wheat
1995	Wheat	Wheat	Wheat
1996	Corn	Corn	Fallow
1997	Hay Millet	Hay Millet	Corn
1998	Wheat	Wheat	Sorghum
1999	Corn	Corn	Corn
2000	Austrian Winter Pea	Austrian Winter Pea	Soybean
2001	Wheat	Wheat	Sorghum
2002	Corn	Corn	Sorghum
2003	Corn	Proso Millet	Sorghum
2004	Proso Millet	Proso Millet	Corn
2005	Corn	Corn	Sorghum

Table2c. Cropping systems during the period from 2003-2005 for the Briggsdale, Akron, and Lamar sites.

Site	Rotations
Briggsdale	1) Wheat-Fallow (WF) 2) Wheat-Hay Millet-Fallow (WMF) 3) Wheat1-Wheat2-Corn1-Corn2-Sunflower-Fallow (WWCCSfF) 4) Opportunity*
Akron	1) Wheat-Fallow (WF) 2) Wheat-Corn-Fallow (WCF) 3) Wheat-Corn-Millet(Proso)-Fallow (WCMF) 4) Wheat-Corn-Millet(Proso) (WCM)
Lamar	1) Wheat-Fallow (WF) 2) Wheat-Sorghum (Grain)-Fallow (WSF)

*Opportunity cropping is designed to be continuous cropping without fallow, but not monoculture.

Table 3a. Monthly precipitation for the original sites for the 2002-2003 growing seasons.

MONTH	SITE					
	STERLING		STRATTON		WALSH	
	----------Inches----------					
2002	2002	Normals	2002	Normals	2002	Normals
JULY	0.24	3.33	0.25	3.25	0.88	2.73
AUGUST	4.29	2.04	3.02	2.59	5.45	2.57
SEPTEMBER	1.09	1.20	0.82	0.94	1.85	1.54
OCTOBER	0.96	0.86	1.14	0.99	1.56	0.98
NOVEMBER	0.43	0.57	0.23	0.71	0.20	0.56
DECEMBER	0.07	0.36	0.03	0.33	0.84	0.37
SUBTOTAL	**7.08**	**8.36**	**5.49**	**8.81**	**10.78**	**8.75**
2003	2003	Normals	2003	Normals	2003	Normals
JANUARY	0.26	0.34	0.00	0.36	0.10	0.31
FEBRUARY	0.29	0.35	0.30	0.47	0.57	0.32
MARCH	2.11	1.03	1.60	0.94	1.32	1.00
APRIL	3.18	1.56	1.21	1.71	2.76	1.35
MAY	2.40	3.09	3.46	3.07	2.29	2.84
JUNE	2.00	2.92	4.06	2.35	6.37	2.18
SUBTOTAL	**10.24**	**9.29**	**10.63**	**8.90**	**13.41**	**8.00**
2003	2003	Normals	2003	Normals	2003	Normals
JULY	1.60	3.33	2.02	3.25	0.78	2.73
AUGUST	2.15	2.04	1.00	2.59	1.80	2.57
SEPTEMBER	0.19	1.20	0.37	0.94	1.21	1.54
OCTOBER	0.04	0.86	0.00	0.99	0.01	0.98
NOVEMBER	0.14	0.57	0.12	0.71	0.44	0.56
DECEMBER	0.30	0.36	0.16	0.33	0.47	0.37
SUBTOTAL	**4.42**	**8.36**	**3.67**	**8.81**	**4.71**	**8.75**
2003 Total	14.66	17.65	14.30	17.71	18.12	16.75
18 Month Total	21.74	26.01	19.79	26.52	28.90	25.50

[1]Normal = 1971-2000 data base

Table 3b. Monthly precipitation for the three new sites for the 2002-2003 growing seasons.

MONTH	SITE					
	BRIGGSDALE		AKRON		LAMAR	
	----------Inches----------					
2002	2002	Normals	2002	Normals	2002	Normals
JULY	0.39	2.51	0.10	2.95	0.03	2.26
AUGUST	3.65	1.81	3.44	2.26	1.63	2.34
SEPTEMBER	0.21	1.28	1.50	0.98	0.87	1.29
OCTOBER	0.63	0.66	1.04	0.85	1.15	0.84
NOVEMBER	0.40	0.45	0.39	0.70	0.24	0.72
DECEMBER	0.00	0.26	0.03	0.36	0.56	0.36
SUBTOTAL	**5.28**	**6.97**	**6.50**	**8.10**	**4.48**	**7.81**
2003	2003	Normals	2003	Normals	2003	Normals
JANUARY	0.06	0.30	0.22	0.36	0.35	0.43
FEBRUARY	0.17	0.19	0.41	0.37	0.60	0.45
MARCH	2.30	0.78	2.34	1.06	0.73	1.03
APRIL	0.63	1.28	2.47	1.42	0.61	1.39
MAY	2.39	1.94	4.05	3.00	1.04	2.42
JUNE	1.83	2.07	4.34	2.28	4.37	2.29
SUBTOTAL	**7.38**	**6.56**	**13.83**	**8.49**	**7.70**	**8.01**
2003	2003	Normals	2003	Normals	2003	Normals
JULY	0.92	2.51	0.90	2.95	1.08	2.26
AUGUST	1.39	1.81	1.54	2.26	0.87	2.34
SEPTEMBER	0.51	1.28	0.42	0.98	1.16	1.29
OCTOBER	0.06	0.66	0.00	0.85	0.00	0.84
NOVEMBER	0.40	0.45	0.12	0.70	0.25	0.72
DECEMBER	0.24	0.26	0.20	0.36	0.08	0.36
SUBTOTAL	**3.52**	**6.97**	**3.18**	**8.10**	**3.44**	**7.81**
2003 Total	10.9	13.53	17.01	16.59	11.14	15.82
18 Month Total	16.18	20.5	23.51	24.69	15.62	23.63

[1]Normal = 1971-2000 data base

Table 4a. Precipitation by growing season segments for Sterling from 1987-2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	----------Inches----------			
1987-88	5.2	9.9	11.1	15.8
1988-89	3.1	6.5	10.5	14.3
1989-90	5.1	4.7	11.8	13.0
1990-91	3.8	7.2	12.3	11.7
1991-92	4.5	4.8	9.1	14.8
1992-93	4.5	6.2	15.5	10.6
1993-94	6.4	3.0	10.2	6.1
1994-95	7.3	14.4	9.6	17.2
1995-96	4.2	9.2	7.5	18.0
1996-97	4.7	7.0	10.6	21.4
1997-98	5.5	4.9	16.7	13.8
1998-99	5.8	7.7	13.5	12.8
1999-00	5.7	3.0	12.6	8.6
2000-01	6.8	8.2	11.5	13.8
2001-02	4.2	1.9	8.2	8.1
2002-03	5.2	7.6	12.9	8.4
Long Term Average	**4.7**	**7.6**	**11.6**	**13.4**

Table 4b. Precipitation by growing season segment for Stratton from 1987 -2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	----------Inches----------			
1987-88	4.3	7.2	8.8	12.6
1988-89	3.0	9.4	5.3	15.5
1989-90	5.3	6.1	11.0	13.4
1990-91	4.4	4.1	10.7	14.7
1991-92	3.3	6.1	14.2	13.6
1992-93	3.3	3.8	11.8	14.7
1993-94	4.3	7.8	16.7	13.5
1994-95	7.0	10.0	14.8	13.7
1995-96	3.5	6.0	8.1	14.5
1996-97	2.9	6.2	12.2	23.2
1997-98	8.0	5.9	22.6	13.9
1998-99	4.4	8.5	15.6	12.3
1999-00	6.2	3.9	14.2	8.8
2000-01	4.7	4.3	9.8	10.6
2001-02	3.8	2.2	9.5	6.9
2002-03	4.1	8.7	8.6	10.9
Long Term Average	**4.5**	**7.1**	**12.3**	**13.2**

Table 4c. Precipitation by growing season segment for Walsh from 1987-2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	----------Inches----------			
1987-88	4.3	7.6	7.4	11.1
1988-89	4.1	11.5	8.1	20.2
1989-90	5.7	7.4	14.1	12.5
1990-91	5.0	7.7	11.7	12.2
1991-92	2.7	5.8	7.1	13.2
1992-93	6.1	9.2	13.8	14.5
1993-94	3.2	5.3	8.7	16.3
1994-95	4.6	7.2	16.6	7.2
1995-96	1.7	3.5	1.9	17.1
1996-97	5.8	5.3	17.2	11.3
1997-98	6.9	2.3	12.3	13.3
1998-99	8.2	7.4	19.4	14.5
1999-00	7.9	3.2	15.8	10.0
2000-01	9.0	7.9	13.4	9.6
2001-02	1.7	2.2	2.9	11.8
2002-03	6.4	11.4	15.5	12.5
Long Term Average	**5.1**	**6.4**	**11.7**	**12.8**

Table 5a. Precipitation by growing season segment for Briggsdale from 1999-2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	----------Inches----------			
1999-00	4.7	3.7	11.4	4.9
2000-01	2.9	8.0	5.6	10.4
2001-02	3.2	2.2	5.9	6.7
2002-03	3.7	4.9	8.4	7.1
Long Term Average	**3.9**	**5.3**	**9.5**	**10.3**

Table 5b. Precipitation by growing season segment for Akron from 1997-2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	----------Inches----------			
1997-98	5.6	2.1	11.1	6.5
1998-99	2.8	7.9	11.4	17.1
1999-00	6.0	2.7	16.3	9.9
2000-01	6.4	6.3	12.1	12.7
2001-02	3.5	2.7	8.8	8.3
2002-03	5.9	10.9	11.9	11.3
Long Term Average	**4.7**	**6.7**	**11.3**	**12.3**

Table 5c. Precipitation by growing season segment for Lamar from 1997-2003.

	GROWING SEASON SEGMENTS			
	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	----------Inches----------			
1997-98	10.5	2.6	19.4	15.9
1998-99	7.5	9.2	22.5	11.0
1999-00	4.5	2.4	9.9	4.4
2000-01	3.6	7.0	5.7	10.2
2001-02	1.6	1.6	5.1	4.8
2002-03	4.5	6.0	6.7	8.5
Long Term Average	**5.1**	**6.1**	**11.1**	**11.4**

Table 6. Grain and stover (straw) yields for WHEAT at Sterling, Stratton, and Walsh in 2003.

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	54.9	56.5	3010	1990	43.0	45.0	1860	2310	60.8	57.6	3390	3715
WCM	43.0	46.0	1595	1735	48.1	46.0	2100	1950	46.6	47.2	2140	1910
(W)WCM	50.6	51.1	4340	2820	38.0	41.6	2755	3580	53.0	54.9	3140	7000
W(W)CM	47.1	45.1	1840	1915	47.5	43.6	2155	2540	51.3	49.7	1190	2190
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	34.4	33.6	1525	1835	26.0	26.3	1085	1380	56.5	45.2	4415	2510
WCM	25.3	28.7	1730	1830	24.6	23.6	1310	1375	48.5	48.3	4960	4760
(W)WCM	18.9	17.3	775	850	31.3	26.3	935	830	31.8	44.5	4195	2760
W(W)CM	31.0	31.4	2190	2000	25.2	22.2	1720	1250	52.0	55.3	5260	5205
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WSF	29.2	30.6	1635	1520	25.9	26.2	1365	1380	49.0	52.4	2155	2305
WCB	20.6	21.5	1090	1135	20.9	20.9	1105	1105	39.1	37.4	1720	1645
(W)WSB	18.7	20.7	985	1090	20.3	21.3	1070	1125	40.6	41.0	2140	2165
W(W)SB	38.7	28.2	2045	1490	35.7	30.2	1890	1595	45.1	44.4	2380	2345

1Wheat grain yield expressed at 12% moisture.

*Only receives phosphorus in wheat phase of each rotation.

Table 7. Grain[1] and stover (straw) yields for all crops at Briggsdale, Akron, and Lamar in 2003.

SITE	Wheat				Corn/Sorghum		Millet		Sunflower	
	GRAIN		*STOVER*		*GRAIN*	*STOVER*	*GRAIN*	*STOVER*	*GRAIN*	*STOVER*
	Susceptible Variety	**Resistant Variety**	**Susceptible Variety**	**Resistant Variety**						
BRIGGSDALE:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	lb/A	lbs/A	lb/A	lbs/A
WF	45.6	46.4	3680	3640						
WMF	32.6	32.8	2230	2570			0			
(W1)W2(C1)C2SfF	0	0	0	0	11.6	880			490	1070
W1(W2)C1(C2)SfF	0	0	0	0	21.2	1460				
Opportunity							0			
AKRON:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	bu/A	lbs/A	lb/A	lbs/A
WF	35.7	38.5	3980	3860						
WCF	61.4	54.6	4620	4020	21.8	1940				
WCM	52.3	57.5	4110	4330	24.4	1830	27.0	673		
WCSfF	59.0	67.7	4010	4700	26.1	2580			538	538
LAMAR:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A				
WF	11.2		322	202						
WSF	0		161	165	0	0				
WCF	7.8		217	253	0	0				

1. Grain or hay yield expressed at the following moistures: Wheat - 12%; Corn - 15.5%; Hay millet - 15%; Proso millet - 10%; Sunflowers - 10%..

Table 8. Grain and stover yields for CORN AND SORGHUM at Sterling, Stratton and Walsh in 2003.

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN N	SUMMIT GRAIN NP	SUMMIT STOVER N	SUMMIT STOVER NP	SIDESLOPE GRAIN N	SIDESLOPE GRAIN NP	SIDESLOPE STOVER N	SIDESLOPE STOVER NP	TOESLOPE GRAIN N	TOESLOPE GRAIN NP	TOESLOPE STOVER N	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	23	21	115	1304	39	34	1194	1967	41	32	2070	1770
WCM	34	23	1515	1506	22	36	2408	1194	48	33	1885	1750
WWCM	24	24	2604	1423	41	43	1896	2006	50	45	1770	1455
OPP	18	14	750	692	29	24			35	30	2250	2020
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	19	25	569	401	32	29	1257	1507	76	65	2375	2505
WCM	36	41	1024	2750	32	22	1750	1680	84	78	2100	1720
WWCM	17	12	1179	365	25	21	1195	1255	73	81	1495	2185
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WSF	17	25	1455	1420	28	39	1740	1895	46	48	1905	1635
WCB	45	43	2130	2040	29	38	1390	1800	21	24	1000	1135
WWSB	27	34	1460	1190	36	44	2010	1555	52	59	1930	1980
CS (Corn)	27	28	1110	740	33	30	1355	870	42	39	1460	1415
CS (Sorghum)	44	45	2080	2150	28	38	1335	1795	23	21	1085	1005
OPP (Corn)	29	39	1380	1860	25	27	1160	1290	27	21	1300	1000

Table 9. Grain and stover yields for MILLET at Sterling and Stratton and MUNG BEAN (B) at Walsh in 2003.

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN N	SUMMIT GRAIN NP	SUMMIT STOVER N	SUMMIT STOVER NP	SIDESLOPE GRAIN N	SIDESLOPE GRAIN NP	SIDESLOPE STOVER N	SIDESLOPE STOVER NP	TOESLOPE GRAIN N	TOESLOPE GRAIN NP	TOESLOPE STOVER N	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	32	36	625	480	33	48	615	635	46	50	635	720
WWCM	58	41	375	720	38	43	740	750	52	49	900	540
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	15	22	325	615	19	14	550	535	45	49	1700	1585
WWCM	12	18	110	220	27	23	350	220	39	41	230	430
OPP	20	23	235	215	38	25	730	300	38	44	420	750
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCB	6.6	8.2	405	250	6.3	7.2	385	435	21.2	21	1295	1285
(W)WSB OPP	29.3	6.0	1785	360	11.4	3.6	695	220	17.6	13.4	1075	820

Table 10. Crop residue weights at planting of all crops at Briggsdale, Akron and Lamar during the 2002 - 2003 crop year.

SITE & ROTATION	Crop			
	Wheat	**Corn/Sorghum**	**Millet**	**Sunflower**
BRIGGSDALE:	**---------- lb/A ----------**			
WF	2483			
WMF	463		1045	
(W1)W2(C1)C2SfF	1510	661		1000
W1(W2)C1(C2)SfF	277	1250		
Opportunity				
AKRON:	---------- lb/A ----------			
WF	223			
WCF	1035	1697		
WCM	3072	2241	3215	
WCSfF	930	946	1482	
LAMAR:	---------- lb/A ----------			
WF	4688			
WSF	4298	982		
WCF	3180	1134		

1. For conversion to lbs/Acre multiply kg/ha by 0.893.

Table 11. Pest insects in wheat at various sampling dates in 2003 averaged across systems.

SITE:	Date (growth stage)		
Insect	1 April (Tillering)	1 May (Jointing)	
BRIGGSDALE:			
Army Cutworm (#/5 ft.^{2})	0.2	0	
Russian Wheat Aphid (#/50 tillers)	0	0	
Other Cerial Aphids (#/50 Tillers)	0	0	
Brown Wheat Mite (#/ 1.75 ft.^{2})	1.4	171	
Banks Grass Mite (#/50 tillers)	0	0	
	18 March (Tillering)	14 April (Jointing)	13 May (Boot)
AKRON:			
Army Cutworm (#/5 ft.^{2})	0.01	2.25	--
Russian Wheat Aphid (#/50 tillers)	0.2	0.6	0.6
Brown Wheat Mite (#/ 1.75 ft.^{2})	1.7	1.0	1.0
		8 May (Boot)	
LAMAR:			
Army Cutworm (#/5 ft.^{2})		0.04	
Pale Western Cutworm (#/5 ft.^{2})		0.02	
Russian Wheat Aphid (#/50 tillers)		2.4	
Other Cerial Aphids (#/50 Tillers)		0	
Brown Wheat Mite (#/ 1.75 ft.^{2})		0	
Banks Grass Mite (#/50 tillers)		0	

Table 12. Insects in corn or sorghum at various sampling dates in 2003 averaged across systems.

Site & Insect	24 June	23 July	23 Aug.
BRIGGSDALE:			
Cutworms (% cut plants)	0.0		
Western corn rootworm larvae (#/plant)			
Western corn rootworm adults (#/ear zone)			0.08
Banks grass mite (#/highest damaged leaf)		0.0	0.0
Aphids (#/plant)		0.0	0.0
Western bean cutworm (#/ear)			0.0
Corn earworm (#/ear)			0.05
Natural Enemies	--	--	0.0

Table 13. Pest insects in sunflowers at various sampling dates in 2003.

Site & Insect	Date		
	24 June	14 August	16 October
BRIGGSDALE:			
Cutworms (% cut plants)	0.0	--	--
Stem weevil (#/stalk)	--	--	22.5
Seed weevil (#/head)	--	--	0.25
Sunflower moth larvae (#/head)	--	--	0
Banded sunflower moth larvae (#/head)	--	--	0
Aphids (#/plant)	--	--	--
	2 June	**15 August**	**22 October**
AKRON:			
Cutworms (% cut plants)	0	--	--
Stem weevil (#/stalk)	--	0	7.0
Seed weevil (#/head)	--	2	2.5
Sunflower moth larvae (#/head)	--	--	2.5
Banded sunflower moth larvae (#/head)	--	--	1.0
Aphids (#/plant)	0	0	--

Table 14. Total Nitrogen content of WHEAT GRAIN in the 2002-2003 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT N Side* N	SUMMIT NP Side N	SIDESLOPE N Side* N	SIDESLOPE NP Side N	TOESLOPE N Side* N	TOESLOPE NP Side N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.22	2.17	2.06	2.03	1.92	2.10
WCM	2.41	2.53	2.24	2.20	2.40	2.26
(W)WCM	2.26	2.09	2.02	2.08	2.15	2.19
W(W)CM	2.58	2.71	2.50	2.13	2.50	2.70
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.63	2.69	2.53	2.61	2.30	2.48
WCM	2.70	2.67	2.37	2.63	2.63	2.35
(W)WCM	3.40	2.45	2.75	2.75	2.31	2.31
W(W)CM	2.38	2.43	2.50	2.50	2.31	2.22
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	2.36	2.37	2.40	2.47	2.12	2.18
WCB	2.53	2.57	2.53	2.56	2.55	2.50
(W)SB	2.37	2.38	2.37	2.47	2.40	2.49
W(W)SB	2.62	2.51	2.47	2.53	2.38	2.31

* Only receives phosphorus in wheat phase of each rotation.

Table 15. Total Nitrogen content of WHEAT STRAW in the 2002-2003 crop.
(No sample taken for Walsh)

SITE & ROTATION	SLOPE POSITION: SUMMIT *N Side** N	SUMMIT *NP Side* N	SIDESLOPE *N Side** N	SIDESLOPE *NP Side* N	TOESLOPE *N Side** N	TOESLOPE *NP Side* N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	0.60	0.50	0.44	0.51	0.67	0.51
WCM	0.72	0.71	0.55	0.59	0.57	0.59
(W)WCM	0.51	0.51	0.53	0.62	0.52	0.64
W(W)CM	0.71	0.74	0.65	0.80	0.75	0.65
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	0.90	0.80	0.93	0.94	1.18	0.83
WCM	0.76	0.83	0.96	1.05	1.27	1.10
(W)WCM	0.92	0.73	1.11	1.17	1.01	0.99
W(W)CM	0.77	0.78	1.06	1.00	1.24	1.13
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF						
WCB						
(W)SB						
W(W)SB						

* Only receives phosphorus in wheat phase of each rotation.

Table 16. Total Nitrogen content of CORN GRAIN or SORGHUM GRAIN in the 2003 crop.

	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
SITE & ROTATION	*N Side** N	*NP Side* N	*N Side** N	*NP Side* N	*N Side** N	*NP Side* N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.72	1.67	1.73	1.73	1.69	1.80
WCM	1.65	1.71	1.70	1.74	1.83	1.79
WWCM	1.68	1.70	1.57	1.59	1.54	1.56
OPP	1.67	1.67	1.63	1.65	1.78	1.60
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF						
WCM						
WWCM						
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	1.62	1.61	1.58	1.62	1.65	1.63
WCB						
WWSB	1.56	1.56	1.61	1.62	1.69	1.66
Cont. Crop (C)						
Cont. Crop (S)	1.55	1.55	1.58	1.60	1.63	1.62

* Only receives phosphorus in wheat phase of each rotation.

Table 17. Total Nitrogen content of CORN STOVER or SORGHUM STOVER in the 2003 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT *N Side** N	SUMMIT *NP Side* N	SIDESLOPE *N Side** N	SIDESLOPE *NP Side* N	TOESLOPE *N Side** N	TOESLOPE *NP Side* N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.35	1.58	0.92	1.07	1.25	1.11
WCM	1.40	1.40	1.19	1.28	1.46	1.23
WWCM	1.46	1.36	0.43	0.85	0.66	1.07
OPP	1.23	1.24	1.10	1.16	1.09	1.26
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.63	1.54	1.28	1.33	0.68	0.57
WCM	1.92	1.20	1.50	1.14	0.86	0.97
WWCM	1.58	1.49	1.26	1.25	0.78	0.85
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	1.46	1.36	1.06	1.17	0.98	0.97
WCB						
WWSB	1.18	1.27	1.09	0.75	1.12	0.77
Cont. Crop (C)						
Cont. Crop (S)	0.85	0.92	0.89	0.70	0.78	0.86

* Only receives phosphorus in wheat phase of each rotation.

Table 18. Total Nitrogen content of MILLET GRAIN at Sterling and Stratton 2003 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT *N Side** N	SUMMIT *NP Side* N	SIDESLOPE *N Side** N	SIDESLOPE *NP Side* N	TOESLOPE *N Side** N	TOESLOPE *NP Side* N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.09	2.13	2.06	1.99	2.08	2.11
WWCM	2.15	2.14	2.07	2.13	2.14	2.11
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.14	2.21	1.99	2.06	2.00	2.06
WWCM	2.27	2.28	2.24	2.22	1.93	1.73
OPP	2.33	2.16	2.19	2.20	2.03	2.16
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCB	No Yield		No Yield		No Yield	
WWSB						

* Only receives phosphorus in wheat phase of each rotation.

Table 19. Total Nitrogen content of MILLET STRAW at Sterling and Stratton and MUNG BEAN at WALSH in the 2003 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT *N Side** N	SUMMIT *NP Side* N	SIDESLOPE *N Side** N	SIDESLOPE *NP Side* N	TOESLOPE *N Side** N	TOESLOPE *NP Side* N
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	1.40	1.67	0.81	0.71	1.33	1.39
WWCM	1.03	1.27	0.92	0.97	1.50	1.22
	N	**N**	**N**	**N**	**N**	**N**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.01	2.16	1.59	1.34	0.61	0.78
WWCM	1.73	1.92	2.12	2.04	0.90	0.86
OPP	1.84	2.10	1.55	1.92	1.40	1.22
	N	**N**	**N**	**N**	**N**	**N**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCB	3.83	3.62	3.86	3.76	3.81	3.71
WWSB	3.74	3.45	3.81	3.60	4.11	4.07

* Only receives phosphorus in wheat phase of each rotation.

Table 20. Available soil water by soil depth of the WHEAT phase in the WCM rotation at Sterling and Stratton, and the WCSb rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	126	15	111	161	11	150	186	23	163
45	130	21	109	232	11	221	215	9	206
75	98	17	81	235	14	221	232	25	207
105	93	8	85	239	11	228	261	36	225
135	-	-	-	-	-	-	253	48	205
155	-	-	-	-	-	-	261	47	214
TOTAL	447	61	386	867	47	820	1408	188	1220
STRATTON:									
15	112	11	101	165	35	130	180	53	127
45	113	18	115	231	38	193	215	63	152
75	99	7	92	232	28	204	234	78	156
105	106	11	95	233	19	214	254	93	161
135	149	19	130	266	26	240	222	68	154
155	135	14	121	233	20	213	227	69	158
TOTAL	734	80	654	1360	166	1194	1332	424	908
WALSH:									
15	67	10	57	106	5	101	69	0	69
45	142	19	123	153	10	143	239	0	239
75	122	11	111	159	10	149	250	24	226
105	106	5	101	196	13	183	222	33	189
135	211	27	184	156	15	141	165	18	147
155	270	31	239	170	28	142	222	22	200
TOTAL	918	103	815	940	81	869	1167	97	1070

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 21. Available soil water by soil depth of the WHEAT phase in the WCF rotation at Sterling and Stratton, and the WSF rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	144	13	131	193	7	186	202	19	183
45	157	19	138	274	13	261	216	23	193
75	133	17	116	286	10	276	238	20	218
105	78	8	70	259	19	240	257	23	234
135	-	-	-	-	-	-	307	26	181
155	-	-	-	-	-	-	255	24	231
TOTAL	512	57	455	1012	49	963	1475	135	1340
STRATTON:									
15	130	11	119	197	30	167	196	56	140
45	160	20	140	273	20	253	216	72	144
75	134	10	124	283	16	267	240	88	152
105	91	11	80	253	8	245	250	94	156
135	93	15	78	237	17	220	276	77	199
155	150	14	136	230	9	221	221	0	221
TOTAL	758	81	677	1473	100	1373	1399	387	1012
WALSH:									
15	76	14	62	72	8	64	109	10	99
45	144	29	115	225	38	187	267	43	224
75	162	30	132	227	6	221	255	38	217
105	232	13	219	168	0	168	239	12	227
135	234	26	208	143	0	143	251	15	236
155	217	11	206	167	13	154	290	21	269
TOTAL	1065	123	942	1002	65	937	1411	139	1272

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 22. Available soil water by soil depth of the WHEAT 1 phase in the WWCM rotation at Sterling and Stratton, and the WWSM rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	118	18	100	164	6	158	203	17	186
45	129	15	114	213	13	200	183	18	165
75	119	23	96	223	28	195	178	28	150
105	112	27	85	232	14	218	185	19	166
135	-	-	-	-	-	-	210	23	187
155	-	-	-	-	-	-	231	33	198
TOTAL	478	83	395	832	61	771	1190	138	1052
STRATTON:									
15	104	6	98	168	40	128	197	50	147
45	132	16	116	212	25	187	183	60	123
75	120	8	112	220	22	198	180	65	115
105	125	9	116	226	33	193	178	51	127
135	145	9	136	256	36	220	179	43	136
155	155	11	144	281	41	240	197	63	134
TOTAL	781	59	722	1363	197	1166	1114	332	782
WALSH:									
15	51	20	31	46	7	39	49	7	42
45	163	28	135	199	22	177	250	17	233
75	149	26	123	183	3	180	279	28	251
105	144	15	129	234	3	231	299	27	272
135	196	4	192	145	0	145	201	52	149
155	202	0	202	187	11	176	248	40	208
TOTAL	905	93	812	994	46	948	1326	171	1155

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 23. Available soil water by soil depth of the WHEAT 2 phase in the WWCM rotation at Sterling and Stratton, and the WWSM rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	116	5	111	133	0	133	199	15	184
45	227	16	211	266	10	256	288	17	271
75	180	15	165	215	7	208	217	21	196
105	156	17	139	192	9	183	202	18	184
135	-	-	-	-	-	-	237	25	212
155	-	-	-	-	-	-	288	29	259
TOTAL	679	53	626	806	26	780	1431	125	1306
STRATTON:									
15	76	1	75	111	9	102	172	41	131
45	196	36	160	230	32	198	249	72	177
75	153	19	134	186	28	158	184	68	116
105	131	16	115	164	18	146	166	65	101
135	157	11	146	236	23	213	185	52	133
155	133	12	121	223	23	200	235	39	196
TOTAL	846	95	751	1150	133	1017	1191	337	854
WALSH:									
15	101	10	91	93	0	93	90	1	89
45	144	38	106	185	44	141	260	39	221
75	129	38	91	181	17	164	245	30	215
105	127	4	123	203	7	196	279	125	154
135	95	18	177	143	0	143	294	6	288
155	103	0	103	136	7	129	311	42	269
TOTAL	699	108	591	941	75	866	1479	243	1236

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 24. Available soil water by soil depth of the CORN phase in the WCM rotation at Sterling and Stratton, and the WCM rotation at Walsh in 2003. **(NO Readings taken for Walsh, trt. 0)****

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	22	3	19	36	4	32	40	10	30
45	70	0	70	57	0	57	49	0	49
75	65	9	56	56	14	42	66	5	61
105	45	2	43	61	20	41	61	14	47
135	-	-	-	-	-	-	20	22	(+2)
155	-	-	-	-	-	-	15	34	(+19)
TOTAL	202	14	188	210	38	172	251	85	166
STRATTON:									
15	2	0	2	28	8	20	32	2	30
45	59	4	55	43	0	43	87	0	87
75	43	20	23	52	8	44	66	0	66
105	29	24	5	42	14	28	60	1	59
135	26	15	11	52	18	34	26	0	26
155	25	13	12	23	16	7	56	0	56
TOTAL	184	76	108	240	64	176	327	3	324
WALSH:									
15									
45									
75									
105									
135									
155									
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 25. Available soil water by soil depth of the CORN phase in the WCF rotation at Sterling and Stratton, and the Sorghum phase of the WSF rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	52	2	50	34	4	30	61	7	54
45	72	9	63	67	0	67	54	0	54
75	54	18	36	57	12	45	63	6	57
105	37	14	23	41	11	30	63	22	41
135	-	-	-	-	-	-	30	28	2
155	-	-	-	-	-	-	21	28	(+7)
TOTAL	215	43	172	199	27	172	292	91	201
STRATTON:									
15	34	0	34	50	11	39	61	1	60
45	56	1	55	58	0	58	83	0	83
75	43	9	34	65	11	54	69	4	65
105	30	15	15	47	17	30	58	2	56
135	18	13	5	22	16	6	38	0	38
155	18	14	4	19	15	4	29	0	29
TOTAL	199	52	147	261	70	191	338	7	331
WALSH:									
15	0	0	0	1	0	1	0	0	0
45	31	0	31	11	0	11	20	0	20
75	36	0	36	38	0	38	40	0	40
105	41	0	41	48	0	48	49	0	49
135	51	0	51	43	0	43	48	0	48
155	40	0	40	38	0	38	50	7	43
TOTAL	199	0	199	179	0	179	207	7	200

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 26. Available soil water by soil depth of the CORN phase in the WWCM rotation at Sterling and Stratton, and the Sorghum phase of the WWSM rotation at Walsh in 2003.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	54	0	54	36	4	32	56	10	46
45	75	2	73	53	0	53	55	7	48
75	60	14	46	66	10	56	62	9	53
105	52	2	50	52	18	34	56	16	40
135	-	-	-	-	-	-	40	28	12
155	-	-	-	-	-	-	26	33	(+7)
TOTAL	241	18	223	207	32	175	295	103	192
STRATTON:									
15	43	0	43	58	10	48	65	3	62
45	48	3	45	55	0	55	81	0	81
75	29	10	19	56	11	45	74	4	70
105	19	15	4	39	16	23	64	6	58
135	14	15	(+1)	25	17	8	52	0	52
155	15	9	6	26	16	10	38	0	38
TOTAL	168	52	116	259	70	189	374	13	361
WALSH:									
15	7	0	7	7	0	7	11	0	11
45	30	0	30	40	0	40	35	0	35
75	34	0	34	42	0	42	42	0	42
105	33	0	33	44	0	44	40	0	40
135	41	0	41	22	0	22	33	0	33
155	30	0	30	30	0	30	60	4	56
TOTAL	175	0	175	185	0	185	221	4	217

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 27. Available soil water by soil depth of the MILLET phase in the WCM rotation at Sterling, Stratton, and Walsh in 2003. **(NO Pre-plant data for Stratton on 6-23-03)****

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	50	7	43	20	3	17	40	6	34
45	68	16	52	49	2	47	50	7	43
75	48	18	30	60	18	42	62	13	49
105	35	2	33	59	14	45	66	20	46
135	-	-	-	-	-	-	28	31	(+3)
155	-	-	-	-	-	-	17	23	(+6)
TOTAL	201	43	158	188	37	151	263	100	163
STRATTON:									
15		0			22			21	
45		17			5			23	
75		22			12			44	
105		24			14			45	
135		24			19			32	
155		22			26			21	
TOTAL									
WALSH:									
15	6	7	(+1)	0	14	(+14)	0	14	(+14)
45	26	24	2	23	28	(+5)	30	25	5
75	22	32	(+10)	40	35	5	32	33	(+1)
105	37	34	3	62	48	14	52	45	7
135	48	42	6	42	50	(+8)	47	49	(+2)
155	46	37	9	49	55	(+6)	53	56	(+3)
TOTAL	185	176	6	216	230	(+14)	214	222	(+8)

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 28. Available soil water by soil depth of the MILLET phase in the WWCM rotation at Sterling, Stratton, and Walsh in 2003. **(NO Pre-plant data for Stratton on 6-23-03)****

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	53	7	46	38	7	31	52	7	45
45	68	12	56	63	13	50	51	4	47
75	38	9	29	73	24	49	59	14	45
105	27	1	26	53	37	16	48	21	27
135	-	-	-	-	-	-	17	22	(+5)
155	-	-	-	-	-	-	16	25	(+9)
TOTAL	186	29	157	227	81	146	243	93	150
STRATTON:									
15		0			19			21	
45		5			3			4	
75		12			15			16	
105		18			19			15	
135		21			24			3	
155		18			28			8	
TOTAL									
WALSH:									
15	0	14	(+14)	0	14	(+14)	0	12	(+12)
45	20	37	(+17)	34	35	(+1)	45	31	14
75	21	34	(+13)	35	34	1	42	38	4
105	20	38	(+18)	45	43	2	42	45	(+3)
135	25	48	(+23)	24	52	(+28)	50	52	(+2)
155	27	60	(+33)	35	65	(+30)	48	42	6
TOTAL	113	231	(+118)	173	243	70	227	220	7

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 29. Available soil water by soil depth of the CORN phase in the OPP rotation at Sterling and Walsh, and the MILLET phase of OPP at Stratton in 2003. **(NO Pre-plant data for Stratton on 6-23-03)****

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	58	1	57	41	6	35	53	12	41
45	71	4	67	59	0	59	57	0	57
75	33	20	13	75	9	66	66	7	59
105	28	4	24	65	14	51	55	14	41
135	-	-	-	-	-	-	29	25	4
155	-	-	-	-	-	-	27	31	(+4)
TOTAL	190	29	161	240	29	211	287	89	198
STRATTON:									
15		0			15			17	
45		7			6			20	
75		15			15			34	
105		25			22			39	
135		28			29			33	
155		18			29			22	
TOTAL									
WALSH:									
15	7	5	2	0	0	0	6	0	6
45	30	21	9	40	0	40	38	0	38
75	38	21	17	45	0	45	45	0	45
105	48	17	31	29	0	29	59	10	49
135	28	13	15	0	0	0	35	14	21
155	22	0	22	5	26	(+21)	45	29	16
TOTAL	173	77	96	119	26	93	228	53	175

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 30a. Monthly precipitation for the original sites for the 2003-2004 growing seasons.

	SITE					
MONTH	STERLING		STRATTON		WALSH	
	---------- inches ----------					
2003	2003	Normals	2003	Normals	2003	Normals
JULY	1.60	3.33	2.02	3.25	0.78	2.73
AUGUST	2.15	2.04	1.00	2.59	1.80	2.57
SEPTEMBER	0.19	1.20	0.37	0.94	1.21	1.54
OCTOBER	0.04	0.86	0.00	0.99	0.01	0.98
NOVEMBER	0.14	0.57	0.12	0.71	0.44	0.56
DECEMBER	0.30	0.36	0.16	0.33	0.47	0.37
SUBTOTAL	**4.42**	**8.36**	**3.67**	**8.81**	**4.71**	**8.75**
2004	2004	Normals	2004	Normals	2004	Normals
JANUARY	0.16	0.34	0.02	0.36	0.14	0.31
FEBRUARY	0.90	0.35	0.39	0.47	0.27	0.32
MARCH	0.29	1.03	0.37	0.94	0.92	1.00
APRIL	1.40	1.56	1.66	1.71	2.37	1.35
MAY	1.03	3.09	0.40	3.07	0.88	2.84
JUNE	2.84	2.92	1.70	2.35	6.87	2.18
SUBTOTAL	**6.62**	**9.29**	**4.54**	**8.90**	**11.45**	**8.00**
2004	2004	Normals	2004	Normals	2004	Normals
JULY	2.65	3.33	0.92	3.25	4.04	2.73
AUGUST	2.80	2.04	1.59	2.59	0.77	2.57
SEPTEMBER	1.41	1.20	1.26	0.94	0.45	1.54
OCTOBER	0.79	0.86	0.47	0.99	0.46	0.98
NOVEMBER	1.29	0.57	1.08	0.71	3.12	0.56
DECEMBER	0.23	0.36	0.30	0.33	0.36	0.37
SUBTOTAL	**9.17**	**8.36**	**5.62**	**8.81**	**9.20**	**8.75**
2004 Total	15.79	17.65	10.16	17.71	20.65	16.75
18 Month Total	20.21	26.01	13.83	26.52	25.36	25.50

[1]Normal = 1971-2000 data base

Table 30b. Monthly precipitation for the three new sites for the 2003-2004 growing seasons.

	SITE					
MONTH	BRIGGSDALE		AKRON		LAMAR	
	---------- inches ----------					
2003	2003	Normals	2003	Normals	2003	Normals
JULY	0.92	2.51	0.90	2.95	1.08	2.26
AUGUST	1.39	1.81	1.54	2.26	0.87	2.34
SEPTEMBER	0.51	1.28	0.42	0.98	1.16	1.29
OCTOBER	0.06	0.66	0.00	0.85	0.00	0.84
NOVEMBER	0.40	0.45	0.12	0.70	0.15	0.72
DECEMBER	0.24	0.26	0.20	0.36	0.02	0.36
SUBTOTAL	**3.52**	**6.97**	**3.18**	**8.10**	**3.28**	**7.81**
2004	2004	Normals	2004	Normals	2004	Normals
JANUARY	0.28	0.30	0.32	0.36	0.01	0.43
FEBRUARY	0.36	0.19	0.39	0.37	0.48	0.45
MARCH	0.14	0.78	0.69	1.06	0.38	1.03
APRIL	0.88	1.28	1.37	1.42	3.68	1.39
MAY	2.24	1.94	1.89	3.00	0.34	2.42
JUNE	1.23	2.07	2.50	2.28	4.05	2.29
SUBTOTAL	**5.13**	**6.56**	**7.16**	**8.49**	**8.94**	**8.01**
2004	2004	Normals	2004	0.98	2004	Normals
JULY	0.50	2.51	1.74	2.95	3.78	2.26
AUGUST	0.77	1.81	2.85	2.26	2.20	2.34
SEPTEMBER	1.35	1.28	1.67	0.98	1.69	1.29
OCTOBER	0.60	0.66	0.80	0.85	0.94	0.84
NOVEMBER	0.54	0.45	0.90	0.70	1.33	0.72
DECEMBER	0.15	0.26	0.54	0.36	0.15	0.36
SUBTOTAL	**3.91**	**6.97**	**8.50**	**8.10**	**10.09**	**7.81**
2004 Total	9.04	13.53	15.66	16.59	19.03	15.82
18 Month Total	12.56	20.50	18.84	24.69	22.31	23.63

[1]Normal = 1971-2000 data base

Table 31a. Precipitation by growing season segments for Sterling from 1987-2004.

	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1987-88	5.2	9.9	11.1	15.8
1988-89	3.1	6.5	10.5	14.3
1989-90	5.1	4.7	11.8	13.0
1990-91	3.8	7.2	12.3	11.7
1991-92	4.5	4.8	9.1	14.8
1992-93	4.5	6.2	15.5	10.6
1993-94	6.4	3.0	10.2	6.1
1994-95	7.3	14.4	9.6	17.2
1995-96	4.2	9.2	7.5	18.0
1996-97	4.7	7.0	10.6	21.4
1997-98	5.5	4.9	16.7	13.8
1998-99	5.8	7.7	13.5	12.8
1999-00	5.7	3.0	12.6	8.6
2000-01	6.8	8.2	11.5	13.8
2001-02	4.2	1.9	8.2	8.1
2002-03	5.2	7.6	12.9	8.4
2003-04	2.0	5.3	7.2	11.5
Long Term Average	**4.9**	**6.6**	**11.2**	**12.9**

Table 31b. Precipitation by growing season segment for Stratton from 1987 - 2004.

	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1987-88	4.3	7.2	8.8	12.6
1988-89	3.0	9.4	5.3	15.5
1989-90	5.3	6.1	11.0	13.4
1990-91	4.4	4.1	10.7	14.7
1991-92	3.3	6.1	14.2	13.6
1992-93	3.3	3.8	11.8	14.7
1993-94	4.3	7.8	16.7	13.5
1994-95	7.0	10.0	14.8	13.7
1995-96	3.5	6.0	8.1	14.5
1996-97	2.9	6.2	12.2	23.2
1997-98	8.0	5.9	22.6	13.9
1998-99	4.4	8.5	15.6	12.3
1999-00	6.2	3.9	14.2	8.8
2000-01	4.7	4.3	9.8	10.6
2001-02	3.8	2.2	9.5	6.9
2002-03	4.1	8.7	8.6	10.9
2003-04	1.4	3.8	6.1	6.3
Long Term Average	**4.3**	**6.1**	**11.8**	**12.9**

Table 31c. Precipitation by growing season segment for Walsh from 1987-2004.

	Wheat		Sorghum	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1987-88	4.3	7.6	7.4	11.1
1988-89	4.1	11.5	8.1	20.2
1989-90	5.7	7.4	14.1	12.5
1990-91	5.0	7.7	11.7	12.2
1991-92	2.7	5.8	7.1	13.2
1992-93	6.1	9.2	13.8	14.5
1993-94	3.2	5.3	8.7	16.3
1994-95	4.6	7.2	16.6	7.2
1995-96	1.7	3.5	1.9	17.1
1996-97	5.8	5.3	17.2	11.3
1997-98	6.9	2.3	12.3	13.3
1998-99	8.2	7.4	19.4	14.5
1999-00	7.9	3.2	15.8	10.0
2000-01	9.0	7.9	13.4	9.6
2001-02	1.7	2.2	2.9	11.8
2002-03	6.4	11.4	15.5	12.5
2003-04	3.5	10.1	8.4	13.5
Long Term Average	**5.1**	**6.8**	**11.4**	**13.0**

Table 31d. Precipitation by growing season segment for Briggsdale from 1999-2004.

	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1999-00	4.7	3.7	11.4	4.9
2000-01	2.9	8.0	5.6	10.4
2001-02	3.2	2.2	5.9	6.7
2002-03	3.7	4.9	8.4	7.1
2003-04	2.0	4.4	5.2	6.7
Long Term Average	**3.3**	**4.6**	**7.3**	**7.2**

Table 31e. Precipitation by growing season segment for Akron from 1997-2004.

	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1997-98	5.6	2.1	11.1	6.5
1998-99	2.8	7.9	11.4	17.1
1999-00	6.0	2.7	16.3	9.9
2000-01	6.4	6.3	12.1	12.7
2001-02	3.5	2.7	8.8	8.3
2002-03	5.9	10.9	11.9	11.3
2003-04	2.1	5.8	6.0	11.5
Long Term Average	**4.6**	**5.5**	**11.1**	**11.0**

Table 31f. Precipitation by growing season segment for Lamar from 1997-2004.

	Wheat		Sorghum	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1997-98	10.5	2.6	19.4	15.9
1998-99	7.5	9.2	22.5	11.0
1999-00	4.5	2.4	9.9	4.4
2000-01	3.6	7.0	5.7	10.2
2001-02	1.6	1.6	5.1	4.8
2002-03	4.5	6.0	6.7	8.5
2003-04	2.2	8.1	7.8	13.0
Long Term Average	**4.9**	**5.3**	**11.0**	**9.7**

Table 32. Grain and stover (straw) yields for WHEAT at Sterling, Stratton, and Walsh in 2004.

SITE & Rotation	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
Sterling:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		---- lbs./A. -----	
WCF	29.9	27.8	990	923	24.3	30.4	1205	1184	30.9	33.7	1420	1208
WCM	0	0	0	0	0	0	0	0	0	0	0	0
(W)WCM	0	0	0	0	0	0	0	0	0	0	0	0
W(W)CM	15	15.2	837	997	17.8	13.	1254	894	11.2	8.8	909	1074
Stratton:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		---- lbs./A. -----	
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WCF	0	0	-	-	4.2	4.2	208	207	33.8	36.5	1659	1793
WCM	0	0	-	-	0	0	-	-	0	0	-	-
(W)WCM	0	0	-	-	0	0	-	-	0	0	-	-
W(W)CM	0	0	-	-	0	0	-	-	0	0	-	-
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		----- lbs./A. -----	
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WSF	17.3	20.9	1127	1155	24.5	22.3	1412	1372	29.2	20.9	1497	1223
WCB	1.6	1.1	32	22	1.1	0.5	23	11	0.9	0.8	14	13
(W)WSB	0.9	0.8	25	15	0.9	0.6	20	13	0.4	0.9	7	16
W(W)SB	9.0	4.9	154	196	5.3	5.3	197	178	4.6	3.5	138	99

1. Wheat grain yield expressed at 12% moisture.
* Only receives phosphorus in wheat phase of each rotation.

Table 33. Grain and stover (straw) yields for WHEAT at Briggsdale, Akron, and Lamar in 2004.

	Wheat				Corn/Sorghum		Millet		Sunflower	
	GRAIN		STOVER		GRAIN	STOVER	GRAIN	STOVER	GRAIN	STOVER
SITE:	Susceptible	Resistant	Susceptible	Resistant						
ROTATION	Variety	Variety	Variety	Variety						
BRIGGSDALE:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	lb/A	lbs/A	lb/A	lbs/A
WF	37.5	56.5	2680	4860						
WMF	32.6	29.3	2600	2140			NA	935		
(W1)W2(S)CSfF*	31.3	29.7	2560	1990	No Yield	2045			No Yield	351
W1(W2)S(C)SfF	No Yield	No Yield	No Yield	No Yield	No Yield	864				
Opportunity(Proso)							548	1875		
AKRON:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	bu/A	lbs/A	lb/A	lbs/A
WF	26.2	32.2	2559	2666						
WCF	34.3	33.4	2628	2550	51.9	2382				
WCM	16.4	15	1606	1391	57.8	2776	14.5	1331		
WCSfF	33.2	32.4	2852	2768	45.4	2000			No Yield	No Yield
LAMAR:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A				
WF	14.4	8.4	1609	1479						
WSF	7.8	7.0	1424	1333	15.1	--				
WCF	--	--	--	--	45.8	--				

1. Grain and hay moistures: Wheat - 12%; Corn - 15.5%; Hay millet - 15%; Proso millet - 10%; Sunflowers - 10%. *Sf = sunflower

Table 34. Grain and stover (straw) yields for CORN and SORGHUM at Sterling, Stratton and Walsh in 2004.

Site & Rotation	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
Sterling:	----- Bu./A. ----		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		----- lbs./A. ------	
WCF	55.2	60.2	3770	3950	70.7	74.2	6160	3770	62.5	63.1	4510	3380
WCM	49.5	50.3	3110	3740	68.0	70.2	3630	3680	51.6	57.2	3250	3290
WWCM	51.5	50.4	3350	5700	72.3	66.1	3580	3590	55.9	51.0	3600	3750
Stratton:	---- Bu./A. -----		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WCF	6.8	5.0	1300	400	15.8	10.1	3340	1690	77.8	74.6	4730	3930
WCM	8.1	5.0	830	710	13.1	9.1	1470	1300	81.7	71.6	5840	4390
WWCM	11.4	8.6	2730	950	19.3	8.3	1580	2580	74.3	57.9	3510	3930
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
Walsh:	----- Bu./A. ----		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCB	53.0	65.0	1570	2000	63.0	68.0	2590	3020	102	118	3840	3650
WSF	62.0	53.0	1360	1150	55.0	40.0	1280	960	86	75	2130	1540
WWSB*	74.0	64.0	1610	1280	62.8	70.7	1840	7400	89.8	88.5	1930	2040
OPP S	50.2	49.7	1440	1430	28.1	40.8	800	1170	73.9	50.4	2130	1440
CC C	48.6	50.6	1490	1560	44.7	49.2	1860	2190	77.3	84.1	2960	2490
CC S	47.0	57.4	1180	1300	37.6	49.0	2700	1120	58.1	69	1200	1670

1. Corn grain yield expressed at 15.5% moisture.
2. Sorghum grain yield expressed at 14% moisture.

* Only receives phosphorus in wheat phase of each rotation. *B = Mung Bean

Table 35. Grain[1] and stover (straw) yields for all crops at Briggsdale, Akron, and Lamar in 2004.

	Wheat				Corn/Sorghum		Millet		Sunflower	
	GRAIN		STOVER		GRAIN	STOVER	GRAIN	STOVER	GRAIN	STOVER
SITE: ROTATION	Susceptible Variety	Resistant Variety	Susceptible Variety	Resistant Variety						
BRIGGSDALE:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	bu/A	lbs/A	lb/A	lbs/A
WF	37.5	56.5	2680	4860						
WMF	32.6	29.3	2600	2140			No yield	935		
(W1)W2(S)CSfF	31.3	29.7	2560	1990	No Yield	2045			No Yield	351
W1(W2)S(C)SfF	No Yield	No Yield	No Yield	No Yield	No Yield	864				
Opportunity(Proso)							10.9	1875		
AKRON:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	bu/A	lbs/A	lb/A	lbs/A
WF	26.2	32.2	2559	2666						
WCF	34.3	33.4	2628	2550	51.9	2382				
WCM	16.4	15	1606	1391	57.8	2776	14.5	1331		
WCSfF	33.2	32.4	2852	2768	45.4	2000			No Yield	No Yield
LAMAR:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A				
WF	14.4	8.4	1609	1479						
WSF	7.8	7.0	1424	1333	15.1	--				
WCF	--	--	--	--	45.8	--				

1. Grain or hay yield expressed at the following moistures: Wheat - 12%; Corn - 15.5%; Hay millet - 15%; Proso millet - 10%; Sunflowers - 10%..

Table 36. Grain and straw yields for MILLET at Sterling and Stratton and MUNG BEAN at Walsh in 2004.

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	23.9	27.2	1375	1225	24.8	24.2	1365	1210	32.1	26.4	1425	995
WWCM	25	24.6	1210	1070	35.2	33.1	1305	1790	27.8	36.4	1240	1245
OPP	38.5	46.3	1050	1710	27.0	30.0	950	1815	31.5	28.3	1225	1050
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	4.0	4.2	180	205	7.7	4.2	215	255	1.7	14.1	415	450
WWCM	2.1	1.6	105	100	6.7	6.2	325	355	23	19	855	625
OPP	4.7	6.4	350	190	9.9	12.8	375	520	23.5	29.4	905	1125
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCB			265	335			205	420			1940	1475
(W)WSB			405	425			635	605			840	830

Table 37. Crop residue weights at planting of all crops at Briggsdale, Akron and Lamar in 2003 - 2004.

SITE & ROTATION	Crop			
	Wheat	Corn/Sorghum	Millet	Sunflower
BRIGGSDALE:	---------- lb/A ----------			
WF	200			
WMF	620		1610	
(W1)W2(S)CSfF	380	600		1900
W1(W2)S(C)SfF	730	1500		
Opportunity(Proso)			1020	
AKRON:	---------- lb/A ----------			
WF	122			
WCF	1439	1764		
WCM	3210	1785	1074	
WCSfF	1094	3823		2024
LAMAR:	---------- lb/A ----------			
WF				
WSF				
WCF				

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Table 38. Pest insects in wheat by day in 2004 averaged across systems.

SITE:	Date (growth stage)		
Insect	23 March (Tillering)	5 April (Jointing)	6 June (Heading)
BRIGGSDALE:			
Army Cutworm (#/5 ft.^{2})	0	0	0
Pale Western Cutworm (#/5ft.^{2})	0	0	0
Russian Wheat Aphid (#/50 tillers)	0	0.42	5.46
Other Cerial Aphids (#/50 Tillers)	0.08	1.29	5.58
Brown Wheat Mite (#/ 1.75 ft.^{2})	4.33	5.92	--
Banks Grass Mite (#/50 tillers)	0	0	0
	8 March (Tillering)	5 April (Jointing)	20 May (Heading)
AKRON:			
Army Cutworm (#/5 ft.^{2})	4.75	10.5	--
Russian Wheat Aphid (#/50 tillers)	0.05	0.91	3.2
Brown Wheat Mite (#/ 1.75 ft.^{2})	4.06		
			(Boot)
LAMAR:			
Army Cutworm (#/5 ft.^{2})			0.09
Pale Western Cutworm (#/5 ft.^{2})			0.06
Russian Wheat Aphid (#/50 tillers)			155
Other Cerial Aphids (#/50 Tillers)			
Brown Wheat Mite (#/ 1.75 ft.^{2})			85
Banks Grass Mite (#/50 tillers)			

Table 39. Insects in corn or sorghum by day in 2004 averaged across systems.

Site & Insect	Date (growth stage)		
	14-Jun		
BRIGGSDALE:			
Cutworms (% cut plants)	0		
Western corn rootworm larvae (#/plant)	No Data - Corn never tasseled		
Western corn rootworm adults (#/ear zone)			
Banks grass mite (#/highest damaged leaf)			
Aphids (#/plant)			
Western bean cutworm (#/ear)			
Corn earworm (#/ear)			
Natural Enemies			
AKRON:	24 June	15 July	30 Aug
Cutworms (% cut plants)	0	0	0
Western corn rootworm adults (#/ear zone)		0	0.07
Banks grass mite (#/highest damaged leaf)		0.5	11.5
Aphids (#/plant)	0	0	0
Western bean cutworm (#/ear)			0.03
Corn earworm (#/ear)			0.02
Natural Enemies	0	0.03	0.3
LAMAR:			
Cutworms (% cut plants)			
Western corn rootworm larvae (#/plant)			
Western corn rootworm adults (#/ear zone)			
Banks grass mite (#/highest damaged leaf)			
Aphids (#/plant)	Few		
Western bean cutworm (#/ear)			
Corn earworm (#/ear)	100% infestation		
Natural Enemies			

Table 40. Pest insects in sunflowers by day in 2004, averaged across

Site & Insect	Date			
	14-Jun	10 Aug.	1 Sept.	28 Sept.
BRIGGSDALE:				
Cutworms (% cut plants)	0	--	--	--
Stem weevil (#/stalk)	--	--	--	0.1
Seed weevil (#/head)	--	0.19	--	--
Sunflower moth larvae (#/head)	--	--	0	--
Banded sunflower moth larvae (#/head)	--	--	0.4	--
Aphids (#/plant)	--	--	--	--
	2-Jun			
AKRON:				
Cutworms (% cut plants)	5			
Stem weevil (#/stalk)				
Seed weevil (#/head)				
Sunflower moth larvae (#/head)				
Banded sunflower moth larvae (#/head)				
Aphids (#/plant)				

Table 41. Total Nitrogen content of WHEAT GRAIN in the 2004 crop. No wheat yield for plots in millet in 2003 for Sterling and Stratton. No wheat yield on summit slope at Stratton.

	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
SITE & ROTATION	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.72	2.66	2.74	2.68	2.84	2.81
WCM						
(W)WCM						
W(W)CM	2.61	2.66	2.64	2.53	2.49	2.74
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF			2.93	2.70	2.68	2.88
WCM						
(W)WCM						
W(W)CM						
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.57	2.73	2.68	2.60	2.63	2.62
WCM						
(W)WCM						
W(W)CM	2.96	2.72	3.02	2.88	3.11	2.99

* Only receives phosphorus in wheat phase of each rotation.

Table 42. Total Nitrogen content of WHEAT STRAW in the 2004 crop. No wheat yield info for plots in millet in 2003 for Sterling. No wheat yield at Stratton.

	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
SITE & ROTATION	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	0.67	0.76	0.73	0.69	0.83	0.88
WCM						
(W)WCM						
W(W)CM	0.91	0.77	0.87	0.84	0.85	1.21
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF						
WCM						
(W)WCM						
W(W)CM						
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	0.50	0.54	0.47	0.48	0.58	0.60
WCM						
(W)WCM						
W(W)CM	0.59	0.58	0.71	0.67	0.88	0.82

* Only receives phosphorus in wheat phase of each rotation.

Table 43. Total Nitrogen content of CORN GRAIN or SORGHUM GRAIN in the 2004 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT N Side* N	SUMMIT NP Side NP	SIDESLOPE N Side* N	SIDESLOPE NP Side NP	TOESLOPE N Side* N	TOESLOPE NP Side NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.70	1.73	1.50	1.70	1.73	1.63
WCM	1.75	1.82	1.73	1.56	1.82	1.85
WWCM	1.87	1.81	1.71	1.78	1.89	1.87
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.04	2.01	1.78	1.92	1.69	1.89
WCM	2.04	2.10	1.88	2.11	1.77	1.70
WWCM	1.94	2.00	1.92	1.98	1.82	1.73
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	0.86	1.60	1.54	1.56	1.68	1.59
WCB						
WWSB	1.58	1.55	1.61	1.61	1.60	1.74
Cont. Crop (C)	1.84	1.70	1.74	1.79	1.74	1.83
Cont. Crop (S)						
OPP	1.47	1.64	0.86	1.67	1.71	1.54

***** Only receives phosphorus in wheat phase of each rotation.

Table 44. Total Nitrogen content of CORN or SORGHUM STOVER in the 2004 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT N Side* (N)	SUMMIT NP Side (NP)	SIDESLOPE N Side* (N)	SIDESLOPE NP Side (NP)	TOESLOPE N Side* (N)	TOESLOPE NP Side (NP)
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	0.91	0.79	0.74	0.59	0.86	0.73
WCM	0.58	1.26	0.85	0.86	1.11	1.12
WWCM	1.14	1.09	1.02	1.06	1.06	1.44
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.08	2.27	1.69	1.42	1.46	1.92
WCM	2.04	2.33	1.22	2.23	1.64	2.74
WWCM	2.14	2.00	1.69	1.45	1.37	1.41
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	0.58	0.73	0.50	0.66	0.48	0.60
WCB	0.62	0.64	0.73	0.74	0.74	0.94
WWSB	0.76	0.78	0.53	0.71	0.78	0.65
Cont. Crop (C)	0.72	0.72	0.96	0.89	0.82	0.80
Cont. Crop (S)	0.61	0.59	0.72	0.66	1.00	0.53
OPP	0.53	00.68	0.68	0.70	0.56	0.72

***** Only receives phosphorus in wheat phase of each rotation.

Table 45. Total Nitrogen content of MILLET OR MUNG BEAN GRAIN in the 2004 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side**	*NP Side*	*N Side**	*NP Side*	*N Side**	*NP Side*
	N	NP	N	NP	N	NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.54	2.50	2.36	2.33	2.45	2.57
WWCM	2.38	2.45	2.14	2.12	2.35	2.77
OPP	2.43	2.32	2.23	2.20	2.43	2.41
	N	NP	N	NP	N	NP
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.48	2.58	2.62	2.53	2.62	2.60
WWCM	2.57	2.78	2.65	2.64	2.64	2.57
OPP	2.67	2.73	2.56	2.63	2.53	2.44
	N	NP	N	NP	N	NP
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM						
WWCM						

* Only receives phosphorus in wheat phase of each rotation.

Table 46. Total Nitrogen content of MILLET OR MUNG BEAN straw in the 2004 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side**	*NP Side*	*N Side**	*NP Side*	*N Side**	*NP Side*
	N	NP	N	NP	N	NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.53	2.37	2.49	2.29	1.76	1.77
WWCM	2.04	2.36	1.32	1.27	0.87	1.71
OPP	1.94	2.66	1.71	1.63	2.02	2.45
	N	NP	N	NP	N	NP
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.86	2.34	2.52	2.15	2.64	2.79
WWCM	2.33	2.13	2.24	2.86	2.39	2.67
OPP	3.00	2.64	2.04	2.28	1.77	1.96
	N	NP	N	NP	N	NP
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	1.77	1.80	1.89	1.93	2.07	1.99
WWCM	1.75	1.62	1.67	1.44	1.64	2.04

* Only receives phosphorus in wheat phase of each rotation.

Table 47. Nitrate-N content of the soil profile at Planting for each crop during 2003-2004 crop year.

Site & Rotation	SLOPE POSITION										
	SUMMIT			SIDESLOPE			TOESLOPE				
	Crop and Time			Crop and Time			Crop and Time				
	Wheat Fall 2003	Corn S 2004	Sorghum S 2004	Wheat Fall 2003	Corn S 2004	Sorghum S 2004	Wheat S 2003	Corn S 2004	Sorghum S 2004		
	----------kg NO3-N ha $^{-1}$----------			----------kg NO3-N ha $^{-1}$----------			----------kg NO3-N ha $^{-1}$----------				
STERLING											
WCF	248	82		135	35		191	28			
WCM		63			95			55			
WWCM		188			103			64			
W(W)CM	121			76			148				
STRATTON											
WCF	212	90		126	108		140	192			
WCM		132			110			138			
WWCM		193			166			175			
W(W)CM	116			117			147				
WALSH											
WSF	104		55	95		54	162		76		
WCB	96	69		86	90		128	81			
(W)WSB	109			84			93				
WWSB			55			49			84		
CC (C)		55			112			130			
CC (S)			20			46			76		

Table 48. Available soil water by soil depth in the WHEAT phase of the WCF rotation at Sterling, Stratton, and WSF at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	5	3	2	10	6	4	15	0	15
45	9	8	1	3	0	3	0	0	0
75	12	0	12	19	0	19	15	2	13
105	1	0	1	17	1	16	25	0	25
135	-	-	-	-	-	-	34	0	34
155	-	-	-	-	-	-	34	0	34
TOTAL	27	11	16	49	7	42	123	2	121
STRATTON:									
15	0	0	0	19	5	14	19	4	15
45	8	16	(+8)	4	8	(+4)	11	0	11
75	16	6	10	14	23	(+9)	28	5	23
105	24	9	15	21	12	9	36	1	35
135	27	9	18	26	13	13	16	0	16
155	22	6	16	28	15	13	10	0	10
TOTAL	97	46	51	112	76	36	120	10	110
WALSH:									
15	22	0	22	20	0	20	23	0	23
45	51	0	51	49	0	49	53	0	53
75	54	0	54	68	0	68	73	0	73
105	54	0	54	76	0	76	84	4	80
135	68	0	68	73	0	73	81	0	81
155	73	0	73	84	0	84	93	7	86
TOTAL	322	0	322	370	0	370	407	11	396

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 49. Available soil water by soil depth in the WHEAT 1 phase of the WWCM rotation at Sterling, Stratton, and WWSM at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7	10	(+3)	7	0	7	7	12	(+5)
45	12	27	(+15)	13	10	3	4	16	(+12)
75	9	11	(+2)	24	16	8	14	16	(+2)
105	1	0	1	37	17	20	21	22	(+1)
135	-	-	-	-	-	-	22	4	18
155	-	-	-	-	-	-	25	4	19
TOTAL	29	48	(+19)	81	43	38	93	74	17
STRATTON:									
15	0	0	0	19	0	19	21	0	21
45	5	0	5	3	0	3	4	0	4
75	12	0	12	15	5	10	16	0	16
105	18	0	18	19	4	15	15	0	15
135	21	0	21	24	4	20	3	0	3
155	18	0	18	28	4	24	8	0	8
TOTAL	74	0	74	108	17	91	67	0	67
WALSH:									
15	14	0	14	14	0	14	12	0	12
45	37	0	37	35	0	35	31	0	31
75	34	0	34	34	0	34	37	0	37
105	38	0	38	43	0	43	45	0	45
135	48	0	48	52	0	52	52	0	52
155	60	0	60	65	0	65	42	9	33
TOTAL	231	0	231	243	0	243	219	9	210

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 50. Available soil water by soil depth in the WHEAT phase of the WCM rotation at Sterling, Stratton, and WCM at Walsh in 2004. *********(No Harvest Data for Sterling or Stratton)****************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7			3			6		
45	16			2			7		
75	18			18			13		
105	2			14			20		
135	-	-	-	-	-	-	31		
155	-	-	-	-	-	-	23		
TOTAL									
STRATTON:									
15	0			22			21		
45	17			5			23		
75	22			12			44		
105	24			14			45		
135	24			19			32		
155	22			26			21		
TOTAL									
WALSH:									
15	7	0	7	14	0	14	14	0	14
45	24	0	24	28	0	28	25	2	23
75	32	0	32	35	0	35	33	0	33
105	34	0	34	48	0	48	45	3	42
135	42	0	42	50	0	50	49	0	49
155	37	0	37	55	0	55	56	11	45
TOTAL	176	0	176	230	0	230	222	16	206

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 51. Available soil water by soil depth in WHEAT 2 phase of the WWCM rotation at Sterling and Stratton, and the WWSM rotation at Walsh in 2004. ********(need harvest data for Stratton)***************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	14	9	5	13	4	9	18	11	7
45	12	0	12	10	2	8	9	1	8
75	28	8	20	16	8	8	14	0	14
105	19	7	12	19	10	9	21	1	20
135	-	-	-	-	-	-	23	0	23
155	-	-	-	-	-	-	23	1	22
TOTAL	73	24	49	58	24	34	108	14	94
STRATTON:									
15	0			19			18		
45	13			6			10		
75	21			15			29		
105	24			18			37		
135	24			26			22		
155	20			28			14		
TOTAL									
WALSH:									
15	21	0	21	16	0	16	15	0	15
45	35	0	35	31	0	31	17	1	16
75	42	0	42	36	0	36	25	0	25
105	51	0	51	39	0	39	41	2	39
135	57	0	57	40	0	40	44	0	44
155	57	0	57	35	0	35	51	3	48
TOTAL	263	0	263	197					

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 52. Available soil water by soil depth in the CORN phase of the WWCM rotation at Sterling and Stratton and the SORGHUM phase of the WWSM rotation at Walsh in 2004. ****(need sorghum harvest data for Walsh, harvest on 12-02-04)*******************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	9	4	5	0	1	(+1)	25	0	25
45	18	0	18	18	0	18	0	0	0
75	3	7	(+4)	10	23	(+13)	1	0	1
105	0	8	(+8)	0	25	(+25)	0	0	0
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	1	(+1)
TOTAL	30	19	11	28	49	(+21)	26	1	25
STRATTON:									
15	0	0	0	3	2	1	21	6	15
45	21	0	21	14	0	14	36	14	22
75	5	0	5	8	0	8	34	25	9
105	1	0	1	1	0	1	32	20	12
135	0	0	0	10	0	10	17	10	7
155	0	5	(+5)	6	0	6	14	18	(+4)
TOTAL	27	5	22	42	2	40	154	93	61
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 53. Available soil water by soil depth in the CORN phase of the WCF rotation at Sterling and Stratton and the SORGHUM phase of the WSF rotation at Walsh in 2004. **(Need harvest data for sorghum at Walsh for trt 4) **

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	2	4	(+2)	7	0	7	22	0	22
45	13	2	11	18	0	18	5	0	5
75	7	5	2	17	25	(+8)	0	0	0
105	0	10	(+10)	0	23	(+23)	0	2	(+2)
135	-	-	-	-	-	-	0	2	(+2)
155	-	-	-	-	-	-	0	0	0
TOTAL	22	21	1	42	48	(+6)	27	4	31
STRATTON:									
15	2	0	2	19	5	14	33	13	20
45	4	0	4	12	0	12	43	1	42
75	0	0	0	6	0	6	48	10	38
105	0	0	0	0	0	0	54	15	39
135	0	0	0	0	0	0	33	3	30
155	0	0	0	0	0	0	29	15	14
TOTAL	6	0	6	37	5	32	240	57	183
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL	0			0					

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 54. Available soil water by soil depth in the CORN phase of the WCM rotation at Sterling, Stratton, and Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7	4	3	13	2	11	8	0	8
45	6	2	4	20	0	20	10	0	10
75	1	7	(+6)	21	17	4	0	0	0
105	0	9	(+9)	0	25	(+25)	0	3	(+3)
135	-	-	-	-	-	-	0	1	(+1)
155	-	-	-	-	-	-	0	2	(+2)
TOTAL	14	22	8	54	44	10	18	6	12
STRATTON:									
15	0	0	0	3	0	3	26	9	17
45	2	0	2	2	0	2	38	2	36
75	0	0	0	5	0	5	46	18	28
105	0	0	0	0	0	0	52	17	35
135	1	0	1	5	0	5	34	9	25
155	1	0	1	2	0	2	31	21	10
TOTAL	4	0	4	17	0	17	227	76	151
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	10			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 55. Available soil water by soil depth in the MILLET phase of the WCM rotation at Sterling and Stratton in 2004. *********(need data for Walsh, trt.0)*****************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	0	0	0	0	0	0	0	0	0
45	3	0	3	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	2	1	1
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	0	0
TOTAL	3	0	3	0	0	0	2	1	1
STRATTON:									
15	0	0	0	0	0	0	0	0	0
45	5	0	5	35	0	35	0	1	(+1)
75	4	0	4	0	5	(+5)	0	0	0
105	0	0	0	0	7	(+7)	0	0	0
135	0	0	0	8	2	6	0	0	0
155	0	0	0	0	2	(+2)	11	3	8
TOTAL	10	0	10	43	16	27	11	4	7
WALSH:									
15									
45									
75									
105									
135									
155									
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 56. Available soil water by soil depth in the MILLET phase of the WWCM rotation at Sterling and Stratton, and WWSM rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	1	0	1	1	0	1	12	0	12
45	0	0	0	3	0	3	0	0	0
75	1	0	1	9	5	4	0	0	0
105	10	0	10	6	2	4	0	2	(+2)
135	-	-	-	-	-	-	3	0	3
155	-	-	-	-	-	-	2	0	2
TOTAL	12	0	12	19	7	12	17	2	15
STRATTON:									
15	0	0	0	16	0	16	11	0	11
45	0	0	0	0	0	0	9	0	9
75	0	4	(+4)	0	7	(+7)	6	6	0
105	0	3	(+3)	2	9	(+7)	10	0	10
135	0	0	0	5	6	(+1)	11	0	11
155	0	0	0	6	5	1	11	0	11
TOTAL	0	7	(+7)	29	27	2	58	6	52
WALSH:									
15	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
75	0	0	0	0	18	(+18)	0	12	(+12)
105	0	20	(+20)	0	6	(+6)	0	5	(+5)
135	0	29	(+29)	0	0	0	0	3	(+3)
155	0	22	(+22)	0	29	(+29)	0	30	(+30)
TOTAL	0	71	(+71)	0	53	(+53)	0	50	(+50)

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 57. Available soil water by soil depth of MILLET in the OPP rotation at Sterling and Stratton, and SORGHUM in the OPP rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	12	0	12	0	0	0	15	0	15
45	0	0	0	3	0	3	0	0	0
75	0	0	0	17	7	10	0	0	0
105	0	0	0	17	0	17	0	0	0
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	0	0
TOTAL	12	0	12	37	7	30	15	0	15
STRATTON:									
15	0	0	0	6	0	6	20	0	20
45	0	1	(+1)	0	0	0	8	0	8
75	0	0	0	0	8	(+8)	34	7	27
105	0	0	0	3	6	(+3)	28	4	24
135	0	0	0	6	4	2	15	0	15
155	0	0	0	5	4	1	16	0	16
TOTAL	0	1	(+1)	20	22	(+2)	121	11	110
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 58. Available soil water by soil depth in the WHEAT phase of the WCF rotation at Sterling, Stratton, and WSF at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	5	3	2	10	6	4	15	0	15
45	9	8	1	3	0	3	0	0	0
75	12	0	12	19	0	19	15	2	13
105	1	0	1	17	1	16	25	0	25
135	-	-	-	-	-	-	34	0	34
155	-	-	-	-	-	-	34	0	34
TOTAL	27	11	16	49	7	42	123	2	121
STRATTON:									
15	0	0	0	19	5	14	19	4	15
45	8	16	(+8)	4	8	(+4)	11	0	11
75	16	6	10	14	23	(+9)	28	5	23
105	24	9	15	21	12	9	36	1	35
135	27	9	18	26	13	13	16	0	16
155	22	6	16	28	15	13	10	0	10
TOTAL	97	46	51	112	76	36	120	10	110
WALSH:									
15	22	0	22	20	0	20	23	0	23
45	51	0	51	49	0	49	53	0	53
75	54	0	54	68	0	68	73	0	73
105	54	0	54	76	0	76	84	4	80
135	68	0	68	73	0	73	81	0	81
155	73	0	73	84	0	84	93	7	86
TOTAL	322	0	322	370	0	370	407	11	396

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 59. Available soil water by soil depth in the WHEAT 1 phase of the WWCM rotation at Sterling, Stratton, and WWSM at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7	10	(+3)	7	0	7	7	12	(+5)
45	12	27	(+15)	13	10	3	4	16	(+12)
75	9	11	(+2)	24	16	8	14	16	(+2)
105	1	0	1	37	17	20	21	22	(+1)
135	-	-	-	-	-	-	22	4	18
155	-	-	-	-	-	-	25	4	19
TOTAL	29	48	(+19)	81	43	38	93	74	17
STRATTON:									
15	0	0	0	19	0	19	21	0	21
45	5	0	5	3	0	3	4	0	4
75	12	0	12	15	5	10	16	0	16
105	18	0	18	19	4	15	15	0	15
135	21	0	21	24	4	20	3	0	3
155	18	0	18	28	4	24	8	0	8
TOTAL	74	0	74	108	17	91	67	0	67
WALSH:									
15	14	0	14	14	0	14	12	0	12
45	37	0	37	35	0	35	31	0	31
75	34	0	34	34	0	34	37	0	37
105	38	0	38	43	0	43	45	0	45
135	48	0	48	52	0	52	52	0	52
155	60	0	60	65	0	65	42	9	33
TOTAL	231	0	231	243	0	243	219	9	210

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 60. Available soil water by soil depth in the WHEAT phase of the WCM rotation at Sterling, Stratton, and WCM at Walsh in 2004. *********(No Harvest Data for Sterling or Stratton)****************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7			3			6		
45	16			2			7		
75	18			18			13		
105	2			14			20		
135	-	-	-	-	-	-	31		
155	-	-	-	-	-	-	23		
TOTAL									
STRATTON:									
15	0			22			21		
45	17			5			23		
75	22			12			44		
105	24			14			45		
135	24			19			32		
155	22			26			21		
TOTAL									
WALSH:									
15	7	0	7	14	0	14	14	0	14
45	24	0	24	28	0	28	25	2	23
75	32	0	32	35	0	35	33	0	33
105	34	0	34	48	0	48	45	3	42
135	42	0	42	50	0	50	49	0	49
155	37	0	37	55	0	55	56	11	45
TOTAL	176	0	176	230	0	230	222	16	206

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 61. Available soil water by soil depth in WHEAT 2 phase of the WWCM rotation at Sterling and Stratton, and the WWSM rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	14	9	5	13	4	9	18	11	7
45	12	0	12	10	2	8	9	1	8
75	28	8	20	16	8	8	14	0	14
105	19	7	12	19	10	9	21	1	20
135	-	-	-	-	-	-	23	0	23
155	-	-	-	-	-	-	23	1	22
TOTAL	73	24	49	58	24	34	108	14	94
STRATTON:									
15	0			19			18		
45	13			6			10		
75	21			15			29		
105	24			18			37		
135	24			26			22		
155	20			28			14		
TOTAL									
WALSH:									
15	21	0	21	16	0	16	15	0	15
45	35	0	35	31	0	31	17	1	16
75	42	0	42	36	0	36	25	0	25
105	51	0	51	39	0	39	41	2	39
135	57	0	57	40	0	40	44	0	44
155	57	0	57	35	0	35	51	3	48
TOTAL	263	0	263	197					

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 62. Available soil water by soil depth in the CORN phase of the WWCM rotation at Sterling and Stratton and the SORGHUM phase of the WWSM rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	9	4	5	0	1	(+1)	25	0	25
45	18	0	18	18	0	18	0	0	0
75	3	7	(+4)	10	23	(+13)	1	0	1
105	0	8	(+8)	0	25	(+25)	0	0	0
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	1	(+1)
TOTAL	30	19	11	28	49	(+21)	26	1	25
STRATTON:									
15	0	0	0	3	2	1	21	6	15
45	21	0	21	14	0	14	36	14	22
75	5	0	5	8	0	8	34	25	9
105	1	0	1	1	0	1	32	20	12
135	0	0	0	10	0	10	17	10	7
155	0	5	(+5)	6	0	6	14	18	(+4)
TOTAL	27	5	22	42	2	40	154	93	61
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 63. Available soil water by soil depth in the CORN phase of the WCF rotation at Sterling and Stratton and the SORGHUM phase of the WSF rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	2	4	(+2)	7	0	7	22	0	22
45	13	2	11	18	0	18	5	0	5
75	7	5	2	17	25	(+8)	0	0	0
105	0	10	(+10)	0	23	(+23)	0	2	(+2)
135	-	-	-	-	-	-	0	2	(+2)
155	-	-	-	-	-	-	0	0	0
TOTAL	22	21	1	42	48	(+6)	27	4	31
STRATTON:									
15	2	0	2	19	5	14	33	13	20
45	4	0	4	12	0	12	43	1	42
75	0	0	0	6	0	6	48	10	38
105	0	0	0	0	0	0	54	15	39
135	0	0	0	0	0	0	33	3	30
155	0	0	0	0	0	0	29	15	14
TOTAL	6	0	6	37	5	32	240	57	183
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL	0			0					

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 64. Available soil water by soil depth in the CORN phase of the WCM rotation at Sterling, Stratton, and Walsh in 2004. ******(Need harvest data for Walsh trt.2)*****************

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	7	4	3	13	2	11	8	0	8
45	6	2	4	20	0	20	10	0	10
75	1	7	(+6)	21	17	4	0	0	0
105	0	9	(+9)	0	25	(+25)	0	3	(+3)
135	-	-	-	-	-	-	0	1	(+1)
155	-	-	-	-	-	-	0	2	(+2)
TOTAL	14	22	8	54	44	10	18	6	12
STRATTON:									
15	0	0	0	3	0	3	26	9	17
45	2	0	2	2	0	2	38	2	36
75	0	0	0	5	0	5	46	18	28
105	0	0	0	0	0	0	52	17	35
135	1	0	1	5	0	5	34	9	25
155	1	0	1	2	0	2	31	21	10
TOTAL	4	0	4	17	0	17	227	76	151
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	10			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 65. Available soil water by soil depth in the MILLET phase of the WCM rotation at Sterling and Stratton in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	0	0	0	0	0	0	0	0	0
45	3	0	3	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	2	1	1
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	0	0
TOTAL	3	0	3	0	0	0	2	1	1
STRATTON:									
15	0	0	0	0	0	0	0	0	0
45	5	0	5	35	0	35	0	1	(+1)
75	4	0	4	0	5	(+5)	0	0	0
105	0	0	0	0	7	(+7)	0	0	0
135	0	0	0	8	2	6	0	0	0
155	0	0	0	0	2	(+2)	11	3	8
TOTAL	10	0	10	43	16	27	11	4	7
WALSH:									
15									
45									
75									
105									
135									
155									
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 66. Available soil water by soil depth in the MILLET phase of the WWCM rotation at Sterling and Stratton, and WWSM rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	1	0	1	1	0	1	12	0	12
45	0	0	0	3	0	3	0	0	0
75	1	0	1	9	5	4	0	0	0
105	10	0	10	6	2	4	0	2	(+2)
135	-	-	-	-	-	-	3	0	3
155	-	-	-	-	-	-	2	0	2
TOTAL	12	0	12	19	7	12	17	2	15
STRATTON:									
15	0	0	0	16	0	16	11	0	11
45	0	0	0	0	0	0	9	0	9
75	0	4	(+4)	0	7	(+7)	6	6	0
105	0	3	(+3)	2	9	(+7)	10	0	10
135	0	0	0	5	6	(+1)	11	0	11
155	0	0	0	6	5	1	11	0	11
TOTAL	0	7	(+7)	29	27	2	58	6	52
WALSH:									
15	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0
75	0	0	0	0	18	(+18)	0	12	(+12)
105	0	20	(+20)	0	6	(+6)	0	5	(+5)
135	0	29	(+29)	0	0	0	0	3	(+3)
155	0	22	(+22)	0	29	(+29)	0	30	(+30)
TOTAL	0	71	(+71)	0	53	(+53)	0	50	(+50)

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 67. Available soil water by soil depth of MILLET in the OPP rotation at Sterling and Stratton, and SORGHUM in the OPP rotation at Walsh in 2004.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	12	0	12	0	0	0	15	0	15
45	0	0	0	3	0	3	0	0	0
75	0	0	0	17	7	10	0	0	0
105	0	0	0	17	0	17	0	0	0
135	-	-	-	-	-	-	0	0	0
155	-	-	-	-	-	-	0	0	0
TOTAL	12	0	12	37	7	30	15	0	15
STRATTON:									
15	0	0	0	6	0	6	20	0	20
45	0	1	(+1)	0	0	0	8	0	8
75	0	0	0	0	8	(+8)	34	7	27
105	0	0	0	3	6	(+3)	28	4	24
135	0	0	0	6	4	2	15	0	15
155	0	0	0	5	4	1	16	0	16
TOTAL	0	1	(+1)	20	22	(+2)	121	11	110
WALSH:									
15	0			0			0		
45	0			0			0		
75	0			0			0		
105	0			0			0		
135	0			0			0		
155	0			0			0		
TOTAL									

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 68a. Monthly precipitation for the original sites for the 2004 - 2005 growing season.

MONTH	LOCATION					
	STERLING		STRATTON		WALSH	
	---------- Inches ----------					
2004	2004	Normals[1]	2004	Normals[1]	2004	Normals[1]
JULY	2.65	3.23	0.92	2.80	4.04	2.62
AUGUST	2.80	1.90	1.59	2.60	0.77	1.96
SEPTEMBER	1.41	1.04	1.26	1.45	0.45	1.74
OCTOBER	0.79	0.76	0.47	0.85	0.46	0.89
NOVEMBER	0.60	0.50	1.03	0.62	1.72	0.53
DECEMBER	0.12	0.40	0.13	0.28	0.00	0.31
SUBTOTAL	**8.37**	**7.83**	**5.40**	**8.60**	**7.44**	**8.05**
2005	2005	Normals[1]	2005	Normals[1]	2005	Normals[1]
JANUARY	0.15	0.33	0.03	0.28	0.19	0.27
FEBRUARY	0.06	0.33	0.06	0.30	0.17	0.28
MARCH	0.35	1.07	0.47	0.76	0.05	0.81
APRIL	1.57	1.60	1.10	1.23	0.69	1.15
MAY	2.39	3.27	1.96	2.70	3.38	2.69
JUNE	2.60	3.00	3.60	2.45	0.67	2.29
SUBTOTAL	**7.12**	**9.60**	**7.22**	**7.72**	**5.15**	**7.49**
2005	2005	Normals[1]	2005	Normals[1]	2005	Normals[1]
JULY	0.50	3.23	1.20	2.80	1.20	2.62
AUGUST	1.50	1.90	3.50	2.60	1.30	1.96
SEPTEMBER	0.20	1.04	0.00	1.45	0.20	1.74
OCTOBER	1.30	0.76	3.60	0.85	1.50	0.89
NOVEMBER	0.60	0.50	0.30	0.62	0.10	0.53
DECEMBER	0.00	0.40	0.00	0.28	0.00	0.31
SUBTOTAL	**4.10**	**7.83**	**8.60**	**8.60**	**4.30**	**8.05**
YEAR TOTAL	**11.22**	**17.43**	**15.82**	**16.32**	**9.45**	**15.54**
18 MONTH TOTAL	**19.59**	**25.26**	**21.22**	**24.92**	**16.89**	**23.59**

[1]Normals = 1961 - 1990 data base

Table 68b. Monthly precipitation for the three new sites for the 2004 - 2005 growing season.

MONTH	LOCATION					
	BRIGGSDALE		AKRON		LAMAR	
	Inches					
2004	2004	Normals[1]	2004	Normals[1]	2004	Normals[1]
JULY	0.60	2.51	1.74	2.67	3.78	2.23
AUGUST	0.67	1.81	2.85	2.11	2.20	1.85
SEPTEMBER	1.35	1.28	1.67	1.24	1.69	1.32
OCTOBER	0.60	0.66	0.80	0.90	0.94	0.71
NOVEMBER	0.54	0.45	0.90	0.55	1.33	0.56
DECEMBER	0.08	0.27	0.54	0.40	0.01	0.40
SUBTOTAL	**3.84**	**6.98**	**8.50**	**7.87**	**9.95**	**7.07**
2005	2005	Normals[1]	2005	Normals[1]	2005	Normals[1]
JANUARY	0.14	0.30	0.12	0.33	0.31	0.42
FEBRUARY	0.04	0.19	0.10	0.35	1.36	0.41
MARCH	0.37	0.78	0.36	0.84	2.01	0.90
APRIL	1.23	1.28	1.64	1.64	1.21	1.15
MAY	0.85	1.94	2.54	2.96	3.84	2.50
JUNE	3.56	2.07	3.02	2.47	1.63	2.18
SUBTOTAL	**6.19**	**6.56**	**7.78**	**8.59**	**10.36**	**7.56**
2005	2005	Normals[1]	2005	Normals[1]	2005	Normals[1]
JULY	0.44	2.51	3.33	2.64	0.24	2.23
AUGUST	0.86	1.81	3.73	2.12	3.85	1.85
SEPTEMBER	0.32	1.28	0.31	1.24	0.35	1.32
OCTOBER	2.66	0.66	2.96	0.93	1.85	0.71
NOVEMBER	0.66	0.45	0.76	0.53	0.12	0.56
DECEMBER	0.00	0.27	0.09	0.40	0.04	0.40
SUBTOTAL	**4.94**	**6.98**	**11.18**	**7.86**	**6.45**	**7.07**
YEAR TOTAL	**11.13**	**13.54**	**18.96**	**16.45**	**16.81**	**14.63**
18 MONTH TOTAL	**14.97**	**20.52**	**27.46**	**24.32**	**26.76**	**21.70**

[1]Normals = 1961 - 1990 data base

Table 69a. Precipitation by growing season segments for Sterling from 1987-2005.

	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	---------- inches ----------			
1987-88	5.2	9.9	11.1	15.8
1988-89	3.1	6.5	10.5	14.3
1989-90	5.1	4.7	11.8	13.0
1990-91	3.8	7.2	12.3	11.7
1991-92	4.5	4.8	9.1	14.8
1992-93	4.5	6.2	15.5	10.6
1993-94	6.4	3.0	10.2	6.1
1994-95	7.3	14.4	9.6	17.2
1995-96	4.2	9.2	7.5	18.0
1996-97	4.7	7.0	10.6	21.4
1997-98	5.5	4.9	16.7	13.8
1998-99	5.8	7.7	13.5	12.8
1999-00	5.7	3.0	12.6	8.6
2000-01	6.8	8.2	11.5	13.8
2001-02	4.2	1.9	8.2	8.1
2002-03	5.2	7.6	12.9	8.4
2003-04	2.0	5.3	7.2	11.5
2004-05	3.5	6.6	10.5	8.5
Long Term Average	**4.9**	**6.6**	**11.2**	**12.7**

Table 69b. Precipitation by growing season segment for Stratton from 1987 - 2005.

	Wheat		Corn	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1987-88	4.3	7.2	8.8	12.6
1988-89	3.0	9.4	5.3	15.5
1989-90	5.3	6.1	11.0	13.4
1990-91	4.4	4.1	10.7	14.7
1991-92	3.3	6.1	14.2	13.6
1992-93	3.3	3.8	11.8	14.7
1993-94	4.3	7.8	16.7	13.5
1994-95	7.0	10.0	14.8	13.7
1995-96	3.5	6.0	8.1	14.5
1996-97	2.9	6.2	12.2	23.2
1997-98	8.0	5.9	22.6	13.9
1998-99	4.4	8.5	15.6	12.3
1999-00	6.2	3.9	14.2	8.8
2000-01	4.7	4.3	9.8	10.6
2001-02	3.8	2.2	9.5	6.9
2002-03	4.1	8.7	8.6	10.9
2003-04	1.4	3.8	6.1	6.3
2004-05	3.5	6.7	7.1	13.9
Long Term Average	**4.3**	**6.1**	**11.5**	**12.9**

Table 69c. Precipitation by growing season segment for Walsh from 1987-2005.

	Wheat		Sorghum	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1987-88	4.3	7.6	7.4	11.1
1988-89	4.1	11.5	8.1	20.2
1989-90	5.7	7.4	14.1	12.5
1990-91	5.0	7.7	11.7	12.2
1991-92	2.7	5.8	7.1	13.2
1992-93	6.1	9.2	13.8	14.5
1993-94	3.2	5.3	8.7	16.3
1994-95	4.6	7.2	16.6	7.2
1995-96	1.7	3.5	1.9	17.1
1996-97	5.8	5.3	17.2	11.3
1997-98	6.9	2.3	12.3	13.3
1998-99	8.2	7.4	19.4	14.5
1999-00	7.9	3.2	15.8	10.0
2000-01	9.0	7.9	13.4	9.6
2001-02	1.7	2.2	2.9	11.8
2002-03	6.4	11.4	15.5	12.5
2003-04	3.5	10.1	8.4	13.5
2004-05	3.0	4.7	8.5	8.3
Long Term Average	**5.0**	**6.7**	**11.3**	**12.7**

Table 69d. Precipitation by growing season segment for Briggsdale from 1999-2005.

	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	inches			
1999-00	4.7	3.7	11.4	4.9
2000-01	2.9	8.0	5.6	10.4
2001-02	3.2	2.2	5.9	6.7
2002-03	3.7	4.9	8.4	7.1
2003-04	2.0	4.4	5.2	6.7
2004-05	3.1	5.6	5.6	8.7
Long Term Average	**3.3**	**4.8**	**7.0**	**7.4**

Table 69e. Precipitation by growing season segment for Akron from 1997-2005.

	Wheat		Corn	
	Vegetat. Sep - Mar	Reprod. Apr - Jun	Preplant Jul - Apr	Growing Season May - Oct
Year	inches			
1997-98	5.6	2.1	11.1	6.5
1998-99	2.8	7.9	11.4	17.1
1999-00	6.0	2.7	16.3	9.9
2000-01	6.4	6.3	12.1	12.7
2001-02	3.5	2.7	8.8	8.3
2002-03	5.9	10.9	11.9	11.3
2003-04	2.1	5.8	6.0	11.5
2004-05	4.5	7.2	10.7	15.9
Long Term Average	**4.6**	**5.7**	**11.0**	**11.6**

Table 69f. Precipitation by growing season segment for Lamar from 1997-2005.

	Wheat		Sorghum	
	Vegetat.	Reprod.	Preplant	Growing Season
	Sep - Mar	Apr - Jun	Jul - Apr	May - Oct
Year	---------- inches ----------			
1997-98	10.5	2.6	19.4	15.9
1998-99	7.5	9.2	22.5	11.0
1999-00	4.5	2.4	9.9	4.4
2000-01	3.6	7.0	5.7	10.2
2001-02	1.6	1.6	5.1	4.8
2002-03	4.5	6.0	6.7	8.5
2003-04	2.2	8.1	7.8	13.0
2004-05	7.7	6.7	14.8	11.8
Long Term Average	**5.3**	**5.4**	**11.5**	**9.9**

Table 70. Grain and stover (straw) yields for WHEAT at Sterling, Stratton, and Walsh in 2005.

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	18.6	19	4025	4449	25.0	23.9	5167	4910	21.7	23.2	3832	5255
WCM	7.3	7.5	6185	2559	6.4	8.5	1876	1133	5.3	6.6	2550	1917
W1WCM	9.5	4.9	4062	3731	12.7	15.3	1509	2249	10.5	8.0	3673	4583
WW2CM	24.7	25.2	4702	7689	29.7	30.8	5274	5849	30.8	28.5	6777	5909
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	3.7	5.3	1511	2619	0.9	1.1	833	763	8.1	12.1	8660	3590
WCM	1.5	1.1	1523	1389	1.2	0.6	240	438	0.7	0.4	937	141
W1WCM	0.5	2.0	115	1448	1.1	0.3	232	117	2.5	1.1	1027	460
WW2CM	2.7	2.3	1455	1957	13.9	11.3	4376	2510	14.5	17.3	9711	
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
W CF	23.0	23.6	2384	2941	17.8	18.1	2095	2096	41.7	36.0	4696	3631
WCM	36.0	16.9	3663	1889	31.1	15.1	3181	1834	42.7	23.2	4193	2758
W1WCM	22.3	16.7	2194	1578	21.3	14.3	1619	1282	40.4	33.3	3884	3337
WW2CM	28.2	29.2	2582	2649	24.0	31.7	2437	3348	43.6	46.0	4574	4672

1. Wheat grain yield expressed at 12% moisture.
* Only receives phosphorus in wheat phase of each rotation.

Table 71. Grain and stover yields for CORN AND SORGHUM at Sterling, Stratton, and Walsh in 2005

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	5.6	1.4	546	81	21.5	14.3	1651	754	35.1	32.3	1516	1195
WCM	4.9	2.7	330	188	28.0	19.4	375	1319	20.4	15.3	780	857
WWCM	14.6	8.0	818	689	27.9	29.0	1018	1235	34.1	33.2	1300	2036
OPP	0.7	1.9	46	503	17.4	18.2	880	841	18.0	16.0	1153	323
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCF	14.6	3.0	2458	213	20.3	22.8	2472	1617	44.7	46.3	3298	4136
WCM	23.1	35.3	4162	4853	18.3	12.6	1298	846	49.0	37.1	3529	2339
WWCM	23.2	21.9	3325	5844	17.8	14.7	7354	1467	58.0	51.0	3910	4048
OPP	53.4		6239				3743		69.6	64.2	5169	3442
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WSF	16.6	16.0	800	771	17.2	18.7	826	900	17.2	16.1	828	774
WCM	28	16	887	567	18.0	17.0	886	830	17.0	18.0	733	482
WWSM	16.1	20.3	775	975	18.7	22.0	903	1060	19.3	18.9	929	910
OPP - C	17.2	23.6	607	813	12.8	17.3	598	864	14.2	17.2	598	628
CC corn	18.5	28.7	665	989	9.6	19.2	441	957	12.5	12.5	456	420
CC SOR	18.7	16.1	903	776	18.8	16.1	903	774	19.7	16.4	950	791

1. Corn grain yield expressed at 15.5% moisture.
2. Sorghum grain yield expressed at 14% moisture.

* Only receives phosphorus in wheat phase of each rotation.

Table 72. Grain[1] and stover (straw) yields at Briggsdale, Akron, and Lamar in 2005.

	Wheat				Corn/Sorghum		Millet		Barley/Sunflower	
	GRAIN		STOVER		GRAIN	STOVER	GRAIN	STOVER	GRAIN	STOVER
SITE:	Susceptible	Resistant	Susceptible	Resistant						
ROTATION	Variety	Variety	Variety	Variety						
BRIGGSDALE:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	lb/A	lbs/A	bu/A	lbs/A
WF	22.7	18.4								
WMF	29.5	30.6					No yield			
(W1)W2(S)CSfF*	No yield	No yield			11.3				23.7*	
W1(W2)S(C)SfF*	No Yield	No Yield			15.4				21*	
Opp (Proso)										
AKRON:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A	bu/A	lbs/A	lb/A	lbs/A
WF	13.9	12.6	2003	1857						
WCF	15.4	16.8	2672	2370	11.3	56				
WCM	4.4	7.7	2400	1163	6.1	108	42.4	2435		
WCSfF	6.4	8.3	1455	2219	No yield	70			136	277
LAMAR:	------ bu/A ------		------ lbs/A ------		bu/A	lbs/A				
WF	12.6	9.8	3537	3153						
WSF	5.7	6.2	4872	4076	7.9					
WCF	14.9	14.4	4329	3339						

1. Grain or hay yield expressed at the following moistures: Wheat - 12%; Corn - 15.5%; Hay millet - 15%; Proso millet - 10%; Sunflowers - 10%..

* Barley grown in 2005 instead of sunflowers

Table 73. Grain and stover yields for MILLET at Sterling, Stratton, and Walsh in 2005

SITE & ROTATION	SLOPE POSITION: SUMMIT GRAIN NP*	SUMMIT GRAIN NP	SUMMIT STOVER NP*	SUMMIT STOVER NP	SIDESLOPE GRAIN NP*	SIDESLOPE GRAIN NP	SIDESLOPE STOVER NP*	SIDESLOPE STOVER NP	TOESLOPE GRAIN NP*	TOESLOPE GRAIN NP	TOESLOPE STOVER NP*	TOESLOPE STOVER NP
STERLING:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	16.5	17.5	469	623	11.1	10.7	344	373	27.4	24.4	651	529
WWCM	11.6	23.6	550	3693	9.4	23.4	370	953	30.6	23.8	1106	985
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	22.1	18.7	343	303	30.2	22.8	468	536	64.6	57.0	1170	865
WWCM	23.6	24.4	474	595	24.5	25.7	354	456	26.3	70.4	670	1577
	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP	NP*	NP
WALSH:	------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------		------ Bu./A. ------		------ lbs./A. ------	
WCM	3.4	3.7	167	229	6.0	7.3	124	544	18.0	21.2	603	212
WWSM	2.2	5.2	164	283	5.2	8.8	277	488	17.6	23.2	950	1059

1. Proso millet grain yield expressed at 10% moisture.
* Only receives phosphorus in wheat phase of each rotation.

Table 74. Measure of Compaction (in millimeters) by cropping system and grazing using a drop cone penetrometer.*

System	2005 Crop		Pre-Grazing	Post-Grazing	Change	Ave.
WF	**Wheat**	Ungrazed	79	75	4	
		Grazed	78	66	12	8
	Fallow	Ungrazed	75	77	-2	
		Grazed	74	77	-3	-2.5
WSF	**Wheat**	Ungrazed	76	80	-4	
		Grazed	77	70	7	1.5
	Sorghum	Ungrazed	78	60	18	
		Grazed	76	57	19	18.5
	Fallow	Ungrazed	68	78	-10	
		Grazed	70	75	-5	-7.5

* Higher numbers indicate a greater depth of penetration by the drop cone, which relates to less compaction

Table 75. Crop residues prior to planting 2005 crops at Akron.

Spring planted crops			**Fall planted crops**		
2005 Crop	Rotation	Residue (lb/A)	2006 Crop	Rotation	Residue (lb/A)
Corn	W-C-F	965	Wheat	W-F	299
Corn	W-C-M	1424	Wheat	W-C-F	1717
Corn	W-C-S-F	651	Wheat	W-C-M	4022
Sunflowers	W-C-S-F	785	Wheat	W-C-S-F	396
Millet	W-C-M	1336			

Table 76a. Crop residue weights on all plots planted to Wheat in the fall 2004.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	Pre-Plant		*Pre-Plant*		*Pre-Plant*	
	NP*	NP	NP*	NP	NP*	NP
STERLING:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCF						
WCM						
(W)WCM						
W(W)CM						
	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCF						
WCM						
(W)WCM						
W(W)CM						
	NP*	NP	NP*	NP	NP*	NP
WALSH:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WSF	1260	985	1490	1590	905	1020
WCM	210	280	230	365		
(W)WSM	355	480	330	290	110	305
W(W)SM	300	580	660	545	585	505

1. For conversion to lbs/Acre multiply Kg/ha by 0.893.
* Only receives phosphorus in wheat phase of each rotation.

Table 76b. Crop residue weights on all plots planted to Wheat in the fall 2005.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	Pre-Plant		*Pre-Plant*		*Pre-Plant*	
	NP*	NP	NP*	NP	NP*	NP
STERLING:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCF	3230	3450	3125	3350	2065	1815
WCM	2700	3200	3350	3585	4130	3085
(W)WCM	2560	2740	2810	2570	2620	1970
W(W)CM	2620	1970	4035	4380	3500	4000
	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCF	2805	1485	1980	2645	9650	9665
WCM	2925	3260	2955	5250	8975	9820
(W)WCM	2100	1680	2190	2350	6490	4060
W(W)CM	3080	5390	5455	4230	6460	4245
	NP*	NP	NP*	NP	NP*	NP
WALSH:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WSF						
WCM						
(W)WSM						
W(W)SM						

1. For conversion to lbs/Acre multiply Kg/ha by 0.893.
* Only receives phosphorus in wheat phase of each rotation.

Table 76c. Crop residue weights on all plots in Proso Millet during the 2005 crop year.

SITE & ROTATION	SLOPE POSITION: SUMMIT *Pre-Plant* NP*	SUMMIT *Pre-Plant* NP	SIDESLOPE *Pre-Plant* NP*	SIDESLOPE *Pre-Plant* NP	TOESLOPE *Pre-Plant* NP*	TOESLOPE *Pre-Plant* NP
STERLING:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCM	3170	5030	4690	4400	5715	8145
WWCM	4850	4030	3695	4630	5130	4130
	NP*	NP	NP*	NP	NP*	NP
STRATTON:	------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCM	1690	1130	3280	2050	5400	3265
WWCM	2015	1535	3275	1085	3335	3515
	NP*	NP	NP*	NP	NP*	NP
WALSH:	-------kg ha^{-1}--------		-------kg ha^{-1}--------		-------kg ha^{-1}--------	
WCSb						
WWSSb						

1. For conversion to lbs/Acre multiply Kg/ha by 0.893.
* Only receives phosphorus in wheat phase of each rotation.

Table 77. Total Nitrogen content of CORN STOVER in the 2005 crop.

SITE & Rotation	SLOPE POSITION: SUMMIT N Side*	SUMMIT NP Side	SIDESLOPE N Side*	SIDESLOPE NP Side	TOESLOPE N Side*	TOESLOPE NP Side
Sterling:	------- % ------		----- % -----		------- % ------	
WCF	**1.74**	**1.60**	**1.58**	**1.22**	**1.11**	**1.23**
WCM	**1.97**	**2.22**	**1.86**	**1.56**	**0.91**	**1.48**
WWCM	**1.48**	**1.21**	**1.25**	**1.25**	**1.27**	**1.34**
OPP	**2.40**	**1.52**	**1.30**	**1.35**	**1.76**	**1.62**
	N	**NP**	**N**	**NP**	**N**	**NP**
Stratton:	------- % ------		------- % ------		------- % ------	
WCF	**0.69**	**0.65**	**1.91**	**0.60**	**0.78**	**1.01**
WCM	**1.61**	**0.65**	**1.61**	**0.46**	**1.10**	**1.44**
WWCM	**061**	**1.64**	**0.65**	**0.99**	**1.00**	**1.19**
OPP	**0.57**	**0.86**	**0.47**	**1.09**	**0.79**	**0.90**
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	------- % ------		------- % ------			
WSF	**0.92**	**0.83**	**0.77**	**0.93**	**0.76**	**0.75**
WCM	**0.86**	**1.40**	**1.31**	**1.30**	**1.21**	**1.31**
(W)WSM	**0.93**	**0.83**	**0.74**	**0.80**	**0.93**	**0.91**
OPP Corn	**0.90**	**0.75**	**0.99**	**0.83**	**1.07**	**0.75**
CC – S	**0.79**	**0.65**	**0.84**	**0.91**	**0.73**	**0.73**
CC - C	**1.11**	**0.86**	**1.14**	**1.33**	**1.05**	**1.05**

*** Only receives phosphorus in wheat phase of each rotation.**

Table 78. Total Nitrogen content of CORN Grain in the 2005 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.70	1.74	1.67	1.70	1.69	1.65
WCM	1.68	1.70	1.63	1.64	1.73	1.69
WWCM	1.71	1.69	1.66	1.69	1.70	1.69
Opportunity Corn	1.70	1.68	1.71	1.69	1.74	1.72
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	.83	.86	.86	.86	1.48	1.48
WCM	.82	.83	.84	.83	1.52	1.58
WWCM	.90	.88	.84	.89	1.54	1.57
Opportunity Corn	1.52	0	.83	0	1.46	1.45
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WSF	1.79	1.79	1.79	1.76	2.14	2.17
WCM	1.71	1.77	1.79	1.81	1.82	1.79
(W)WSM	2.04	1.96	2.03	2.10	2.34	2.33
Opportunity Corn	1.64	1.65	1.66	1.73	1.73	1.77
CC – S	1.81	1.87	1.86	1.94	2.12	2.01
CC - C	1.61	1.62	1.68	1.75	1.79	1.80

* Only receives phosphorus in wheat phase of each rotation.

Table 79. Total Nitrogen content of WHEAT GRAIN in the 2005 crop.

SITE & ROTATION	SLOPE POSITION: SUMMIT N Side* (N)	SUMMIT NP Side (NP)	SIDESLOPE N Side* (N)	SIDESLOPE NP Side (NP)	TOESLOPE N Side* (N)	TOESLOPE NP Side (NP)
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	3.09	3.15	2.92	2.86	2.96	2.92
WCM	3.21	3.24	3.20	3.21	3.15	3.18
(W)WCM	3.17	3.27	3.08	3.04	3.04	3.27
W(W)CM	3.02	2.98	2.81	2.89	2.82	2.90
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	3.66	3.57	1.68	3.35	3.35	3.34
WCM	3.56	3.33	3.92	1.73	1.89	1.70
(W)WCM	1.85	2.13	3.55	1.81	1.73	1.74
W(W)CM	3.32	3.29	3.33	3.44	3.42	8.64
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.36	2.36	2.28	2.42	2.25	2.31
WCM	2.56	2.68	2.71	2.80	2.52	1.13
(W)WCM	2.32	2.22	1.83	2.16	2.33	2.23
W(W)CM	2.18	2.02	2.15	1.96	2.06	2.19

* Only receives phosphorus in wheat phase of each rotation.

Table 80. Total Nitrogen content of WHEAT STRAW in the 2005 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.06	2.22	2.04	2.08	2.09	2.20
WCM	2.47	2.28	2.23	1.98	2.13	2.13
(W)WCM	2.39	2.41	1.73	1.89	1.98	2.04
W(W)CM	2.20	2.17	2.00	1.91	1.91	2.09
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	2.25	2.08	2.17	2.25	2.36	2.10
WCM	2.42	2.14	1.97	2.32	2.42	2.30
(W)WCM	3.64	3.27	3.97	3.70	4.87	4.52
W(W)CM	2.36	2.45	2.65	2.69	2.90	3.15
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCF	1.27	1.38	1.14	1.37	1.19	1.17
WCM	1.18	1.31	1.30	1.49	1.35	1.24
(W)WCM	1.24	1.18	1.17	1.22	1.24	1.09
W(W)CM	1.19	1.30	1.02	1.20	1.26	1.14

* Only receives phosphorus in wheat phase of each rotation.

Table 81. Total Nitrogen content of MILLET GRAIN in the 2005 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.36	2.42	2.40	2.30	2.22	2.27
WWCM	2.41	2.57	2.44	2.50	2.20	2.24
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	3.07	2.86	2.76	2.89	1.30	2.52
WWCM	2.90	1.34	2.86	2.76	2.40	2.65
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	2.62	2.60	2.54	2.49	2.70	2.58
WWCM	2.56	2.60	2.60	2.57	2.51	2.67

* Only receives phosphorus in wheat phase of each rotation.

Table 82. Total Nitrogen content of MILLET GRAIN in the 2005 crop.

SITE & ROTATION	SLOPE POSITION					
	SUMMIT		SIDESLOPE		TOESLOPE	
	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP	*N Side** N	*NP Side* NP
STERLING:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	1.65	1.49	1.05	.89	.76	1.10
WWCM	1.90	1.96	1.46	1.61	1.42	1.03
	N	**NP**	**N**	**NP**	**N**	**NP**
STRATTON:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	1.76	1.94	1.40	1.88	.84	.97
WWCM	2.29	2.28	1.60	1.77	1.25	1.08
	N	**NP**	**N**	**NP**	**N**	**NP**
WALSH:	---------- % ----------		---------- % ----------		---------- % ----------	
WCM	1.38	1.43	1.41	1.16	.99	1.22
WWCM	1.12	1.27	1.32	1.39	1.05	1.11

* Only receives phosphorus in wheat phase of each rotation.

Table 83. Available soil water by soil depth in the CORN phase of the OPP rotation at Sterling and Walsh, and the MILLET phase of the OPP rotation at Stratton in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	48	18	30	31	22	9	0	23	(23)
45	43	12	31	56	16	40	0	6	(6)
75	17	13	4	63	20	43	0	12	(12)
105	25	3	22	47	20	27	0	14	(14)
135	-	-	-	-	-	-	0	15	(15)
155	-	-	-	-	-	-	0	16	(16)
TOTAL	133	46	87	197	78	119	0	86	(86)
STRATTON:									
15	40	18	22	54	37	17	40	49	(9)
45	46	35	11	58	33	25	52	69	(17)
75	37	14	23	47	22	25	66	88	(22)
105	35	15	20	51	27	24	56	78	(22)
135	31	8	23	52	24	28	36	50	(14)
155	33	13	20	53	24	29	35	45	(10)
TOTAL	222	103	119	316	167	149	285	379	(94)
WALSH:									
15	13	0	13	5	0	5	0	0	0
45	30	6	24	30	0	30	10	0	10
75	34	0	34	32	3	29	21	13	8
105	39	0	39	23	0	23	32	19	13
135	36	0	36	5	0	5	13	0	13
155	-	4	(4)	11	2	9	-	(33)	(33)
TOTAL	152	10	142	106	5	101	76	65	11

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 84. Available soil water by soil depth in the CORN phase of the WCM rotation at Sterling and Stratton and the SORGHUM phase of the WCM rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	46	19	27	15	19	(4)	38	21	17
45	54	12	42	42	13	29	38	5	33
75	37	15	22	49	22	27	33	10	23
105	34	14	20	54	35	19	28	15	13
135	-	-	-	-	-	-	13	17	(4)
155	-	-	-	-	-	-	13	17	(4)
TOTAL	171	60	111	160	89	71	163	85	78
STRATTON:									
15	38	20	18	56	38	18	37	50	(13)
45	43	18	25	53	19	34	58	67	(9)
75	25	4	21	46	17	29	63	81	(18)
105	32	5	27	47	25	22	54	51	3
135	35	5	30	57	44	13	38	42	(4)
155	37	6	31	64	49	15	40	59	(19)
TOTAL	210	58	152	323	192	131	290	350	(60)
WALSH:									
15	13	0	13	6	0	6	0	0	0
45	27	1	26	27	15	12	12	0	12
75	24	0	24	31	10	21	18	0	18
105	34	0	34	34	0	34	27	7	20
135	33	0	33	18	0	18	21	15	6
155	37	0	37	34	4	30	30	25	5
TOTAL	168	1	167	150	29	121	108	47	61

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 85. Available soil water by soil depth in the CORN phase of the WWCM rotation at Sterling and Stratton and the SORGHUM phase of the WWSM rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	35	16	19	42	18	24	37	23	14
45	44	12	32	54	14	40	42	6	36
75	48	14	34	61	19	42	44	12	32
105	32	3	29	50	24	26	38	15	23
135	-	-	-	-	-	-	12	17	(5)
155	-	-	-	-	-	-	9	17	(8)
TOTAL	159	45	114	207	75	132	182	90	92
STRATTON:									
15	40	22	18	57	38	19	47	45	2
45	52	30	22	60	30	30	58	43	15
75	34	11	23	58	28	30	68	33	35
105	31	7	24	54	42	12	60	27	33
135	29	7	22	51	45	6	40	21	19
155	27	8	19	69	43	26	-	48	48
TOTAL	213	85	128	349	226	123	273	217	152
WALSH:									
15	23	0	23	21	0	21	4	0	4
45	26	8	18	32	0	32	24	0	24
75	25	0	25	33	0	33	27	14	13
105	32	0	32	36	34	2	39	20	19
135	39	0	39	-	0	0	32	2	30
155	36	0	36	-	11	11	-	32	32
TOTAL	181	8	173	123	46	99	126	68	122

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 86. Available soil water by soil depth in the MILLET phase of the WWCM rotation at Sterling, Stratton, and Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	40	4	36	21	4	17	30	6	24
45	58	11	47	54	20	34	36	18	18
75	38	11	27	53	10	43	32	4	28
105	22	14	8	36	26	10	33	20	13
135	-	-	-	-	-	-	19	20	(1)
155	-	-	-	-	-	-	11	18	(7)
TOTAL	158	40	118	164	60	104	161	86	75
STRATTON:									
15	49	0	49	49	17	32	52	36	16
45	77	18	59	74	2	72	80	30	50
75	48	17	31	65	15	50	56	38	18
105	39	15	24	37	26	11	59	37	22
135	36	17	19	40	31	9	53	19	34
155	41	14	27	-	31	(31)	-	13	(13)
TOTAL	290	81	209	265	122	174	300	173	127
WALSH:									
15	2	0	2	0	0	0	-	0	0
45	13	4	9	6	0	6	-	0	0
75	13	0	13	12	0	12	-	0	0
105	17	2	15	16	25	(9)	-	13	(13)
135	22	0	22	0	7	(7)	-	13	(13)
155	15	0	15	8	18	(10)	-	26	(26)
TOTAL	82	6	76	42	50	(8)	-	52	(52)

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 87. Available soil water by soil depth in the WHEAT 1 phase of the WWCM rotation at Sterling, Stratton, and the WWSM rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	0	24	(24)	0	13	(13)	0	26	(26)
45	0	15	(15)	0	13	(13)	0	20	(20)
75	0	25	(25)	5	14	(9)	0	21	(21)
105	0	44	(44)	3	0	3	0	19	(19)
135	-	-	-	-	-	-	0	25	(25)
155	-	-	-	-	-	-	0	0	0
TOTAL	0	108	(108)	8	40	(32)	0	111	(111)
STRATTON:									
15	0	5	(5)	0	-	0	0	43	(43)
45	0	6	(6)	0	-	0	0	58	(58)
75	0.2	7	(6.8)	0.3	-	0.3	0.2	53	(52.8)
105	0.1	11	(10.9)	0.3	-	0.3	0	52	(52)
135	0	-	0	0.2	-	0.2	0	32	(32)
155	0	-	0	0.2	-	0.2	0	21	(21)
TOTAL	0.3	29	(28.7)	1	-	1	0.2	259	(258.8)
WALSH:									
15	0	12	(12)	0	5	(5)	0	-	0
45	0	21	(21)	0	26	(26)	0	-	0
75	0	7	(7)	18	0	18	12	-	12
105	20	24	(4)	6	0	6	5	-	5
135	29	25	4	0	0	0	3	-	3
155	22	18	4	29	6	23	30	-	30
TOTAL	71	107	(36)	53	37	16	50	-	50

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 88. Available soil water by soil depth in the WHEAT 2 phase of the WWCM rotation at Sterling, Stratton, and the WWSM rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	10	18	(8)	0	14	(14)	12	16	(4)
45	27	14	13	10	11	(1)	16	13	3
75	11	8	3	15	25	(10)	16	15	1
105	0	9	(9)	17	29	(12)	22	11	11
135	-	-	-	-	-	-	4	9	(5)
155	-	-	-	-	-	-	4	10	(6)
TOTAL	48	49	(1)	42	79	(37)	74	74	0
STRATTON:									
15	0	9	(9)	0	28	(28)	0	44	(44)
45	0.4	13	(12.6)	0	25	(25)	0	64	(64)
75	0	14	(14)	5	33	(28)	0	74	(74)
105	0	19	(19)	4	22	(18)	0	62	(62)
135	0	21	(21)	4	14	(10)	0	24	(24)
155	0	21	(21)	4	-	-	0	30	(30)
TOTAL				17	122	(109)	0	298	(298)
WALSH:									
15	27	-	27	39	-	39	56	0	56
45	34	-	34	53	-	53	71	15	56
75	38	-	38	56	-	56	63	2	61
105	40	-	40	54	-	54	52	5	47
135	45	-	45	64	-	64	57	0	57
155	59	-	59	48	-	48	42	3	39
TOTAL	243	-	243	314	-	314	341	25	316

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 89. Available soil water by soil depth in the WHEAT phase of the WCF rotation at Sterling, Stratton, and the WSF rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	10	26	(16)	0	16	(16)	8	16	(8)
45	32	15	17	4	14	(10)	8	10	(2)
75	20	17	3	15	14	1	9	13	(4)
105	0	23	(23)	20	0	20	14	15	(1)
135	-	-	-	-	-	-	3	9	(6)
155	-	-	-	-	-	-	3	12	(9)
TOTAL	62	81	(19)	39	44	(5)	45	74	(30)
STRATTON:									
15	0	9	(9)	0	33	(33)	6	41	(35)
45	2	21	(19)	0	11	(11)	2	49	(47)
75	0	8	(8)	7	14	(7)	1	56	(55)
105	0	8	(8)	3	13	(10)	0	43	(43)
135	0	9	(9)	2	18	(16)	0	8	(8)
155	0	10	(10)	5	16	(11)	0	0	0
TOTAL	2	65	(63)	17	105	(88)	9	197	(188)
WALSH:									
15	0	4	(4)	74	0	74	0	0	0
45	0	24	(24)	1	2	(1)	0	16	(16)
75	0	9	(9)	0	5	(5)	7	9	(2)
105	21	2	19	0	22	(22)	6	12	(6)
135	29	17	12	0	13	(13)	16	8	8
155	16	13	3	0	25	(25)	29	38	(9)
TOTAL	66	69	(3)	75	67	8	58	83	(25)

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 90. Available soil water by soil depth in the WHEAT phase of the WCM rotation at Sterling, Stratton, and the WCSb rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	0	22	(22)	0	14	(14)	0	19	(19)
45	0	20	(20)	0	7	(7)	0	13	(13)
75	0	16	(16)	0	-	0	0	21	(21)
105	0	20	(20)	0	-	0	1	19	(18)
135	-	-	-	-	-	-	0	13	(13)
155	-	-	-	-	-	-	0	14	(14)
TOTAL	0	78	(78)	0	21	(21)	1	99	(98)
STRATTON:									
15	0	0	0	0	26	(26)	0	34	(34)
45	0	36	(36)	0	22	(22)	1	47	(46)
75	0	35	(35)	5	13	(8)	0.5	-	0.5
105	0	35	(35)	7	16	(9)	0	-	0
135	0	33	(33)	2	37	(35)	0	-	0
155	0	28	(28)	2	-	2	3.5	-	3.5
TOTAL	0	162	(162)	16	112	(98)	4	81	80
WALSH:									
15	-	-	-	-	-	-	-	-	-
45	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-
105	-	-	-	-	-	-	-	-	-
135	-	-	-	-	-	-	-	-	-
155	-	-	-	-	-	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	-

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 91. Available soil water by soil depth in the CORN phase of the WCF rotation at Sterling and Stratton and the SORGHUM phase of the WSF rotation at Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	37	15	22	30	18	12	31	22	9
45	56	8	48	-	13	(13)	42	3	39
75	38	12	26	-	19	(19)	35	8	27
105	21	2	19	-	24	(24)	30	13	17
135	-	-	-	-	-	-	13	14	(1)
155	-	-	-	-	-	-	0	16	(16)
TOTAL	152	37	115	30	74	(44)	151	76	75
STRATTON:									
15	27	10	17	35	22	13	26	45	(19)
45	61	45	16	65	35	30	45	22	23
75	48	23	25	79	52	27	53	86	(33)
105	52	25	25	48	26	22	47	73	(26)
135	46	22	24	45	22	23	24	52	(28)
155	47	1119	(1072)	-	16	(16)	27	44	(17)
TOTAL	281	1244	(965)	272	173	99	222	322	(100)
WALSH:									
15	14	5	9	6	4	2	3	0	3
45	33	-	33	29	-	29	25	-	25
75	31	1	30	27	1	26	33	8	25
105	42	-	42	34	-	34	44	-	44
135	48	7	41	12	0	12	32	5	27
155	39	-	39	29	-	29	55	-	55
TOTAL	207	13	194	137	5	132	192	13	179

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 92. Available soil water by soil depth in the MILLET phase of the WCM rotation at Sterling, Stratton, and Walsh in 2005.

SITE & DEPTH (cm)	SLOPE POSITION								
	SUMMIT			SIDESLOPE			TOESLOPE		
	Planting	Harvest	Change	Planting	Harvest	Change	Planting	Harvest	Change
	----------mm/30cm----------			----------mm/30cm----------			----------mm/30cm----------		
STERLING:									
15	47	12	35	40	18	22	38	33	5
45	52	10	42	46	28	18	41	12	29
75	40	7	33	58	25	33	49	9	40
105	35	12	23	44	34	10	40	48	(8)
135	-	-	-	-	-	-	18	53	(35)
155	-	-	-	-	-	-	14	56	(42)
TOTAL	174	41	133	188	105	83	200	211	(11)
STRATTON:									
15	42	0	42	-	22	(22)	65	35	30
45	35	7	28	-	12	(12)	84	29	55
75	21	7	14	-	23	(23)	85	40	45
105	24	12	12	-	22	(22)	88	35	53
135	29	17	12	-	27	(27)	64	18	46
155	-	-	-	-	20	(20)	-	-	-
TOTAL	151	43	108	-	126	(126)	386	157	229
WALSH:									
15	8	0	8	2	0	2	0	0	0
45	-	0	0	10	0	10	0	0	0
75	-	0	0	14	0	14	5	0	5
105	-	3	(3)	17	0	17	12	5	7
135	-	7	(7)	10	0	10	5	8	(3)
155	-	0	0	26	14	12	23	26	(3)
TOTAL	8	10	(2)	79	14	65	45	39	6

1. To convert from millimeters of H20/30 centimeters of soil to inches of H20/foot of soil multiply by 0.04.
2. ( ) Indicates a positive change in available soil water.

Table 93. Wheat insects at Akron for the 2004-2005 crop.

Date	Insect	W-F	W-C-F	W-C-M	Total Number By Rotation W-C-S-F			
18 April	Russian wheat aphid (#/400 tillers)	Tam		0	0	0	0	
				P. R.	9	0	7	0
	Brown wheat mite (#/7 ft.²)				0	0	0	0
	Brown wheat mite (#/stake)				0	0	0	0
	Army cutworm (#/10 ft.²)			0	0	0	1	
06 May	Russian wheat aphid (#/400 tillers)	Tam		10	34	11	5	
				P.R.	2	27	9	8
	Brown wheat mite (#/7 ft.²)				0	6	0	14
	Brown wheat mite (#/stake)				0	11	18	3
	Army cutworm (#/10 ft.²)			10	3	8	7	
18 June	Russian wheat aphid (#/400 tillers)	Tam		72	19	71	53	
				P.R.	44	82	101	26
	Brown wheat mite (#/7 ft.²)				3	0	3	18
	Brown wheat mite (#/stake)				0	0	7	2

* Insects not listed were insignificant during sampling.

Table 94. Corn Insects at Briggsdale in 2005.

	Date	
Pest Insects	23-Aug	8-Sep
Cutworms (#/10plants)	0	0
Western corn rootworm (#/10 plants)	4	0
Banks grass mite (#/10 palnts)	19	173
Two-spotted Spider Mite (#/10 plants)	0	19
Aphids (#/10 plants)	0	0
Western bean cutworm (#/10 plants)	0	0
Corn earworm (#/10plants)	0	0
Predatory Insects		
Coccinellids (#/10plants)	2	0
Lacewings (#/10plants)	1	0
Mite destroyer (#/10plants)	0	0
Pirate bugs (#/10plants)	3	0
Predatory mites (#/10plants)	4	0
Mummies (#/10plants)	0	0
Nabid (#/10plants)	0	0
Spider (#/10plants)	4	0

APPENDIX A TABLES

Appendix A Table 1. Crop variety, seeding rate, and planting date for each site in the 2002-2003 season.

Site	Crop	Variety	Seeding Rate	Planting Date
Briggsdale	Wheat	Yuma & Yumar	60 lbs/A	9/19/02
	Corn	Pioneer 3893 & Dekalb 39-47	13,000 seeds/A	5/27/03
	Hay Millet	Golden German	10 lbs/A	6/21/03
	Sunflower	Cargill 187	14,000 seeds/A	5/27/03
Sterling	Wheat	Prairie Red	60 lbs/A & 90 lbs/A	9/23/02
	Corn	Dekalb 46-28RR	18,000 seeds/A	5/21/03
	Proso Millet	Huntsman	12 lbs/A	6/15/03
Akron	Wheat	TAM 107 & Prairie Red	60 lbs/A	9/17/02
	Corn	Dekalb DKC 46-28RR	14,500 seeds/A	5/27/03
	Proso Millet	Early Bird	12 lbs/A	6/27/03
	Sunflower	Triumph 765	16,600 seeds/A	5/29/03
Stratton	Wheat	Prairie Red	60 lbs/A & 90 lbs/A	7/15/03
	Corn	Dekalb DK46-28RR	18,000 seeds/A	5/15/03
	Proso Millet	Huntsman	12 lbs/A	6/23/03
Lamar	Wheat	TAM 107 & Prairie Red	45 lbs/A	9/17/02
	Sorghum	DKS 36-00	24,000	5/28/03
Walsh	Wheat	Prairie Red	50 lbs/A	9/24/02
	Sorghum	Cargill 627	40,000 seeds/A	6/13/03
	Corn	Dekalb 105 Bt RR	18,000 seeds/A	5/28/03
	Mung Bean	Berkin	18 lb/ac	5/28/03

Appendix A Table 2. Crop variety, seeding rate, and planting date for each site in the 2003-2004 season.

Site	Crop	Variety	Seeding Rate	Planting Date
Briggsdale	Wheat	Akron & Ankor	60 lbs/A	9/17/2003
	Corn	Dekalb 39-47	13,000 seeds/A	5/27/2004
	Hay Millet	Golden German	10 lbs/A	6/14/2004
	Sunflower	Mycogen SF187	13,000 seeds/A	5/27/2004
	Grain Sorghum	Dekalb 28E	42.000 seeds/A	6/2/2004
	Proso Millet	Huntsman	15 lbs/A	6/2/2004
Sterling	Wheat	Ankor	60 lbs/A	9/22/2003
	Corn	Dekalb DKC 46-28RR	15,000 seeds/A	5/17/2004
	Proso Millet	Huntsman	12 lbs/A	5/24/2004
Akron	Wheat	Halt & TAM 107	60 lbs/A	10/2/2003
	Corn	Dekalb DKC 46-28RR	14,000 seeds/A	5/23/2004
	Proso Millet	Early Bird	12 lbs/A	6/4/2004
	Sunflower	Triumph 765	16,600 seeds/A	5/29/2004
Stratton	Wheat	Ankor	60 lbs/A	9/23/2003
	Corn	Dekalb DK46-28RR	15,000 seeds/A	5/17/2004
	Proso Millet	Huntsman	12 lbs/A	5/25/2004
Lamar	Wheat	TAM 107 & Prairie Red	45 lbs/A	9/7/2002
	Sorghum	DKS 36-00	24,000	5/18/2003
Walsh	Wheat	Prairie Red	50 lbs/A	9/24/2002
	Sorghum	Pioneer 85G01	40,000 seeds/A	6/13/2003
	Corn	Dyna-Gro DG5478 Bt/RR	19,000 seeds/A	5/28/2003
	Mung Bean	Berkins	110,000 seeds/A	5/28/2003

Appendix A Table 3. Crop variety, seeding rate, and planting date for each site in the 2004-2005 season.

Site	Crop	Variety	Seeding Rate	Planting Date	Harvest Date
Akron	Wheat	TAM 107, Prairie Red	60 lbs/A	10/12/04	07/14/05
	Corn	DK 40-08RR/YG	14,210 seeds/A	05/20/05	11/10/05
	Sunflowers	Triumph 565	17,500 seeds/A	06/09/05	11/02/05
	Proso Millet	Sunup	15 lbs/A	06/23/05	09/11/05
Briggsdale	Wheat	Akron, Ankor	60 lbs/A	09/20/04	07/07/05
	Corn	DKC 39-47	7,500 seeds/A	05/24/25	10/18/05
	Barley	Otil trt. with Cruiser	50 lbs/A	02/24/05	07/25/05
	Hay Millet	Golden German, Grazex	14 lbs/A	05/14/05	n/a
Lamar	Wheat	Akron, Ankor	45 lbs/A	09/09/04	07/01/05
	Sorghum	Northrup KS 310	34,700 seeds/A	06/06/05	11/02/05
	Corn	DKC 53-34	15,000 seeds/A	06/06/05	n/a
Sterling	Wheat	Ankor	60 lbs/A	09/16/04	07/07/05
	Corn	DKC46-28 (RR2)	18,000 seeds/A	05/17/05	10/27/05
	Proso Millet	Huntsman	15 lbs/A	06/07/05	09/28/05
	Hay Millet	Golden German	12 lbs/A	06/07/05	09/28/05
	Triticale	NE 422T	80 lbs/A	09/16/04	06/07/05
Stratton	Wheat	Ankor	60 lbs/A	09/21/04	07/05/05
	Corn	DKC46-28(RR2)	18,000 seeds/A	05/17/05	11/01/05
	Proso Millet	Huntsman	15 lbs/A	06/20/05	09/19/05
Walsh	Wheat	Above	50 lbs/A	10/10/04	07/01/05
	Corn	Mycogen 2K541	16,000 seeds/A	05/19/05	09/30/05
	Grain Sorghum	Mycogen 1482	40,000 seeds/A	06/06/05 - 06/14/05	11/14/05
	Proso Millet	Huntsman	18 lbs/A	06/20/05	09/15/05

Appendix A Table 4. Nitrogen fertilizer application by soil and crop for 2003.

Site	Soil	Crop	Rotation				
			W'WCM	WW'CM	WCM	WCF	OPP
Sterling	Summit	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Side	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Toe	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Summit	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	101 lbs.
	Side	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	101 lbs.
	Toe	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	101 lbs.
	Summit	Millet	38 lbs.	38 lbs.	38 lbs.	X	
	Side	Millet	38 lbs.	38 lbs.	38 lbs.	X	
	Toe	Millet	38 lbs.	38 lbs.	38 lbs.	X	
Stratton	Summit	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Side	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Toe	Wheat	64 lbs.	64 lbs.	64 lbs.	64 lbs.	X
	Summit	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	
	Side	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	
	Toe	Corn	101 lbs.	101 lbs.	101 lbs.	101 lbs.	
	Summit	Millet	38 lbs.	38 lbs.	38 lbs.	X	38 lbs.
	Side	Millet	38 lbs.	38 lbs.	38 lbs.	X	38 lbs.
	Toe	Millet	38 lbs.	38 lbs.	38 lbs.	X	38 lbs.
Walsh	Summit	Wheat	50 lbs.	50 lbs.	50 lbs.	50 lbs.	X
	Side	Wheat	50 lbs.	50 lbs.	50 lbs.	50 lbs.	X
	Toe	Wheat	50 lbs.	50 lbs.	50 lbs.	50 lbs.	X
	Summit	Sorghum	50 lbs.	50 lbs.	50 lbs.	50 lbs.	50 lbs.
	Side	Sorghum	50 lbs.	50 lbs.	50 lbs.	50 lbs.	50 lbs.
	Toe	Sorghum	50 lbs.	50 lbs.	50 lbs.	50 lbs.	50 lbs.
	Summit	MungBean	6 lbs.	6 lbs.	6 lbs.	X	
	Side		6 lbs.	6 lbs.	6 lbs.	X	
	Toe		6 lbs.	6 lbs.	6 lbs.	X	
	Summit	Corn	106 lbs.	Cont. C			
	Side	Corn	106 lbs.	Cont. C			
	Toe	Corn	106 lbs.	Cont. C			

Appendix A Table 5. Nitrogen fertilizer application by soil and crop for 2004.

Site	Soil	Crop	Rotation				
			W'WCM	WW'CM	WCM	WCF	OPP
Sterling	Summit	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Side	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Toe	Wheat	54 lbs.	54 lbs.	54 lbs.		X
	Summit	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Side	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Toe	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Summit	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
	Side	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
	Toe	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
Stratton	Summit	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Side	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Toe	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Summit	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Side	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Toe	Corn	88 lbs.	88 lbs.	88 lbs.	88 lbs.	
	Summit	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
	Side	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
	Toe	Millet	X	30 lbs.	30 lbs.	X	30 lbs.
Walsh	Summit	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Side	Wheat	54 lbs.	54 lbs.	54 lbs.	54 lbs.	X
	Toe	Wheat	54 lbs.	54 lbs.	54 lbs.		X
	Summit	Sorghum	88 lbs.	88 lbs.	88 lbs.	88 lbs.	88 lbs.
	Side	Sorghum	88 lbs.	88 lbs.	88 lbs.	88 lbs.	88 lbs.
	Toe	Sorghum	88 lbs.	88 lbs.	88 lbs.	88 lbs.	88 lbs.
	Summit	Millet	X	30 lbs.	30 lbs.	X	
	Side	Millet	X	30 lbs.	30 lbs.	X	
	Toe	Millet	X	30 lbs.	30 lbs.	X	
	Summit	Corn	75 lbs.	Cont. C			
	Side	Corn	75 lbs.	Cont. C			
	Toe	Corn	75 lbs.	Cont. C			

APPENDIX A Table 6. Nitrogen fertilizer application by soil and crop for 2005.

Site	Soil	Crop	Rotation W'WCM	WW'CM	WCM	WCF	OPP
Sterling	Summit	Wheat	60 lbs.	20 lbs.	60 lbs.	20 lbs.	X
	Side	Wheat	60 lbs.	20 lbs.	60 lbs.	20 lbs.	X
	Toe	Wheat	60 lbs.	20 lbs.	60 lbs.	20 LBS.	X
	Summit	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Side	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Toe	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Summit	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Side	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Toe	Millet	30 lbs.	30 lbs.	30 lbs.	X	
Stratton	Summit	Wheat	60 lbs.	20 lbs.	60 lbs.	20 lbs.	X
	Side	Wheat	60 lbs.	20 lbs.	60 lbs.	20 lbs.	X
	Toe	Wheat	60 lbs.	20 lbs.	60 lbs.	20 LBS.	X
	Summit	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Side	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Toe	Corn	80 lbs.	80 lbs.	45 lbs.	45 lbs.	80 lbs.
	Summit	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Side	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Toe	Millet	30 lbs.	30 lbs.	30 lbs.	X	
Walsh	Summit	Wheat	45 lbs.	45 lbs.	45 lbs.	45 lbs.	X
	Side	Wheat	45 lbs.	45 lbs.	45 lbs.	45 lbs.	X
	Toe	Wheat	45 lbs.	45 lbs.	45 lbs.	45 lbs.	X
	Summit	Sorghum	54 lbs.	54 lbs.	54 lbs.	54 lbs.	54 lbs.
	Side	Sorghum	54 lbs.	54 lbs.	54 lbs.	54 lbs.	54 lbs.
	Toe	Sorghum	54 lbs.	54 lbs.	54 lbs.	54 lbs.	54 lbs.
	Summit	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Side	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Toe	Millet	30 lbs.	30 lbs.	30 lbs.	X	
	Summit	Corn	75 lbs.	Cont. C			
	Side	Corn	75 lbs.	Cont. C			
	Toe	Corn	75 lbs.	Cont. C			

APPENDIX B
HERBICIDE PROGRAMS AT RESEARCH SITES
2003-2005

Appendix B Table 1. Weed control methods including herbicide rate, cost and date applied at STERLING in 2003.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Corn-Fallow					
Wheat:	Ally	0.1 oz/ac	7.01 g/ha	$2.33/ac	14 April 2003
	2,4-D LV6	5.36 oz/ac	0.39 l/ha	$0.83/ac	14 April 2003
	Clarity	2 oz/ac	0.15 l/ha	$1.76/ac	14 April 2003
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	19 Aug. 2003
	2,4-D LV6	10 oz/ac	0.73 l/ha	$1.54/ac	19 Aug. 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	20 Sept. 2003
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.43/ac	20 Sept. 2003
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$2.72/ac	10 April 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 June 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 July 2003
Fallow:	RT Master	24 oz/ac	1.75 l/ha	$4.08/ac	7 May 2003
	RT Master	24 oz/ac	1.75 l/ha	$4.08/ac	9 June 2003
	2,4-D LV6	12 oz/ac	0.87 l/ha	$1.85/ac	9 June 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	11 July 2003
	2,4-D LV6	20 oz/ac	1.46 l/ha	$3.08/ac	11 July 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	19 Aug. 2003
	2,4-D LV6	10 oz/ac	0.73 l/ha	$1.54/ac	19 Aug. 2003
(Wheat Planting)	RT Master	48 oz/ac	3.50 l/ha	$8.16/ac	20 Sept. 2003
Rotation: Wheat-Corn-Millet					
Wheat:	Ally	0.1 oz/ac	7.01 g/ha	$2.33/ac	14 April 2003
	2,4-D LV6	5.36 oz/ac	0.39 l/ha	$0.83/ac	14 April 2003
	Clarity	2 oz/ac	0.15 l/ha	$1.76/ac	14 April 2003
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	19 Aug. 2003
	2,4-D LV6	10 oz/ac	0.73 l/ha	$1.54/ac	19 Aug. 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	20 Sept. 2003
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.43/ac	20 Sept. 2003
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$2.72/ac	10 April 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 June 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 July 2003
Proso Millet:	RT Master	24 oz/ac	1.75 l/ha	$4.08/ac	7 May 2003
	RT Master	24 oz/ac	1.75 l/ha	$4.08/ac	9 June 2003
	2,4-D LV6	12 oz/ac	0.87 l/ha	$1.85/ac	9 June 2003
	Clarity	4 oz/ac	0.29 l/ha	$2.92/ac	11 July 2003
	2,4-D Amine	12 oz/ac	0.87 l/ha	$1.30/ac	11 July 2003
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	Ally	0.1 oz/ac	7.01 g/ha	$2.33/ac	14 April 2003
	2,4-D LV6	5.36 oz/ac	0.39 l/ha	$0.83/ac	14 April 2003
	Clarity	2 oz/ac	0.15 l/ha	$1.76/ac	14 April 2003
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	19 Aug. 2003
	2,4-D LV6	10 oz/ac	0.73 l/ha	$1.54/ac	19 Aug. 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	20 Sept. 2003
Wheat2:	Beyond	5 oz/ac	0.36 l/ha	$21.4/ac	10 April 2003
	Ally	0.1 oz/ac	7.01 g/ha	$2.33/ac	14 April 2003
	2,4-D LV6	5.36 oz/ac	0.39 l/ha	$0.83/ac	14 April 2003
	Clarity	2 oz/ac	0.15 l/ha	$1.76/ac	14 April 2003
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	19 Aug. 2003
	2,4-D LV6	10 oz/ac	0.73 l/ha	$1.54/ac	19 Aug. 2003
	RT Master	20 oz/ac	1.46 l/ha	$3.40/ac	20 Sept. 2003
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.43/ac	20 Sept. 2003
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$2.72/ac	10 April 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 June 2003
	Round-up Ultra MAX	26 oz/ac	1.89 l/ha	$10.76/ac	9 July 2003

Proso Millet:	**RT Master**	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**7 May 2003**
	RT Master	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**9 June 2003**
	2,4-D LV6	**12 oz/ac**	**0.87 l/ha**	**$1.85/ac**	**9 June 2003**
	Clarity	**4 oz/ac**	**0.29 l/ha**	**$2.92/ac**	**11 July 2003**
	2,4-D Amine	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**11 July 2003**
Rotation: Opportunity					
Corn (RR):	**RT Master**	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**7 May 2003**
	Prowl 3.3EC	**32 oz/ac**	**2.33 l/ha**	**$5.54/ac**	**21 May 2003**
	Atrazine 4L	**32 oz/ac**	**2.33 l/ha**	**$2.50/ac**	**21 May 2003**
	RT Master	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**21 May 2003**
	Clarity	**8 oz/ac**	**0.58 l/ha**	**$5.85/ac**	**11 July 2003**

Appendix B Table 2. Weed control methods including herbicide rate, cost and date applied at STRATTON in 2003.					
Crop	**Herbicide/Tillage**	**Rate (English)**	**Rate (Metric)**	**Cost**	**Date Applied**
Rotation: Wheat-Corn-Fallow					
Wheat:	**Ally**	**0.1 oz/ac**	**7.0 g/ha**	**$2.33/ac**	**11 April 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**11 April 2003**
(Stubble)	**RT Master**	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**16 July 2003**
	2,4-D LV6	**10 oz/ac**	**0.79 l/ha**	**$1.54/ac**	**16 July 2003**
	Atrazine 4F	**32 oz/ac**	**2.33 l/ha**	**$2.43/ac**	**19 Sept. 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**19 Sept. 2003**
Corn (RR):	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$2.72/ac**	**11 April 2003**
	Round-up UltraMAX	**24 oz/ac**	**1.75 l/ha**	**$9.94/ac**	**16 June 2003**
	Round-up UltraMAX	**26 oz/ac**	**1.90 l/ha**	**$10.76/ac**	**2 July 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**2 July 2003**
Fallow:	**RT Master**	**32 oz/ac**	**2.33 l/ha**	**$5.44/ac**	**15 May 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**10 June 2003**
	RT Master	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**2 July 2003**
	2,4-D LV6	**10 oz/ac**	**0.79 l/ha**	**$1.54/ac**	**2 July 2003**
(Wheat planting)	**RT Master**	**48 oz/ac**	**3.50 l/ha**	**$8.16/ac**	**19 Sept. 2003**
Rotation: Wheat-Corn-Millet					
Wheat:	**Ally**	**0.1 oz/ac**	**7.0 g/ha**	**$2.33/ac**	**11 April 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**11 April 2003**
(Stubble)	**RT Master**	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**16 July 2003**
	2,4-D LV6	**10 oz/ac**	**0.79 l/ha**	**$1.54/ac**	**16 July 2003**
	Atrazine 4F	**32 oz/ac**	**2.33 l/ha**	**$2.43/ac**	**19 Sept. 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**19 Sept. 2003**
Corn (RR):	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$2.72/ac**	**11 April 2003**
	Round-up UltraMAX	**24 oz/ac**	**1.75 l/ha**	**$9.94/ac**	**16 June 2003**
	Round-up UltraMAX	**26 oz/ac**	**1.90 l/ha**	**$10.76/ac**	**2 July 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**2 July 2003**
Proso Millet:	**RT Master**	**32 oz/ac**	**2.33 l/ha**	**$5.44/ac**	**15 May 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**10 June 2003**
	2,4-D amine	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**2 July 2003**
	Clarity	**4 oz/ac**	**0.29 l/ha**	**$2.92/ac**	**16 July 2003**
	2,4D LV6	**12 oz/ac**	**0.87 l/ha**	**$1.85/ac**	**16 July 2003**
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	**Ally**	**0.1 oz/ac**	**7.0 g/ha**	**$2.33/ac**	**11 April 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**11 April 2003**
	RT Master	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**16 July 2003**
	2,4-D LV6	**10 oz/ac**	**0.79 l/ha**	**$1.54/ac**	**16 July 2003**
(Wheat Planting)	**RT Master**	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**19 Sept. 2003**
Wheat2:	**Beyond**	**5 oz/ac**	**0.36 l/ha**	**$21.40/ac**	**3 April 2003**
	Ally	**0.1 oz/ac**	**7.0 g/ha**	**$2.33/ac**	**11 April 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**11 April 2003**
	RT Master	**24 oz/ac**	**1.75 l/ha**	**$4.08/ac**	**16 July 2003**
	2,4-D LV6	**10 oz/ac**	**0.79 l/ha**	**$1.54/ac**	**16 July 2003**
	Atrazine 4F	**32 oz/ac**	**2.33 l/ha**	**$2.43/ac**	**19 Sept. 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**19 Sept. 2003**
Corn (RR):	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$2.72/ac**	**11 April 2003**
	Round-up UltraMAX	**24 oz/ac**	**1.75 l/ha**	**$9.94/ac**	**16 June 2003**
	Round-up UltraMAX	**26 oz/ac**	**1.90 l/ha**	**$10.76/ac**	**2 July 2003**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.23/ac**	**2 July 2003**
Proso Millet:	**RT Master**	**32 oz/ac**	**2.33 l/ha**	**$5.44/ac**	**15 May 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**10 June 2003**
	2,4-D amine	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**2 July 2003**
	Clarity	**4 oz/ac**	**0.29 l/ha**	**$2.92/ac**	**16 July 2003**
	2,4D LV6	**12 oz/ac**	**0.87 l/ha**	**$1.85/ac**	**16 July 2003**
Rotation: Opportunity					

Proso Millet:	**RT Master**	**32 oz/ac**	**2.33 l/ha**	**$5.44/ac**	**15 May 2003**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.40/ac**	**10 June 2003**
	2,4-D amine	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**2 July 2003**
	Clarity	**4 oz/ac**	**0.29 l/ha**	**$2.92/ac**	**16 July 2003**
	2,4D LV6	**12 oz/ac**	**0.87 l/ha**	**$1.85/ac**	**16 July 2003**
Note: Atrazine is applied at 125 % of the rate on toeslope soils.					

Appendix B Table 3. Weed control methods including herbicide rate, cost and date applied at WALSH in 2003.					
Crop	**Herbicide/Tillage**	**Rate (English)**	**Rate (Metric)**	**Cost**	**Date Applied**
Rotation: Wheat-Sorghum-Fallow					
Wheat:	**Ally**	**0.1 oz/ac**	**7.01 g/ha**	**$2.33/ac**	**12 March 2003**
	2,4-D	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**12 March 2003**
(Stubble)	**Round-up**	**16 oz/ac**	**1.17 l/ha**	**$5.12/ac**	**27 June 2003**
	2,4-D	**16 oz/ac**	**1.17 l/ha**	**$1.73/ac**	**27 June 2003**
	Tillage - Sweep				**26 Aug. 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Sorghum:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**14 June 2003**
	Banvel	**5 oz/ac**	**0.36 l/ha**	**$3.66/ac**	**27 June 2003**
	2,4-D amine	**8 oz/ac**	**0.58 l/ha**	**$86/ac**	**27 June 2003**
Fallow:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Tillage - Sweep				**12 May 2003**
	Round-up	**16 oz/ac**	**1.17 l/ha**	**$5.12/ac**	**12 July 2003**
	2,4-D	**16 oz/ac**	**1.17 l/ha**	**$1.73/ac**	**12 July 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Rotation: Wheat-Corn-Mung Bean					
Wheat:	**Ally**	**0.1 oz/ac**	**7.01 g/ha**	**$2.33/ac**	**12 March 2003**
	2,4-D	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**12 March 2003**
(Stubble)	**Round-up**	**16 oz/ac**	**1.17 l/ha**	**$5.12/ac**	**27 June 2003**
	2,4-D	**16 oz/ac**	**1.17 l/ha**	**$1.73/ac**	**27 June 2003**
	Tillage - Sweep				**26 Aug. 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Corn:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**14 June 2003**
	Round-up Ultra	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**12 July 2003**
Mung Bean:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Tillage - Sweep				**12 May 2003**
	Raptor	**4 oz/ac**	**1.02 l/ha**	**$17.20/ac**	**27 June 2003**
	Basagran	**12 oz/ac**	**0.87 l/ha**	**$7.88/ac**	**27 June 2003**
	Select	**6 oz/ac**	**0.43 l/ha**	**$9.25/ac**	**27 June 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Rotation: Wheat-Wheat-Sorghum-Mung Bean					
Wheat:	**Ally**	**0.1 oz/ac**	**7.01 g/ha**	**$2.33/ac**	**12 March 2003**
	2,4-D	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**12 March 2003**
(Stubble)	**Round-up**	**16 oz/ac**	**1.17 l/ha**	**$5.12/ac**	**27 June 2003**
	2,4-D	**16 oz/ac**	**1.17 l/ha**	**$1.73/ac**	**27 June 2003**
	Tillage - Sweep				**26 Aug. 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Wheat:	**Ally**	**0.1 oz/ac**	**7.01 g/ha**	**$2.33/ac**	**12 March 2003**
	2,4-D	**12 oz/ac**	**0.87 l/ha**	**$1.30/ac**	**12 March 2003**
(Stubble)	**Round-up**	**16 oz/ac**	**1.17 l/ha**	**$5.12/ac**	**27 June 2003**
	2,4-D	**16 oz/ac**	**1.17 l/ha**	**$1.73/ac**	**27 June 2003**
	Tillage - Sweep				**26 Aug. 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Sorghum:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**14 June 2003**
	Banvel	**5 oz/ac**	**0.36 l/ha**	**$3.66/ac**	**27 June 2003**
	2,4-D amine	**8 oz/ac**	**0.58 l/ha**	**$86/ac**	**27 June 2003**
Mung Bean:	**GlyStar Plus**	**16 oz/ac**	**1.17 l/ha**	**$3.00/ac**	**31 March 2003**
	Tillage - Sweep				**12 May 2003**
	Raptor	**4 oz/ac**	**1.02 l/ha**	**$17.20/ac**	**27 June 2003**
	Basagran	**12 oz/ac**	**0.87 l/ha**	**$7.88/ac**	**27 June 2003**
	Select	**6 oz/ac**	**0.43 l/ha**	**$9.25/ac**	**27 June 2003**
	Round-up	**18 oz/ac**	**1.31 l/ha**	**$5.76/ac**	**15 Sept. 2003**
Continuous Cropping:					

Corn:	**GlyStar Plus** **Round-up** **Round-up Ultra**	**16 oz/ac** **18 oz/ac** **18 oz/ac**	**1.17 l/ha** **1.31 l/ha** **1.31 l/ha**	**$3.00/ac** **$5.76/ac** **$5.76/ac**	**31 March 2003** **14 June 2003** **12 July 2003**
Sorghum:	**GlyStar Plus** **Round-up** **Banvel** **2,4-D amine**	**16 oz/ac** **18 oz/ac** **5 oz/ac** **8 oz/ac**	**1.17 l/ha** **1.31 l/ha** **0.36 l/ha** **0.58 l/ha**	**$3.00/ac** **$5.76/ac** **$3.66/ac** **$86/ac**	**31 March 2003** **14 June 2003** **27 June 2003** **27 June 2003**
Opportunity					
Corn:	**GlyStar Plus** **Tillage - Sweep** **Round-up** **Round-up Ultra**	**16 oz/ac** **18 oz/ac** **18 oz/ac**	**1.17 l/ha** **1.31 l/ha** **1.31 l/ha**	**$3.00/ac** **$5.76/ac** **$5.76/ac**	**31 March 2003** **12 May 2003** **14 June 2003** **12 July 2003**

Appendix B Table 4. Weed control methods including herbicide rate, cost and date applied at Briggsdale in 2003 season.					
Crop	**Herbicide/Tillage**	**Rate (English)**	**Rate (Metric)**	**Cost**	**Date Applied**
Rotation: Wheat-Fallow					
	Ally XP	0.10 oz/A	7.02 g/ha	$2.33/A	21 April
	2,4-D LV6	5.3 oz/A	0.39 l/ha	$0.82/A	21 April
	Clarity	2.0 oz/A	0.15 l/ha	$1.46/A	21 April
	RT Master	20 oz/A	1.46 l/ha	$3.40/A	17 July
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	17 July
Wheat:	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
	Atrazine 4L	24 oz/A	1.75 l/ha	$1.86/A	22 September
(Stubble)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
Fallow:	RT Master	24 oz/A	1.75 l/ha	$4.08/A	29 April
	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	17 June
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	17 June
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
(Wheat Planting)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
Rotation: Wheat-Millet-Fallow					
	Ally XP	0.10 oz/A	7.02 g/ha	$2.33/A	21 April
	2,4-D LV6	5.3 oz/A	0.39 l/ha	$0.82/A	21 April
	Clarity	2.0 oz/A	0.15 l/ha	$1.46/A	21 April
	RT Master	20 oz/A	1.46 l/ha	$3.40/A	17 July
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	17 July
Wheat:	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
	Atrazine 4L	24 oz/A	1.75 l/ha	$1.86/A	22 September
(Stubble)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
	RT Master	24 oz/A	1.75 l/a	$4.08/A	29 April
Millet:	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
	Round-up Ultra MAX	26 oz/A	1.90 l/ha	$10.76/A	17 June
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
(to kill)	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
Fallow:	RT Master	24 oz/A	1.75 l/ha	$4.08/A	29 April
	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	17 June
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	17 June
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
(Wheat Planting)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
Appendix A Table 4, continued.			**Rotation: Wheat-Wheat-Corn-Corn-Sunflower-Fallow**		
Wheat:	Harmony Extra	0.40 oz/A	28.1 g/ha	$5.67/A	14 May
	2,4-D LV6	5.3 oz/A	0.39 l/ha	$0.82/A	14 May
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
(Wheat Planting)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
	Harmony Extra	0.40 oz/A	28.1 g/ha	$5.67/A	14 May
	2,4-D LV6	5.3 oz/A	0.39 l/ha	$0.82/A	14 May
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	13 August
Wheat:	2,4-D LV6	10 oz/A	0.73 l/ha	$1.54/A	13 August
	Atrazine 4L	24 oz/A	1.75 l/ha	$1.86/A	22 September
(Stubble)	RT Master	20 oz/A	1.46 l/ha	$3.40/A	22 September
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	29 April
	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
	Prowl	32 oz/A	2.33 l/ha	$5.54/A	28 May
Corn1:	Atrazine 4L	32 oz/A	2.33 l/ha	$2.46/A	28 May
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	29 April
	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
Corn2:	Round-up Ultra MAX	26 oz/A	1.90 l/ha	$10.76/A	17 June
	RT Master	24 oz/A	1.75 l/ha	$4.08/A	29 April
	RT Master	32 oz/A	2.33 l/ha	$5.44/A	14 May
Sunflowers:	Spartan	2.0 oz/A	140 g/ha	$5.67/A	22 May

Fallow:	**RT Master**	**24 oz/A**	**1.75 l/ha**	**$4.08/A**	**29 April**
	RT Master	**32 oz/A**	**2.33 l/ha**	**$5.44/A**	**14 May**
	RT Master	**24 oz/A**	**1.75 l/ha**	**$4.08/A**	**17 June**
	2,4-D LV6	**10 oz/A**	**0.73 l/ha**	**$1.54/A**	**17 June**
	RT Master	**24 oz/A**	**1.75 l/ha**	**$4.08/A**	**13 August**
	2,4-D LV6	**10 oz/A**	**0.73 l/ha**	**$1.54/A**	**13 August**
(Wheat planting)	**RT Master**	**20 oz/A**	**1.46 l/ha**	**$3.40/A**	**22 September**
Rotation: Opportunity					
Millet:	**RT Master**	**24 oz/A**	**1.75 l/a**	**$4.08/A**	**29 April**
	RT Master	**32 oz/A**	**2.33 l/ha**	**$5.44/A**	**14 May**
	Round-up Ultra MAX	**26 oz/A**	**1.90 l/ha**	**$10.76/A**	**17 June**
(to kill)	**RT Master**	**24 oz/A**	**1.75 l/ha**	**$4.08/A**	**13 August**
	2,4-D LV6	**10 oz/A**	**0.73 l/ha**	**$1.54/A**	**13 August**
The appropriate adjuvants were applied according to label directions.					

Appendix B Table 5. Weed control methods including herbicide rate or tillage, cost and date applied at Akron in 2003 season.					
Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Wheat:	Tandem disc			$7.00/A	06 Sept 2002
	Tandem disc			$7.00/A	04 May 2003
	Sweep tillage			$5.50/A	27 July 2003
Fallow:	Sweep tillage			$5.50/A	05 Aug 2003
	Sweep tillage			$5.50/A	04 Sept 2003
Rotation: Wheat-Corn-Fallow					
Wheat:	Roundup	32 oz/A	2.33 l/ha	$10.24	06 Sept 2002
Corn:	RT Master	24 oz/A	1.75 l/ha	$4.56/A	06 May 2003
	Roundup	24 oz/A	1.75 l/ha	$7.68/A	06 June 2003
Fallow:	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	16 Sept 2002
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	06 May 2003
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	06 June 2003
	Gramoxone Xtra	20 oz/A	1.46 l/ha	$6.80/A	19 Aug 2003
Rotation: Wheat-Corn-Millet					
Wheat:	Roundup	32 oz/A	2.33 l/ha	$10.24	06 Sept 2002
Corn:	RT Master	24 oz/A	1.75 l/ha	$4.56/A	06 May 2003
	Roundup	24 oz/A	1.75 l/ha	$7.68/A	06 June 2003
Millet:	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	06 June 2003
Rotation: Wheat-Corn-Sunflower-Fallow:					
Wheat:	Roundup	32 oz/A	2.33 l/ha	$10.24	06 Sept 2002
	RT Master	24 oz/A	1.75 l/ha	$4.56/A	06 May 2003
Corn:	Roundup	24 oz/A	1.75 l/ha	$7.68/A	06 June 2003
	Sonalan 10G	7.5 lb/A	8400g/ha	$7.58/A	03 May 2003
Sunflower	Sonalan 10G	7.5 lb/A	8400g/ha	$7.58/A	28 May 2003
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	16 Sept 2002
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	06 May 2003
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	06 June 2003
Fallow:	Gramoxone Xtra	20 oz/A	1.46 l/ha	$6.80/A	19 Aug 2003
The appropriate adjuvants were applied according to label directions.					

Appendix B Table 6. Weed control methods including herbicide rate, cost and date applied at Lamar during the 2003 growing season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Weed Pressure	Cost	Date Applied
Rotation: Wheat-Fallow						
Wheat:	Ally	0.1 oz/A	7.0 g/ha	III		14 Apr 2003
	Clarity	2 oz/A	0.15 l/ha	III		14 Apr 2003
	2,4-D Amine	8 oz/A	4.67 l/ha	III		14 Apr 2003
Fallow:	Paramount	5.3 oz/A	371.8 g/ha	I		5 Sep 2003
	RT Master	16 oz/A	1.17 l/ha	I		5 Sep 2003
	2,4-D LV 4	16 oz/A	1.17 l/ha	I		5 Sep 2003
Rotation: Wheat-Sorghum-Fallow						
Wheat:	Ally	0.1 oz/A	7.0 g/ha	III		14 Apr 2003
	Clarity	2 oz/A	0.15 l/ha	III		14 Apr 2003
	2,4-D Amine	8 oz/A	4.67 l/ha	III		14 Apr 2003
Sorghum:	Marksman	32oz/A	2.33 l/ha	I		20 June 2003
Fallow:	Paramount	5.3 oz/A	371.8 g/ha	I		5 Sep 2003
	RT Master	16 oz/A	1.17 l/ha	I		5 Sep 2003
	2,4-D LV 4	16 oz/A	1.17 l/ha	I		5 Sep 2003
Rotation: Wheat-Corn-Fallow						
Wheat:	Ally	0.1 oz/A	7.0 g/ha	III		14 Apr 2003
	Clarity	2 oz/A	0.15 l/ha	III		14 Apr 2003
	2,4-D Amine	8 oz/A	4.67 l/ha	III		14 Apr 2003
Corn:	Roundup Ultramax	26oz/A	1.90 l/ha			20 June 2003
	Atrazine	0.75 lb/A	52.61 g/ha	I		20 June 2003
Fallow:	Paramount	5.3 oz/A	371.8 g/ha	I		5 Sep 2003
	RT Master	16 oz/A	1.17 l/ha	I		5 Sep 2003
	2,4-D LV 4	16 oz/A	1.17 l/ha	I		5 Sep 2003
The appropriate adjuvants were applied according to label directions.						

Appendix B Table 7. Weed control methods including herbicide rate, cost and date applied at STERLING in 2004.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Corn-Fallow					
Wheat:	Ally XP	0.10 oz/ac	7.02 g/ha	$2.43/ac	21 Apr 2004
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	21 Apr 2004
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	12 Aug 2004
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	12 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	12 Aug 2004
	Select	6 oz/ac	0.437 l/ha	$9.73/ac	12 Aug 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	24 Sep 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.68/ac	24 Sep 2004
Corn (RR):	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.68/ac	26 May 2004
	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	2 Jul 2004
Fallow:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	27 Apr 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	26 May 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	26 May 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	26 May 2004
	Gramoxone Extra	32 oz/ac	2.33 l/ha	$11.13/ac	28 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	28 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	28 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	12 Aug 2004
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	12 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	12 Aug 2004
	Select	6 oz/ac	0.437 l/ha	$9.73/ac	12 Aug 2004
(Wheat Planting)	RT Master	40 oz/ac	2.92 l/ha	$7.97/ac	17 Sep 2004
Rotation: Wheat-Corn-Millet					
Wheat:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	27 Apr 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	26 May 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	26 May 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	26 May 2004
	Gramoxone Extra	32 oz/ac	2.33 l/ha	$11.13/ac	28 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	28 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	28 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	12 Aug 2004
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	12 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	12 Aug 2004
	Select	6 oz/ac	0.437 l/ha	$9.73/ac	12 Aug 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	24 Sep 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.68/ac	24 Sep 2004
Corn (RR):	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.68/ac	26 May 2004
	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	2 Jul 2004
Proso Millet:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	27 Apr 2004
	RT Master	32 oz/ac	2.33 l/ha	$6.38/ac	26 May 2004
	2,4-D amine	12 oz/ac	0.875 l/ha	$1.14/ac	28 Jun 2004
	Clarity	4 oz/ac	0.292l/ha	$3.52/ac	28 Jun 2004
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	27 Apr 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	26 May 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	26 May 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	26 May 2004

	Gramoxone Extra	**32 oz/ac**	**2.33 l/ha**	**$11.13/ac**	**28 Jun 2004**
	2,4-D LV6	**6 oz/ac**	**0.437 l/ha**	**$0.98/ac**	**28 Jun 2004**
	Clarity	**2 oz/ac**	**0.146 l/ha**	**$1.76/ac**	**28 Jun 2004**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**12 Aug 2004**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.31/ac**	**12 Aug 2004**
	Clarity	**2 oz/ac**	**0.146 l/ha**	**$1.76/ac**	**12 Aug 2004**
	Select	**6 oz/ac**	**0.437 l/ha**	**$9.73/ac**	**12 Aug 2004**
(Wheat Planting)	**RT Master**	**40 oz/ac**	**2.92 l/ha**	**$7.97/ac**	**17 Sep 2004**
Wheat2:	**Beyond**	**5oz/ac**	**0.36 l/ha**	**$22.27/ac**	**31 Mar 2004**
	Ally XP	**0.10 oz/ac**	**7.02 g/ha**	**$2.43/ac**	**21 Apr 2004**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.31/ac**	**21 Apr 2004**
(Stubble)	**RT Master**	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**12 Aug 2004**
	2,4-D LV6	**8 oz/ac**	**0.58 l/ha**	**$1.31/ac**	**12 Aug 2004**
	Clarity	**2 oz/ac**	**0.146 l/ha**	**$1.76/ac**	**12 Aug 2004**
	Select	**6 oz/ac**	**0.437 l/ha**	**$9.73/ac**	**12 Aug 2004**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**24 Sep 2004**
	Atrazine 4F	**32 oz/ac**	**2.33 l/ha**	**$2.68/ac**	**24 Sep 2004**
Corn (RR):	**Atrazine 4F**	**32 oz/ac**	**2.33 l/ha**	**$2.68/ac**	**26 May 2004**
	Round-up UltraMAX	**26 oz/ac**	**1.90 l/ha**	**$11.38/ac**	**2 Jul 2004**
Proso Millet:	**RT Master**	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**27 Apr 2004**
	RT Master	**32 oz/ac**	**2.33 l/ha**	**$6.38/ac**	**26 May 2004**
	2,4-D amine	**12 oz/ac**	**0.875 l/ha**	**$1.14/ac**	**28 Jun 2004**
	Clarity	**4 oz/ac**	**0.292l/ha**	**$3.52/ac**	**28 Jun 2004**
Rotation: Opportunity					
Proso Millet:	**RT Master**	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**27 Apr 2004**
	RT Master	**32 oz/ac**	**2.33 l/ha**	**$6.38/ac**	**26 May 2004**
	2,4-D amine	**12 oz/ac**	**0.875 l/ha**	**$1.14/ac**	**28 Jun 2004**
	Clarity	**4 oz/ac**	**0.292l/ha**	**$3.52/ac**	**28 Jun 2004**

Appendix B Table 8. Weed control methods including herbicide rate, cost and date applied at STRATTON in 2004.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Corn-Fallow					
Wheat:	Starane + Salvo	21.3 oz/ac	1.55 l/ha	$7.65/ac	12 Apr 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	8 Jul 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	8 Jul 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	8 Jul 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	10 Aug 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	10 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	10 Aug 2004
	Select 2EC	6 oz/ac	0.437 l/ha	$9.73/ac	10 Aug 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	28 Sep 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	28 Sep 2004
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	25 May 2004
(Replant)	Gromoxane Extra	32 oz/ac	2.33 l/ha	$11.13/ac	11 Jun 2004
	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	8 Jul 2004
Fallow:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	11 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	11 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	11 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	8 Jul 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	8 Jul 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	8 Jul 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	10 Aug 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	10 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	10 Aug 2004
	Select 2EC	6 oz/ac	0.437 l/ha	$9.73/ac	10 Aug 2004
(Wheat Planting)	RT Master	40 oz/ac	2.92 l/ha	$7.97/ac	15 Sep 2005
Rotation: Wheat-Corn-Millet					
Wheat:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	11 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	11 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	11 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	8 Jul 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	8 Jul 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	8 Jul 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	10 Aug 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	10 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	10 Aug 2004
	Select 2EC	6 oz/ac	0.437 l/ha	$9.73/ac	10 Aug 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	28 Sep 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	28 Sep 2004
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	25 May 2004
(Replant)	Gromoxane Extra	32 oz/ac	2.33 l/ha	$11.13/ac	11 Jun 2004

	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	8 Jul 2004
Proso Millet:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	32 oz/ac	2.33 l/ha	$6.38/ac	25 May 2004
	2,4-D amine	12 oz/ac	0.87 l/ha	$1.14/ac	8 Jul 2004
	Clarity	4 oz/ac	0.292 l/ha	$3.52/ac	8 Jul 2004
(Wheat Planting)	RT Master	40 oz/ac	2.92 l/ha	$7.97/ac	9/15/2005
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	11 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	11 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	11 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	8 Jul 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	8 Jul 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	8 Jul 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	10 Aug 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	10 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	10 Aug 2004
	Select 2EC	6 oz/ac	0.437 l/ha	$9.73/ac	10 Aug 2004
(Wheat Planting)	RT Master	40 oz/ac	2.92 l/ha	$7.97/ac	9/15/2005
Wheat2:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	6 Apr 2004
	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	11 Jun 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	11 Jun 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	11 Jun 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	8 Jul 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	8 Jul 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	8 Jul 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	10 Aug 2004
	2,4-D LV6	6 oz/ac	0.437 l/ha	$0.98/ac	10 Aug 2004
	Clarity	2 oz/ac	0.146 l/ha	$1.76/ac	10 Aug 2004
	Select 2EC	6 oz/ac	0.437 l/ha	$9.73/ac	10 Aug 2004
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	28 Sep 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	28 Sep 2004
Corn (RR):	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	Atrazine 4F	32 oz/ac	2.33 l/ha	$2.67/ac	25 May 2004
(Replant)	Gromoxane Extra	32 oz/ac	2.33 l/ha	$11.13/ac	11 Jun 2004
	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	8 Jul 2004
Proso Millet:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	32 oz/ac	2.33 l/ha	$6.38/ac	25 May 2004
	2,4-D amine	12 oz/ac	0.87 l/ha	$1.14/ac	8 Jul 2004
	Clarity	4 oz/ac	0.292 l/ha	$3.52/ac	8 Jul 2004
(Wheat Planting)	RT Master	40 oz/ac	2.92 l/ha	$7.97/ac	9/15/2005
Rotation: Opportunity					
Proso Millet:	RT Master	16 oz/ac	1.17 l/ha	$3.19/ac	12 May 2004
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	12 May 2004
	RT Master	32 oz/ac	2.33 l/ha	$6.38/ac	25 May 2004
	2,4-D amine	12 oz/ac	0.87 l/ha	$1.14/ac	8 Jul 2004
	Clarity	4 oz/ac	0.292 l/ha	$3.52/ac	8 Jul 2004

Appendix B Table 9. Weed control methods including herbicide rate, cost and date applied at WALSH in 2004.					
Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Sorghum-Fallow					
Wheat:	Express	0.33 oz/ac	23.2 g/ha	$6.24/ac	19 Mar 2004
	2,4-D 4#	12 oz/ac	0.87 l/ha	$1.39/ac	19 Mar 2004
	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	7 Jul 2004
	Saber	16 oz/ac	1.17 l/ha	$1.53/ac	7 Jul 2004
	Glystar Plus	24 oz.ac	1.75 l/ha	2.64/ac	9 Aug 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	9 Aug 2004
	Glystar Plus	16 oz/ac	1.17 l/ha	2.64/ac	23 Oct 2004
Corn (RR):	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	5 May 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	5 May 2004
	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	24 May 2004
	Round-up UltraMax	24 oz/ac	1.75 l/ha	$10.5/ac	7 Jul 2004
Fallow:	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	5 May 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	5 May 2004
	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	24 May 2004
	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	7 Jul 2004
	Saber	16 oz/ac	1.17 l/ha	$1.53/ac	7 Jul 2004
	Glystar Plus	24 oz.ac	1.75 l/ha	$2.64/ac	9 Aug 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	9 Aug 2004
Rotation: Wheat-Corn-Mung Bean					
Wheat:	Express	0.33 oz/ac	23.2 g/ha	$6.24/ac	19 Mar 2004
	2,4-D 4#	12 oz/ac	0.87 l/ha	$1.39/ac	19 Mar 2004
	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	7 Jul 2004
	Saber	16 oz/ac	1.17 l/ha	$1.53/ac	7 Jul 2004
	Glystar Plus	24 oz.ac	1.75 l/ha	2.64/ac	9 Aug 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	9 Aug 2004
	Glystar Plus	16 oz/ac	1.17 l/ha	2.64/ac	23 Oct 2004
Corn (RR):	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	5 May 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	5 May 2004
	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	24 May 2004
	Round-up UltraMax	24 oz/ac	1.75 l/ha	$10.5/ac	7 Jul 2004
Mung Bean:	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	5 May 2004
	Round-up UltraMax	18 oz/ac	1.31 l/ha	$7.88/ac	24 May 2004
	Raptor	4 oz/ac	0.29 l/ha	$17.81/ac	14 Jun 2004
	Basagran	16 oz/ac	1.17 l/ha	$10.76/ac	14 Jun 2004
	Cultivated				21 Jul 2004
Rotation: Wheat-Wheat-Sorghum-Mung Bean					
Wheat1:	Express	0.33 oz/ac	23.2 g/ha	$6.24/ac	19 Mar 2004
	2,4-D 4#	12 oz/ac	0.87 l/ha	$1.39/ac	19 Mar 2004
	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	7 Jul 2004
	Saber	16 oz/ac	1.17 l/ha	$1.53/ac	7 Jul 2004
	Glystar Plus	24 oz.ac	1.75 l/ha	2.64/ac	9 Aug 2004
	2,4-D 4#	24 oz/ac	1.75 l/ha	$2.78/ac	9 Aug 2004
Wheat2:	Express	0.33 oz/ac	23.2 g/ha	$6.24/ac	19 Mar 2004
	2,4-D 4#	12 oz/ac	0.87 l/ha	$1.39/ac	19 Mar 2004
	Round-up UltraMax	20 oz/ac	1.46 l/ha	$8.75/ac	7 Jul 2004

	Saber	**16 oz/ac**	**1.17 l/ha**	**$1.53/ac**	**7 Jul 2004**
	Glystar Plus	**24 oz.ac**	**1.75 l/ha**	**2.64/ac**	**9 Aug 2004**
	2,4-D 4#	**24 oz/ac**	**1.75 l/ha**	**$2.78/ac**	**9 Aug 2004**
	Glystar Plus	**16 oz/ac**	**1.17 l/ha**	**2.64/ac**	**23 Oct 2004**
Grain Sorghum:	**Round-up UltraMax**	**18 oz/ac**	**1.31 l/ha**	**$7.88/ac**	**5 May 2004**
	2,4-D 4#	**24 oz/ac**	**1.75 l/ha**	**$2.78/ac**	**5 May 2004**
	Round-up UltraMax	**18 oz/ac**	**1.31 l/ha**	**$7.88/ac**	**24 May 2004**
	Banvel	**4 oz/ac**	**0.29 l/ha**	**$3.52/ac**	**7 Jul 2004**
	Saber	**12 oz/ac**	**0.87 l/ha**	**$1.15/ac**	**7 Jul 2004**
	Cultivated				**21 Jul 2004**
Mung Bean:	**Round-up UltraMax**	**20 oz/ac**	**1.46 l/ha**	**$8.75/ac**	**5 May 2004**
	Round-up UltraMax	**18 oz/ac**	**1.31 l/ha**	**$7.88/ac**	**24 May 2004**
	Raptor	**4 oz/ac**	**0.29 l/ha**	**$17.81/ac**	**14 Jun 2004**
	Basagran	**16 oz/ac**	**1.17 l/ha**	**$10.76/ac**	**14 Jun 2004**
	Cultivated				**21 Jul 2004**
Rotation: Opportunity					
Grain Sorghum:	**Round-up UltraMax**	**18 oz/ac**	**1.31 l/ha**	**$7.88/ac**	**5 May 2004**
	2,4-D 4#	**24 oz/ac**	**1.75 l/ha**	**$2.78/ac**	**5 May 2004**
	Round-up UltraMax	**18 oz/ac**	**1.31 l/ha**	**$7.88/ac**	**24 May 2004**
	Banvel	**4 oz/ac**	**0.29 l/ha**	**$3.52/ac**	**7 Jul 2004**
	Saber	**12 oz/ac**	**0.87 l/ha**	**$1.15/ac**	**7 Jul 2004**
	Cultivated				**21 Jul 2004**

Appendix B Table10. Weed control methods including herbicide rate, cost and date applied at Briggsdale in 2004 season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Wheat:	Ally XP	0.10 oz/ac	7.02 g/ha	$2.42/ac	4-May-04
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	4-May-04
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	19-Jul-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	19-Jul-04
	Clarity	2 oz/a	0.15 l/ha	$1.76/ac	19-Jul-04
Fallow:	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	1-Jun-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	1-Jun-04
	Banvel	2 oz/ac	0.15 l/ha	$1.76/ac	1-Jun-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	2-Jul-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	2-Jul-04
	Clarity	2 oz/ac	0.15 l/ha	$1.76/ac	2-Jul-04
(Wheat Planting)	RT Master	32 oz/ac	2.33 l/ha	$6.37/ac	18-Sep-04
Rotation: Wheat-Millet-Fallow					
Wheat:	Ally XP	0.10 oz/ac	7.02 g/ha	$2.42/ac	4-May-04
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	4-May-04
(Stubble)	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	19-Jul-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	19-Jul-04
	Clarity	2 oz/a	0.15 l/ha	$1.76/ac	19-Jul-04
Millet:	RT Master	16 oz/ac	1.17 l/ha	$3.18/ac	5-May-04
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	5-May-04
	Round-up UltraMAX	26 oz/ac	1.90 l/ha	$11.38/ac	1-Jun-04
Fallow:	RT Master	16 oz/ac	1.17 l/ha	$3.18/ac	5-May-04
	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	5-May-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	1-Jun-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	1-Jun-04
	Banvel	2 oz/ac	0.15 l/ha	$1.76/ac	1-Jun-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	2-Jul-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	2-Jul-04
	Banvel	2 oz/ac	0.15 l/ha	$1.76/ac	2-Jul-04
(Wheat Planting)	RT Master	32 oz/ac	2.33 l/ha	$6.37/ac	18-Sep-04
Rotation:Wheat-Wheat-Corn-Corn-Sunflower-Fallow:					
Wheat:	Ally XP	0.10 oz/ac	7.02 g/ha	$2.42/ac	4-May-04
	2,4-D LV6	8 oz/ac	0.58 l/ha	$1.31/ac	4-May-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	19-Jul-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	19-Jul-04
	Clarity	2 oz/a	0.15 l/ha	$1.76/ac	19-Jul-04
(Wheat Planting)	RT Master	32 oz/ac	2.33 l/ha	$6.37/ac	18-Sep-04
Wheat:	RT Master	16 oz/ac	1.17 l/ha	$3.18/ac	5-May-04
(Wheat desiccated)	2,4-D LV6	16 oz/ac	1.17 l/ha	$2.61/ac	5-May-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	1-Jun-04
	2,4-D LV6	6 oz/ac	0.44 l/ha	$0.98/ac	1-Jun-04
	Banvel	2 oz/ac	0.15 l/ha	$1.76/ac	1-Jun-04
	RT Master	20 oz/ac	1.46 l/ha	$3.98/ac	2-Jul-04

	2,4-D LV6	**6 oz/ac**	**0.44 l/ha**	**$0.98/ac**	**2-Jul-04**
	Banvel	**2 oz/ac**	**0.15 l/ha**	**$1.76/ac**	**2-Jul-04**
Grain Sorghum:	**Bicep Lite II Magnum**	**35.2 oz/ac**	**2.57 l/ha**	**$16.22/ac**	**21-May-04**
	RT Master	**16 oz/ac**	**1.17 l/ha**	**$3.18/ac**	**21-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$2.61/ac**	**21-May-04**
	Clarity	**8 oz/ac**	**0.58 l/ha**	**$7.00**	**9-Jul-04**
Corn:	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$7.04/ac**	**5-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$2.61/ac**	**5-May-04**
	Atrazine 4F	**32 oz/ac**	**2.33 l/ha**	**$2.67/ac**	**28-May-04**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**28-May-04**
	2,4-D LV6	**6 oz/ac**	**0.44 l/ha**	**$0.98/ac**	**28-May-04**
	Banvel	**2 oz/ac**	**0.15 l/ha**	**$1.76/ac**	**28-May-04**
	Round-up UltraMAX	**26 oz/ac**	**1.901/ha**	**$11.38/ac**	**9-Jul-04**
Sunflowers:	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$3.18/ac**	**5-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$2.61/ac**	**5-May-04**
	Spartan	**1.5 oz/ac**	**105 g/ha**	**$4.41/ac**	**11-May-04**
	Prowl H20	**48 oz/ac**	**3.50 l/ha**	**$11.81**	**28-May-04**
	Round-up UltraMAX	**26 oz/ac**	**1.90 l/ha**	**$11.38/ac**	**28-May-04**
	Select 2EC	**6 oz/ac**	**0.44 l/ha**	**$9.73/ac**	**2-Jul-04**
Fallow:	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$3.18/ac**	**5-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$0.98/ac**	**5-May-04**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**1-Jun-04**
	2,4-D LV6	**6 oz/ac**	**0.44 l/ha**	**$0.98/ac**	**1-Jun-04**
	Banvel	**2 oz/ac**	**0.15 l/ha**	**$1.76/ac**	**1-Jun-04**
	RT Master	**20 oz/ac**	**1.46 l/ha**	**$3.98/ac**	**2-Jul-04**
	2,4-D LV6	**6 oz/ac**	**0.44 l/ha**	**$0.98/ac**	**2-Jul-04**
	Banvel	**2 oz/ac**	**0.15 l/ha**	**$1.76/ac**	**2-Jul-04**
(Wheat planting)	**RT Master**	**32 oz/ac**	**2.33 l/ha**	**$6.37/ac**	**18-Sep-04**
Rotation: Opportunity					
Proso:	**RT Master**	**16 oz/ac**	**1.17 l/ha**	**$3.18/ac**	**5-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$2.61/ac**	**5-May-04**
	RT Master	**16 oz/ac**	**1.17 l/ha**	**$3.18/ac**	**21-May-04**
	2,4-D LV6	**16 oz/ac**	**1.17 l/ha**	**$2.61/ac**	**21-May-04**
	2,4-D amine	**12 oz/ac**	**0.87 l/ha**	**$1.14/ac**	**14-Jun-04**
	Clarity	**4 oz/ac**	**0.29 l/ha**	**$3.52/ac**	**14-Jun-04**

The appropriate adjuvant was applied with herbicides according to label directions.

Appendix B Table 11. Weed control methods including herbicide rate, cost and date applied at Akron in 2004 season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Fallow:	Tandem disc	Preplant	Wheat	$7.00/A	27-Sep-03
	Sweep tillage			$5.50/A	31-Mar-04
	RT Master	32 oz/A	2.33 l/ha	$10.24/A	21-May-04
	Roundup Ultra	25 oz/A	1.82 l/ha	$8.00/A	21-Jul-04
	sweep tillage			$5.50/A	30-Aug-04
Rotation: Wheat-Corn-Fallow					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87/A	29-Sep-03
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	21-May-04
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	21-Jul-04
Fallow:	Gramoxone Xtra	22.6 oz/A	1.65 l/ha	$7.68/A	3-Aug-03
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	21-May-04
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	21-Jul-04
	RT Master	32 oz/A	2.33 l/ha	$6.08/A	18-Aug-04
Rotation: Wheat-Corn-Millet					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87/A	29-Sep-03
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	21-May-04
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	21-Jul-04
Millet:	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	21-May-04
Rotation: Wheat-Corn-Sunflower-Fallow:					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87	29-Sep-03
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	21-May-04
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	21-Jul-04
Sunflower:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	21-May-04
	Select 2EC	10 oz/A	0.73 l/ha	$9.89/A	11-Jul-04
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	11-Jul-04
Fallow:	Gramoxone Xtra	22.6 oz/A	1.65 l/ha	$7.68/A	3-Aug-03
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	21-May-04
	Roundup Max	24 oz/A	1.75 l/ha	$10.08/A	21-Jul-04
	RT Master	32 oz/A	2.33 l/ha	$6.08/A	18-Aug-04

The appropriate adjuvant was applied with herbicides according to label directions.

Appendix B Table 12. Weed control methods including herbicide rate, cost and date applied at Lamar during the 2003-2004 growing season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Wheat:	Clarity	8 oz/A	4.67 l/ha	$7.04/ac	5-Sep-03
Fallow:	Paramount	5.3 oz/A	210.5 g/ha	$16.53/ac	25-Oct-03
	RT Master	16 oz/A	1.17 l/ha	$3.18/ac	25-Oct-03
	2,4-D LV 4	16 oz/A	1.17 l/ha	$1.85/ac	25-Oct-03
Rotation: Wheat-Sorghum-Fallow					
Wheat:	Clarity	8 oz/A	4.67 l/ha	$7.04/ac	5-Sep-03
Fallow:	Paramount	5.3 oz/A	210.5 g/ha	$16.53/ac	25-Oct-03
	RT Master	16 oz/A	1.17 l/ha	$3.18/ac	25-Oct-03
	2,4-D LV 4	16 oz/A	1.17 l/ha	$1.85/ac	25-Oct-03
	Sweep				12-May-04
Sorghum	Bicep Lite II	1.5 qt/A	3.51 l/ha	$22.12/ac	20-May-04
	RT Master	16 oz/A	1.17 l/ha	$3.18/ac	20-May-04
	2,4-D Amine	16 oz/A	1.17 l/ha	$1.52/ac	20-May-04
	Banvel	8oz/A	4.67 l/ha	$7.04/ac	24-Jun-04
Rotation: Wheat-Corn-Fallow					
Wheat:	Clarity	8 oz/A	4.67 l/ha	$7.04/ac	5-Sep-03
Fallow:	Paramount	5.3 oz/A	210.5 g/ha	$16.53/ac	25-Oct-03
	RT Master	16 oz/A	1.17 l/ha	$3.18/ac	25-Oct-03
	2,4-D LV 4	16 oz/A	1.17 l/ha	$1.85/ac	25-Oct-03
	Sweep				12-May-04
Corn:	Bicep Lite II	1.5 qt/A	3.51 l/ha	$22.12/ac	20-May-04
	RT Master	16 oz/A	1.17 l/ha	$3.18/ac	20-May-04
	2,4-D Amine	16 oz/A	1.17 l/ha	$1.52/ac	20-May-04
	Banvel	8oz/A	4.67 l/ha	$7.04/ac	24-Jun-04

The appropriate adjuvant was applied with herbicides according to label directions.

Appendix B Table 13. Weed control methods including herbicide rate, cost and date applied at STERLING in 2005.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Corn-Fallow					
Wheat:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	25-Jul-05
(Stubble)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	25-Jul-05
	Atrazine 4F	20 oz/ac	1.5 l/ha	$1.60	18-Aug-05
	Rt Master II	20 oz/ac	1.5 l/ha	$4.00	18-Aug-05
	Weedmaster	20 oz/ac	1.5 l/ha	$4.20	18-Aug-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
(Pre-Plant Corn)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	21-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	21-Jun-05
Fallow:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	21-Jun-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	21-Jun-05
	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	25-Jul-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	25-Jul-05
(Pre-Plant Wheat)	Rt Master II	20 oz/ac	1.5 l/ha	$4.00	18-Aug-05
	Weedmaster	20 oz/ac	1.5 l/ha	$4.20	18-Aug-05
Rotation: Wheat-Corn-Millet					
Wheat:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	25-Jul-05
(Stubble)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	25-Jul-05
	Atrazine 4F	20 oz/ac	1.5 l/ha	$1.60	18-Aug-05
	Rt Master II	20 oz/ac	1.5 l/ha	$4.00	18-Aug-05
	Weedmaster	20 oz/ac	1.5 l/ha	$4.20	18-Aug-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
(Pre-Plant Corn)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	21-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	21-Jun-05
Proso Millet:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
(Pre-Plant Millet)	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	8-Jun-05
	2, 4D LV6	8 oz/ac	0.6 l/ha	$1.20	8-Jun-05
(Pre-Plant Wheat)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	29-Sep-05
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	25-Jul-05
(Stubble)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	25-Jul-05
	Rt Master II	20 oz/ac	1.5 l/ha	$4.00	18-Aug-05
	Weedmaster	20 oz/ac	1.5 l/ha	$4.20	18-Aug-05

(Pre-Plant Wheat)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Wheat2:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	25-Jul-05
(Stubble)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	25-Jul-05
	Atrazine 4F	20 oz/ac	1.5 l/ha	$1.60	18-Aug-05
	Rt Master II	20 oz/ac	1.5 l/ha	$4.00	18-Aug-05
	Weedmaster	20 oz/ac	1.5 l/ha	$4.20	18-Aug-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
(Pre-Plant Corn)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	21-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	21-Jun-05
Proso Millet:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
(Pre-Plant Millet)	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	8-Jun-05
	2, 4D LV6	8 oz/ac	0.6 l/ha	$1.20	8-Jun-05
(Pre-Plant Wheat)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	29-Sep-05
Rotation: Opportunity					
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	6-Apr-05
(Pre-Plant Corn)	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	6-Apr-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	21-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	21-Jun-05

Appendix B Table 14. Weed control methods including herbicide rate, cost and date applied at STRATTON in 2005.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Corn-Fallow					
Wheat:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96	21-Apr-05
	2, 4D LV6	5.33 oz/ac	0.4 l/ha	$0.80	21-Apr-05
	Rt Master II	22 oz/ac	1.6 l/ha	$4.40	05-Sep-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	05-Sep-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Corn)	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	16-May-05
(Re-Plant)	Gramoxone Max	32 oz/ac	2.3 l/ha	$9.43	20-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	20-Jun-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	20-Jun-05
Fallow:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	20-Jun-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	20-Jun-05
	Rt Master II	22 oz/ac	1.6 l/ha	$4.40	05-Sep-05
(Wheat Planting)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Rotation: Wheat-Corn-Millet					
Wheat:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96	21-Apr-05
	2, 4D LV6	5.33 oz/ac	0.4 l/ha	$0.80	21-Apr-05
	Rt Master II	22 oz/ac	1.6 l/ha	$4.40	05-Sep-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	05-Sep-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Corn)	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	16-May-05
(Re-Plant)	Gramoxone Max	32 oz/ac	2.3 l/ha	$9.43	20-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	20-Jun-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	20-Jun-05
Proso Millet:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Millet)	Rt Master II	24 oz/ac	1.8 l/ha	$4.80	20-Jun-05
(Wheat Planting)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Rotation: Wheat-Wheat-Corn-Millet					
Wheat1:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96	21-Apr-05
	2, 4D LV6	5.33 oz/ac	0.4 l/ha	$0.80	21-Apr-05

	Rt Master II	22 oz/ac	1.6 l/ha	$4.40	05-Sep-05
(Wheat Planting)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Wheat2:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96	21-Apr-05
	2, 4D LV6	5.33 oz/ac	0.4 l/ha	$0.80	21-Apr-05
	Rt Master II	22 oz/ac	1.6 l/ha	$4.40	05-Sep-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	05-Sep-05
	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	22-Sep-05
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Corn)	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	16-May-05
(Re-Plant)	Gramoxone Max	32 oz/ac	2.3 l/ha	$9.43	20-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	20-Jun-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	20-Jun-05
Proso Millet:	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Millet)	Rt Master II	24 oz/ac	1.8 l/ha	$4.80	20-Jun-05
(Wheat Planting)	Rt Master II	44 oz/ac	3.2 l/ha	$8.80	22-Sep-05
Rotation: Opportunity					
Corn (RR):	Rt Master II	16 oz/ac	1.2 l/ha	$3.20	10-May-05
	Weedmaster	16 oz/ac	1.2 l/ha	$3.36	10-May-05
(Pre-Plant Corn)	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	16-May-05
(Re-Plant)	Gramoxone Max	32 oz/ac	2.3 l/ha	$9.43	20-Jun-05
	Atrazine 4F	32 oz/ac	2.3 l/ha	$2.56	20-Jun-05
	CoStar	64 oz/ac	4.7 l/ha	$8.10	20-Jun-05

Appendix B Table 15. Weed control methods including herbicide rate, cost and date applied at WALSH in 2005.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Sorghum-Fallow					
Wheat:	Alley	0.1 oz/ac	7.0 g/ha	$0.99/ac	11-Mar-05
	LoVol 2, 4D	5.9 oz/ac	0.4 l/ha	$0.86/ac	11-Mar-05
	Penetrate II	4.0 oz/ac	0.3 l/ha	$0.60/ac	11-Mar-05
(Stubble)	Roundup Ultra	20 oz/ac	1.5 l/ha	$9.33/ac	4-Jul-05
	Saber	12 oz/ac	0.9 l/ha	$1.68/ac	4-Jul-05
	Glystar Plus	20 oz/ac	1.5 l/ha	$2.80/ac	29-Aug-05
	LoVol 2, 4D	16 oz/ac	1.2 l/ha	$2.32/ac	29-Aug-05
Grain Sorghum:	Roundup Ultra	18 oz/ac	1.3 l/ha	$8.39/ac	18-Apr-05
	LoVol 2, 4D	8 oz/ac	0.6 l/ha	$1.16/ac	18-Apr-05
	Glystar Plus	96 oz/ac	7.0 l/ha	$13.44/ac	20-May-05
	Atrazine	12 oz/ac	0.9 l/ha	$1.32/ac	10-Jun-05
	LoVol 2, 4D	12 oz/ac	0.9 l/ha	$1.74/ac	10-Jun-05
	Banvel	5 oz/ac	0.4 l/ha	$2.55/ac	4-Jul-05
	Saber	8 oz/ac	0.6 l/ha	$1.12/ac	4-Jul-05
Fallow:	Roundup Ultra	18 oz/ac	1.3 l/ha	$8.39/ac	18-Apr-05
	LoVol 2, 4D	8 oz/ac	0.6 l/ha	$1.16/ac	18-Apr-05
	Glystar Plus	96 oz/ac	7.0 l/ha	$13.44/ac	20-May-05
	Roundup Ultra Max	16 oz/ac	1.2 l/ha	$7.36/ac	10-Jun-05
	Glystar Plus	20 oz/ac	1.5 l/ha	$2.80/ac	27-Jul-05
	HiDep	16 oz/ac	1.2 l/ha	$2.49/ac	27-Jul-05
	Glystar Plus	20 oz/ac	1.5 l/ha	$2.80/ac	29-Aug-05
	LoVol 2, 4D	16 oz/ac	1.2 l/ha	$2.32/ac	29-Aug-05
Rotation: Wheat-Corn-Millet					
Wheat:	Alley	0.1 oz/ac	7.0 g/ha	$0.99/ac	11-Mar-05
	LoVol 2, 4D	5.9 oz/ac	0.4 l/ha	$0.86/ac	11-Mar-05
	Penetrate II	4.0 oz/ac	0.3 l/ha	$0.60/ac	11-Mar-05
(Stubble)	Roundup Ultra	20 oz/ac	1.5 l/ha	$9.33/ac	4-Jul-05
	Saber	12 oz/ac	0.9 l/ha	$1.68/ac	4-Jul-05
	Glystar Plus	20 oz/ac	1.5 l/ha	$2.80/ac	29-Aug-05
	LoVol 2, 4D	16 oz/ac	1.2 l/ha	$2.32/ac	29-Aug-05
Corn (RR):	Roundup Ultra	18 oz/ac	1.3 l/ha	$8.39/ac	18-Apr-05
	LoVol 2, 4D	8 oz/ac	0.6 l/ha	$1.16/ac	18-Apr-05
	Glystar Plus	96 oz/ac	7.0 l/ha	$13.44/ac	20-May-05
	Roundup Ultra Max	16 oz/ac	1.2 l/ha	$7.36/ac	10-Jun-05
	Roundup Ultra	20 oz/ac	1.5 l/ha	$9.33/ac	4-Jul-05
Proso Millet:	Roundup Ultra	18 oz/ac	1.3 l/ha	$8.39/ac	18-Apr-05
	LoVol 2, 4D	8 oz/ac	0.6 l/ha	$1.16/ac	18-Apr-05
	Glystar Plus	96 oz/ac	7.0 l/ha	$13.44/ac	20-May-05
	Roundup Ultra Max	16 oz/ac	1.2 l/ha	$7.36/ac	10-Jun-05

	Banvel	**5 oz/ac**	**0.4 l/ha**	**$2.55/ac**	**4-Jul-05**
	Saber	**8 oz/ac**	**0.6 l/ha**	**$1.12/ac**	**4-Jul-05**
Rotation: Wheat-Wheat-Sorghum-Millet					
Wheat1:	**Alley**	**0.1 oz/ac**	**7.0 g/ha**	**$0.99/ac**	**11-Mar-05**
	LoVol 2, 4D	**5.9 oz/ac**	**0.4 l/ha**	**$0.86/ac**	**11-Mar-05**
	Penetrate II	**4.0 oz/ac**	**0.3 l/ha**	**$0.60/ac**	**11-Mar-05**
(Stubble)	**Roundup Ultra**	**20 oz/ac**	**1.5 l/ha**	**$9.33/ac**	**4-Jul-05**
	Saber	**12 oz/ac**	**0.9 l/ha**	**$1.68/ac**	**4-Jul-05**
	Glystar Plus	**20 oz/ac**	**1.5 l/ha**	**$2.80/ac**	**29-Aug-05**
	LoVol 2, 4D	**16 oz/ac**	**1.2 l/ha**	**$2.32/ac**	**29-Aug-05**
Wheat2:	**Alley**	**0.1 oz/ac**	**7.0 g/ha**	**$0.99/ac**	**11-Mar-05**
	LoVol 2, 4D	**5.9 oz/ac**	**0.4 l/ha**	**$0.86/ac**	**11-Mar-05**
	Penetrate II	**4.0 oz/ac**	**0.3 l/ha**	**$0.60/ac**	**11-Mar-05**
(Stubble)	**Roundup Ultra**	**20 oz/ac**	**1.5 l/ha**	**$9.33/ac**	**4-Jul-05**
	Saber	**12 oz/ac**	**0.9 l/ha**	**$1.68/ac**	**4-Jul-05**
	Glystar Plus	**20 oz/ac**	**1.5 l/ha**	**$2.80/ac**	**29-Aug-05**
	LoVol 2, 4D	**16 oz/ac**	**1.2 l/ha**	**$2.32/ac**	**29-Aug-05**
Grain Sorghum:	**Roundup Ultra**	**18 oz/ac**	**1.3 l/ha**	**$8.39/ac**	**18-Apr-05**
	LoVol 2, 4D	**8 oz/ac**	**0.6 l/ha**	**$1.16/ac**	**18-Apr-05**
	Glystar Plus	**96 oz/ac**	**7.0 l/ha**	**$13.44/ac**	**20-May-05**
	Atrazine	**12 oz/ac**	**0.9 l/ha**	**$1.32/ac**	**10-Jun-05**
	LoVol 2, 4D	**12 oz/ac**	**0.9 l/ha**	**$1.74/ac**	**10-Jun-05**
	Banvel	**5 oz/ac**	**0.4 l/ha**	**$2.55/ac**	**4-Jul-05**
	Saber	**8 oz/ac**	**0.6 l/ha**	**$1.12/ac**	**4-Jul-05**
Proso Millet:	**Roundup Ultra**	**18 oz/ac**	**1.3 l/ha**	**$8.39/ac**	**18-Apr-05**
	LoVol 2, 4D	**8 oz/ac**	**0.6 l/ha**	**$1.16/ac**	**18-Apr-05**
	Glystar Plus	**96 oz/ac**	**7.0 l/ha**	**$13.44/ac**	**20-May-05**
	Roundup Ultra Max	**16 oz/ac**	**1.2 l/ha**	**$7.36/ac**	**10-Jun-05**
	Banvel	**5 oz/ac**	**0.4 l/ha**	**$2.55/ac**	**4-Jul-05**
	Saber	**8 oz/ac**	**0.6 l/ha**	**$1.12/ac**	**4-Jul-05**
Rotation: Opportunity					
Corn (RR):	**Roundup Ultra**	**18 oz/ac**	**1.3 l/ha**	**$8.39/ac**	**18-Apr-05**
	LoVol 2, 4D	**8 oz/ac**	**0.6 l/ha**	**$1.16/ac**	**18-Apr-05**
	Glystar Plus	**96 oz/ac**	**7.0 l/ha**	**$13.44/ac**	**20-May-05**
	Roundup Ultra Max	**16 oz/ac**	**1.2 l/ha**	**$7.36/ac**	**10-Jun-05**
	Roundup Ultra	**20 oz/ac**	**1.5 l/ha**	**$9.33/ac**	**4-Jul-05**

Appendix B Table 16. Weed control methods including herbicide rate, cost and date applied at Briggsdale in 2005 season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Wheat:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
(Stubble)	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	7 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	7 July 2005
Fallow:	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
	Clarity	2 oz/ac	0.15 l/ha	$1.50/ac	3 April 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	22 June 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	22 June 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	28 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	28 July 2005
(Wheat Planting)	RT Master II	20 oz/ac	1.46 l/ha	$4.00/ac	4 Oct. 2005
Rotation: Wheat-Millet-Fallow					
Wheat:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
(Stubble)	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	7 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	7 July 2005
Millet:	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
	Clarity	2 oz/ac	0.15 l/ha	$1.50/ac	3 April 2005
	RT Master II	22 oz/ac.	1.61 l/ha	$4.40/ac	22 June 2005
Fallow:	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
	Clarity	2 oz/ac	0.15 l/ha	$1.50/ac	3 April 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	22 June 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	22 June 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	28 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	28 July 2005
(Wheat Planting)	RT Master II	20 oz/ac	1.46 l/ha	$4.00/ac	4 Oct. 2005
Rotation: Wheat-Corn-Fallow:					
Wheat:	Ally Extra	0.4 oz/ac	28 g/ha	$3.96/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
(Stubble)	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	7 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	7 July 2005
	RT Master II	20 oz/ac	1.46 l/ha	$4.00/ac	4 Oct. 2005
	Atrazine 4F	32 oz/ac	2.34 l/ha	$2.56/ac	4 Oct. 2005
Corn:	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
	Clarity	2 oz/ac	0.15 l/ha	$1.50/ac	3 April 2005
	Round-up Ultra Max II	22 oz/ac	1.61 l/ha	$7.92/ac	22 June 2005
	Atrazine 4F	24 oz/ac	1.75 l/ha	$1.92/ac	22 June 2005
Fallow:	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	3 April 2005
	2,4-D LV6	5.3 oz/ac	0.39 l/ha	$0.80/ac	3 April 2005
	Clarity	2 oz/ac	0.15 l/ha	$1.50/ac	3 April 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	22 June 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	22 June 2005
	RT Master II	16 oz/ac	1.17 l/ha	$3.20/ac	28 July 2005
	Weedmaster	16 oz/ac	1.17 l/ha	$3.36/ac	28 July 2005
(Wheat Planting)	RT Master II	20 oz/ac	1.46 l/ha	$4.00/ac	4 Oct. 2005

Appendix B Table 17. Weed control methods including herbicide rate or tillage, cost and date applied at Akron in 2005 season.					
Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Cost	Date Applied
Rotation: Wheat-Fallow					
Wheat:	Sweep tillage			$6.00/A	16 Sept 2004
	Tandem disc tillage			$7.50/A	10 May 2005
	Sweep tillage			$6.00/A	19 June 2005
Fallow:	Tandem disc tillage			$7.50/A	18 July 2005
	Tandem disc tillage			$7.50/A	18 Sept 2005
Rotation: Wheat-Corn-Fallow					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87/A	30 Sept 2004
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	16 May 2005
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	27 June 2005
Fallow:	RT Master	20 oz/A	1.46 l/ha	$6.35/A	24 May 2005
	Clarity	8 oz/A	0.58 l/ha	$5.40/A	20 June 2005
	RT Master	20 oz/A	1.46 l/ha	$6.35/A	20 June 2005
	RT Master	20 oz/A	1.46 l/ha	$6.35/A	08 Aug 2005
	Roundup Ultra	24 oz/A	1.75 l/ha	$10.08/A	09 Sept 2005
Rotation: Wheat-Corn-Millet					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87/A	30 Sept 2004
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	16 May 2005
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	27 June 2005
Millet:	RT Master	20 oz/A	1.46 l/ha	$6.35/A	20 June 2005
	Clarity	8 oz/A	0.58 l/ha	$5.40/A	20 June 2005
	Select 2EC	10 oz/A	0.73 l/ha	$12.89/A	27 June 2005
Rotation: Wheat-Corn-Sunflower-Fallow:					
Wheat:	Roundup Original	32 oz/A	2.33 l/ha	$9.87	30 Sept 2004
Corn:	RT Master	32 oz/A	2.33 l/ha	$6.08/A	16 May 2005
	Roundup Original	25 oz/A	1.82 l/ha	$7.71A	27 June 2005
	Sweep tillage			$6.00/A	17 May 2005
	Sonalan 10G	12 lbs/A	13,440 g/ha	$12.15/A	17 May 2005
	Select 2EC	10 oz/A	0.73 l/ha	$12.89/A	08 June 2005
Sunflower	Roundup Ultra	16 oz/A	1.17 l/ha	$7.46/A	08 June 2005
Fallow:	RT Master	20 oz/A	1.46 l/ha	$6.35/A	24 May 2005
	Clarity	8 oz/A	0.58 l/ha	$5.40/A	20 June 2005
	RT Master	20 oz/A	1.46 l/ha	$6.35/A	20 June 2005
	RT Master	20 oz/A	1.46 l/ha	$6.35/A	08 Aug 2005
	Tandem disc			$7.50/A	18 Sept 2005

Appendix B Table 18. Weed control methods including herbicide rate, cost and date applied at Lamar during the 2004-2005 growing season.

Crop	Herbicide/Tillage	Rate (English)	Rate (Metric)	Weed Pressure	Cost/A	Date Applied
Rotation: Wheat-Fallow						
Wheat:	Glyphosate	24 oz/A	1.75 l/ha	I	5.52	23 Aug 2004
Wheat:	Paramount	5.3 oz/A	371.8 g/ha	I	16.80	19 Oct 2004
Wheat:	Ally Exta 2,4-D LV	0.4 oz/A 8 oz/A	28.0 g/ha 0.6 l/ha	I I	5.32	13 Apr 2005
Fallow:	Paramount	3 oz/A	210.5 g/ha	I	9.51	19 Oct 2004
Fallow:	Fallowmaster RT Master	32 oz/A 16 oz/A	2.3 l/ha 1.2 l/ha	I I	5.64	21 May 2005
Fallow:	Sweep			I	4.50	15 Jul 2005
Rotation: Wheat-Sorghum-Fallow						
Wheat:	Glyphosate	24 oz/A	1.75 l/ha	I	5.52	23 Aug 2004
Wheat:	Paramount	5.3 oz/A	371.8 g/ha	I	16.80	19 Oct 2004
Wheat:	Ally Exta 2,4-D LV	0.4 oz/A 8 oz/A	28.0 g/ha 0.6 l/ha	I I	5.32	13 Apr 2005
Fallow:	Paramount	3 oz/A	210.5 g/ha	I	9.51	19 Oct 2004
Fallow:	Fallowmaster RT Master	32 oz/A 16 oz/A	2.3 l/ha 1.2 l/ha	I I	5.64	21 May 2005
Fallow:	Sweep			I	4.50	15 Jul 2005
Sorghum	Fallowmaster RT Master Aatrex 4L	32 oz/A 16 oz/A 2 pts/A	2.3 l/ha 1.2 l/ha 2.4 l/ha	I I I	7.20	20 May 2005
Sorghum:	Hi-Dep	12 oz/A	0.87 l/ha	I	1.87	15 Jul 2005
Rotation: Wheat-Corn-Fallow						
Wheat:	Glyphosate	24 oz/A	1.75 l/ha	I	5.52	23 Aug 2004
Wheat:	Paramount	5.3 oz/A	371.8 g/ha	I	16.80	19 Oct 2004
Wheat:	Ally Exta 2,4-D LV	0.4 oz/A 8 oz/A	28.0 g/ha 0.6 l/ha	I I	5.32	13 Apr 2005
Fallow:	Paramount	3 oz/A	210.5 g/ha	I	9.51	19 Oct 2004
Fallow:	Sweep			I	4.50	15 Jul 2005
Corn:	Fallowmaster RT Master Aatrex 4L	32 oz/A 16 oz/A 2 pts/A	2.3 l/ha 1.2 l/ha 2.241 l/ha	I I I	7.20	20 May 2005
Corn:	Buccaneer	32 oz/A	2.3 l/ha	I	7.36	28 Jun 2005

***Applied 17 lbs. Ammonium Sulfate/100 gallons water with Round-up products.**

Weed Pressure Ratings: I =Farmer would need to spray. II = Farmer would delay application. III =Farmer would not plan a spray application.

APPENDIX C
PROJECT PUBLICATIONS

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