Optimal agronomic conditions for spring canola production in northern Idaho

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Objectives

Evaluate performance of spring and canola cultivars under variable nitrogen, seeding rates and seeding dates.

Make the farming community aware of the best practices that will increase productivity and acreage of canola in Idaho.

Introduction

Lack of economically viable alternative crops to grow in rotation with small grain cereals has increased grower interest in growing spring and winter canola. Higher yielding canola cultivars combined with competitive prices has resulted in an increase of canola acreage in the Pacific Northwest region. Although adapted canola cultivars are now available to growers, few attempts have been made to optimize productivity through agronomic management of the crop. The aim of this two-year study is to optimize growers' productivity and profitability with a range of adapted winter and spring canola cultivars in specific environments. Agronomic factors examined include planting date, seeding rate, and fertility management in two different tillage systems. This information will be valuable to the farming community to aid in the correct choice of cultivars and management practices to optimize grower profitability. The first year of field trial results will be presented and discussed.

Material and Methods

The experimental design is a four replicate, split-split-plot with main plots being nitrogen rates, sub-plots being the cultivars, sub-sub-plots as seeding rates, and with early and late planting dates. In 2013 the experiment was grown at two locations: Craigmont, Idaho and Genesee, Idaho. The early seeding date was planted as soon as the weather permitted and late planting 14 days later. Four spring cultivars were examined: two that were developed at the University of Idaho ('Cara' and 'Zephyr') and two commonly grown canola varieties ('InVigor L130 LL' and 'DKL 30-42 RR'). Nitrogen was applied as a 50/50 blend of urea (46%N) and phosphate sulfate (16%N, 20%P, 15%S) at rates of 0, 30, 60, 90, 120, and 150 lbs applied nitrogen per acre. A base fertility level was determined using soil tests and with results averaged over both sites the top two feet contained 64 lbs of available N per acre. Three seeding rates were examined (360,000, 450,000 and 540,000 seeds per acre). Plots were 5 x 16 ft. Nutrients other than nitrogen were supplied at levels recommended for spring canola production. Weed and insect populations were controlled as necessary during the growing season. Data was collected on the number of plants per meter of row, seedling establishment, days to flower, plant height, lodging, weed counts, seed yield, and seed oil content.

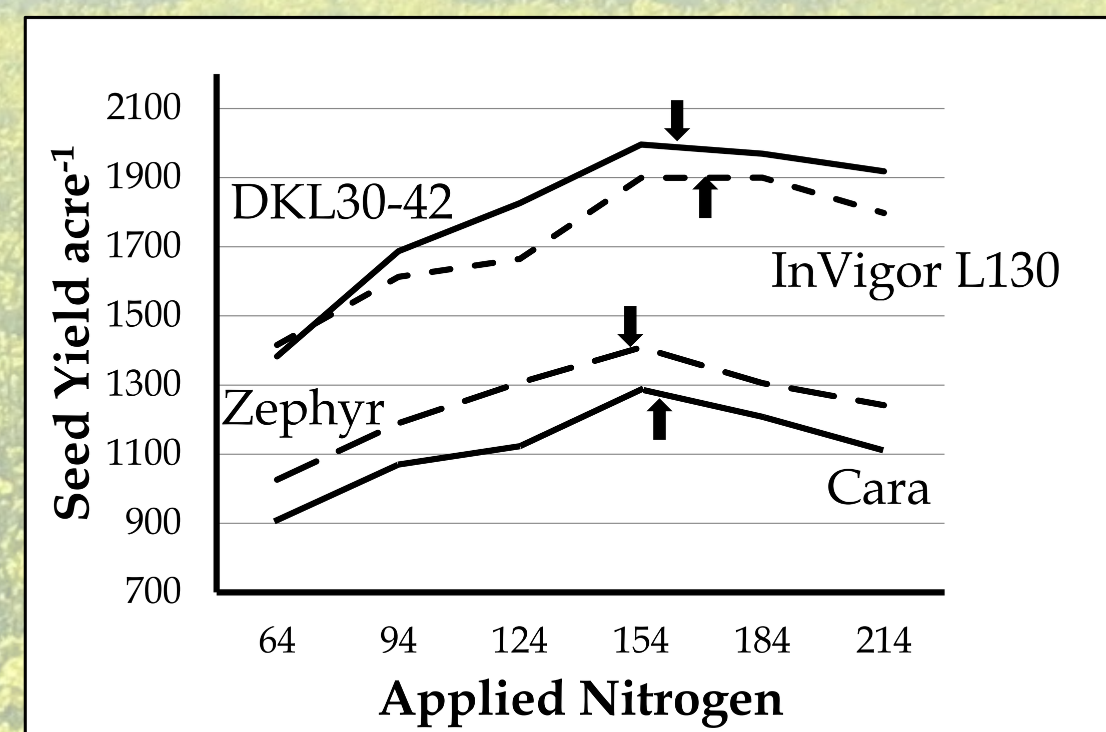

Figure 1. Yield response of cultivars to increasing available nitrogen.

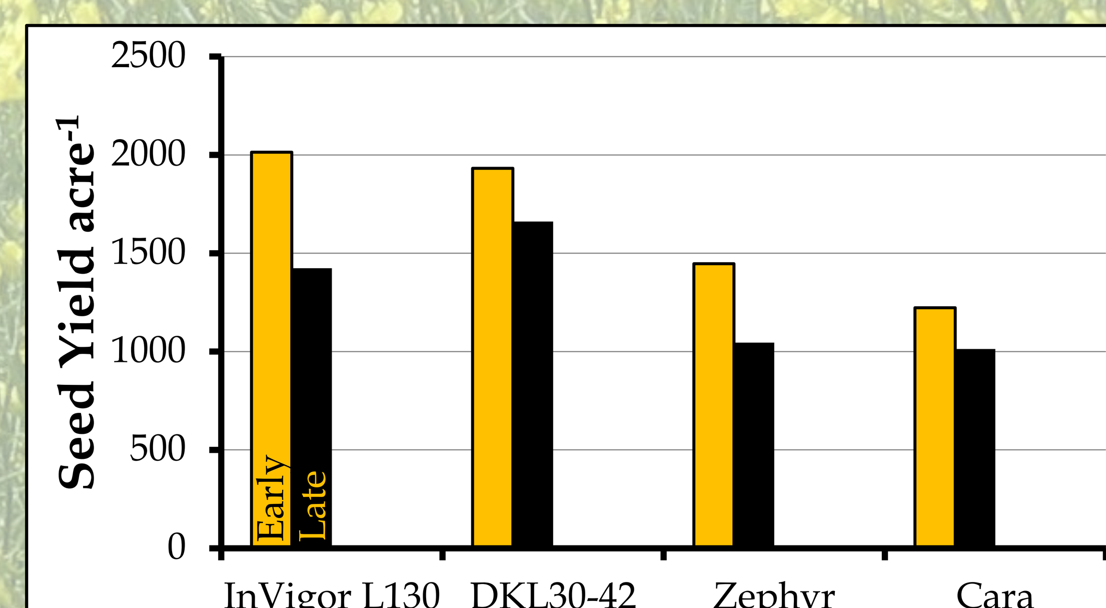

Figure 2. Yield of four cultivars from early and late plantings.

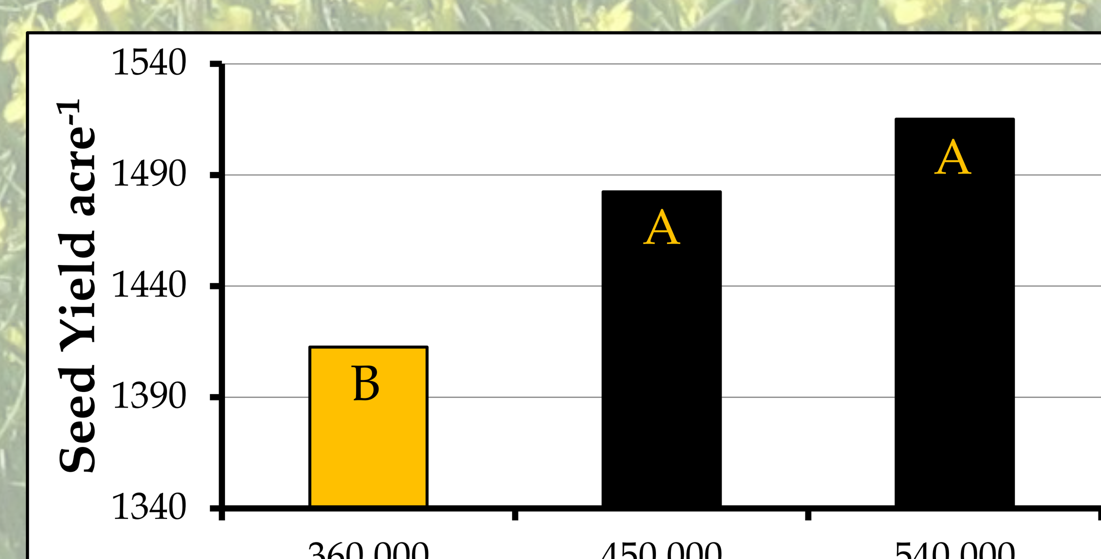

Figure 3. Yield of three seeding rates (seeds per acre). Yields the same letter are not different.

Results and Discussion

Analysis of variance over sites showed significant differences between sites, planting dates, nitrogen rates, cultivars, and seeding rates for seed yield. Averaged over cultivars, seed yield was significantly linear with increasing nitrogen until a optimum yield was achieved (Figure 1). There were, however, significant cultivar x nitrogen and a cultivar x planting date interactions. Increasing nitrogen from lowest to highest resulted in a 34% to 44% yield increase in the early and later plantings, respectively.

The planting date x cultivar interaction was significant (Figure 2). All cultivars produced a higher yield from the early planting compared to the later date; although each cultivar responded to a different degree. The cultivar Zephyr was most sensitive to planting date and had 38% yield loss when planted late, compared to an average of 21% loss for the other cultivars. The late planting had a shorter vegetative period before flowering combined with higher temperatures during flowering and seed set, which is most likely the major cause of the decreased yields. No interactions with seeding rate were found; however seeding rate itself did affect yield (Figure 3). The high and intermediate seeding rates did not affect seed yield in any cultivars, but both produced higher seed yields than the low seeding rate.

Conclusions

Preliminary data supports optimum available nitrogen for DKL 30-42 was 109 lbs N per acre to obtain maximum seed yield of 1,974 lbs per acre. Similar optimum nitrogen for InVigor L130 at 107 lbs N per acre for yield of 1,887 lbs. per acre for Zephyr 89 lbs N per acre for yield of 1,406 lbs per acre; and for Cara 99 lbs N per acre for a maximum yield of 1,280 lbs per acre. Further analysis is needed to calculate economic optimums based on input and commodity prices. Growers should plant as early as possible to avoid yield loss, seeding at 450,000K seeds per acre.