**Summary of Research Results 2004**

**3.1 Cereals – Variety Evaluation:**

**Barley:** None of the early malting barley varieties/biotypes (101-106 days maturity) could surpass *AC Vision* that yielded 7,233 kg grains/ha in 103 days. *Nordbec* (6,772 kg/ha), *OBS 4714-1* (6,500 kg/ha) and *OB 5383-9* (6,649 kg/ha) were statistically at par with *AC Vision* in the grain yield.

Amongst the normal duration (108-115 days) barley varieties, *Chapais* (8,000 kg/ha), *AC Klinck* (7,974 kg/ha), and *Balance* (7,904 kg/ha) were the top grain yielders. *Brucefield* (7,413 kg/ha) and *B1602* (7,344 kg/ha) were in the medium range and gave higher yield than *AC Metcalfe* (6,439 kg/ha) and *CDC Copeland* (5,960 kg/ha). The latter is a newly released variety that was claimed to be high yielding. *AC Klinck*, *AC Metcalfe* and *AC Alma* (forage yield of ~15-16 MT/ha) had an edge over others in the forage yield, though the differences were not significant. *AC Metcalfe* recorded the highest straw yield (5,791 kg/ha dry weight).

**Oats:** *AC Ernie* (5,625 kg/ha) out yielded *AC Baton* and *AC Lotta* that had the same grain yield (~5,000 kg/ha). There were several new numbers that exceeded these standard varieties, especially *AC Baton* and *AC Lotta* in grain yield; *NO 205-5* (6,217 kg/ha), *NO 210-6* (6,126 kg/ha) and *NO 210-1* (6,034 kg/ha) are worth mentioning. The yield of these Hulless oats was relatively lower than the yield from the Hulled varieties (see next para).

In the Hulled oats, *AC Rigodon* produced the highest grain yield (8,475 kg/ha). However, *Triple Crown* (8,215 kg/ha) and *QO.685.43* (7,941 kg/ha) were statistically at par with *AC Rigodon*. The next best *AC Goslin* (7,667 kg/ha) had lower yield than that of *AC Rigodon*. *Triple Crown* had the highest forage yield (15.3 MT/ha) closely followed by *AC Kaufman* (14.5 MT/ha) and *OA 1019-1* (13.1 MT/ha). In the straw yield too, *Triple Crown* (5,907 kg/ha dry weight) excelled all other varieties. A comparison of standard Hulled oats varieties with the new promising numbers from Phytogene Research Inc. revealed that the *PGR 03-3* has the potential to beat *AC Rigodon*. The duration of Hulled and Hulless oats was more or less the same (around 115 days).

**Spring Wheat:** *CM 2032 (Sable)* and *QW 628:5* with a grain yield of 7,976 and 7,935 kg/ha, respectively, took the lead over others including *Superb* (7,336 kg/ha) – the recently released high yielding spring wheat variety. *Torka* (7,071 kg/ha) and *SS Fundy* (7,065 kg/ha) almost equaled *Superb* in grain yield. The differences in forage yield between the spring wheat varieties were no significant. However, *Torka* had the highest forage yield of 17.7 MT/ha. This means that under favorable conditions, *Torka* could produce higher grain yield than it did this year. *QW 628:5* produced the highest straw yield (6,661 kg/ha dry weight) - ~ 11% higher than *Torka*.

**3.2 Legumes and Oilseeds:**

**Chickpea:** With an average grain yield of ~4,300 kg/ha (40% higher than that during last year) did very well, because of the relatively warm and extended fall, this year. Highest yield (5,056 kg/ha) was obtained with *02-458D* followed by 4,687 kg/ha with *02-847D* and 4,536 kg/ha with *98-111D* in 162 days. *97-148D* (4,438 kg/ha), which matured in 141 days, wasn’t much behind the top yielding varieties.

**Soybean:** *Gaillard*, it seems, didn’t like the cold summer of 2004 and couldn’t sustain its grain yield of ~3 MT/ha during the last summer. This year, its yield was only 1,696 kg/ha, which is lower than even the trial mean of 2,042 kg/ha. *OAC Prudence* (2,969 kg/ha), *S00-J4* (2,807 kg/ha), *Emerson* (2,643 kg/ha) and *Primo RR* (2,625 kg/ha) were the four top yielding varieties this year with a duration of 155-159 days.

**Canola:** Faired well with an overall mean seed yield of 3,486 kg/ha. *Highest canola see yield (4,237 kg/ha) was recorded with ammonium nitrate @ 200 kg N/ha.* Increased N rate from 150 to 200 kg/ha improved the seed yield in case of ammonium nitrate, but not with urea because of its adverse effect on plant stand. The difference (4.9%) between the average seed yield with the two fertilizers was non-significant. Treatment of urea with Agrotain (urease inhibitor) didn’t improve its efficiency. Application of elemental S @ 20 kg S/ha with 150 kg N/ha significantly increased the seed yield in case of ammonium nitrate, but not with urea. *Application of ammonium nitrate @ 150 kg N/ha with 20 kg S/ha produced almost as much seed yield (4,112 kg/ha) as its application alone @ 200 kg N/ha (4,237 kg/ha*).

**3.4 Forages:**

**Alfalfa:** In the OFCC variety trial, *Pioneer 5312* topped in the first cut (4,371 kg/ha) and *Magnum IV* topped in the second cut (4,523 kg/ha) and the total yield (8,566 kg/ha) from the two cuts. Yields from both the cuts from *Pioneer 5312*, *GH 777* and *Hybri Force* were 8,485, 8,242 and 7,851 kg/ha, respectively. The yield differences were, however, statistically non-significant.

In another set of alfalfa variety experiments;

*Forecast 1001* produced 58.3, 54.3, and 35.4% higher yield than *134*, *Geneva* and *2065 MF.* *NK 711 MF* gave 50, 24 and 8% higher yield than *8925 MF*, *OAC Superior* and *2065 MF* and *Stealth* had 66, 58 and 21% higher yield than *2065 MF*, *Macon* and *Guardsman*, respectively. Considering a yield index of *2065 MF* as 100, the yield indices of other varieties were *Stealth*: 166, *Guardsman*: 137, *Forecast 1001*: 135, *NK 711 MF*: 108, *Macon*: 105 and the rest (*Geneva, 134, OAC Superior* and *8925 MF*) below 90.

Summer seeded alfalfa did not show any significant effect of K or S on the stems/foot and the plant height. On the contrary, both N and B improved the plant height as compared to the check plots receiving neither N nor B. These height differences, however, became non-significant by 8th October. This was true of rates (15 and 30 kg N/ha) and sources of N (ammonium nitrate, ammonium sulphate and urea) as well, though only ammonium sulphate treated plots retained the blueish green colour typical of alfalfa.

**Grasses:** Only Orchard Grass was cut twice. Timothy and Meadow Brome Grass growth was too poor to take a second cut.

**Timothy:** Highest yield was obtained with *Itasca* (5,625 kg/ha) following by *Richmond* (5,334 kg/ha) and *Climax* (4,647 kg/ha).

**Meadow Brome:** *Fleet* with a yield of 5,313 kg/ha was at the top of other varieties-*Brome A* (5,104 kg/ha), *Baylor* (4,947 kg/ha) and *AC Knowles* (4,934 kg/ha).

**Orchard Grass:** *Kay* gave the highest first cut (4,962 kg/ha) and *Okay* gave the highest second cut yield (5,325 kg/ha) as well as the highest total yield (10,136 kg/ha). *Kay* (9,481 kg/ha) and *Benchmark* (9,313 kg/ha) were at par not only with each other but also with *Okay* because the yield differences between the 3 varieties were not significant.

**Corn for Silage:** Neither the sources (ammonium nitrate, urea, orurea + agrotain) nor the levels of N (0-150 kg/ha) had any significant effect on the fresh or dry matter yield of corn for silage. May be because, the corn plots were dressed with manure @ 50 MT/ha, had N contribution from last year’s turned down red clover and the corn growth was restricted due to limited heat units.

Application of N in corn appear to improve the protein and TDN content, and lowered the percent ADF, NDF, Ca, Mg, P and K. Corn in plots dressed with urea had less protein and higher ADF and Mg as compared to those dressed with ammonium nitrate. Treatment of urea with Agrotain improved not only the protein content but also concentration of P and K.

Cultivar *Pioneer 39P78* out yielded *HLS 009* and *N02-K1*.

**3.5 Long Term Experiments:**

**Lime and Wood Ash:** Highest dry matter yield of alfalfa was obtained with the application of wood ash followed by the combined application of wood ash and lime in 50:50 proportion. Application of lime alone did not improve the alfalfa yield as compared to the check.

Mid-season soil tests indicated that application of wood ash increased/tended to increase the pH, K, Ca, Mg, S, Mn, B and Cation Exchange Capacity (CEC), whereas application of lime improved K, Ca, Mg, and the CEC only. The yield and soil test results were better marked in Set 2 than those in Set 1.

Application of wood ash and lime, in the long-term experiments, were matched with lime requirements as per the soil tests.

**Manure, Wood Ash, and Fertilizer Nutrients:** Both manure @ 50 MT/ha and wood ash appeared to improve fresh and dry matter yield of alfalfa; the combined application of the two produced the highest yields.

Application of N alone @ 15 kg/ha or with 20 kg P2O5**/**ha tended to increase the alfalfa yield. Addition of 20 kg K2O or foliar application of 2 kg Mn/ha did not improve the yield over that of N + P. Due to the year of establishment, the dry matter yields were low (~2,000 kg/ha) and the treatment differences were therefore not well marked.

Mid-season soil tests revealed that application of wood ash increased pH and available nutrients (P, K and Mg). This was true with manure as well. Nonetheless, wood ash increased pH more than manure and the manure improved the availability of nutrients more than the wood ash. Together, the two brought the highest improvement in available P.

**Efficient Cropping Systems:** An experiment with 10 potential cropping systems, including forage and grain legumes, other forages and cereals, spread over 10 years, was initiated this year with alfalfa as the first crop. Expectedly, the variation in alfalfa yield between the 10 plots was non-significant. Crop yields and the nutrient(s) additions and removals will be monitored closely over a 10-year period to study the effect of cropping systems on the soil health and its productivity.

**3.6: Single Replicated Trials on Methods of Seeding:** Highest dry matter yield of soybeans was recorded in ridge and furrow method closely followed by ridge and broad furrow. Flat or broad bed and furrow methods had the same yield, whereas lowest yield was recorded by seeding on squares.

In alfalfa, plant height was maximum with flat beds closely followed by ridge and broad furrow. Shortest plants were observed in the ridge and furrow with seeding on the ridge that might have stressed the plants for soil moisture.

These preliminary trials indicated that a single method of seeding may not be ideal for all the crops. Systematic experiments therefore need to be initiated on the new methods of seeding, which might require only change of implements, within the already existing implements with the farmers, without any additional costs.

**3.7: Observations from the farmers’ field visits:** Important observations from the farmers’ field visits were well spread Zn and Mn deficiency in cereals, Zn deficiency in corn and that of S and B in alfalfa. *Micronutrients deficiencies could be the major yield limiting factors in the near future*. We are therefore gearing ourselves to meet these challenges by initiating systematic research on micronutrient nutrition of crop plants at Thunder Bay Agricultural Research Station in the coming spring.

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