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RISK MANAGEMENT GUIDE - DEVELOPMENT PROJECT

1ST ANNUAL REPORT

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MARCH 1989

A RISK MANAGEMENT GUIDE FOR CANADIAN WHEAT PRODUCERS

SUMMARY

TITLE OF PROJECT: A RISK MANAGEMENT GUIDE FOR CANADIAN WHEAT PRODUCERS

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ANNUAL REPORT

A RISK MANAGEMENT GUIDE FOR CANADIAN WHEAT PRODUCERS

PROJECT OBJECTIVE

The objective of this project is to develop a risk management guide which will enable wheat producers in Canada to evaluate the risk and probability of success associated with the use of inputs or other management practices throughout the growing season. The purpose of the guide will be to assist farmers in evaluatin g the potential net return associated with major production management decisions. Specifically, the Applicant will:

1. Develop a set of risk management charts and associated documentation (hereafter referred to as "the guide"), that can be used by wheat producers to evaluate the risk and probability of success associated with major production management decisions throughout the growing season.

2. Conduct an extensive review of the pertinent literature in order to design the necessary components of each part of the guide, and to highlight areas requiring further research.

3. Conduct a field study to develop methods for establishing yield targets for major Canadian wheat varieties under Canadian conditions, and for updating these yield targets as the season progresses.

4. Determine the probabilities associated with achieving a positive net return from the use of inputs or other management practices given the latest yield target for the crop, expected market prices for the crop, and the cost of inputs.

5. Field test and refine the risk management guide with the assistance of commercial farm operators.

6. Produce a prototype professional quality guide, and employ the services of a progressional agronomist to promote the use and benefits of the guide throughout the farm, and private and public extension communities across Canada.

The proposed guide will provide for initial practical yield targets based on environmental and economic factors, and provide farmers with the necessary information to update yield predictions at critical decision making stages of crop growth. The guide will provide benchmarks and threshold levels for farmers to assess the risk or likelihood of achieving net returns from each cropping input. The net effect of the guide will be to increase the probability of the farmer achieving the maximum economic yield.

The long term target for the guide will be to have all farmers in Canada who are concerned about lowering the per unit cost of production using the guide in the management of their farms.

1988 WORK SUMMARY

The 1988 work on the risk management guide was focused on 2 series of field trials as well as development of preliminary information on three of the seven modules of the guide.

The field trials included 9 trials on Flexible Nitrogen Management, 5 trials on Split Nitrogen Strategies, 4 trials on Nitrogen Sources for Flexible Nitrogen Management, 6 trials on Optimizing Crop Establishment and one Variety Performance trial. As well, additional measurements were taken from selected trials to assist in the development of the Yield Tracking Module.

Preliminary work has been initiated on three of the Guide Modules. The preliminary step on each module is to develop information suitable for an overall production manual, similar to the Canola Council of Canada's Grow with Canola production manual. Presently, we have prepared draft copies for weed control (40 pages) and crop establishment (30 pages). We are in the process and expect to complete sections on Variety considerations, Crop Nutrition/Fertilizer Management and Target Yields and Yield Tracking by March 31. The preliminary development work will not only provide the basis for a production manual but is critical to the development of our primary objective, a reliable and useable Risk Management Guide.

As a consequence to the extreme conditions of 1988, yield expectations were far from being realized. However, from a research perspective the results of the 1988 test plots provided invaluable data, perhaps previously unattainable relating to the stress conditions encountered. This allows for the establishment of a lower boundary for yield potential and input levels, and therefore will form a solid basis for dealing with risk management under crop stress conditions.

C871 FLEXIBLE NITROGEN MANAGEMENT TRIALS (9)

OBJECTIVE: To determine the effect of various nitrogen management strategies, including split N applications on wheat yield and quality.

A target yield was determined for each trial site based on the following formula.

Target Yield = PAW x WUE

PAW = plant available water x water use efficiency*
(soil availability water at seeding + expected ppt./growing season)-5
Note - 5 inches of water are necessary for vegetative growth
eg. Target Yield = [(8 + 7) -5] x 4
10 x 4 = 40

A post harvest yield 'prediction' was also calculated based on the target yield formula but based on actual moisture conditions during the year.

The nitrogen requirement to achieve the target yield was based on the following formula.

N requirement = [Target Yield (bu) x 2.0 lbs of N/bu] - soil NO3 - N to 2 ft.
eg. N requirement = [40 x 2] - 30 = 50 lbs/acre

*Suggested parameters

Type of wheat	WUE(bu/inch)	N requirement/bu
Hard red spring	4	2.0
Canadian Prairie Spring	5.2	1.6

The split application of nitrogen was based on the nitrogen requirement for achieving a 50% increase in the target yield. For example if the target yield was 40 bu/acre of Katepwa, the split N requirement would have been 40 x .5 = 20 x 2 = 40 lbs of N.

FLEXIBLE NITROGEN MANAGEMENT, MINTO 1988

C871 IH IP NH NP
IH - irrigated hard red spring wheat
IP - irrigated Canada Prairie Spring wheat
NH - non-irrigated hard red spring wheat
NP - non-irrigated Canada Prairie Spring wheat

MATERIALS AND METHODS

Wheat was seeded near Minto, Manitoba on May 11 at a rate of 300 seeds/m2 (96 kg/ha for Katepwa and 111 kg/ha for HY320) in 15 cm rows at a depth of 3 cm. 50 kg/ha P205 and 25 kg/ha K20 were placed with the seed. Initial N was banded between rows at the time of seeding. The experiment design was a randomized complete block with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass II + MCPA applied at 1.09 kg/ha + 0.035 kg/ha respectively on June 1 and with Estaprop on June 7 at a rate of 1.01 kg/ha. Tilt was applied at a rate of 0.125 kg/ha on June 30 to control foliar diseases. The split nitrogen treatments were applied at Zadoks growth stage 31-32 using 34-0-0. The split application rate was 40 and 80 kg/ha for the non-irrigated and irrigated experiments respectively. C871 IP and IH were irrigated June 7 and July 6 with 4 cm of water at each date. Soil moistures were taken at seeding, June 17 and June 30 at Zadoks 00, 31 and 49 respectively. Head counts were taken July 28. Plots were harvested August 9 (C871 IH), August 16 (C871 NH, NP) and August 23 (C871 IP). Yields were adjusted to 14.5% grain moisture. Data was analyzed at the 5% level.

C871 IH
RESULTS AND DISCUSSION

There were no significant differences in heads/m2 or kernel weight. Nitrogen rates or timing had no significant effect on maturity or kernel weight. The split application of nitrogen had no significant effect on yield. When nitrogen was applied as a split application, yields tended to be higher than when the same amount was applied in a single application. Protein content of grain increased as the rate of applied nitrogen increased. The extra nitrogen as a split application also increased grain protein.

TABLE 1. FLEXIBLE NITROGEN MANAGEMENT STUDY ON IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 JULY 27	MATURITY (0-9) AUG.4	AUG.8	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50	408	7.0	9.0	37.3	2614	15.6
3 INITIAL N: -25	397	6.8	8.8	37.8	2779	16.2
5 INITIAL N: TARGET*	378	6.5	8.8	38.5	2522	16.2
7 INITIAL N: +25	389	6.8	9.0	37.7	2626	17.2
9 INITIAL N: +50	389	6.8	8.8	38.1	2668	17.3
11 CHECK	361	7.0	9.0	36.8	2205	12.9
L.S.D. .05	51	0.3	0.3	1.2	258	
1 SPLIT N: 0	385	6.9	8.9	37.8	2531	15.6
2 SPLIT N: +50	390	6.7	8.8	37.6	2607	16.7
L.S.D. .05	30	0.5	0.2	0.8	171	

*Target yield = 80 bushels/acre (5380 kg/ha)
Post harvest yield 'prediction' = 52 bushels/acre (3497 kg/ha)

TABLE 2. FLEXIBLE NITROGEN MANAGEMENT STUDY ON IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 JULY 27	MATURITY (0-9) AUG.4	AUG.8	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	400	7.0	9.0	36.7	2542	14.6
2 INITIAL N: -50 SPLIT N: +50	415	7.0	9.0	37.9	2686	16.5
3 INITIAL N: -25 SPLIT N: 0	403	7.0	9.0	37.8	2751	15.7
4 INITIAL N: -25 SPLIT N: +50	392	6.5	8.5	37.8	2807	16.7
5 INITIAL N: TARGET SPLIT N: 0	355	6.5	8.5	39.7	2370	15.9
6 INITIAL N: TARGET SPLIT N: +50	402	6.5	9.0	37.3	2674	16.5
7 INITIAL N: +25 SPLIT N: 0	398	7.0	9.0	37.7	2671	17.2
8 INITIAL N: +25 SPLIT N: +50	381	6.5	9.0	37.8	2581	17.1
9 INITIAL N: +50 SPLIT N: 0	386	7.0	9.0	38.2	2656	17.2
10 INITIAL N: +50 SPLIT N: +50	392	6.5	8.5	38.1	2679	17.3
11 CHECK SPLIT N: 0	366	7.0	9.0	37.0	2198	12.9
12 CHECK SPLIT N: +50	356	7.0	9.0	37.0	2213	12.9
L.S.D. .05	59	0.6	0.4	1.7	337	
STANDARD DEVIATION	40.7	.39	.30	1.1	233	
COEFF. OF VARIABILITY	10.5	5.7	3.4	3.0	9.1	

RESULTS AND DISCUSSION

Nitrogen rates or timings of application had no significant effect on heads/m2. Increasing initial N rates tended to delay maturity, while split application had no significant effect on maturity. There were no significant differences in kernel weight. Yields tended to increase as total N rate increased. The addition of nitrogen as a split application resulted in a non-significant 100 kg/ha yield increase. However the split application was not positive where no initial N was added. The -50/+50 treatment (#2) gave a slightly higher yield when compared to the target treatment #5. Grain protein tended to be the greatest at target nitrogen rates. The addition of the 50 kg/ha N as a split application also increased grain protein by an average of 0.7%.

TABLE 3. FLEXIBLE NITROGEN MANAGEMENT STUDY ON IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 27	MATURITY (0-9) AUG.4	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	256	6.0	7.0	8.0	9.0	43.4	2698	12.9
2 INITIAL N: -50 SPLIT N: +50	231	5.0	6.0	8.0	9.0	44.3	2747	14.7
3 INITIAL N: -25 SPLIT N: 0	249	5.0	6.0	7.5	9.0	43.7	2986	14.4
4 INITIAL N: -25 SPLIT N: +50	238	5.0	6.0	8.0	9.0	43.3	2814	14.9
5 INITIAL N: TARGET SPLIT N: 0	232	5.0	6.0	7.5	8.5	44.2	2712	15.2
6 INITIAL N: TARGET SPLIT N: +50	266	4.5	6.0	7.5	8.5	44.8	2795	15.8
7 INITIAL N: +25 SPLIT N: 0	231	4.0	5.5	7.5	8.5	42.6	2892	14.2
8 INITIAL N: +25 SPLIT N: +50	257	4.5	5.5	7.5	8.5	43.9	3276	14.8
9 INITIAL N: +50 SPLIT N: 0	242	4.0	5.0	7.0	8.0	43.2	2601	14.6
10 INITIAL N: +50 SPLIT N: +50	262	4.0	5.0	7.0	8.5	43.9	3010	15.4
11 CHECK SPLIT N: 0	225	6.0	7.0	8.0	9.0	45.9	2480	12.5
12 CHECK SPLIT N: +50	189	6.0	7.0	8.0	9.0	44.3	2325	12.3
L.S.D. .05	36	0.3	0.4	0.5	0.6	2.2	394	
STANDARD DEVIATION	25	.22	.25	.36	.39	1.5	273	
COEFF. OF VARIABILITY	10	4.6	4.1	4.7	4.4	3.4	10	

TABLE 4. FLEXIBLE NITROGEN MANAGEMENT STUDY ON IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 27	MATURITY (0-9) AUG.4	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50	244	5.5	6.5	8.0	9.0	43.8	2722	13.8
3 INITIAL N: -25	243	5.0	6.0	7.8	9.0	43.5	2900	14.7
5 INITIAL N: TARGET*	249	4.8	6.0	7.5	8.5	44.5	2753	15.5
7 INITIAL N: +25	244	4.3	5.5	7.5	8.5	43.2	3084	14.5
9 INITIAL N: +50	252	4.0	5.0	7.0	8.3	43.5	2805	15.0
11 CHECK	207	6.0	7.0	8.0	9.0	45.1	2403	12.4
L.S.D. .05	30	.2	NSD	.4	.4	1.6	320	--
1 SPLIT N: 0	239	5.0	6.1	7.6	8.7	43.8	2728	14.0
2 SPLIT N: +50	240	4.8	5.9	7.7	8.8	44.1	2828	14.7
L.S.D. .05	13	.3	.3	.2	.2	1.8	273	--

*Target yield = 104 bu/acre (6994 kg/ha)
Post harvest prediction = 67.4 bu/acre (4546 kg/ha)

C871 NH
RESULTS AND DISCUSSION

The timing or rate of nitrogen application had no significant effect on heads/m2. Splitting N had no effect on maturity. As initial N rates increased, maturity tended to be delayed. Kernel weight tended to increase as initial N rates increased. The additional nitrogen as a split application resulted in a non-significant yield increase of 160 kg/ha over all N rates. All treatments except Target - 50 (#1) yielded more than the unfertilized check. There were no significant differences between nitrogen treatments. As in the previous 2 trials, split applications tended to yield more than the comparable single application. The split application, -50/+50 treatment (#2) yielded 247 kg/ha more than the target treatment (#5). Protein was increased from 14.8 to 15.5 in favour of the split N treatment. These treatments have the same total nitrogen applied. The extra nitrogen did not have a significant effect after Target -25 and yields tended to be similar regardless of N rate. Protein content tended to increase as the rate of applied nitrogen increased and also with the addition of the 50 kg/ha as a split application. All rates of N from Target -25 up (including the split application) resulted in protein contents of over 14.5%.

TABLE 5. FLEXIBLE NITROGEN MANAGEMENT STUDY ON NON-IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 26	MATURITY AUG.4	AUG.8	AUG.12	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	409	7.0	8.5	9.0	33.0	2014	12.6
2 INITIAL N: -50 SPLIT N: +50	417	7.0	8.0	9.0	34.8	2674	15.5
3 INITIAL N: -25 SPLIT N: 0	417	6.5	8.0	9.0	34.8	2471	14.5
4 INITIAL N: -25 SPLIT N: +50	437	6.0	7.5	9.0	34.7	2712	16.1
5 INITIAL N: TARGET SPLIT N: 0	415	6.0	7.5	9.0	34.9	2427	14.8
6 INITIAL N: TARGET SPLIT N: +50	426	6.0	7.0	8.5	34.3	2589	15.7
7 INITIAL N: +25 SPLIT N: 0	437	6.0	8.0	9.0	35.9	2551	15.1
8 INITIAL N: +25 SPLIT N: +50	387	6.0	7.5	8.5	34.8	2573	15.6
9 INITIAL N: +50 SPLIT N: 0	393	6.0	7.0	9.0	35.0	2484	15.6
10 INITIAL N: +50 SPLIT N: +50	420	5.5	7.5	8.5	34.7	2534	16.0
11 CHECK SPLIT N: 0	388	7.0	8.5	9.0	32.8	2267	11.9
12 CHECK SPLIT N: +50	390	7.0	8.0	9.0	33.8	2116	12.3
L.S.D. .05	68	.07	.08	.04	1.4	392	
STANDARD DEVIATION	47	.51	.54	.26	.96	272	
COEFF. OF VARIABILITY	11.5	8.1	7.0	2.9	2.8	11	

TABLE 6. FLEXIBLE NITROGEN MANAGEMENT STUDY ON NON-IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 26	MATURITY AUG.4	AUG.8	AUG.12	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50	413	7.0	8.3	9.0	33.9	2344	14.1
3 INITIAL N: -25	427	6.3	7.8	9.0	34.7	2591	15.3
5 INITIAL N: TARGET*	420	6.0	7.3	8.8	34.6	2508	15.3
7 INITIAL N: +25	412	6.0	7.8	8.8	35.4	2562	15.4
9 INITIAL N: +50	407	5.8	7.3	8.8	34.8	2509	15.8
11 CHECK	389	7.0	8.3	9.0	33.3	2192	12.1
L.S.D. .05	57	.8	.7	.2	1.0	262	
1 SPLIT N: 0	410	6.4	7.9	9.0	34.4	2369	14.1
2 SPLIT N: +50	413	6.3	7.6	8.8	34.5	2533	15.2
L.S.D. .05	42	.3	NSD	.5	0.6	446	

*Target yield = 40 bu/acre (2690 kg/ha)
Post harvest yield 'prediction' = 40 bu/acre (2690 kg/ha)

C871 NP
RESULTS AND DISCUSSION

Heads/m2 were not affected by initial or split N rates. Maturity of plants tended to be delayed as the rate of both initial and split N increased. Kernel weight tended to decrease as nitrogen rates increased. However yields increased steadily as rates of N increased, both for initial N and for split N. Split applications gave yields comparable to treatments with the same total nitrogen applied as a single application. Grain protein content tended to increase as applied nitrogen increased. The split application of nitrogen at GS 31 increased grain protein on average by 1.1 points or 7%.

TABLE 7. FLEXIBLE NITROGEN MANAGEMENT STUDY ON NON-IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 26	MATURITY AUG.4	AUG. 8	AUG.12	AUG.16	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	208	6.5	7.5	8.5	9.0	44.1	2584	11.1
2 INITIAL N: -50 SPLIT N: +50	214	5.5	7.0	8.5	9.0	44.0	2738	12.8
3 INITIAL N: -25 SPLIT N: 0	222	6.0	7.0	8.0	9.0	44.2	2726	11.8
4 INITIAL N: -25 SPLIT N: +50	224	5.0	6.5	8.0	9.0	44.2	2733	13.5
5 INITIAL N: TARGET SPLIT N: 0	208	6.0	7.0	8.0	9.0	43.8	2689	12.6
6 INITIAL N: TARGET SPLIT N: +50	229	4.5	5.5	7.5	8.5	44.1	2825	13.5
7 INITIAL N: +25 SPLIT N: 0	234	5.5	6.5	8.0	9.0	43.2	2745	13.5
8 INITIAL N: +25 SPLIT N: +50	257	4.5	5.5	7.5	8.5	43.7	2803	14.0
9 INITIAL N: +50 SPLIT N: 0	252	4.5	6.0	8.0	9.0	43.2	2908	13.8
10 INITIAL N: +50 SPLIT N: +50	238	4.0	5.5	7.5	8.5	42.7	3084	13.5
11 CHECK SPLIT N: 0	243	6.0	7.0	8.0	9.0	--	2556	11.5
12 CHECK SPLIT N: +50	231	6.0	7.0	8.0	9.0	42.8	2470	10.4
L.S.D. .05	37	0.6	0.6	0.6	0.4	1.8	291	
STANDARD DEVIATION	25.6	.41	.43	.39	.26	1.3	202	
COEFF. OF VARIABILITY	11.1	7.8	6.6	4.9	2.9	2.9	7.4	

TABLE 8. FLEXIBLE NITROGEN MANAGEMENT STUDY ON NON-IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	HEADS/M2 JULY 26	MATURITY AUG.4	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N: -50	211	6.0	7.3	8.5	9.0	44.1	2661	12.0
3 INITIAL N: -25	223	5.5	6.8	8.0	9.0	44.2	2730	12.7
5 INITIAL N: TARGET*	218	5.3	6.3	7.8	8.8	44.0	2757	13.1
7 INITIAL N: +25	246	5.0	6.0	7.8	8.8	43.5	2774	13.8
9 INITIAL N: +50	245	4.3	5.8	7.8	8.8	42.9	2996	13.7
11 CHECK	237	6.0	7.0	8.0	9.0	?	2513	11.0
L.S.D. .05	31	.6	.4	.5	.2	?	243	
1 SPLIT N: 0	228	5.8	6.8	8.1	9.0	?	2701	12.4
2 SPLIT N: +50	232	4.9	6.2	7.8	8.8	43.6	2775	13.0
L.S.D. .05	9	NSD	.6	.5	.5	?	124	

*Target yield 52 bu/acre (3497 kg/ha)
Post harvest yield 'prediction' 52 bu/acre (3497 kg/ha)

FLEXIBLE NITROGEN MANAGEMENT

C871 OH OP
OH - low natural fertility, poor tilth site, hard red spring wheat - Katepwa
OP - low natural fertility, poor tilth site Canada Prairie spring wheat HY320

MATERIALS AND METHODS

Wheat was planted near Fairfax, Manitoba on May 10, 1988 at a rate of 300 seeds/m2 (96 kg/ha for Katepwa and 111 kg/ha for HY320) and a depth of 3 cm in 15 cm rows. 50 kg/ha P205 and 25 kg/ha K2) were placed with the seed. Initial rates of N were banded between the rows at seeding. The experimental design was a randomized completed block design with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass II + MCPA at 1.09 kg/ha + 0.035 kg/ha applied June 1, Estaprop at 1.01 kg/ha applied June 7, and Lontrel at 0.2 kg/ha applied June 21. Soil moisture probes were taken June 20, June 30 and July 11. Plots were harvested August 8 with a small plot combine and yields adjusted to 14.5% moisture. Data was analyzed at the 5% level.

C871OH

RESULTS AND DISCUSSION

There were no significant differences in kernel weight between initial nitrogen treatments or between single and split applications. Yields tended to increase as initial N application increased and also when additional N was added as a split application. Increases were significant only for the initial N rates. Yields were generally low due to extreme heat in May and June coupled with low soil fertility at this location. Grain protein tended to increase as the rate of nitrogen increased. The split application increased grain protein by over 1% of grain protein, which was an improvement of 7.9%.

TABLE 9. NITROGEN APPLICATION STAGING STUDY ON HARD RED SPRING WHEAT
LOW FERTILITY SOIL, FAIRFAX, 1988

TREATMENT	TKW(G)	YIELD (KG/HA)	% GRAIN PROTEIN
1 INITIAL N: -50	25.6	285	13.8
3 INITIAL N: -25	25.4	371	14.6
5 INITIAL N: TARGET*	26.3	349	14.4
7 INITIAL N: +25	26.5	386	15.0
9 INITIAL N: +50	26.1	449	15.5
11 CHECK	25.5	266	13.5
L.S.D. .05	1.5	68	
1 SPLIT N: 0	26.0	340	13.9
2 SPLIT N: +50	26.9	362	15.0
L.S.D. .05	1.4	38	

*Target yield 40 bu/acre (2690 kg/ha)

TABLE 10. FLEXIBLE NITROGEN MANAGEMENT STUDY ON HARD RED SPRING WHEAT LOW FERTILITY SOIL, FAIRFAX, 1988

TREATMENT	TKW (G)	YIELD (KG/HA)	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	25.7	236	13.1
2 INITIAL N: -50 SPLIT N: +50	25.6	335	14.4
3 INITIAL N: -25 SPLIT N: 0	25.6	368	13.7
4 INITIAL N: -25 SPLIT N: +50	25.3	374	15.4
5 INITIAL N: TARGET SPLIT N: 0	25.8	363	13.7
6 INITIAL N: TARGET SPLIT N: +50	26.9	334	15.1
7 INITIAL N: +25 SPLIT N: 0	27.0	389	14.3
8 INITIAL N: +25 SPLIT N: +50	25.9	384	15.6
9 INITIAL N: +50 SPLIT N: 0	26.4	439	15.1
10 INITIAL N: +50 SPLIT N: +50	25.8	459	15.9
11 CHECK SPLIT N: 0	25.8	246	13.3
12 CHECK SPLIT N: +50	25.2	285	13.6
L.S.D..05	2.1	94	
STANDARD DEVIATION	1.5	65.4	
COEFF. OF VARIABILITY	5.7	18.6	

RESULTS AND DISCUSSION

Yields increased as initial N increased. Both the check and the Target -50 were significantly lower yielding than the Target +50 treatment. The split application resulted in a 40 kg/ha yield increase. The Target +50 treatment with the additional split had significantly higher yields than the check, check with the split and the Target -50 treatment. Protein content of the grain increased as applied nitrogen increased. The split application also increased protein content by about 1%.

The heat stress combined with poor past management of the site resulted in extremely low yields compared to the site at Minto (C871 IH, IP, NH, NP). It is interesting to note however that the split application did increase yields and proteins despite the very adverse conditions.

TABLE 11. FLEXIBLE NITROGEN MANAGEMENT STUDY ON CANADA PRAIRIE SPRING WHEAT LOW FERTILITY SOIL, FAIRFAX, 1988

TREATMENT	TKW (G)	YIELD (KG/HA)	% GRAIN PROTEIN
1 INITIAL N: -50	34.9	284	12.9
3 INITIAL N: -25	35.2	320	13.0
5 INITIAL N: TARGET*	35.7	356	13.8
7 INITIAL N: +25	35.2	343	14.1
9 INITIAL N: +50	35.8	380	14.5
11 CHECK	33.7	230	11.3
L.S.D. .05	-	84	
1 SPLIT N: 0	35.4	298	12.7
2 SPLIT N: +50	35.1	340	13.8
L.S.D.	-	82	

*Target yield 52 bu/acre (3497 kg/ha)

TABLE 12. FLEXIBLE NITROGEN MANAGEMENT STUDY ON CANADA PRAIRIE SPRING WHEAT LOW FERTILITY SOIL, FAIRFAX, 1988

TREATMENT	TKW (G)	YIELD (KG/HA)	% GRAIN PROTEIN
1 INITIAL N: -50 SPLIT N: 0	34.5	239	12.1
2 INITIAL N: -50 SPLIT N: +50	35.3	330	13.7
3 INITIAL N: -25 SPLIT N: 0	34.5	311	12.2
4 INITIAL N: -25 SPLIT N: +50	35.0	330	13.7
5 INITIAL N: TARGET SPLIT N: 0	36.0	346	13.2
6 INITIAL N: TARGET SPLIT N: +50	35.5	367	14.3
7 INITIAL N: +25 SPLIT N: 0	35.0	316	13.5
8 INITIAL N: +25 SPLIT N: +50	35.4	370	14.6
9 INITIAL N: +50 SPLIT N: 0	35.8	361	13.9
10 INITIAL N: +50 SPLIT N: +50	35.7	399	15.1
11 CHECK SPLIT N: 0	-	214	11.2
12 CHECK SPLIT N: +50	33.7	246	11.3
L.S.D. .05	2.1	104	
STANDARD DEVIATION	1.5	71.8	
COEFF. OF VARIABILITY	4.1	22.5	

FLEXIBLE NITROGEN MANAGEMENT

C871 DHDP
DH - droughty soil, hard red spring wheat
DP - droughty soil, Canada Prairie Spring Wheat

MATERIALS AND METHODS
Wheat was seeded near Wawanesa, Manitoba on May 14, 1988 at a rate of 300 seed/m2 (90 kg/ha for Katepwa and 111 kg/ha for HY320), a depth of 3 cm and a row spacing of 15 cm. 50 kg/ha P2O5 and 25 kg/ha K2O were placed with the seed. Initial N was banded between seed rows during the seeding operation. The experimental design was a randomized complete block with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass II applied at a rate of 1.09 kg/ha on June 6. Splikelet counts were conducted June 20; plots were harvested August 9.

C871 DH

RESULTS AND DISCUSSION
Grain yields tended to decrease as nitrogen rates increased, both for initial nitrogen and split applications. Under droughty conditions, increased vegetative growth as a result of the extra N may have reduced grain yield.

TABLE 13. NITROGEN APPLICATION STAGING STUDY ON HARD RED SPRING WHEAT DRYLAND WAWANESA, 1988

TREATMENT	GRAIN YIELD (KG/HA)
1 INITIAL N: -50 SPLIT N: 0	46
2 INITIAL N: -50 SPLIT N: +50	47
3 INITIAL N: -25 SPLIT N: 0	35
4 INITIAL N: -25 SPLIT N: +50	34
5 INITIAL N: TARGET SPLIT N: 0	31
6 INITIAL N: TARGET SPLIT N: +50	19
7 INITIAL N: +25 SPLIT N: 0	26
8 INITIAL N: +25 SPLIT N: +50	19
9 INITIAL N: +50 SPLIT N: 0	11
10 INITIAL N: +50 SPLIT N: +50	10
11 CHECK SPLIT N: 0	
12 CHECK SPLIT N: +50	20
L.S.D. .05	33
STANDARD DEVIATION	23.2
COEFFICIENT OF VARIABILITY	86.4

TABLE 14. NITROGEN APPLICATION STAGING STUDY ON HARD RED SPRING WHEAT DRYLAND WAWANESA, 1988

TREATMENT	GRAIN YIELD (KG/HA)
1 INITIAL N: -50	46
3 INITIAL N: -25	34
5 INITIAL N: TARGET*	25
7 INITIAL N: +25	22
9 INITIAL N: +50	10
11 CHECK	20
1 SPLIT N: 0	30
2 SPLIT N: +50	25

*Target yield 20 bushels/acre (1345 kg/ha)
Post harvest yield 'prediction' 2 bu/acre (134 kg/ha)

C871 DP

RESULTS AND DISCUSSION

There were no significant differences in yield due to initial N rates or the addition of the extra 50 kg/ha as a split application. The addition of the 50 kg/ha as a split did tend to increase yields slightly. Overall yields were extremely low due to drought conditions accented by the low moisture holding capacity of the soil. Green foxtail, which emerged after herbicide application also reduced yields.

TABLD 15. NITROGEN APPLICATION STAGING STUDY ON CANADA PRAIRIE SPRING WHEAT DRYLAND WAWANESA, 1988

TREATMENT		GRAIN YIELD (KG/HA)
1 INITIAL N:	-50	25
SPLIT N:	0	
2 INITIAL N:	-50	28
SPLIT N:	+50	
3 INITIAL N:	-25	48
SPLIT N:	0	
4 INITIAL N:	-25	52
SPLIT N:	+50	
5 INITIAL N:	TARGET	49
SPLIT N:	0	
6 INITIAL N:	TARGET	49
SPLIT N:	+50	
7 INITIAL N:	-25	62
SPLIT N:	0	
8 INITIAL N:	+25	55
SPLIT N:	+50	
9 INITIAL N:	+50	28
SPLIT N:	0	
10 INITIAL N:	+50	40
SPLIT N:	+50	
11 CHECK	0	0
SPLIT N:	0	
12 CHECK	0	35
SPLIT N:	+50	
L.S.D. .05		78
STANDARD DEVIATION		54.3
COEFFICIENT OF VARIABILITY		127.2

TABLE 16. NITROGEN APPLICATION STAGING STUDY ON PRAIRIE SPRING WHEAT DRYLAND WAWANESA, 1988

TREATMENT	GRAIN YIELD (KG/HA)
1 INITIAL N: -50	26
3 INITIAL N: -25	50
5 INITIAL N: TARGET*	49
7 INITIAL N: +25	59
9 INITIAL N: +50	34
11 CHECK	35
1 SPLIT N: 0	42
2 SPLIT N: +50	43

*Target yield 26 bu/acre (1748 kg/ha)
Post harvest yield 'prediction' 2.6 bu/acre (174 kg/ha)

FLEXIBLE NITROGEN MANAGEMENT - FAIRFAX 1988

C871 WH - late seeded, hard red spring wheat - Katepwa

MATERIALS AND METHODS

Katepwa wheat was seeded near Fairfax, Manitoba on June 8, 1988 at a rate of 96 kg/ha in 15 cm rows at a depth of 6 cm. 50 kg/ha P2O5 and 25 kg/ha K2O were placed with the seed. Initial rates of N were banded between the rows at the time of seeding. The experimental design was a randomized complete block design with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass 284 applied at 0.7 kg/ha on June 25. The split nitrogen application were broadcast on the appropriate plots on July 4 (Zadoks 31). Soil moisture probes and spikelet counts were taken July 11 (Zadoks 32). Plots were harvested September 7 and yields adjusted to 14.5% moisture. Data was analyzed at the 5% level.

RESULTS AND DISCUSSION

There were no significant differences in plants/m2 or heads/m2 due to initial N application or the addition of split N. There were no consistent trends in plant height as a result of N levels. Addition of a split application of nitrogen had no significant effect on kernel weight. Initial N rates had a significant effect on kernel weight, with the check treatment having the highest kernel weight. There were no significant differences in grain yield as a result of either initial N or split N. Protein levels were high as a result of low yields and high rates of nitrogen. The check treatments tended to have the lowest protein levels and protein generally increased as the amount of applied nitrogen was increased up to a maximum of Target + 25, Treatment 7. The combination of late seeding and heat stress resulted in a very low yield potential; nitrogen was not the factor limiting yield in this trial.

TABLE 17. FLEXIBLE NITROGEN MANAGEMENT STUDY ON HARD RED SPRING WHEAT FAIRFAX, 1988

TREATMENT	TKW (GRAMS)	GRAIN YIELD (KG/HA)
1 INITIAL N: -50	23.62	987
3 INITIAL N: -25	23.80	1034
5 INITIAL N: TARGET*	24.11	962
7 INITIAL N: +25	23.16	1004
9 INITIAL N: +50	23.43	963
11 CHECK	24.89	1041
L.S.D. .05	1.2	180
1 SPLIT N: 0	24.10	1008
2 SPLIT N: +50	23.57	988
L.S.D. .05	1.08	139

Target yield 40 bu/acre (2690 kg/ha)

TABLE 18. FLEXIBLE NITROGEN MANAGEMENT STUDY ON HARD RED SPRING WHEAT
FAIRFAX, 1988

TREATMENT	PLANT COUNTS /M2 JULY 11	HEADS/M2 AUG.29	PLANT HEIGHTS (CM) AUG.29	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 INITIAL N:-50 SPLIT N: 0	174	230	47	22.9	1006	18.3
2 INITIAL N:-50 SPLIT N: +50	180	229	44	24.3	969	18.4
3 INITIAL N:-25 SPLIT N: 0	195	210	48	24.1	988	18.1
4 INITIAL N:-25 SPLIT N: +50	158	235	46	23.5	1081	18.5
5 INITIAL N:TARGET SPLIT N: 0	173	226	46	24.7	1006	19.1
6 INITIAL N:TARGET SPLIT N: +50	175	242	47	23.6	917	18.5
7 INITIAL N:+25 SPLIT N: 0	189	243	48	23.3	1033	19.7
8 INITIAL N:+25 SPLIT N: +50	195	231	48	23.1	975	18.0
9 INITIAL N:+50 SPLIT N: 0	168	215	45	24.3	943	18.4
10 INITIAL N:+50 SPLIT N: +50	177	216	47	22.6	982	18.4
11 CHECK SPLIT N: 0				25.4	1075	18.1
12 CHECK SPLIT N: +50	187	237	48	24.4	1007	17.7
L.S.D. .05	38	40	4	1.6	202	
STANDARD DEVIATION	26.1	27.4	2.5	1.1	139.8	
COEFF. OF VAR.	14.6	12.0	5.5	4.7	14.0	

C871 GENERAL SUMMARY

Irrigation did not increase yields of Katepwa significantly. Under both irrigated and non-irrigated treatments, split applications had yields greater or equal to comparable single applications. In both situations, highest yields were obtained at target + 25 kg/ha. At later seeding dates (C871WH) or lower soil fertility (C871OH) rate or timing of nitrogen had less effect. At low levels of fertility, (C871OH) increasing rates of N did increase yields, though only about 150 kg/ha. HY320 did not respond to the irrigation with significantly higher yields. Yields tended to increase as nitrogen rates increased. This was true for normal, irrigated and low fertility (C871 NP, IP and OP respectively). Split applications had no effect on yield when compared to single application.

Yields under dry conditions (C871 DH, DP) were extremely low due to low water holding capacity of the soil. Grain protein levels tended to increase as applied nitrogen increased and also when extra nitrogen was added as a split application. Protein levels were higher for Katepwa than for HY320. Protein also tended to increase as available water increased, with the irrigated trials having higher protein levels than the non-irrigated trials. The only exception is C871WH, where a late seeding date lowered yields, increasing protein.

SPLIT NITROGEN MANAGEMENT STRATEGIES (5 TRIALS)

OBJECTIVE: To examine the performance of various combinations of pre-emergent nitrogen (base nitrogen) in combination with types and rates of topdressed nitrogen on the yield of HY320 and Katepwa wheat under various conditions.

SPLIT NITROGEN MANAGEMENT STRATEGIES, MINTO 1988

C873 IH IP NH NP
IH - irrigated hard red spring
NH - non-irrigated hard red spring
IP - irrigated Canada Prairie spring
NP - non-irrigated Canada Prairie spring

MATERIALS AND METHODS

Wheat was seeded near Minto, Manitoba on May 11, 1988 at a rate of 300 seeds/m2 (90 kg/ha for Katepwa and 111 kg/ha for HY320) a depth of 3 cm and a row spacing of 15 cm. 50 kg/ha P2O5 and 25 kg/ha K2O were banded with the seed. Initial applications of nitrogen were banded between the seed rows as 46-0-0. The experimental design was a randomized complete block with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with applications of Hoegrass II + MCPA at 1.09 kg/ha + 0.035 kg/ha on June 1 and Estaprop at 1.01 kg/ha on June 7. Tilt was applied at 0.25 kg/ha June 30 to control foliar diseases. Additional nitrogen was applied to the appropriate plots on June 16 (Zadoks 31) and June 29 (Zadoks 49). C873 IH and C873 IP were irrigated on June 6 and on July 10 with 4 cm water each time. Plants heights were taken August 4 and plots were rated for maturity 3 times prior to harvest. C873 NH and NP were harvested August 9 and August 15 respectively and C873 IP and IH were harvested August 24. Yields were adjusted to 14.5% moisture and kernel weights were assessed. Data was analyzed at the 5% level using Duncan's Multiple Range Test.

C873 IH
RESULTS AND DISCUSSION

Fertilizer rates had no significant effect on plant height for any of the fertilizer types used. 20-0-0(3) tended to result in taller plants than 34-0-0. In all cases, the 50/50 split resulted in the shortest plants. With the 20-0-0 (3), the 75/25 split resulted in the tallest plants and with the 34-0-0, the 75/12.5/12.5 split resulted in the tallest plants. Differences in maturity were slight and did not appear to follow any trend. There were no differences in kernel weight. Nitrogen rates above target (target +50) were not found to be advantageous. Yields decreased significantly as nitrogen rates dropped below target levels. There were no significant differences between 34-0-0 and 20-0-0(3) when applied at the same rates. Split nitrogen applications at the target rate gave yields which were generally equal to or higher than the single application treatment. The 75/25 split treatment gave the best yield response compared to the other split treatments. Protein levels were generally high, with the levels tending o be highest where applied N was greatest.

TABLE 19. NITROGEN STUDY ON IRRIGATED HARD RED SPRING WHEAT
MINTO, 1988

TREATMENT	PLANT HEIGHTS CM AUG.4	MATURITY(0-9) AUG.4	AUG.8	AUG.12	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 TARGET RATE 100% N @ SEEDING	86	5.5	7.5	8.5	35.5	2889	14.8
2 +50 RATE 100% N @ SEEDING	86	5.5	7.0	9.0	35.1	2998	15.7
3 TARGET RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	78	6.5	8.5	9.0	35.4	2989	15.8
4 TARGET RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	79	6.5	8.5	9.0	35.9	3009	15.3
5 +50 RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	77	5.5	7.5	9.0	34.6	3191	17.0
6 +50 RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	80	4.5	5.5	8.0	36.3	3120	16.5
7 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	79	5.5	9.0	8.5	35.5	3073	15.5
8 TARGET RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	86	6.0	7.0	8.5	36.4	2936	14.6
9 +50 RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	81	5.0	7.0	8.5	36.4	3038	16.8
10 +50 RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	88	5.0	6.0	8.0	36.4	3005	15.5
11 TARGET RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	81	5.5	7.5	8.5	33.8	2810	15.8
12 TARGET RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	83	6.5	7.5	9.0	36.5	2911	15.0
13 +50 RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	84	5.0	6.5	8.5	36.1	2981	16.3

TABLE 19. CONTINUED

14 +50 RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	84	6.0	7.0	9.0	35.1	3860	16.2
15 TARGET RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	85	5.5	7.0	8.5	35.7	3013	15.8
16 TARGET RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	83	6.5	8.0	9.0	36.0	2875	15.1
17 +50 RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	86	5.0	6.5	8.0	36.4	2960	17.2
18 +50 RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	84	6.0	7.5	9.0	35.4	3068	16.2
19 TARGET RATE 75% N @ SEEDING	88	6.5	7.5	9.0	35.3	2692	13.9
20 +50 RATE 75% N @ SEEDING	87	6.0	7.5	9.0	36.0	2998	14.6
21 TARGET RATE 50% N @ SEEDING	86	6.5	8.5	9.0	35.5	2461	14.0
22 +50 RATE 50% N @ SEEDING	87	6.5	8.5	9.0	35.9	2791	13.8
L.S.D. .05	5	0.7	1.2	0.6	1.6	247	
STANDARD DEVIATION	3.3	.51	.852	.40	1.1	175	
COEFF. OF VARIABILITY	3.9	8.9	11.7	4.6	3.2	5.9	

Target yield (Target) 80 bu/acre (5380 kg/ha)
Target yield (Target +50) 120 bu/acre (8070 kg/ha)

C873 NH
RESULTS AND DISCUSSION

Maturity of wheat was not affected by the rate or timing of nitrogen. Plant heights tended to be higher when the top dressed nitrogen source was 20-0-0(3) rather than 34-0-0. This differences was most pronounced at the Target +50 rate when split applied at 3 separate times. Kernel weight decreased as total N decreased. There were no significant differences in kernel weight between types of fertilizer. Kernel weight tended to decrease as the amount of fertilizer applied at Zadoks 31 decreased. There were no significant differences in yield between rates, timings or fertilizer types. Generally the split application treatments at the target nitrogen rate gave yields which were equal to or slightly better than the single rate treatment. The 75/25 split had a slight advantage over the other split application treatments. There was no consistent difference between 20-0-0(3) or 34-0-0 as a top dressing source in this trial. Protein levels were generally high.

TABLE 20. NITROGEN STUDY ON NON-IRRIGATED HARD RED SPRING WHEAT
MINTO, 1988

TREATMENT	PLANT HEIGHTS CM AUG.4	MATURITY(0-9) AUG.4	AUG.8	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 TARGET RATE 100% N @ SEEDING	57	7.0	8.5	35.1	1982	16.2
2 +50 RATE 100% N @ SEEDING	57	7.0	9.0	34.9	1927	16.6
3 TARGET RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	56	7.0	9.0	34.5	1967	16.8
4 TARGET RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	57	7.5	9.0	35.4	2021	16.1
5 +50 RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	55	7.0	9.0	34.7	1920	16.5
6 +50 RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	55	7.5	9.0	34.5	2137	15.8
7 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	55	7.0	9.0	34.2	2031	16.2
8 TARGET RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	56	7.0	9.0	34.7	2046	16.1
9 +50 RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	56	7.0	9.0	34.7	1995	16.4
10 +50 RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	56	7.0	9.0	33.8	2112	16.9

TABLE 20. CONTINUED

11 TARGET RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	54	7.5	9.0	32.8	2004	15.8
12 TARGET RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	56	8.0	9.0	33.5	1943	15.7
13 +50 RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	52	7.5	9.0	33.1	1805	15.6
14 +50 RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	58	8.0	9.0	33.3	1888	16.0
15 TARGET RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	56	7.5	9.0	34.0	1923	15.7
16 TARGET RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	56	8.0	9.0	33.5	1834	15.2
17 +50 RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	53	7.0	9.0	32.8	1890	16.7
18 +50 RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	56	7.0	9.0	33.5	1955	15.6
19 TARGET RATE 75% N @ SEEDING	58	8.0	9.0	34.0	2050	14.8
20 +50 RATE 75% N @ SEEDING	55	8.0	9.0	33.8	1724	15.8
21 TARGET RATE 50% N @ SEEDING	55	8.0	9.0	33.1	1970	13.6
22 +50 RATE 50% N @ SEEDING	56	8.0	9.0	33.9	1969	15.6
L.S.D. .05	2	0.4	0.2	1.4	335	
STANDARD DEVIATION	1.7	.28	.12	.995	237	
COEFF. OF VARIABILITY	3.1	3.8	1.4	2.9	12	

Target yield (Target) 40 bu/acre (2690 kg/ha)
Target yield (Target +50) 60 bu/acre (4035 kg/ha)

RESULTS AND DISCUSSION

Plant height tended to decrease as rates of applied nitrogen decreased. Plant heights also tended to be significantly lower when nitrogen was split three ways (at seeding, Zadoks 31 and 49) compared to applications at seeding and Zadoks 31. Application of 20-0-0(3) also tended to result in shorter plants than when 34-0-0 was used, though differences were not significant. There were no trends evident in maturity of plants as a result of rate or timing of nitrogen application. Kernel weights tended to be greater for plots treated with 34-0-0 than for plots treated with the comparable rate of 20-0-0(3). Kernel weight also tended to decrease as the rate of nitrogen applied increased, but only for split application treatments. Protein tended to increase as N rate increased.

Favourable yield responses were found with split applications compared to the single applications. This was particularly noticeable for the target rate treatments. The 75/25 splits or 50/25/25 split gave 300-400 kg/ha higher yields than the single application (Treatments 7, 8 and 11, 12 vs 1). On average, HY320 tended to give higher yields when 34-0-0 was used for top dressing compared to 20-0-0(3). This was particularly noticeable with the target +50 rates, where up to 120 kg/ha of N as 20-0-0(3) or 34-0-0 was applied. The high rate of 20-0-0(3) caused plant damage thus explaining the lower yield response with the 20-0-0(3) compared to the 34-0-0. It should be noted however that the rates of N applied in this trial were much higher than necessary as actual yields were much lower than target yields. The level of irrigation water plus rainfall was 10 inches instead of the anticipated 17 inches.

TABLE 21. SPLIT NITROGEN MANAGEMENT STRATEGIES; IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT HEIGHTS CM AUG.4	MATURITY (0-9) AUG.4	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 TARGET RATE 100% N @ SEEDING	68	5.5	6.0	7.5	8.5	44.1	3108	13.4
2 +50 RATE 100% N @ SEEDING	69	5.0	5.5	7.0	8.0	44.2	2997	15.5
3 TARGET RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	69	5.0	5.5	7.0	8.5	42.5	3098	13.8
4 TARGET RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	67	5.0	5.5	7.0	8.0	43.1	3067	13.6
5 +50 RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	69	5.0	5.0	6.5	8.0	44.2	3433	14.3
6 +50 RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	68	5.0	5.5	7.0	8.0	42.1	3017	14.1
7 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	68	6.0	6.0	8.0	9.0	45.4	3431	13.7
8 TARGET RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	67	5.0	6.0	7.5	8.5	43.9	3424	13.7
9 +50 RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	67	5.5	5.5	7.0	7.5	44.5	3507	14.2
10 +50 RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	65	5.0	5.5	7.0	7.5	43.0	3058	15.1
11 TARGET RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	64	5.5	6.0	7.0	8.0	45.6	3381	14.0
12 TARGET RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	64	5.8	6.0	7.0	8.0	43.9	3412	13.8
13 +50 RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	63	5.5	6.0	7.5	8.5	44.5	3514	15.1

TABLE 21. CONTINUED

14 +50 RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	65	5.0	5.5	7.0	8.0	41.7	3540	14.1
15 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	64	6.0	7.0	8.0	9.0	44.9	3500	13.9
16 TARGET RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	63	6.0	6.5	7.5	8.5	43.3	3204	14.4
17 +50 RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	62	5.0	5.5	7.0	8.0	42.7	3625	14.0
18 +50 RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	61	5.0	6.0	7.0	8.0	43.1	2923	14.0
19 TARGET RATE 75% N @ SEEDING	61	5.5	6.5	8.0	8.5	43.8	3244	12.6
20 +50 RATE 75% N @ SEEDING	62	5.0	5.5	6.0	8.0	43.2	3240	14.4
21 TARGET RATE 50% N @ SEEDING	62	5.5	6.0	7.5	8.5	44.2	3309	12.7
22 +50 RATE 50% N @ SEEDING	62	5.5	6.5	7.5	9.0	44.6	3357	13.2
L.S.D. .05	1	0.4	0.7	0.6	0.5	2.5	521	
STANDARD DEVIATION	1.0	.31	.48	.40	.37	1.8	368	
COEFF. OF VARIABILITY	1.6	5.8	8.1	5.5	4.5	4.0	11	

Target yield (Target) 104 bu/acre
Target yield (Target +50) 156 bu/acre

C873 NP

RESULTS AND DISCUSSION

Plant height tended to decrease as the rate of applied nitrogen decreased. Split applications also tended to result in shorter plants than comparable single applications. Plants treated with 20-0-0(3) were shorter than plants treated with 34-0-0. Maturity was delayed slightly with the use of 34-0-0 compared to 20-0-0 (3). Neither rate or time of application of fertilizer had any significant effect on kernel weight. There were no significant differences in yield, with the exception of treatment -Target 34-0-0 50%/50% which was higher than the treatment Target 20-0-0 (3) 75/12.5/12.5. Yields tended to be lower for Target +50 than for comparable target rates, especially for single applications or split applications with 34-0-0. The trend was reversed when N was split 3 times using 20-0-0(3). Treatments 3 (34-0-0, 50/50), 7 (34-0-0, 75/25) and 8 (20-0-0(3), 75/25) gave the highest yields which were approximately 200 kg/ha higher than Treatment 1, the single application of the same rate of nitrogen.

The high rates of 20-0-0(3), up to 60 kg/ha with the 50/50 split at the target +50 rate resulted in plant damage which reduced yields. Nitrogen loss by volatization +/or injury by high rates of 20-0-0(3) resulted in poor performance of 20-0-0(3) as a top dressing nitrogen source in this trial. The treatments with 34-0-0 gave comparatively superior yields to those with 20-0-0(3). The split N treatment was more effective with the target rate rather than the target +50 rate. The most effective 34-0-0 split application treatments were 50/50 and 75/25 as compared to 50/25/25 or 75/12.5/12.5. A larger amount of nitrogen applied at growth stage 31 was more effective.

TABLE 22. CONTINUED

14 +50 RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	54	6.5	7.5	9.0	41.7	2609	12.1
15 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	58	7.0	7.5	8.5	44.3	2863	12.8
16 TARGET RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	56	7.0	8.0	9.0	43.3	2486	12.9
17 +50 RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	57	6.0	7.0	8.5	44.2	3010	13.7
18 +50 RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	56	6.5	8.0	9.0	43.0	2704	12.4
19 TARGET RATE 75% N @ SEEDING	58	6.5	7.5	9.0	44.6	2803	12.1
20 +50 RATE 75% N @ SEEDING	58	7.0	7.5	9.0	44.5	2533	11.4
21 TARGET RATE 50% N @ SEEDING	56	7.0	7.5	9.0	42.1	2765	12.0
22 +50 RATE 50% N @ SEEDING	57	7.0	7.5	9.0	43.5	2660	11.7
L.S.D. .05	3	0.4	0.4	0.4	2.5	542	
STANDARD DEVIATION	1.9	.31	.32	.29	1.8	383	
COEFF. OF VARIABILITY	3.3	4.9	4.4	3.4	4.1	13.6	

Target yield (Target) 52 bu/acre (3497 kg/ha)
Target yield (Target +50) 78 bu/acre (5245 kg/ha)

TABLE 22. NITROGEN STUDY ON NON-IRRIGATED CANADA PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT HEIGHTS CM	AUG.4	MATURITY AUG.8	AUG.12	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 TARGET RATE 100% N @ SEEDING	60	6.0	7.0	9.0	43.5	2942	13.2
2 +50 RATE 100% N @ SEEDING	57	6.0	7.0	9.0	42.0	2928	12.0
3 TARGET RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	61	6.0	7.0	8.5	43.3	3162	11.7
4 TARGET RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	58	6.5	7.5	9.0	45.1	2805	11.9
5 +50 RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	61	6.0	7.0	9.0	43.0	2969	11.7
6 +50 RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	55	5.5	7.0	8.5	44.6	2719	11.5
7 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	60	6.0	7.0	8.5	43.3	3139	11.3
8 TARGET RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	57	6.0	7.0	8.5	44.1	3132	11.8
9 +50 RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	59	5.5	6.5	8.5	42.5	2985	12.5
10 +50 RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	57	6.0	7.0	8.5	42.7	2708	12.1
11 TARGET RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	59	6.0	7.0	8.5	44.7	3045	11.7
12 TARGET RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	55	7.0	8.0	9.0	43.9	2500	12.3
13 +50 RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	58	6.0	7.0	8.5	44.9	2722	12.9

C873 WH - late seeded non-irrigated hard red spring wheat

MATERIALS AND METHODS

Katepwa wheat was seeded near Minto, Manitoba on June 10, 1988 at a rate of 90 kg/ha, a depth of 7 cm and a row spacing of 15 cm. 50 kg/ha P2O5 and 25 kg/ha K2O were placed with the seed. Initial rates of nitrogen were banded between seed rows as 46-0-0. The experimental design was a Randomized Complete Block with 4 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass 284 applied at 0.7 kg/ha on June 25. Additional nitrogen was applied to the appropriate plots on July 4 (Zadoks 31) and July 29 (Zadoks 50). Plant heights and heads/m2 were measured August 31. Plots were harvested September 7 with a small plot combine. Kernel weights were taken and yields adjusted to 14.5% moisture. Data was analyzed at the 5% level using Duncan's MRT.

C873WH

RESULTS AND DISCUSSION

There were no significant differences in plant population between treatments. Plant heights were not affected by varying the initial rate of nitrogen. Rate and timing of 20-0-0(3) and 34-0-0 had only slight affects on plant height. Heads/m2 were reduced slightly in the Target rate of 20-0-0 (3) applied as a 50/50 split. There were no significant differences in kernel weight between rates and timings for each fertilizer type. At Target rates, 34-0-0 resulted in lower TKW than 20-0-0 (3) but the difference was significant only with the 50/25/25 split application. Yields tended to increase as nitrogen rates increased, though differences were not significant at similar timings of application. Yields were higher for 20-0-0 (3) than for comparable rates and timings of 34-0-0, though differences were not significant. Yield increases with the split nitrogen application treatments were not consistent with this trial. The low yield levels and lack of consistent significant responses would indicate that the lowest levels of fertilizer inputs would have been optimum for this trial. Due to low yields and high levels of available nitrogen, grain protein levels were extremely high. Lower yields, with the exception of the check, tended to have higher protein levels.

TABLE 23. NITROGEN STUDY ON HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS /M2 SEPT.1	PLANT HEIGHTS CM	HEADS /M2 AUG.31	TKW G	YIELD KG/HA	% GRAIN PROTEIN
1 TARGET RATE 100% N @ SEEDING	155	53	305	26.3	1331	16.6
2 +50 RATE 100% N @ SEEDING	156	53	343	25.2	1412	17.4
3 TARGET RATE 34-0-0 50% @ SEEDING 50% @ GS 31	128	49	320	23.5	1123	17.3
4 TARGET RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	145	53	290	25.7	1312	17.3
5 +50 RATE 34-0-0 50% N @ SEEDING 50% N @ GS 31	142	50	312	26.0	1222	17.2
6 +50 RATE 20-0-0(3) 50% N @ SEEDING 50% N @ GS 31	125	55	348	26.3	1636	16.5
7 TARGET RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	173	51	316	24.4	1210	17.7
8 TARGET RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	142	52	307	26.2	1285	17.4
9 +50 RATE 34-0-0 75% N @ SEEDING 25% N @ GS 31	123	55	360	24.0	1286	18.2
10 +50 RATE 20-0-0(3) 75% N @ SEEDING 25% N @ GS 31	120	57	352	25.1	1554	17.0
11 TARGET RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	146	54	325	23.3	1201	18.1
12 TARGET RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	118	55	318	26.3	1481	17.2
13 +50 RATE 34-0-0 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	178	56	344	23.8	1441	17.2

TABLE 23. CONTINUED

14 +50 RATE 20-0-0(3) 50% N @ SEEDING 25% N @ GS 31 25% N @ GS 49	149	56	336	25.5	1566	17.2
15 TARGET RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	133	51	313	25.0	1161	18.6
16 TARGET RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	145	53	325	25.4	1518	17.3
17 +50 RATE 34-0-0 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	146	51	354	25.5	1299	18.0
18 +50 RATE 20-0-0(3) 75% N @ SEEDING 12.5% N @ GS 31 12.5% N @ GS 49	116	54	346	24.7	1322	18.5
19 TARGET RATE 75% N @ SEEDING	155	52	307	26.6	1382	17.0
20 +50 RATE 75% N @ SEEDING	127	54	334	26.3	1469	17.4
21 TARGET RATE 50% N @ SEEDING	183	52	342	25.7	1256	17.6
22 +50 RATE 50% N @ SEEDING	99	52	310	24.3	1276	18.2
L.S.D. .05	78	5	48	2.4	359	
STANDARD DEVIATION	54.9	3.5	34.1	1.7	254	
COEFF. OF VARIABILITY	38.9	6.5	10.4	6.9	19	

Target yield (Target) 40 bu/acre (2690 kg/ha)
Target yield (Target +50) 60 bu/acre (4035 kg/ha)

C873 GENERAL SUMMARY

Trials with HY320 resulted in higher yields than trials with Katepwa. Irrigation increased yields for both cultivars, about 500 kg/ha for HY320 and 1000 kg/ha for Katepwa. The addition of 50% more N over the target resulted in yield increases of 100 kg/ha in C873 IH and C873 WH. All other trials showed a slight decrease or no effect from the addition of the extra base N. Over all three trials with Katepwa, plots treated with 20-0-0(3) consistently outyielded plots where N was applied as 34-0-0/ Over both trials with HY320, the plots treated with 20-0-0(3) yielded less than plots treated with 34-0-0. Yield increases due to the extra 50% N were small but occured in 80% of the cases for Katepwa while with HY320 increases occured less than 40% of the time.

Protein contents were high in 1988 due to low yields brought about by drought conditions. Protein levels of Katepwa were higher than those of HY320. Irrigated Katepwa had a slightly lower grain protein level than the non-irrigated Katepwa. The late seeded experiment (C873WH) had the highest protein levels, probably due in part to the very low yields. Protein levels of HY320 were generally 2-3% lower than Katepwa, but were lowest for the non-irrigated trial.

COMPARISON OF NITROGEN SOURCE FOR FLEXIBLE NITROGEN MANAGEMENT (4 TRIALS)

C872 IP IH NP NH
NH - non-irrigated hard red spring wheat
IH - irrigated, hard red spring wheat
NP - non-irrigated Canada Prairie Spring wheat
IP - irrigated Canada Prairie Spring wheat

OBJECTIVE: To determine the efficiency of 4 nitrogen sources for top dressing in HRS and CPS wheats under various conditions.

MATERIALS AND METHODS

Wheat was planted near Minto, Manitoba on May 11, 1988 at a rate of 300 seeds/m2 (96 kg/ha for Katepwa and 111 kg/ha for HY320) in 15 cm rows at a depth of 3 cm. 50 kg/ha P205 and 25 kg/ha K20 were placed with the seed. Initial N was banded with the seed to provide a total of 80 kg/ha of fertilizer and soil nitrogen for the NH and NP trials, and total of 160 kg/ha N for the IP and IH trials. The experiment design was a randomized complete block with 12 replicates and a plot size of 2 x 7.5 m. Weeds were controlled with Hoegrass II + MCPA applied at 1.09 kg/ha + 0.035 respectively on June 1 and with Estaprop on June 9 at a rate of 1.01 kg/ha. Tilt was applied at a rate of .125 kg/ha on June 30 to control foliar diseases. Additional nitrogen was applied June 17, (growth stage 31-32) by injecting, spraying or broadcasting. The rates of nitrogen applied to the non-irrigated trial was 40 kg/ha and 80 kg/ha to the irrigated trial. C872 IP and IH were irrigated with 4 cm of water on June 9 and again on July 8. Plots were harvested August 15 (C872 NH, NP) and August 24 (C872 IH, IP). Data as analyzed at the 5% level.

RESULTS AND DISCUSSION

C872 NH

Yields ranged from 2531 to 2613 kg/ha. There were no significant differences in yield between treatments. All treatment means were within a 100 kg/ha range.

C872 IH

Yields ranged from 3339 to 3197 kg/ha. The 28-0-0 stripband treatment yielded significantly more than the untreated check. All other treatments did not differ from these two.

C872 IP

Yields ranged from 3292 to 2533 kg/ha. There were no significant differences in yield between treatments. The untreated check had the highest yield by over 100 kg/ha. The lowest yields were on plots treated with the 20-0-0 (3) injected.

C872 NP

Yields ranged from 3399 to 3173 kg/ha. The 20-0-0 (3) sprayed resulted in the highest yields, significantly higher than the 28-0-0 injected or the untreated check. The 34-0-0 and 28-0-0 stripband treatments were intermediate in yield.

The difference between the treatment would have been minimized due to the occurence of a 5 cm rain the evening after the treatments were applied. Extra water was to have been applied on a split plot basis after the topdressing treatments were applied. Due to the rainfall after application, these treatments were not carried out. Rainfall will be controlled in 1989 trials with the use of rain shelters. Yields of Katepwa increased about 600 kg/ha when plots were irrigated. Yields of HY320 increased about 100 kg/ha when irrigated. Under both moisture situations, HY320 outyielded Katepwa with the difference greatest under dryland conditions.

TABLE 24. EFFECTS OF NITROGEN APPLICATION METHODS ON WHEAT YIELD MINTO, 1988

TREATMENT	YIELD (KG/HA)			
	C872 IP	C872 NP	C872 IH	C872 NH
1. 34-0-0 BROADCAST	3414	3273	3270	2531
2. 28-0-0 STRIPBAND	3344	3244	3339	2572
3. 20-0-0(3)SPRAYED	3292	3399	3254	2537
4. 28-0-0 INJECTED	3380	3173	3315	2613
5. CHECK	3522	3204	3197	2565
L.S.D. .05	238	153	123	75
C.V.	8.5	5.7	4.6	3.6

C830 CROP ESTABLISHMENT ROW SPACING AND DENSITY

OBJECTIVE: To determine the effects of row spacing and crop density on wheat yields over a range of environmental conditions.

C830 IH IP NH NP
IH - irrigated, hard red spring wheat
IP - irrigated, Canada Prairie Spring wheat
NH - non-irrigated hard red spring wheat
NP - non-irrigated Canada Prairie Spring wheat

MATERIALS AND METHODS

Wheat was seeded near Minto, Manitoba on May 13, 1988 at 200, 300 and 400 seeds/m2 (64, 96 and 128 kg/ha for Katepwa and 73, 110 and 147 kg/ha for HY320 respectively) in rows of 11, 15 and 23 cm. 50 kg/ha P2O5 and 25 kg/ha K2O were placed with the seed. For C830 IH, IP 110 kg/ha N as 46-0-0 was banded prior to seeding and for C830 NH, NP 30 kg/ha N as 46-0-0 was banded prior to seeding. Weeds were controlled with Hoegrass II + MCPA applied at 1.09 + 0.035 kg/ha respectively on June 1 and with Estaprop applied at 1.01 kg/ha on June 7. Tilt was applied at 0.125 kg/ha June 30 to control foliar diseases. C830 IH and IP were irrigated with 4 cm water on June 9 and again on July 8. Head counts were taken July 28. Plots were harvested August 16 (NH, NP) and August 23 (IH and IP). Yields were adjusted to 14.5% moisture and data was analyzed at the 5% level.

C830 IH Irrigated hard red spring wheat - Katepwa
RESULTS AND DISCUSSION

The 11 cm rows had the highest number of plants/m2 but were not significantly different from the 15 or 23 cm rows. This trend was evident over all seeding rates. Plants/m2 increased as seeding rate increased, but amounted to only about 55-60% of seeds planted. There were significantly higher number of heads/m2 for the 11 cm row spacing. Heads/m2 also increased as seeding rate increased. There were differences in maturity between treatments. Narrow rows and higher seeding rates tended to hasten maturity, probably due to increased competition for moisture and nutrients. Kernel weight tended to increase as seeding rate increased. There was no evident trend in TKW as affected by row spacing, though the 15 cm rows resulted in significantly higher TKW than the 11 or 23 cm rows. There were significant differences in yield between treatments. Highest yields were obtained with the 11 cm row spacing and 400 seeds/m2 seeding rate, which were significantly higher than the other treatments except the 11 cm with 300 seeds/m2 and the 15 cm with 300 and 400 seeds/m2. Over all seeding rates, the 11 cm row spacing yielded 119 kg/ha more than the 15 cm row spacing and 223 kg/ha more than 23 cm row spacing. Yields also tended to increase as seeding rates increased, with the difference between 200 and 300 seeds/m2 being significant.

TABLE 25. ROW SPACING VS SEEDING RATE STUDY ON IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS/M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	TKW GRAMS	YIELD KG/HA
ROW SPACING: 4.5"	200	372	5.5	7.3	8.7	30.51	2212
ROW SPACING: 6.0"	180	325	6.3	7.8	8.8	31.64	2093
ROW SPACING: 9.0"	180	286	6.3	7.7	8.5	31.25	1989
L.S.D. .05	28	44	0.6	0.2	0.2	0.8	107
RATE: 200 SEEDS/M2	112	288	5.5	7.0	8.2	30.77	1908
RATE: 300 SEEDS/M2	187	340	6.0	7.7	8.8	31.08	2178
RATE: 400 SEEDS/M2	262	355	6.7	8.2	9.0	31.55	2209
L.S.D. .05	35	33	0.5	0.3	0.2	0.8	127

TABLE 26. ROW SPACING VS SEEDING RATE STUDY ON IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS/M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	TKW GRAMS	YIELD KG/HA
1 ROW SPACING: 4.5" RATE: 200 SEEDS/M2	134	337	4.5	6.5	8.0	29.72	1990
2 ROW SPACING: 4.5" RATE: 300 SEEDS/M2	193	372	6.0	7.5	9.0	30.68	2295
3 ROW SPACING: 4.5" RATE: 400 SEEDS/M2	271	408	6.0	8.0	9.0	31.14	2351
4 ROW SPACING: 6.0" RATE: 200 SEEDS/M2	98	290	6.0	7.5	8.5	32.24	1926
5 ROW SPACING: 6.0" RATE: 300 SEEDS/M2	175	332	6.0	8.0	9.0	31.28	2138
6 ROW SPACING: 6.0" RATE: 400 SEEDS/M2	268	352	7.0	8.0	9.0	31.41	2216
7 ROW SPACING: 9.0" RATE: 200 SEEDS/M2	104	237	6.0	7.0	8.0	30.36	1808
8 ROW SPACING: 9.0" RATE: 300 SEEDS/M2	192	315	6.0	7.5	8.5	31.30	2100
9 ROW SPACING: 9.0" RATE: 400 SEEDS/M2	245	306	7.0	8.5	9.0	32.10	2061
L.S.D.	56	58	0.8	0.4	0.4	1.28	203
STANDARD DEVIATION	38.8	39.6	.58	.30	.25	.88	139
COEFFIC. OF VAR.	20.6	12.1	9.5	4.0	2.9	2.8	6.6

C830 IP Irrigated Canada Prairie Spring wheat - HY320
RESULTS AND DISCUSSION

There were no significant differences in plants/m2 between row spacings. Plants/m2 increased significantly as seeding rate increased, but remained at about 60% of planted seeds for all seeding rates. Heads/m2 increased as row spacing decreased, with the 11 cm row spacing having significantly more heads/m2 than the 15 or 23 cm row spacing. Heads/m2 also increased significantly as seeding rate increased from 200 to 400 seeds/m2. There were no significant differences in maturity due to row spacing. Maturity was delayed as seeding rates decreased. There were no significant differences in kernel weight between row spacings, though kernel weight tended to increase as row spacing increased. Kernel weight increased as seeding rate increased, with the 300 and 400 seeds/m2 rates having significantly higher kernel weights than the 200 seeds/m2 rate. Row spacing had no significant effect on yield though yields tended to increase as row spacing decreased with the 4.5" row spacing yielding more than the other row spacings. The 300 and 400 seeds/m2 rates yielding significantly more than the 200 seeds/m2 rate. The 400 seeds/m2 rate yielded more than the 300 seeds/m2 but differences were not significant.

TABLE 27. ROW SPACING VS SEEDING RATE STUDY ON IRRIGATED PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS/M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA
ROW SPACING: 4.5"	188	286	4.3	5.7	7.5	8.5	39.21	2706
ROW SPACING: 6.0"	178	246	4.3	5.7	7.3	8.3	39.89	2572
ROW SPACING: 9.0"	175	228	4.3	6.2	7.3	8.3	40.17	2525
L.S.D. .05	32	33	0.4	0.5	0.2	0.2	2.1	308
RATE: 200 SEEDS/M2	116	233	3.8	5.3	7.0	8.0	38.40	2341
RATE: 300 SEEDS/M2	178	252	4.3	5.8	7.2	8.2	39.94	2631
RATE: 400 SEEDS/M2	247	275	4.8	6.3	8.0	9.0	40.93	2832
L.S.D. .05	20	29	0.2	0.2	0.2	0.2	1.5	203

TABLE 28. ROW SPACING VS SEEDING RATE STUDY ON IRRIGATED PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS /M2 MAY 30	HEADS/M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA
1 ROW SPACING: 4.5" RATE: 200 SEEDS/M2	116	270	3.5	5.5	7.0	8.0	38.5	2433
2 ROW SPACING: 4.5" RATE: 300 SEEDS/M2	184	281	4.5	5.5	7.5	8.5	38.8	2775
3 ROW SPACING: 4.5" RATE: 400 SEEDS/M2	266	305	5.0	6.0	8.0	9.0	40.4	2911
4 ROW SPACING: 6.0" RATE: 200 SEEDS/M2	114	224	4.0	5.0	7.0	8.0	37.6	2407
5 ROW SPACING: 6.0" RATE: 300 SEEDS/M2	183	245	4.5	6.0	7.0	8.0	41.4	2498
6 ROW SPACING: 6.0" RATE: 400 SEEDS/M2	237	271	4.5	6.0	8.0	9.0	40.8	2813
7 ROW SPACING: 9.0" RATE: 200 SEEDS/M2	118	205	4.0	5.5	7.0	8.0	39.2	2184
8 ROW SPACING: 9.0" RATE: 300 SEEDS/M2	168	229	4.0	6.0	7.0	8.0	39.7	2620
9 ROW SPACING: 9.0" RATE: 400 SEEDS/M2	238	250	5.0	7.0	8.0	9.0	41.7	2772
L.S.D. .05	38	49	0.4	0.5	0.3	0.3	2.7	375
STANDARD DEVIATION	26.0	33.2	.30	.35	.19	.19	1.8	257
COEFF. OF VARIABILITY	14.4	13.1	7.0	6.0	2.6	2.3	4.6	9.9

C830 NH Non-irrigated hard red spring wheat - Katepwa
RESULTS AND DISCUSSION

There were no significant differences in plants/m2 between row spacings. All row spacings had about 80% emergence. Plants/m2 increased significantly with each increase in seeding rate, though % emergence tended to decrease. As row spacing decreased, the heads/m2 increased, with the 11 cm row spacing having significantly more heads/m2 than the 15 or 23 cm row spacings. Heads/m2 also decreased as seeding rate decreased, with the 200 seeds/m2 having significantly less heads/m2 than the 300 or 400 seeds/m2 treatments. Maturity was hastened as row spacing narrowed and as seeding rate increased, though differences were slight. Row spacing and seeding rate had no significant effect on kernel weight. There were no significant differences in yield due to row spacing, though the 11 cm row spacing yielded over 100 kg/ha more than the 15 or 23 cm row spacings. Yields increased as seeding rate increased from 200 to 400 seeds/m2, though only the difference between 200 and 300 seeds/m2 was significant.

TABLE 29. ROW SPACING VS SEEDING RATE STUDY ON NON-IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS/M2 JULY 27	MATURITY(0-9) AUG.3	AUG.8	AUG.12	TKW G	YIELD KG/HA
ROW SPACING:4.5"	236	407	6.3	8.5	8.8	33.1	2029
ROW SPACING:6.0"	255	339	6.3	8.3	9.0	33.6	1909
ROW SPACING:9.0"	241	312	6.5	8.0	8.7	33.1	1920
L.S.D. .05	38	58	0.2	0.2	0.3	1.1	301
RATE: 200 SEEDS/M2	171	298	6.2	8.0	8.8	33.3	1757
RATE: 300 SEEDS/M2	251	364	6.3	8.3	8.8	33.6	2035
RATE: 400 SEEDS/M2	310	396	6.7	8.5	8.8	33.0	2066
L.S.D. .05	38	31	0.3	0.4	0.2	1.0	313

TABLE 30. ROW SPACING VS SEEDING RATE STUDY ON NON-IRRIGATED HARD RED SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS/M2 JULY 27	MATURITY(0-9) AUG.3	AUG.8	AUG.12	TKW G	YIELD KG/HA
1 ROW SPACING: 4.5" RATE: 200 SEEDS/M2	177	310	6.0	8.5	9.0	33.4	1885
2 ROW SPACING: 4.5" RATE: 300 SEEDS/M2	209	424	6.5	9.0	9.0	33.2	1933
3 ROW SPACING: 4.5" RATE: 400 SEEDS/M2	322	486	6.5	8.0	8.5	32.7	2270
4 ROW SPACING: 6.0" RATE: 200 SEEDS/M2	168	306	6.0	8.0	9.0	33.3	1749
5 ROW SPACING: 6.0" RATE: 300 SEEDS/M2	298	368	6.5	8.5	9.0	34.3	2132
6 ROW SPACING: 6.0" RATE: 400 SEEDS/M2	298	343	6.5	8.5	9.0	33.0	1846
7 ROW SPACING: 9.0" RATE: 200 SEEDS/M2	167	278	6.5	7.5	7.5	33.0	1638
8 ROW SPACING: 9.0" RATE: 300 SEEDS/M2	244	299	6.0	7.5	8.5	33.2	2039
9 ROW SPACING: 9.0" RATE: 400 SEEDS/M2	310	360	7.0	9.0	9.0	33.2	2082
L.S.D. .05	62	62	0.4	0.6	0.4	1.7	511
STANDARD DEVIATION	42.5	42.8	.30	.38	.29	1.2	350
COEFF. OF VARIABILITY	17.5	12.1	4.8	3.3	4.7	3.5	18.0

C830 NP Non-irrigated Canada Prairie Spring wheat - HY320
RESULTS AND DISCUSSION

Row spacing had no effect on plant population. Plants/m2 increased significantly as seeding rate increased from 200 to 400 seeds/m2. Heads/m followed the same trends as plants/m2, with greater heads/m2 at narrower row spacing and higher seeding rates. The 11 cm rows had significantly more heads/m2 than the 15 or 23 cm rows. Heads/m2 also increased significantly as seeding rate increased from 200 to 300 and from 300 to 400 seeds/m2. Maturity tended to be delayed by narrow row spacing and increased seeding rates. There were no significant differences in kernel weight as a result of changing row spacing or seeding rate. There were no significant differences in yield as a result of changes in row spacing, though yields tended to increase as row spacing decreased. Seeding rates had a significant effect on grain yield. Significant yield increases occured as a result of each increase in seeding rate.

TABLE 31. ROW SPACING VS SEEDING RATE STUDY ON NON-IRRIGATED PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS /M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA
ROW SPACING 4.5"	207	319	5.0	6.5	7.8	8.8	43.5	2212
ROW SPACING 4.5"	109	263	5.5	7.0	7.8	8.7	43.86	2158
ROW SPACING 4.5"	197	260	5.8	7.5	8.5	9.0	43.73	2133
L.S.D. .05	89	43	0.2	0.3	0.4	0.3	1.5	242
RATE 200 SEEDS/M2	137	238	5.2	6.7	8.0	8.8	43.4	1817
RATE 300 SEEDS/M2	209	271	5.3	7.0	8.2	8.8	43.8	2203
RATE 400 SEEDS/M2	247	333	5.8	7.3	8.0	8.8	44.0	2484
L.S.D. .05	86	26	0.2	0.2	0.3	0.2	1.1	218

TABLE 32. ROW SPACING VS SEEDING RATE STUDY ON NON-IRRIGATED PRAIRIE SPRING WHEAT MINTO, 1988

TREATMENT	PLANT COUNTS/M2 MAY 30	HEADS /M2 JULY 27	MATURITY (0-9) AUG.3	AUG.8	AUG.12	AUG.16	TKW G	YIELD KG/HA
1 ROW SPACING 4.5" RATE 200 SEEDS/M2	140	274	4.5	6.0	7.5	8.5	42.7	1775
2 ROW SPACING 4.5" RATE 300 SEEDS/M2	234	305	5.0	6.5	8.0	9.0	43.5	2176
3 ROW SPACING 4.5" RATE 400 SEEDS/M2	246	379	5.5	7.0	8.0	9.0	44.4	2685
4 ROW SPACING 6.0" RATE 200 SEEDS/M2	123	215	5.5	7.0	8.0	9.0	43.9	1838
5 ROW SPACING 6.0" RATE 300 SEEDS/M2	188	264	5.5	7.0	8.0	8.5	44.1	2262
6 ROW SPACING 6.0" RATE 400 SEEDS/M2	257	309	5.5	7.0	7.5	8.5	43.6	2374
7 ROW SPACING 9.0" RATE 200 SEEDS/M2	148	225	5.5	7.0	8.5	9.0	43.6	1838
8 ROW SPACING 9.0" RATE 300 SEEDS/M2	206	242	5.5	7.5	8.5	9.0	43.7	2169
9 ROW SPACING 9.0" RATE 400 SEEDS/M2	239	313	6.5	8.0	8.5	9.0	43.9	2391
L.S.D. .05	60	50	0.3	0.4	0.6	0.4	1.9	367
STANDARD DEVIATION	41.4	34.0	.19	.29	.38	.29	1.3	251
COEFF. OF VAR.	20.9	12.1	3.5	4.1	4.8	3.3	2.9	11.6

TABLE 33. YIELD TRACKING - YIELD COMPONENTS AT VARIOUS STAGES

CULTIVAR	PLANTS/M2 MAY 30	TILLERS/M2 JUNE 22	SPIKELETS/ TILLER JUNE 22	YIELD KG/HA AUG.23	HEADS/M2 AUG. 2	TKW G
Max	171	151	15	2718	348	30
Katepwa	168	176	12	3098	504	32
Neepawa	186	250	13	3401	504	31
Roblin	185	196	11	2748	405	37
Laura	179	215	12	3745	435	33
HY320	172	190	15	3852	420	34
HY355	215	160	17	3402	329	31
L.S.D. .05	40	51	2	592	94	2.3

TABLE 34. AGRONOMIC DATA

CULTIVAR	VIGOR RATING* JUNE 2	VIGOR RATING* JULY 11	PLANT HEIGHT CM AUG.2	DAYS TO MATURITY	YIELD** KG/HA	PROTEIN %
Max	8.75	7.5	78	94	2718	13.4
Katepwa	8.00	8.0	80	92	3098	15.9
Neepawa	8.50	8.3	87	94	3401	16.2
Roblin	9.00	7.0	69	87	2748	17.6
Laura	8.75	7.8	79	93	3745	15.8
HY320	8.25	8.0	67	97	3852	13.4
HY355	8.75	8.0	78	93	3402	13.2
L.S.D. .05			10		592	

*Vigor - 9=most vigorous; 0=dead
**Average yield with + without fungicide

TABLE 35. DISEASE REACTIONS

CULTIVAR	LEAF RUST(0-9)* JULY 12	LEAF RUST(0-9)* AUG 3	TANSPOT/SEPTORIA(0-9) JULY 12	YIELD(KG/HA) NO FUNGICIDE	YIELD(KG/HA) WITH TILT
Max	4.0	4.3	4.0	2265	3171
Katepwa	1.0	2.0	4.0	3300	2897
Neepawa	1.5	3.0	4.0	3275	3528
Roblin	2.0	2.0	3.0	2538	2957
Laura	2.5	2.0	5.0	3639	3851
HY320	1.0	1.5	3.5	3805	3900
HY355	2.5	4.0	5.5	3103	3700

*Disease rating from untreated plots
Disease rating scale used was the Horsfall-Barratt, see Appendix for description

CROP ESTABLISHMENT
GENERAL SUMMARY

In all cases, seeding rate had a larger effect on yield than row spacing. Over all 4 trials, the increase in yield due to seeding rate increases from 200 to 400 seeds/m2, averaged over 400 kg/ha. The largest increases occured between 200 and 300 seeds/m2. This was consistent in both irrigated and non-irrigated trials of both CPS and HRS wheat.

In all cases, yields increased as row spacing decreased. Yield increases averaged 200 kg/ha for irrigated trials and 100 kg/ha for dryland trials when row spacing decreased from 23 to 11 cm. Yield increases tended to be greater as row spacings decreased from 15 to 11 cm than with the decrease from 23 to 15 cm.

Yield increases as a result of greater seeding rates may be due largely to the increase in plant counts and the resultant increase in heads/m2. Seeding rate had a greater effect on plant population than did row spacing. This was true for both Katepwa and HY320.

TABLE 36. EFFECTS OF ROW SPACING AND SEEDING RATE ON PLANT ESTABLISHMENT AND YIELD OF KATEPWA AND HY320 WHEAT

		HY320							KATEPWA						
		NORMAL			IRRIGATED				NORMAL			IRRIGATED			
	SEEDS/M2	PLANTS/M2	% EMERGENCE	YIELD KG/HA	PLANTS/M2	% EMERGENCE	YIELD KG/HA	% EMERGE. X̄	PLANTS/M2	% EMERGENCE	YIELD KG/HA	PLANTS/M2	% EMERGENCE	YIELD KG/HA	% EMERGE. X̄
11 CM	200	140	70	1775	116	58	2433	64	177	89	1885	134	67	1990	78
	300	234	78	2176	184	61	2775	70	209	70	1933	193	64	2295	67
	400	246	62	2685	266	67	2911	65	322	81	2270	271	68	2351	75
	X	207	70	2212	189	62	2706	66	236	80	2029	199	66	2212	73
15 CM	200	123	62	1838	114	57	2407	60	168	84	1749	98	49	1926	67
	300	188	63	2263	183	61	2498	62	298	99	2132	175	58	2138	79
	400	257	64	2374	237	59	2813	62	298	75	1846	268	67	2216	71
	X	189	63	2158	178	59	2573	61	255	86	1909	180	58	2093	72
23 CM	200	148	74	1838	118	59	2184	66	167	84	1638	104	52	1808	68
	300	206	69	2169	168	56	2620	63	244	81	2039	192	64	2100	73
	400	239	60	2391	238	60	2772	60	310	78	2082	245	61	2061	70
	X	198	68	2133	175	58	2525	63	240	81	1920	180	59	1990	70

PT841 WHEAT CULTIVAR EVALUATION TRIAL, MINTO 1988

OBJECTIVE: To evaluate the yield potential and yield components of seven wheat cultivars.

TREATMENT

CULTIVAR	ORIGIN	TYPE
1. Max	Germany	HRS
2. Katepwa	Manitoba	HRS
3. Neepawa	Manitoba	HRS
4. Roblin	Manitoba	HRS
5. Laura	Saskatchewan	HRS
6. HY320	Saskatchewan	CPS(red)
7. HY355	Saskatchewan	CPS(white)

MATERIALS AND METHODS

Seven wheat cultivars were treated with Vitavax and seeded near Minto, Manitoba on May 18, 1988. The trial was established on summerfallow at a rate of 300 seeds/m2 using 15 cm row spacing. Fertilizer was applied as a pre-plant band at a rate of 60 kg/ha N and 50 kg/ha P2O5. Overall pesticide applications included Hoegrass II + MCPA on June 1 and Tilt at .125 kg ai/ha on June 30 on reps C + D only. Plants counts were taken May 30. Tiller counts and spikelet counts were taken June 22 at approximately G.S. 31. Disease ratings were taken July 12 and August 13. Plant heights, shattering ratings, days to maturity and heads/m2 were recorded near harvest. Grain yields were taken August 23 using a Wintersteiger plot combine. Grain yields were corrected for moisture and reported at a moisture content of 14.5%. Protein content and TKW were determined from samples of harvested grain. Data was analyzed at the .05 level and means compared using the Duncan's Multiple Range Test.

RESULTS AND DISCUSSION

The major information sought in this trial is in regards to yield tracking and final yield (Table 33). The data collected on yields and yield components will be used to establish a yield tracking formula which will be used in the Risk Management Guide. Due to the limited amount of data collected on cultivars to date, no attempt was made to establish a yield tracking formula for individual cultivars. Formula development will proceed in subsequent years.

Agronomic data (Table 34) indicate that Laura and Katepwa were the two top yielding HRS cultivars. HY320 gave the highest overall yield and was also the latest maturity variety.

Disease ratings shown in Table 35 show that Max spring wheat and HY355 exhibit the greatest susceptibility to the prevalent diseases. Both cultivars gave good response to the fungicide applications. In general, the average yields increased approximately 400 kg/ha when the fungicide was added compared to the untreated check. Katepwa and HY320 exhibited low disease ratings and low response to the fungicide. Low disease ratings are not common on HY320 and the results are somewhat surprising.

COMPARISON OF VARIETY PERFORMANCE

TABLE 37 RELATIVE PERFORMANCE OF HY320 VS KATEPWA, MINTO 1988

TRIAL*	AVERAGE YIELD (KG/HA)*		
	KATEPWA	HY320	% YIELD OF KATEPWA
C871 irrigated	2569	2778	108
C871 non-irrigated	2451	2738	112

*All trials reported were seeded at 300 seeds/m2 on 6" row spacing.

The normal yield expectation of HY320 over Katepwa is approximately 30%. However the yield data from 1988 shows HY320 was not as well adapted to the drought and in particular to the extreme heat stress as was the Katepwa.

Some of the reasons for the lower than expected yield difference could be due to low tillering capacity of HY320 compared to Katepwa. The 1988 season accentuated the difference by reducing the amount of tillers formed.

TABLE 38 VARIETY PERFORMANCE AFFECTED BY CROP ESTABLISHMENT, MINTO 1988

TREATMENT	YIELD (KG/HA) (IRRIGATED TRIALS)		
	KATEPWA	HY320	% YIELD OF KATEPWA
300 SEEDS AT 6"	2216	2498	113
400 SEEDS AT 4.5"	2351	2911	124
	YIELD (KG/HA) (NON-IRRIGATED TRIALS)		
300 SEEDS AT 6"	2132	2262	106
400 SEEDS AT 4.5"	2270	2685	118

Results from the Crop Establishment trials show that some of the yield difference could be recaptured when HY320 was established using narrow row spacing and higher seed rates. While both varieties responded to the increased plant density and more equidistant geometry of establishment, HY320 was particularly responsive. Under the non-irrigated conditions HY320 went from 106% of Katepwa at 300 seeds at 6" row spacing to 118% of Katepwa at 400 seeds and 4.5" row spacing. The more favourable condition under the irrigated trials also allowed HY320 to perform better relative to Katepwa than in the non irrigated trial. Comparing the performance of HY320 relative to Katepwa based on 400 seeds at 4.5" row spacing, HY320 yielded 124% of Katepwa under the irrigated condition but only 118% under the non-irrigated conditions.

YIELD TRACKING

Assessments of the various yield components were conducted at growth stage 31 in a number of trials during 1988. A rough formula was developed based on plant counts, tillering, spikelet counts and average kernel weight which could be used to predict final grain yields. At a later date in the study regression analysis will be performed on the data to assess the reliability of the formula for estimating yields at growth stage 31. The following tables list the input data, taken at growth stage 31, actual harvested yields and the yield estimates from data collected at growth stage 31.

The formula used is as follows:
YIELD = plants/m2 x tillers/plant x spikelets/tiller x 1.4 x TKW - 100
ASSUMPTIONS
Kernel weight for Katepwa 28g/1000 kernels
Kernel weight for HY320 36g/1000 kernels

TABLE 39. YIELD COMPONENTS, HARVESTED YIELD AND ESTIMATED YIELD

EXPERIMENT	TREATMENT	YIELD COMPONENTS AT G.S.31 PLANTS/M2	TILLERS/ PLANT	SPIKELETS/ TILLER	HARVESTED YIELD KG/HA	EST. YIELD KG/HA
KATEPWA						
C871 IH	1	265	3.0	9.5	2542	2961
	9	265	3.5	9.0	2056	3272
C871 NH	1	230	4.0	9.5	2014	3426
	9	230	3.0	8.5	2484	2299
C871 WH	1	174	3.0	7.5	1006	1534
	5	173	3.0	7.2	1006	1468
	9	168	3.0	7.6	943	1517
C871 DH	1	213	1.0	8.5	<100	709
	9	213	1.0	7.5	<100	626
C873 WH	1	155	3.1	8	1331	1502
	5	142	3.5	9	1222	1252
	9	123	3.6	9	1286	1562
C873 NH	1	239	2.6	9	2107	2192
HY320						
C871 IP	1	195	3.8	11.3	2698	3553
	9	195	3.8	11.1	2600	4145
C871 NP	1	208	2.4	9.4	2584	2365
	9	208	2.6	9.8	2908	2671
C871 DP	1	175	1	9.0	<100	763
C873 NP	1	223	2.0	10	2942	2248

TABLE 40. COMPARISON OF MANITOBA CROP INSURANCE YIELD ESTIMATES WITH PRELIMINARY CANADA GRAINS COUNCIL ESTIMATOR FOR KATEPWA, 1988.

EXPERIMENT	MANITOBA CROP INSURANCE* YIELD (KG/HA)	RISK MGT GUIDE** YIELD (KG/HA)	HARVEST YIELD(KG/HA)
C871 IN	3635	3272	2656
C871 NH	3155	2484	2299
C871 WH	2304	1517	943
C871 DE	2922	626	<100
C873 NH	3279	2192	2107

*MANITOBA CROP INSURANCE before heading calculation
Yield = # of plants x tiller factor x .068 x 67.25

**PRELIMINARY RISK MANAGEMENT YIELD CALCULATOR for Katepwa
Yield = # of plants x tillers/plant x spikelets/tiller x 1.4 x 28 - 100

Note that the Risk Management Guide yield calculator is based on a very limited number of situations. The project is expected to evaluate up to 10 times as much data before the yield estimator formula would be finalized.

MODULE PREPARATION

During the 1988/89 season, work has been conducted on development for the background of the guide modules. The preliminary information will serve both as the basis for a production guide for wheat production as well as the major source of information on which to base the decision making guide (risk management guide).

Four sections have been prepared. They include: weed control; crop establishment; crop nutrition and a general introduction section describing types of wheat, their uses and adoption. The weed control module has focused on describing crop yield losses due to weeds. While the major information is focused on grassy weeds, competition with broadleaf weeds is also discussed. The module serves as the basis on which to build the decision making guide to assist farmers in ensuring herbicide applications are economical.

The crop establishment module describes the various factors affecting establishment of wheat. Factors discussed include seeding rate, seeding date, seed depth, row spacing, seed quality, seedbed preparation and seeding equipment.

The crop nutrition module provides information on the nutritional aspects of wheat production as well as the implications of using soil tests and fertilizer (both organic and inorganic) to feed the crop.

The introductory section of wheat describes the importance of wheat worldwide and domestically. The module also includes information on the types of wheat grown in Canada, their uses, adoption and economics.

Module preparation will continue in 1989 and 1990 with emphasis on disease control, lodging control, insect control and harvest systems.

LOCATION DESCRIPTION, MINTO, MANITOBA 1988

WEATHER SUMMARY

TEMPERATURE (C)	MAY	JUNE	JULY	AUGUST
1988 AVERAGE	16.5	22.2	19.7	19.3
98 YEAR AVERAGE	10.5	15.2	18.7	17.3
DIFFERENCE	+6	+7	+1	+2

PRECIPITATION				
1988 TOTAL	52.0	46.7	79.8	11.0
98 YEAR AVERAGE	48.6	79.2	70.6	64.5
% OF AVERAGE	107	59	113	17

SOIL FERTILITY	N	P	K	S	pH
MINTO (N,I)	89	18	702	149+	7.8
FAIRFAX (O)	15	6	527	150+	7.6
DEYAEGHERS/MINTO (W)	55	11	409	50	7.5
WAWANESA(D)	---------NOT AVAILABLE--------				

1988-89 EXTENSION ACTIVITIES

FIELD DAYS

Canada Grains Council Risk Management Guide Tour Attendance: 54	July 12
Canada Grains Council Sponsor's Tour Attendance: 8	July 14
Agriculture Canada Tour Carl Stewart	July
Potash & Phosphate Institute Tour Mark Stauffer	June

MEETINGS AND PRESENTATIONS

Intensive Culture of Wheat 3 Year Summary
Canada Grains Council Annual Meeting, April 10-11, 1988 Vancouver

Risk Management Guide Concepts - Redfern Yield Club, Rivers, Man.
April 1988, Attendance 25

Risk Management Guide Update - MEY Club Update + Workshop, Carrington N.D.
January 6, 1989

Risk Management Guide - Review Meeting
Canada Grains Council, Winnipeg, Man. March 9, 1989

Intensive Wheat Management + Risk Management Concepts
Simplot Manager's Meeting, Winnipeg, Man. March 16, 1989

Risk Management Guide - Concepts
Manitoba-North Dakota Zero Till Farmers Assn., Spring Board Meeting
Devil's Lake, N.D.,March 20, 1989

Research at Ag-Quest - Risk Management Guide
Agriculture Canada Research Station Seminar, Brandon, Man. March 13, 1989

Risk Management Guide - Concepts
Manitoba Soil + Water Strategies, Soil + Water Conservation Discussions
Boissevain Legion Hall, March 23, 1989