Effect of Planting Date on Winter and Spring Camelina sativa Biotypes

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The vast majority of camelina varieties are spring biotypes. However, winter biotypes also exist that require vernalization to flower and consequently exhibit different patterns of growth. These winter types have yet to be evaluated in field trials because camelina traditionally is a spring planted crop. The purpose of this experiment was to evaluate both spring and winter camelina biotypes planted at different times throughout the growing season. Five different planting dates were used, with two fall planting dates, October 5 (F1) and October 24 (F2), and three spring planting dates, April 5 (S1), April 22 (S2), and May 10 (S3). A total of eighteen camelina varieties, consisting of fifteen spring and three winter biotypes, were used in the variety trial, and each of the varieties was replicated three times per planting date. The field trial was located at Cook Agronomy Farm in Pullman, WA.

Although winter biotypes reportedly have superior cold tolerance, we did not observe any significant differences in winter survival between the two biotypes. Despite average temperatures of 26.7°F and temperatures as low as -11°F, negligible rates of winter-kill were observed in both winter and spring types. This result was not surprising, as spring types exhibit cold tolerance comparable to that of winter wheat, and prolonged snow cover likely buffered the plants from the extreme cold. Every fall-planted variety reached the rosette stage before being covered by snow for more than 90 days. All fall-planted varieties flowered before the end of May and were ready for harvest by mid-July. For both S1 and S2, the spring and winter types flowered in synchrony, indicating that the vernalization requirement of the winter types was met by the cool, early spring conditions. S1 reached 50% flowering around June 10, S2 around June 18, and S3 (spring types only) around June 25, and all three were ready to harvest by mid-August. However, the winter varieties in S3 were not thoroughly vernalized and exhibited significant delay in flowering (Photo 1). These varieties did not start flowering until the end of July, had just started seed set by harvest, and ultimately had significantly low yields. This disparity in yields is depicted in Figure 1. Figure 1 also illustrates the differences in yields of winter and spring biotypes across all planting dates. Excluding S3, the winter types out yielded the spring types in every other planting date, although this difference was only statistically significant in F2. Figure 2 depicts mean yields of all varieties for each planting. F1 and F2 had highest yields, then S2 and S3, and S1 had the lowest yields overall. It is important to note that S3 was negatively biased by the significantly lower yields of the winter types. Spring types in S3 average
yield was 480g/plot, comparable to yields of spring types in F1 and F2. Another interesting trend for spring types is yield increased as planting date got later. Overall, these results demonstrate winter camelina biotypes are capable of performing as well, if not better than, spring types, as long as they are planted early enough to ensure vernalization occurs.

**Recommendations for Growers**

**Winter varieties:** Plant as soon as moisture is available. But if spring planted, be sure to plant early enough to ensure vernalization.

**Spring varieties:** Spring varieties can be either fall or spring planted. Later spring plantings did not compromise yields in this experiment, so waiting for weeds to emerge for control before planting may be a better strategy in higher rainfall zones. For more comprehensive information on planting dates for spring varieties, please see *Camelina: planting date and method effects on stand establishment and seed yield.*

![Figure 1. Biotype yields across planting dates. Lowercase letters represent significant differences (Tukey HSD).](image1)

![Figure 2. Mean yields across planting dates. Lowercase letters represent significant differences (Tukey HSD).](image2)