

Canola Needs Phosphorus

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Kentucky research has shown that canola is highly sensitive to phosphorus (P) deficiencies. Winter survival and high yields are keyed to the availability of adequate amounts of P.

CANOLA is a high quality, edible oil crop that shows promise in the U.S. due to increasing demand for the oil within this country. The crop has been grown in Canada for many years and much of the information about the crop has been adapted from Canadian research. However, most of that research has been with the spring types which are planted in the spring and harvested in the fall. Most of the canola varieties grown in the U.S. are winter types which are planted in the fall and harvested in early summer.

One of the important fertility components of a fall seeded crop is P, since canola grows much of the time under cool soil conditions and P affects seedling vigor. In an effort to learn more about P requirements, canola was grown on a soil with different soil test levels of P.

Design

A field study was conducted at the Research and Education Center at Princeton, KY, in 1990 and 1991 on a Tilsit silt loam soil with a fragipan at about 24 inches and a pH of 6.5. Canola was drill-seeded in a conventional tillage situation at optimum planting dates in the fall. Nitrogen (N) was applied to the canola at the rate of 120 lb/A in the spring.

The different soil test levels for P and potassium (K) were obtained by adjustments to the field site over many years. The soil test levels for P ranged from 10 lb/A (low) to over 60 lb/A (high). Each plot

was sampled for P soil test levels prior to planting and again after harvest. Soil test levels of P were determined using a Mehlich III extractant. The canola crops were grown on the plots without the addition of any fertilizer P.

Results

Phosphorus nutrition proved to be very critical for canola growth, survival and yield. There was no visual effect of the different levels of soil test P on emergence. However, after emergence, all phases of growth were affected. Fall growth was greatly affected by the different levels of P available to the plants. It was obvious in plant height and size of each plant (**Table 1**).

Table 1. Effect of P soil test levels on canola plant height and percent ground cover.

P soil test, lb/A	Plant height, inches	Ground cover, %
10	1.5	17
25	2.3	32
45	2.8	47
60	3.3	53
80	3.5	67

Two months after planting (1990).

There was also an effect on winter survival. Only a few plants survived the winter at the lowest level of P soil test. This was an extremely dramatic effect. Although no plant counts were taken, it can be easily seen in the yields in **Figure 1**. The lower yields of canola at the 20 to 30 lb/A soil test level may also have been

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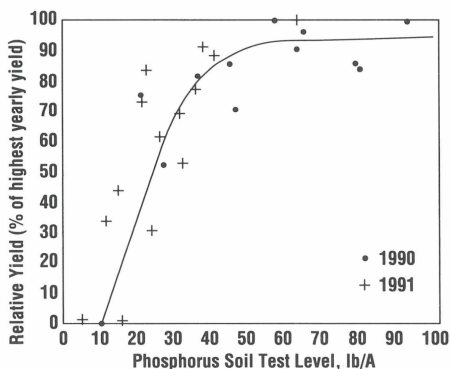


Figure 1. Phosphorus soil test levels have dramatic effects on canola yields (1990 and 1991).

partially related to some reduced winter survival. At higher soil test levels, the differences in yield were primarily related to spring growth and pod fill.

In 1990, maximum yield was obtained at a P soil test level of 60 lb/A, and 95 percent of maximum yield at 50 lb/A. In 1991, a maximum yield was obtained at a P soil test of 48 lb/A, and 95 percent of maximum yield at 40 lb/A. Combining the two years of data, it appears maximum

yield level would be reached at a P soil test level of 50 lb/A and 95 percent of maximum yield at 45 lb/A.

These data indicate canola is very sensitive to P. At the lower soil test levels, canola showed a steep response curve. In fact, at P soil test levels of 10 to 15 lb/A or less, canola yields were extremely low or zero. Much of the sensitivity at low P soil test levels can be attributed to winter-hardiness. Although a high plant stand was achieved in the fall on the low soil test plots, few, if any, plants remained in the spring as compared to higher soil test level plots.

Summary

Our data indicate that canola is quite sensitive to P, even more so than wheat. Higher soil test levels of P were required by canola for maximum and 95 percent of maximum yield levels.

Phosphorus nutrition is important for canola winter survivability as indicated by low or zero yields and stands obtained with low soil test P levels. ■



SIX WEEKS after planting, fall growth differences are clear for canola in medium (left) and low (right) P soil test plots.