

FERTILIZER BANDING RESULTS, 1981-83

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INTRODUCTION

The interest in deep banding of "dry" fertilizers has been rapidly growing since the introduction of the pneumatic applicator. Pneumatic applicators were designed primarily as seeding units, however, it soon became evident that the machines were well suited to the deep banding of "dry" fertilizers. In the fall of 1979, the Product Development Branch obtained three makes of air seeders, and working with farmer co-operators, deep banded over 2000 ha of stubble using urea fertilizer. This demonstrated that the machines were capable of banding fertilizers on a large scale. Following the test, a three year project was set up to compare deep banded N and double shot N & P with traditional fertilizer practices such as broadcasting N and placing P with the seed. Full size farm equipment was used for the banding and seeding operations.

METHODOLOGY

The study includes the Watrous test site plus off-stations within a 100 km radius of Watrous. The locations include Drake, Dafoe, Raymore, Young, Stalwart and Davidson. Over the three year period data was available from a total of 16 locations.

Equipment used for this test included a Prasco 75/55 air seeder on a 9.2 m C.I. heavy duty cultivator equipped with Ace knives and a 3.0 m Morris M-10 double disc press drill.

All test sites were seeded to wheat on stubble. Strip plots (non-replicated) 9.2 m wide and from 50-170 m long were used on all sites except for 3 m wide check strips. Length of the plots varied depending on the topography of the site.

All broadcast and banded treatments were fall applied using urea (46-0-0) as the nitrogen source. Banded applications were placed at a depth of 10 cm. Nitrogen treatments were applied October 15 in all three years.

Seed bed preparation and weed control, except for Watrous, was the responsibility of the farmer while the banding and seeding operations were handled by the Product Development Branch.

Yields were taken by harvesting 18 m² per strip.

Soil sampling was done on the same day as the banding.

Table 1 outlines the treatments at each test site.

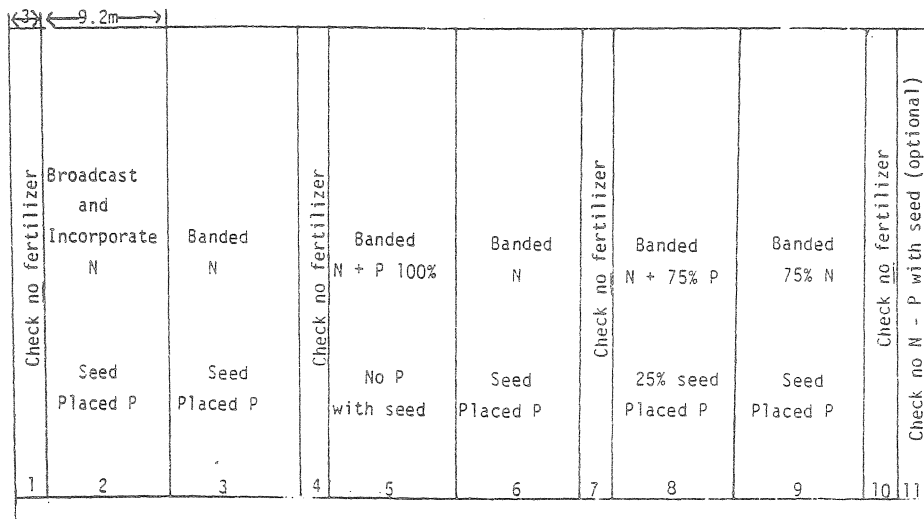
TABLE 1

<u>FALL</u>	<u>SPRING</u>
1. Banded N	Seed placed P
2. Banded N + 100% P	No P with seed
3. Banded N + 75% P	25% P with seed
4. Banded 75% N	Seed placed P
5. Broadcast & Incorporated N	Seed placed P
6. Check	Seed placed P
7. Check	No P with seed

P from 11-51-0 @ 28 kg/ha P
 N from 46-0-0 @ 56 kg/ha N

Figure 1 outlines the field plan for the off-station fertilizer trials.

FIGURE 1: FERTILIZER BANDING FIELD PLAN
 OFF-STATION



RESULTS AND DISCUSSION

Table 2 outlines the yield data from 1981-83 as well as the average yields over the three year period.

TABLE 2: BANDING RESULTS 1981-83 (KG/HA)

<u>Treatment</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>Average</u>
Banded N-seed placed P	1824	1855	2076	1918 (28.5 bu/ac)
Banded N + 100% P-no P with seed	1822	1848	2062	1911 (28.3 bu/ac)
Banded N + 75% P-25% P with seed	1705	1828	1981	1838 (27.3 bu/ac)
Band 75% N-seed placed P	1836	1702	1926	1821 (26.9 bu/ac)
Broadcast N-seed placed P	1768	1552	1624	1649 (24.4 bu/ac)
Check-seed placed P	1390	1183	1244	1272 (18.9 bu/ac)
Check-no fertilizer	-	961	999	981 (14.6 bu/ac)

Soil test results at each location over the three years are outlined in Table 3.

TABLE 3: SOIL TEST RESULTS

<u>Location</u>	<u>1981</u>		<u>1982</u>		<u>1983</u>	
	<u>N</u>	<u>P</u>	<u>N</u>	<u>P</u>	<u>N</u>	<u>P</u>
Watrous	49	9	32	15	28	10
Drake	48	11	44	22	20	14
Dafoe	53	10	42	17		
Raymore	55	6	20	15		
Young			18	21	13	10
Stalwart			34	13	26	12
Davidson	<u>108</u>	<u>6</u>	<u>—</u>	<u>—</u>	<u>18</u>	<u>22</u>
Average	62.6	8.4	31.7	17.2	21	13.6

N results from 0-24" sample

Analysis of the data indicates the following:

1. The use of fertilizer (best treatment) increased yields by an average of 937 kg/ha (13.9 bu/ac) over the unfertilized check.
2. Banded N (seed placed P) out yielded broadcast and incorporated N (seed placed P) in 15 of 16 locations.
3. Banded N + 100% P (no P with seed) out yielded broadcast and incorporated N (seed placed P) in 14 of 16 locations.

4. Banded N + 75% P (25% P with seed) out yielded broadcast and incorporated (seed placed P) in 11 of 16 locations.
5. Banded N (seed placed P) out yielded banded N + 100% P (no P with seed) in 7 of 16 locations.
6. Banded N (seed placed P) out yielded banded N + 75% P (25% P with seed) in 10 of 16 locations.
7. Band N + 100% P (no P with seed) out yielded banded N + 75% P (25% P with seed) in 10 of 16 locations.
8. Band 75% N (seed placed P) out yielded broadcast and incorporated N (seed placed P) in 12 of 16 locations.

Moisture conditions during the growing seasons at the test sites varied from dry to wet, however, the combined results from 16 test sites over three years should reflect the long term yield trends from the various fertilizer treatments in central Saskatchewan. There does however, appear to be a somewhat abnormal response in 1981. In 1980 the growing conditions were very dry which resulted in poor crops and a high level of available N in the soil for the 1981 crop. The high soil test levels of N was likely the reason for the very small increase in yield of banding over broadcasting in that year. Due to these circumstances, the 1981 results were not representative and therefore the three year average yield difference between banding and broadcasting is likely conservative.

Banded N (seed placed P) and banded N + 100% P performed well in all three years of the test. Banded N + 75% P (25% P with seed) performed poorly in 1981 and somewhat better in 1982 and 1983, although on the average this treatment yielded lower than the other two banded treatments in all three years. The reason for the poor performance of the split application of P is not known.

As a result of the good performance of banded N + 100% P is expected that farmers in central and southern Saskatchewan will further accept this method of fertilizer placement.

One observation noted at a number of locations during these trials is that substantial yield differences occurred between banded and broadcast treatments even though there were heavy rains on the plots early in the growing season. These rains should have moved the broadcast N down in the soil profile resulting in yields similar to banding, however, yield differences as high as 558 kg/ha (8.3 bu/ac) were recorded at these sites. It is possible that the tight band provided by the knife openers may have decreased the loss or tie-up of this N (compared to broadcast and incorporated N) and this may have been a factor in the yield difference.

CONCLUSIONS

1. Banded N is clearly superior to broadcast and incorporated N in central Saskatchewan.
2. Banded N + 100% P performed almost as well as banded N (seed placed P).
3. Banded N + 75% P (25% P with seed) did not perform as well as banded N (seed placed P) or banded N + 100% P.
4. The rate of N banded can be reduced by 25% and still out yield the full rate of broadcast and incorporated N.

ECONOMICS

The extra yield resulting from the best fertilizer treatment compared to the check resulted in a return of \$3.48 for every dollar invested in fertilizer. This is based on N @ 25.6¢/lb. and P @ 26.5¢/lb. and wheat at \$5.00/bu., and a yield increase from fertilizer of 13.9 bu/ac.

The increased yield of banding over broadcasting resulted in an extra revenue of \$20.50/acre (4.1 bu/ac x \$5.00/bu). If a banding machine were rented at \$4.00/acre, this still leaves an additional \$16.50/acre which would pay for about 80% of the total fertilizer cost.