

# Dakota Lakes Research Farm – East River Site (Hughes County)

## Dryland Rotations - 1999

**1999 ACCOMPLISHMENTS:** Three dryland (no-till) rotations have been practiced at the Dakota Lakes Research Farm since 1991. They are: (1) Winter Wheat – Corn – Cool Season Broadleaf, (2) Winter Wheat – Corn – Warm Season Broadleaf – Spring Wheat, and (3) Winter Wheat – Warm Season Broadleaf – Corn – Cool Season Broadleaf.

The station hosts numerous small plot studies by scientists from the main University campus. These rotations were chosen to provide a range of environments for these studies. All of the work done by the station is “production scale”. This means that field size equipment is utilized with all harvest results being weighed in a 300 bushel weigh cart. Three tractors, one 12.5’ drill, one 12.5’ row crop planter, one 37.5’ sprayer, and one combine are used for all field work. The tractors are 85, 105, and 145 hp.

It is assumed that this equipment is capable of handling 600 acres per crop type and perform all seeding operations in a 10 day window. With this assumption at least 2,400 acres could be farmed with the present crop mix if all land were in a production enterprise (no research). Fifty percent of the land would be in rotation #1 (W.Wheat-Corn-Cool Season Broadleaf). The remaining 50% of the acreage would be devoted equally to the # 2 (W.Wheat-Corn-Warm Season Broadleaf-S.Wheat) and #3 (W.Wheat-Warm Season Broadleaf-Corn-Cool Season Broadleaf) rotations. This ratio provides a good balance between risk and return in the mixed grass prairie ecosystem present at the research center. The soils have moderately good water holding capacity.

The fall 1998 and spring 1999 (October through March) precipitation was slightly below average. Precipitation in April, May, and June was above average. July was slightly below average. Most of August was dry. A total of 2.81 of precipitation fell from July 1 through August 28, 1999. A very good rain event of 3.89 inches occurred on August 29 and 30. The research farm had 17 days of temperatures equal to or exceeding 95 degrees F and **six** of those days exceeded a high of 100 degrees F. The recorded high at the farm this year was 107 degrees F on July 29<sup>th</sup>.

See the chart below for actual precipitation received at the farm from October 1998 through September 1999 versus average precipitation.



the spring wheat year and wet again in the winter wheat year, has the potential for disease pressure (tan spot or septoria leaf diseases) in the winter wheat crop. The winter wheat variety planted in this rotation can have less than standard hardiness since it is planted into spring wheat stubble. The variety harvested in 1999 in this rotation was Jagger. This variety is not recommended to be planted north of Interstate 70 in Kansas with conventional tillage, due to its low winter hardiness. Jagger fits this rotation since it has good resistance to the leaf spotting diseases (i.e. tan spot or septoria). In 1999, this variety averaged 77 bushels per acre. This rotation is designed to save deep “soil profile” water for two years (during the wheat years) prior to planting a high water use crop like corn. In essence, it would need to be dry years in a row to prevent corn from having a full profile of moisture at seeding time. The corn variety Pioneer 36F30 (planted May 4<sup>th</sup> at 23,500 ppa) produced acceptable yields in 1999. Soybeans (Stine 2254RR and Pio92B21) and sunflowers (Cargill SF290NL) were utilized this year. The soybeans yielded very well. The full season cultivars utilized were able to take advantage of the late August rain event. Sunflowers can root deeper than corn to utilize the water and/or nitrates that may leach below the corn roots. The spring wheat variety was Russ; when planted in mid March it yielded 63.3 bushel per acre.

Spring wheat was also dormant seeded at two different dates: (1) December 11, 1998, into sunflower residue and (2) December 19, 1998, into both sunflower and soybean residue. The seeding rate was 132 pounds per acre with 70 pounds per acre of 10-50-0 fertilizer placed in the slot with the seed. The spring wheat yielded 68.4 bushels/acre behind sunflowers in the December 11<sup>th</sup> planting date. When planted on December 19<sup>th</sup> into soybean and sunflower residue yielded 68.3 bushels/acre and 63.2 bushels/acre respectively. These were not replicated tests.

### 3. Winter Wheat – Warm Season Broadleaf – Corn – Cool Season Broadleaf

Winter Wheat	-	Soybean / Sunflower	-	Corn	-	Field Pea
92 bu		43 bu / 1,634 lbs		119 bu		63 bu

Rotation #3 is designed for a milder winter (low winter kill) and wetter than average conditions. This rotation contains alternate year broadleaf crops and consequently experiences more broadleaf weed and disease pressure in the years when these crops are grown. Therefore, this rotation relies more heavily on technological inputs (herbicides, herbicide tolerant crops, disease resistant cultivars, etc) to prevent these problems in the broadleaf years. The lack of surface residue characteristic of this rotation means that the winter wheat variety in this rotation needs to have good to excellent winter hardiness. There is a potential for good wheat yields in this rotation when both a mild winter and a wetter than normal fall and spring occur. This is due to the three-year break between wheat crops. Jagger, 2137, and Quantum AP7510 were planted in this rotation in 1999 and yielded very well. The Quantum variety yielded 100.8 bushels/acre while the Jagger and 2137 yielded 89.2 bushels/acre and 87.3 bushels/acre respectively. Soybean (Stine 2254 RR and Pio92B21) and/or sunflower (Cargill SF290NL) were planted into the wheat stubble. The wheat stubble provides the soybean and sunflower with more deep moisture when compared to planting them behind a corn crop, however, long-term yield advantages of this sequence are quite small. This may partially due to the cool and wetter seedbed that is present. This impact appears to be more pronounced for sunflowers. Sunflower stands in 1999 were marginal in this rotation. The relatively dark, low-residue seedbed conditions present for the corn in this rotation allow early planting and utilization of full season hybrids. This crop is expected to perform well when fall, winter, and spring precipitation is sufficient to recharge the soil water profile. Pioneer 33A14 was utilized in this rotation in 1999

and yielded well. The field pea variety 'Carneval' was planted March 19<sup>th</sup> into corn stalks. The field peas yielded 63 bushels/acre.