SK-13

Report on

"Seed Placed Fertilizer Experiments"

Prepared for:

Dr. T.J. Roberts
Potash and Phosphate Institute of Canada
Suite 704, CN Tower
Midtown Plaza
Saskatoon, SK S7K 1J5

Prepared by:

J.L. Henry, P.Ag.
Department of Soil Science
University of Saskatchewan
Saskatoon, SK, S7N 5A8

January 18, 1996

1. METHODS

All experiments within this study have been growth chamber experiments utilizing flats. The specific soil under study was prepared in flats at a depth of about 10 cm in flats of dimension 30 cm by 80 cm. The soil was brought to field capacity moisture content and were allowed to equilibrate for approximately one day. The seed and fertilizer was then placed in a single row to simulate a close placement as would be obtained in a double disc press drill. Directly after seeding, the trays were covered with moist peat. The moist peat prevented rapid evaporation loss which can occur in the growth chamber where significant air movement is present.

With the methods utilized, no subsequent water was applied to the trays. Preliminary growth chamber seed placed fertilizer experiments had failed because the rapid evaporation conditions resulted in surface drying and the need for watering. When water is applied the fertilizer can be moved away from the seed by the water passing through the soil and few effects of fertilizer on seed were noted.

The method used in these growth chamber experiments simulates the situation in the field where seed is placed into moist soil and there is no subsequent precipitation during the period of germination and emergence.

The test crops used in all experiments were wheat, canola and peas.

2. UREA-AMMONIUM SULPHATE EXPERIMENT

An experiment was conducted where urea, ammonium sulphate and urea-ammonium sulphate were utilized as sources. Rates of 0, 20, 40 and 80 lbs of nitrogen per acre were utilized.

For peas and canola, any rate of any source above 20 lbs N/acre was very detrimental to seedling emergence. For wheat, rates of above 40 lbs N/acre were very detrimental.

At the 80 lbs N/acre rate for wheat, the emergence with ammonium sulphate fertilizer was greater than urea and the urea ammonium sulphate source was intermediate. At 40 and 80 lbs N/acre for canola the same trend was noted, i.e., ammonium sulphate less damaging than urea ammonium sulphate less damaging than urea. However, for canola the differences were small and likely of little practical significance even if statistically significant.

The general conclusion is that ammonium sulphate is not much different than urea at the same rate of actual N.

3. MAP AND KCl EXPERIMENTS

These experiments included individual experiments using monoammonium phosphate (MAP) and potassium chloride (KCl) fertilizer. The MAP was utilized at rates 0, 20, 40, 80 and 160 lbs P_2O_5 per acre, and the KCl was utilized at 0, 20, 40, 80 and 160 lbs K_2O per acre. Test crops were wheat, canola and peas, and soils were an Asquith sandy loam and a Naicam clay loam soil. Asquith soil is a Dark Brown and Naicam is a Thick Black. For wheat, rates in excess of 40 lbs K_2O or lbs P_2O_5, resulted in significant reduction in plant stand. For canola, the plant count was a linear reduction from the 0 to the 160 lb rate. Practical field experience in the past has shown that rates in excess of 20 lbs P_2O_5 per acre for canola are detrimental and should be avoided. For KCl, rates in excess of 20 lbs K_2O per acre resulted in reductions in canola plant population. The data for peas was inconclusive because of germination problems and that experiment is being repeated.

The overall conclusion from the MAP and KCl experiments are that the two fertilizers are about equal in germination effects when expressed on a P_2O_5 and K_2O basis.

The data for the wheat and canola KCl and MAP experiments are presented as Figures 1 and 2 at the end of this document.

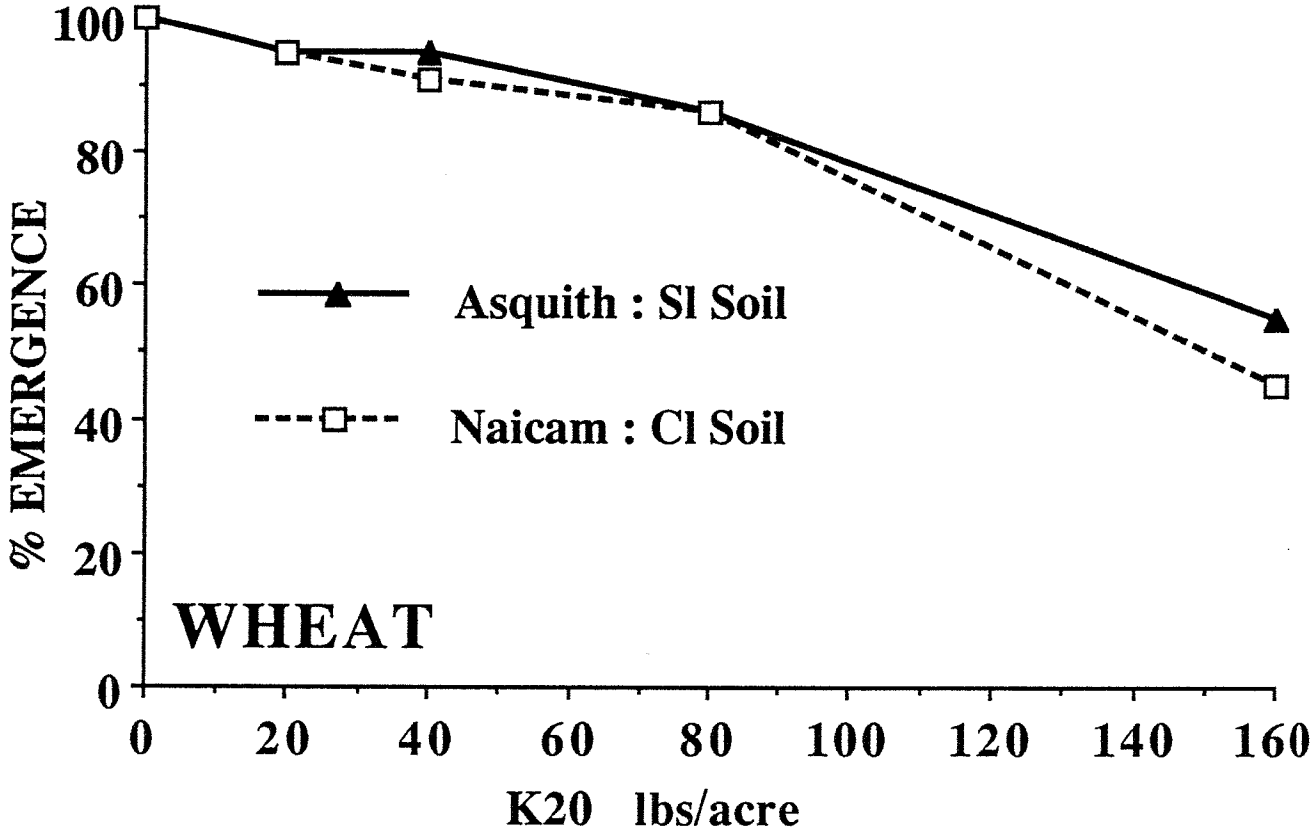
4. COMPLETE FERTILIZER EXPERIMENT

Two complete fertilizers were prepared utilizingMAP, ammonium sulphate or urea, and KCl.

The fertilizer prepared using ammonium sulphate had analysis 13-14-15-12 and the fertilizer using urea had an analysis 18-18-20-0. These fertilizers were applied to wheat, canola and peas on Asquith and Naicam soils at rates of 0, 50, 100 and 200 lbs of product per acre. There was relatively little difference between the two fertilizers. For canola and peas, the 50 lb rate resulted in about 25% reduction in emergence, but for wheat rates in excess of 100 lbs product per acre were required to reduce emergence below 85%.

Even with wheat at 50 lbs of product per acre, significant delays of about 5 days were noted in emergence.

The general conclusion from the MAP, KCl and complete fertilizer experiments are that the various products are additive in their effects on germination and emergence and that seed placement of complete fertilizer should be approached with considerable caution.



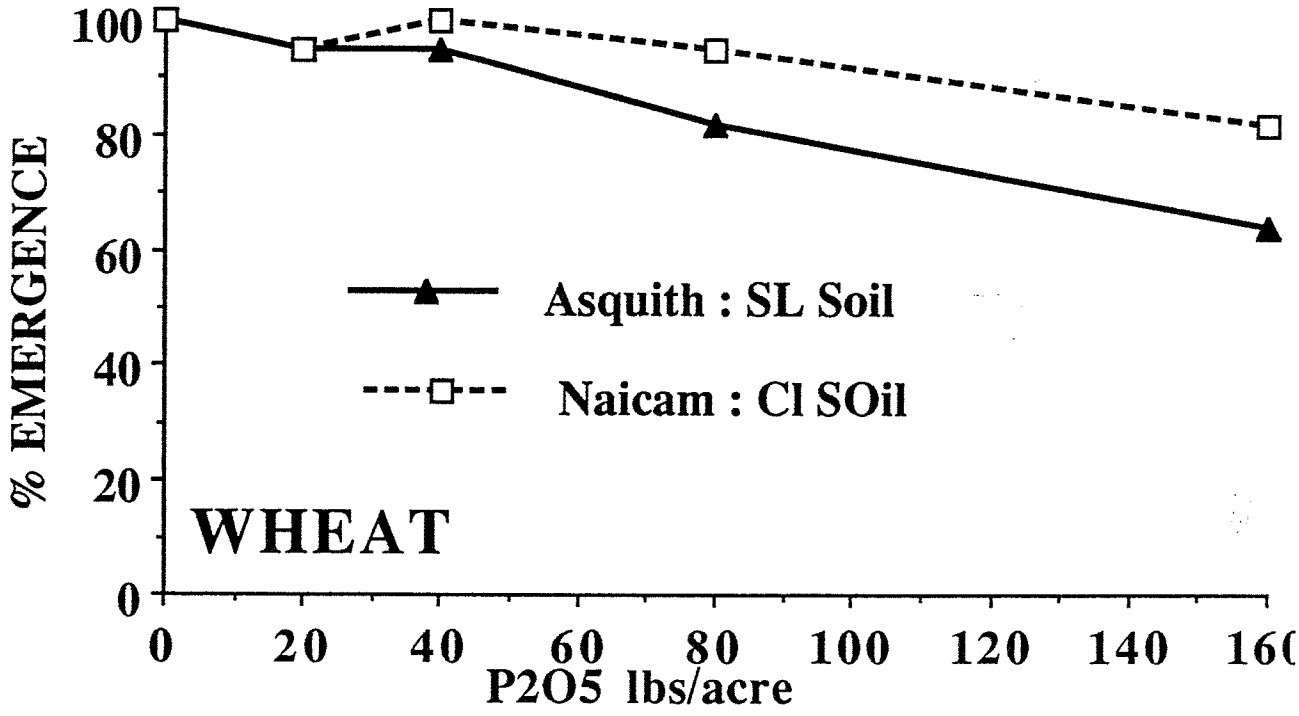
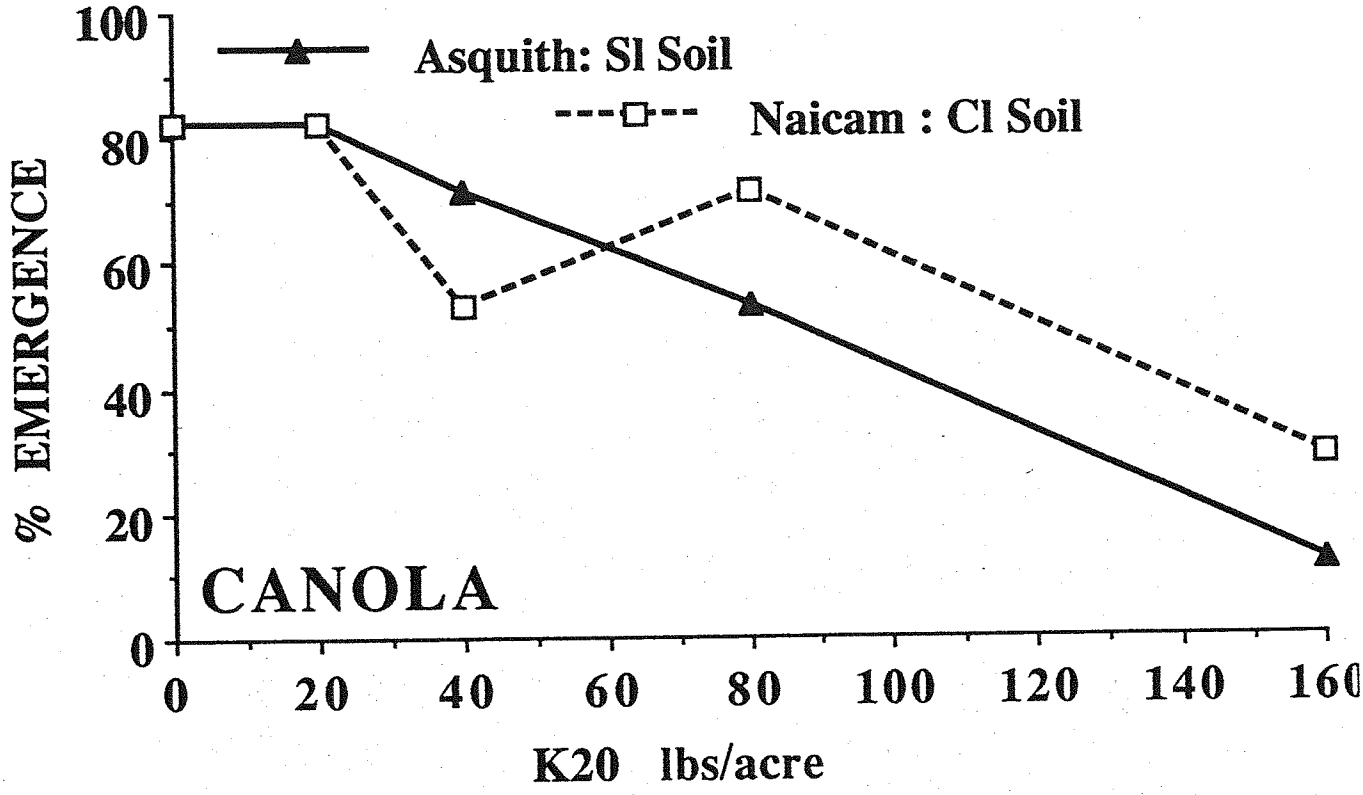


Figure 1. Effect of MAP and KCL on emergence of wheat.



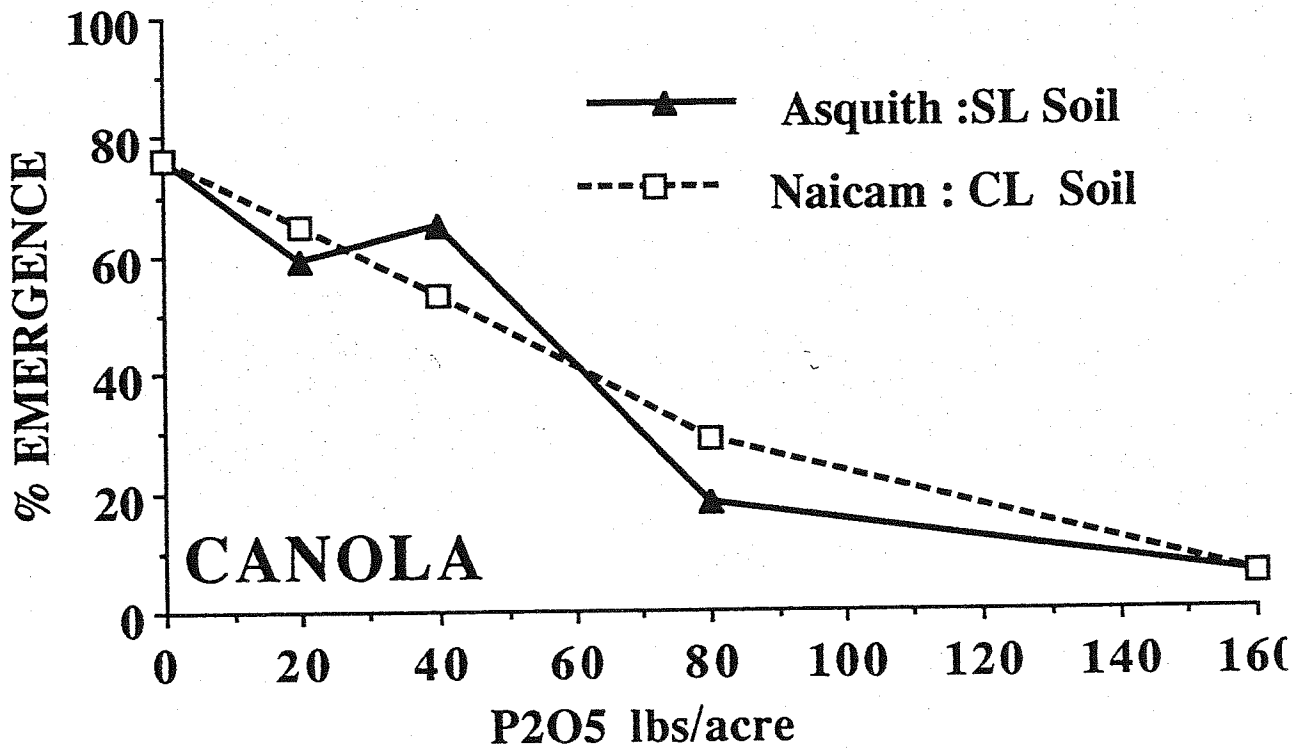
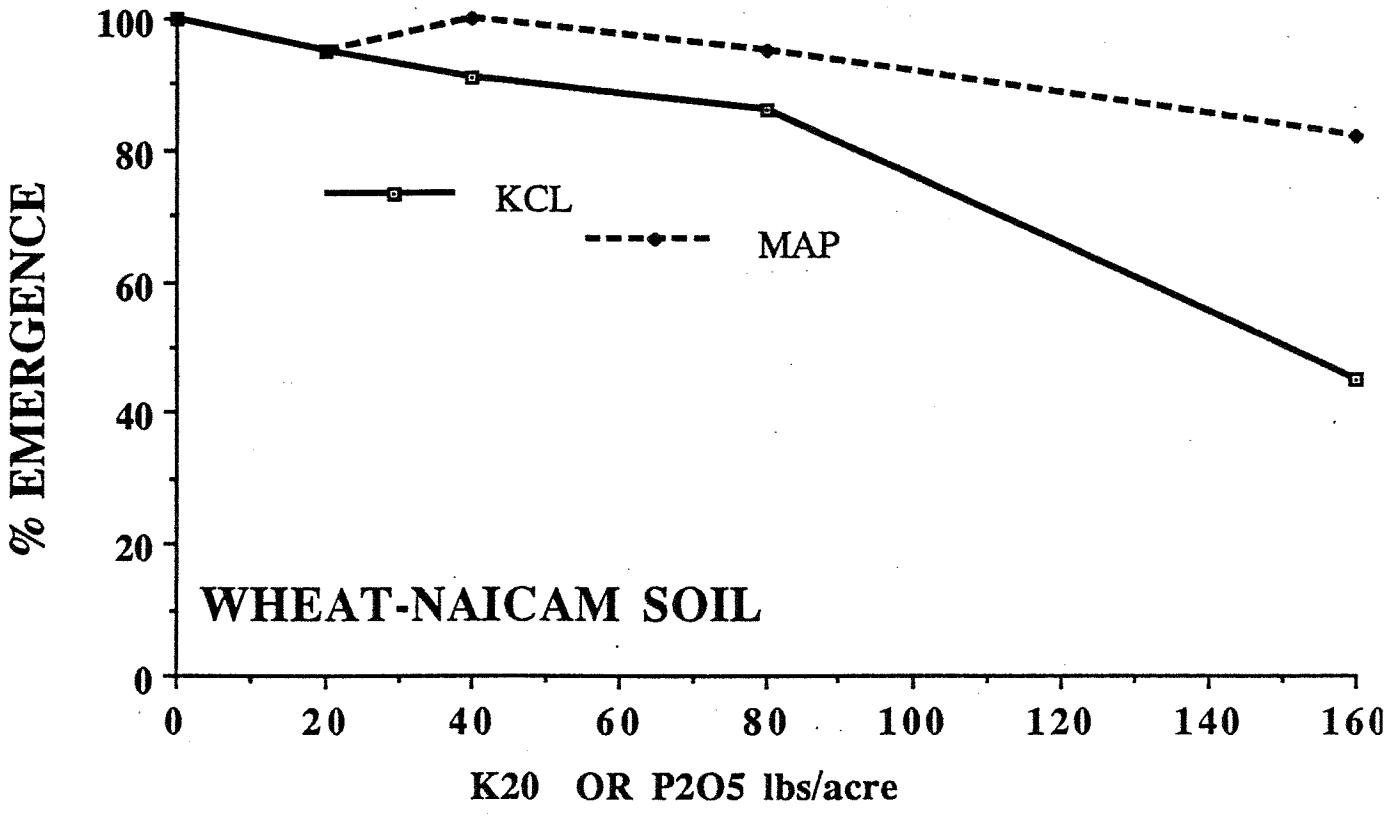
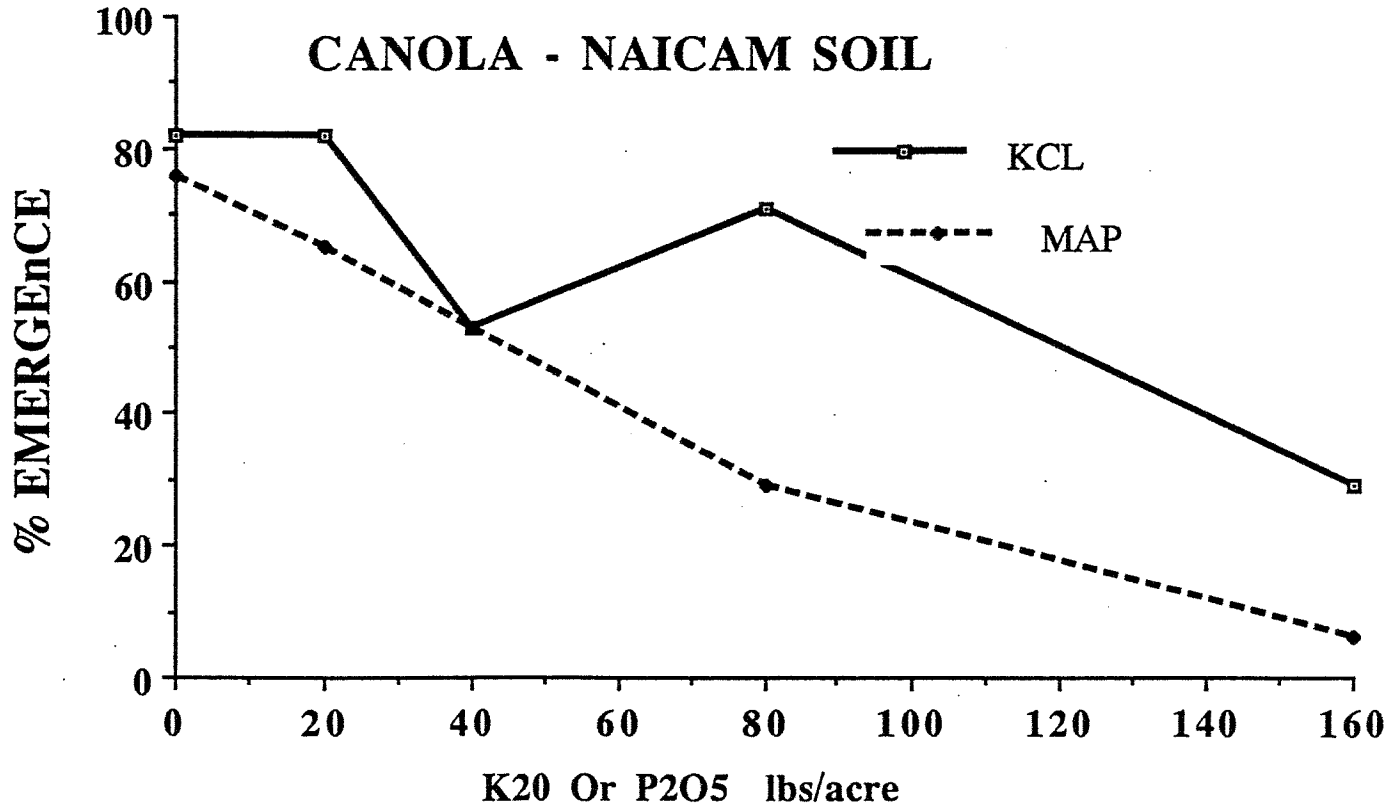
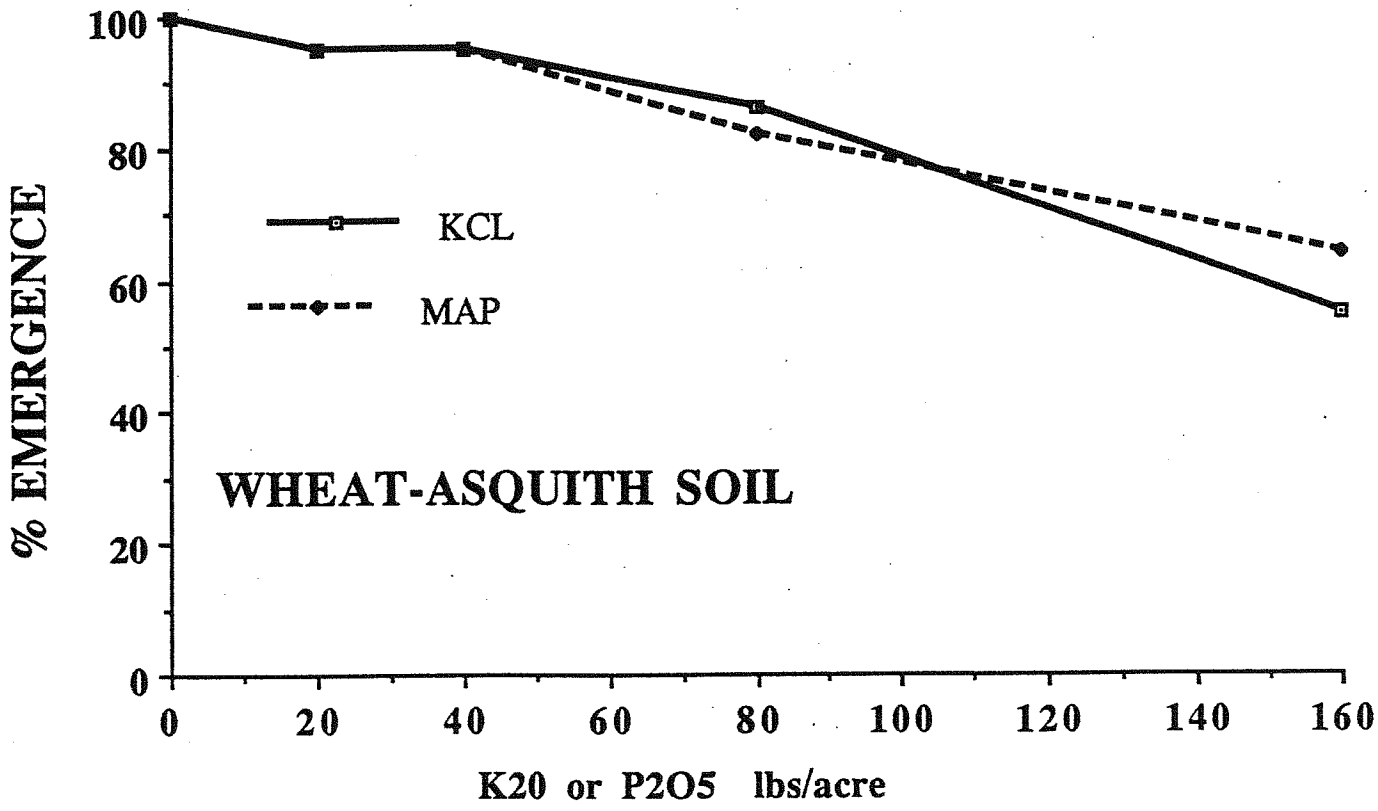


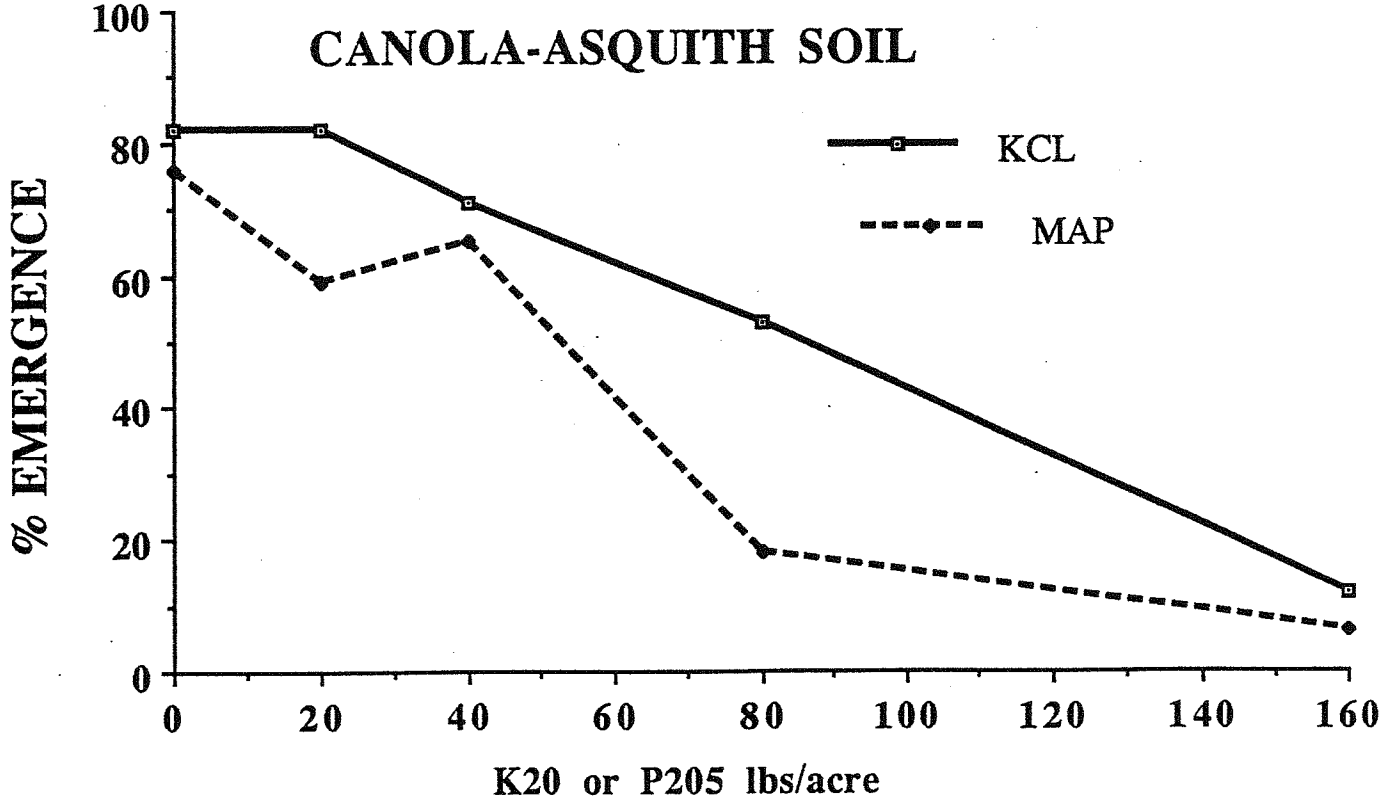
Figure 2. Effect of MAP and KCL on emergence of canola.

Terry, These are the figures I mentioned on the phone.
Les.






100
80
60
40
20
0
% EMERGENCE
KCL
MAP
WHEAT-ASQUITH SOIL
0
20
40
60
80
100
120
140
160
K20 or P2O5 lbs/acre


CANOLA-ASQUITH SOIL
100
80
60
40
20
0
% EMERGENCE
KCL
MAP
0
20
40
60
80
100
120
140
160
K20 or P205 lbs/acre