EFFECT OF FERTILIZER/SEED SPREAD WIDTH ON CANOLA

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INTRODUCTION

In Western Canada, fertilizers (especially nitrogen) are usually placed away from the seed due to seedling damage when large amounts of fertilizer are placed in immediate proximity. These recommendations were based on fertility research conducted primarily at Agriculture Canada Research Stations in the 1960's and '70's (Canola Growers' Manual, 1984). This research was conducted primarily with equipment that placed the seed and fertilizer in very close proximity and with relatively wide opener spacings which led to very low row width utilization (RWU = effective opener spread width / machine opener spacing x 100). In recent years, producers in western Canada have moved to the use of air seeding equipment over conventional drills due to several factors including reduced fill-up times and the ability to seed in heavy amounts of crop residue reducing the number of required field passes and subsequent soil degradation. In using this equipment, many openers are available which effect the row width and relative concentration of the seed and seed placed fertilizer. This paper will discuss the effects of varying seed row widths using all fertilizer placed with the seed on spring canola crop growth. Factors discussed will include seedling emergence, crop maturity and yield.

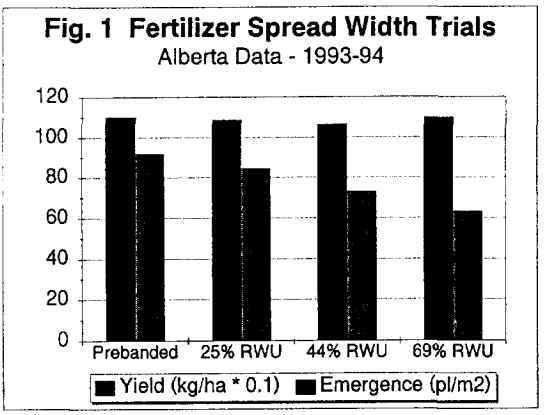
METHOD

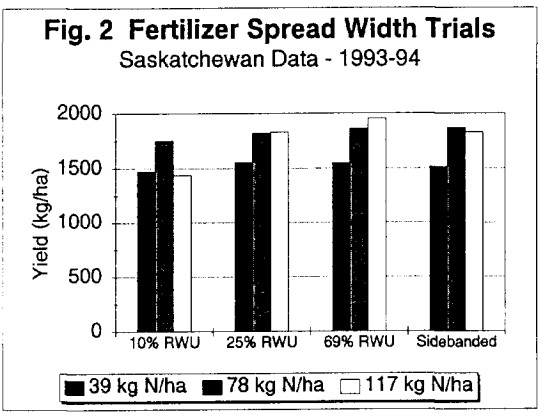
Alberta Trials - Three different opener combinations were used on a cultivator based air seeder to effect different spread widths of 5, 9 and 14 cm which in turn led to row width utilizations of 25, 44 and 69% respectively. These were compared to a check where the fertilizer was applied separately from the seed in a preplant band. The amounts of fertilizer applied was 78 kg/ha of actual nitrogen as urea along with the recommended amount of P, K and S for each site. Seed used in these trials was from B. rapa spring varieties. These trials were conducted at three sites over two years producing six site years of data. Typical plot size was 10.5 m x 92 m. The trials were conducted using four replicates in a randomized complete block design.

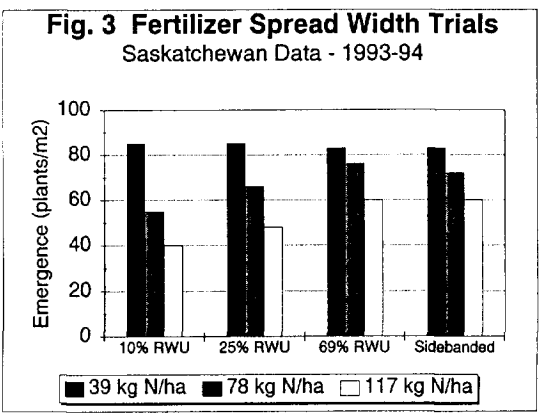
Saskatchewan Trials - Four different designs of openers were used with a cultivator based air seeder. Three of the openers effected spread widths of 2, 5 and 14 cm which in turn led to row width utilizations of 10, 25 and 69% respectively. These were compared to a sidebanding opener which placed the fertilizer in a separate band below and to the side of the seed row. Three different nitrogen rates (as urea) were used; 39, 78 and 117 kg/ha of actual N. Recommended rates of P, K and S were seed placed. Seed used in these trials was from B napus spring varieties. Individual plot size was 9 m x 123 m conducted in a split plot design using four replicates. These trials were also conducted at three locations over two years.

RESULTS

Compiled results from the numerous site years of data are presented in Figures 1-3







DISCUSSION

Alberta Results - There were no significant differences in crop yield among the various spread widths when compared to the prebanded treatment. Expected results were that emergence and possibly yield would be most negatively impacted by the smallest RWU (25%), but that emergence and yield should recover somewhat using the wider spread patterns. Although yield was relatively unaffected, crop emergence was affected by the various spread patterns with emergence declining with increasing spread pattern which is opposite from what was expected. Along with the increase in spread width was an increase in the vertical dispersion of the seed, which led to the reduction in plant emergence because of the fact that some seeds were stranded in the upper layer of dry soil. Soil moisture conditions at the time of seeding ranged from fair to excellent. Although soil moisture had an inverse relationship with days to emergence, the effects caused by the various openers was minimal.

Saskatchewan Results - With regards to yields, there was a definite trend to increases in yield from increases in nitrogen rates, but there were differences between the openers. In general, at the low N rate of 39 kg/ha there were only small differences among openers, but as the nitrogen rates increased, there was an increase in yield with an increase in row width utilization. At the lowest RWU of 10%, the 117 kg/ha rate of N led to a decrease in yield due to the significant decrease in plant emergence counts and the increased days to emergence. Plant emergence numbers differed between the rates of nitrogen. Increasing rates of nitrogen led to decreases in plant emergence with all openers, but the rate of reduction was inversely related to the RWU. Soil moisture at the time of seeding ranged from fair to excellent among the site-years.

CONCLUSIONS

Although increased fertilizer nitrogen rates caused decreases in plant emergence counts, the differences in yields were not directly related to plant emergence numbers. In general, increased row width utilization reduced the level of plant stands with the higher nitrogen rates. At nitrogen rates up to 78 kg/ha, yields did not vary significantly between the various levels of row width utilization. However, at rates of 117 kg/ha, increasing the level of row width utilization led to both increases in plant emergence numbers and yields.

Although these results are derived from 12 site years of data, the soil moisture conditions at the time of seeding were generally favorable for plant germination and growth. Results from drier years should be obtained to develop a better understanding of crop reaction under conditions of relatively low soil moisture. These trials will be conducted for at least another two years to further develop the database.

REFERENCES

Thomas, P. (1984). Editor. *Canola Growers Manual.* p. 901-939. Canola Council of Canada. Winnipeg, Manitoba