The John Deere row crop planter seeding into alfalfa sod. PHOTO COURTESY OF AGTECH CENTRE

Papworth says the AgTech and John Deere stands were very similar. There were no bare patches and the emergence looked very uniform, indicating the metering systems metered evenly, but at a higher than necessary rate. The Flexi-Coil seed had many bare patches and thick patches with dense growth, indicating surging of the metering system. However, the average plant population of the bare and dense patches was equal to the population stands of the other two seeders.

Unfortunately, a hail storm passed through the corn field on August 10, causing significant damage. As a result, individual yield results were not taken, but the average yield across the field was six tonnes per acre (15t/ha), which is significantly lower than typical corn silage in the area.

While the yield results were wiped out, Papworth says the stand establishment and general progress of the crop, up until the hail storm, showed that the practice of seeding directly into sod has potential. Because the demonstration did not include a field of alfalfa removed with tillage, direct comparisons cannot be made. The best guess, given the hail storm, must come from plant stands and crop development. "Based on what we saw in the field, I think the yields would have been similar," he says.

However, even if corn direct seeded into alfalfa sod gave up some yield, considering the expense of taking alfalfa out with tillage, the practice still might come out on top. ■

N, P and K: fertilizer management for oats

by R.M. Mohr, C.A. Grant and W.E. May*

Oats yield was optimized when soil N plus fertilizer N was at 90 to 100lb/ac. Response to phosphorus (P) and potassium chloride (KCl) was minor in these trials.

Oats production in the northern Great Plains has increased in recent years. Production on the Canadian prairies currently accounts for more than half of the total Canadian oats crop and exports.

Despite the growing prominence of oats in today's production systems, limited research on fertilizer management for oats has been conducted in this region. Fertilizers often account for a significant proportion of total input costs in cereal production systems and may strongly influence crop growth, development, yield and quality. Moreover, improved fertilizer management of oats may help to enhance crop quality and thus the potential for producing high quality oats that are suitable for more specialized milling and horse feed markets offering price premiums.

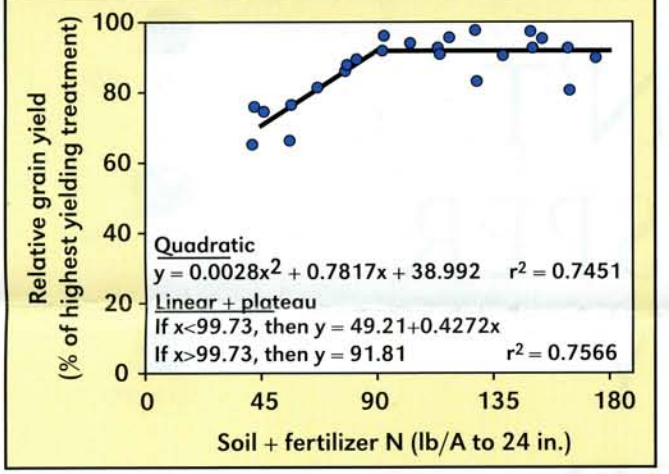
A three year field study was initiated in 2000 with the objectives of determining the effect of N, P and KCl on the growth, yield and quality of oats, and to determine the impact of varying combinations of the nutrients. Field experiments were established at two sites in the area of Brandon, Manitoba. One site was located on a Newdale clay loam containing low levels of soil nitrate-N (NO_3-N) and extractable-P. The second site was located on a Stockton fine sandy loam or Wellwood loam soil containing low levels of soil NO_3-N and higher extractable-P levels, but considered marginal based on soil test results.

Experimental treatments consisted of a factorial combination of four N rates (zero, 36, 72, 108 pounds N per acre as urea), three P rates (zero, 27, 54 pounds P_2O_5 per acre as mono-ammonium phosphate – MAP), and two potassium (K) rates (0 and 36lb K_2O per acre as KCl). Each treatment received an additional 12lb N per acre as urea or MAP in addition to the N rate indicated, to account for N supplied by the highest P rate. An unfertilized control treatment was also included. Oats (cv. AC Assiniboia) was direct seeded using a plot seeder equipped with hoe openers on nine inch row spacing. At the time of seeding, urea and KCl were side-banded and MAP was placed with the seed. Grain yield was determined by straight-combining the entire plot and oats test weight, kernel weight and percentage of plump kernels were determined.

Soil test nutrient levels at the trial sites ranged from low to medium for N: eight to 15 parts per million (ppm) in the top 24 inches; low to sufficient for P: four to 15ppm in the top six inches; and medium to sufficient for K: 113 to 246ppm in the top six inches. Soil nutrient analysis used an extraction with $NaHCO_3$. Nitrate-N was determined by hydrazine reduction, P (PO_4) was by molybdate/ascorbic acid, and K was by atomic absorption. Grain yield responses were expected for N and P, while no response was expected for K.

Low rates of fertilizer N were found to increase oats grain yields at all locations, with the crop response

Figure 1. Effect of soil NO_3-N level (to 24in deep) plus fertilizer N on relative yield of oats at six field sites. Treatments not receiving P were not included in the calculation of the means.



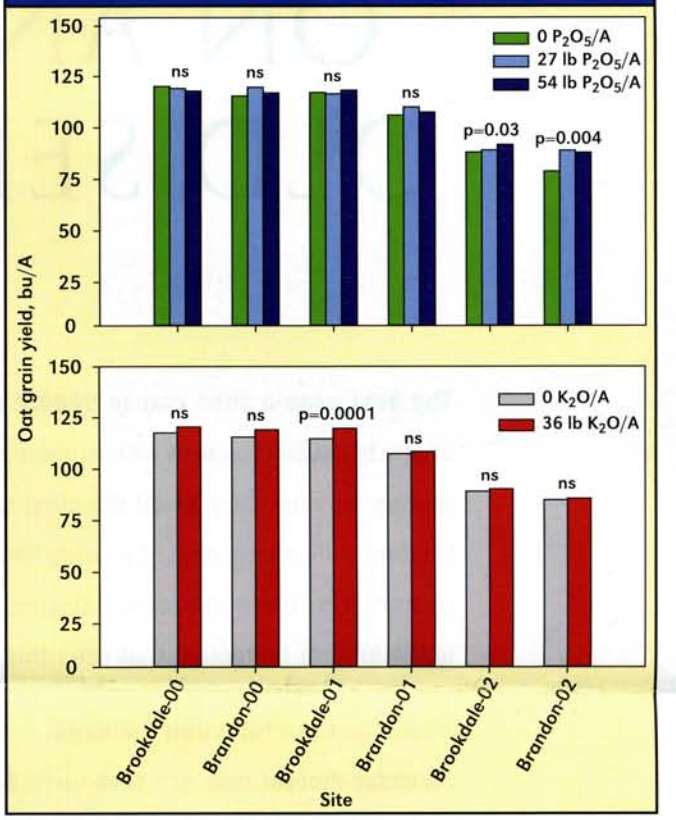
levelling off or declining at higher rates. While maximum oats yield was typically attained at the 36 to 72 pounds N per acre rate, the optimum relative yield was achieved with a total of soil plus fertilizer N of approximately 90lb N per acre (see Figure 1). In this study, optimum yields ranged from 90bu/ac to 135bu/ac of oats. Nitrogen additions had the most consistent impact on the grain quality of the oats crop. Increasing N rates always resulted in a small but significant decline in oats test weight, kernel weight and the percentage of plump kernels for both trial locations and all years.

Phosphorus application was found to increase oats grain yield at two of the six trial site years (see Figure 2). This occurred despite an increase in early season crop bio-mass yield at tillering with P application at both sites and all years (data not shown). In addition, plant development assessment showed that P application significantly advanced the developmental stage of the main stem and tillers arising from the coleoptile (T0) and the first leaf (T1). The observed crop response to fertilizer P application did not appear to be closely linked to soil test P levels. The response to P addition in 2002 may reflect the very dry spring soil moisture conditions, reducing the availability of soil P to plants and contributing to the positive crop response to fertilizer P. No consistent grain quality effects were observed with the application of P fertilizer to the oats crop.

Potassium fertilizer use was found to provide a small but statistically significant oats grain yield increase at one of the six trial locations (see Figure 2). While a similar trend was observed at the two locations in 2000, these were not significant. The use of KCl increased the plumpness of oats kernels at three of the six locations (data not shown). The test weights of oats were also increased at one of the six locations and decreased at another. While significant, these grain quality differences were relatively small in magnitude. While interactions among nutrients applied occurred in a number of instances, there was no strong or consistent pattern.

The results of this study support previous research indicating that oats remove less nutrients per bushel of production than many of the other crops grown on the northern Great Plains. Nutrient removal in oats is approximately 0.5 to 0.8 pounds N per bushel, 0.23 to 0.28 pounds P_2O_5 per bushel, and 0.17 to 0.20 pounds K_2O per bushel. While fertilizer N additions increased oat yields, application in excess of rates required to optimize yield should be avoided to maintain grain quality. Fertilizer P additions improved early season plant development at all locations, and grain yield at two of the six trials. Potassium fertilizer application resulted in small improvements in both oats yield and quality. ■

Figure 2. Oats grain yield in response to P and K application: mean of all N rates. Note: ns indicates that differences among treatments within a site were not statistically significant at p = 0.05.



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