

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

## Dryland Rotations - 2000

**2000 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 1999 through summer 2000 (October through September) precipitation was significantly below average. Additionally, precipitation for each month throughout this time period was below average. The research farm had 27 days of temperatures equal to or exceeding 95 degrees F and ten of those days exceeded a high of 100 degrees F. The recorded high at the farm this year was 108 degrees F on June 8<sup>th</sup>.

See the chart below for actual precipitation received at the farm from October 1999 through September 2000 versus average precipitation.



approximately 10-12 years) cheatgrass (and potentially leaf spotting and root rot diseases) problems due to the 2 in and 2 out stacking concept. If crops are to be stacked in the rotation, the crops need to be a minimum of 3 years out prior to the stacking and preferably 4 years out to be sustainable.

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 two years in a row to prevent corn from having a full profile of moisture at seeding time. The corn variety Pioneer 37M34 (planted April 29<sup>th</sup> at 22,000 ppa) produced 68 bushels/acre with limited precipitation. Soybean (Asgrow 2101RR) and sunflowers (Cargill SF290NL) were grown this year. 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 and yielded only 32 bushels per acre this year due to limited precipitation and where it is placed in the rotation (behind soybean and sunflower).

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

Winter Wheat	-	Soybean / Sunflower	-	Corn	-	Field Pea
81 bu		26 bu / 1,900 lbs		50 bu		33 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. ‘2137’ and ‘Wesley’ were planted in this rotation in 2000 and yielded very well.

Soybean (Pioneer 92B74) 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.

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 37M34 was planted in this rotation in 2000 and yielded relatively poorly due to the lack of precipitation. The field pea variety ‘Carneval’ was planted March 22<sup>nd</sup> into corn stalks. The field peas yielded 33 bushels/acre.