Summary of Six-year Soybean Planting Technology Trial

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Soybean acreage has dramatically expanded westward and northward in North Dakota in recent years. Over the past six years, an experiment was conducted by NDSU to provide agronomic recommendations for planting soybean in these regions that typically have drier and shorter growing seasons.

During 1999-2001, the experiment was conducted at Carrington, Minot, and Hettinger to study the performance of two varieties (Traill – maturity group 0.0 and Daksoy – maturity group 00.5) tested at three row spacings (6-7, 18-21, and 30 inch) and three planting rates (100,000, 150,000, and 200,000 pure live seeds (pls)/A). In addition, normal (18-21 May) and late (early June) planting dates were investigated at Carrington, and no-till compared to minimum-till systems were compared at Minot and Hettinger.

Averaged across the three years of the trial, solid-seeding increased seed yield 10% and 18- to 21-inch rows increased yield 5% compared to 30-inch rows. Planting 200,000 pls/A resulted in an average stand (4 site-years) of about 144,000 plants/A. The high- and mid-planting rates produced 15% and 6% higher average yields, respectively, compared to the lowest planting rate. In years with above-average August rainfall at Carrington (1999 and 2000), yield increased as seeding rate increased and as row spacing decreased. Under conditions of slightly below-average precipitation during podfill (2001), yield was unaffected by seeding rate or row spacing. The normal planting date provided a 6% seed yield advantage vs. late planting. No-till improved yield 24% compared to minimum till across years in the western locations.

During 2002-04, the experiment was refined and conducted at Carrington and Minot (2002 only) to study the performance of two varieties in 6- to 7- and 12- to 14-inch rows and planting rates of 175,000 and 225,000 pls/A. The varieties included Walsh (maturity group 0.0) and Barnes (maturity group 0.3) or RG200RR (maturity group 0.5). In addition, first-half vs. last-half of May planting dates were investigated at Carrington.

Solid-seeding increased seed yield in 2 of 4 site-years (Carrington and Minot, 2002) with a 4 site-year average of 36.3 bu/A with the 6- to 7-inch rows compared to 34.6 bu/A with the 12- to 14-inch rows. At Carrington in 2004, 14-inch rows yielded 22.2 bu/A vs. 7-inch rows at 19.8 bu/A. The three-year average stand at Carrington was 151,700 plants/A with the 225,000 pls/A planting rate and 131,700 plants/A with 175,000 pls/A. Yield was similar between planting rates in 3 of 4 site-years (Carrington, 2002-04), with a 4 site-year average of 36.2 bu/A with the higher planting rate vs. 34.6 bu/A with the lower rate. At Minot in 2002, yield was 54.8 bu/A with 225,000 pls/A and 50.9 bu/A with the lower rate. Below-average August rainfall occurred during 1 of 4 site-years (Carrington, 2004 = 0.3 inches less than long-term average). Planting dates at

Carrington in 2002 were May 10 and 20, 2003 were May 15 and 30, and 2004 were May 10 and 26. Yield was similar each year between planting dates (3-year average of 28.6 bu/A early vs. 28.9 bu/A normal dates).

Based on an initial yield potential of 25 bu/A and experiment results, if a soybean grower plants on a timely basis (6% yield increase vs. late planting), using narrow rows (5-10% yield increase vs. 30-inch rows), and establishes an adequate plant population (6-15% yield increase with > 140,000 plants/A vs. < 120,000 plants/A), a yield increase of 4-8 bu/A is possible. Using a soybean market price of $5/bu times 4-8 bu/A equals a gain of $20-40/A if a grower has a similar yield response with planting strategies as generated by the trial. In addition, improvement in income can be anticipated with direct-seeded systems.