Comparison of Flower Stalk Development in 'Premier' and 'Squire' Kale Cultivars

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Abstract. 'Squire' Scotch kale (*Brassica oleracea* L.) (n = 9) and 'Premier' smooth-leaved kale (*B. napus* L.) (n = 19) were planted in a field study to compare the onset and rate of flower stalk elongation after overwintering. Flower stalk elongation began 28 days later in 'Premier' than in 'Squire'; 'Premier' plants remained marketable 24 days longer. In spite of the delay in the onset of stalk elongation, siliques of 'Premier' were only 3 days later maturing.

Many *Brassica* spp. are biennial, requiring vernalization before the reproductive growth phase is initiated. Parham and Moore (1959) determined that vernalization of 'Vates' collard requires 4 to 5 weeks of exposure to 6C, while other biennial cultivars may require longer or shorter periods. Since several biennial *Brassicaceae* are overwintered in regions having cool, but not severe, winters where natural vernalization occurs, an important economic consideration is the rapidity of flower stalk development following overwintering. Since significant flower stalk development renders the crop unmarketable, the greater the delay in this development, the longer the harvest period is extended and, generally, the higher the yield (Borchers, 1990; Borchers and Taylor, 1979, 1983).

The kale cultivar Premier was developed from two smooth-leaved plants discovered in a planting of 'Dwarf Siberian' (Borchers and Taylor, 1983). Both cultivars contain 19 pairs of chromosomes and belong in *B. napus* L. 'Premier' is extremely slow to produce flower stalks, even when compared with 'Champion' collard and 'Squire' kale, cultivars belonging to *B. oleracea* L. (n = 9) that have been selected for delayed flower stalk development (Borchers, 1990; Borchers and Taylor, 1979).

The objective of this study was to compare flower stalk development in overwintered plants of 'Premier' and 'Squire' kales to determine whether the 'Premier' pattern of flower stalk development is economically superior enough to warrant transferring this trait into collard and Scotch kale cultivars.

'Premier' and 'Squire' kale seed, sown in

the field in Virginia Beach, Va., on slightly raised beds on 30 Aug. 1990 with a Planet Jr. seeder, produced a seedling stand having an in-row spacing of ≈ 2.5 cm. Plants were thinned to ≈ 4.5 cm on 27 Sept. 1990. Twenty consecutive plants of each cultivar in adjacent rows were selected for measurement. On 1 Mar. 1991, when many 'Squire' plants had developed a small flower bud cluster but before any measurable flower stalk elongation in either cultivar had occurred, individual plant heights were recorded (ground to apex of bud cluster or vegetative growing point). Flower stalk elongation was monitored by continuing to record height readings at semiweekly intervals through the flowering stage and ending with complete silique maturity. The flowering stage was considered initiated when five flowers had opened, and complete silique maturity was reached when all siliques had dried and turned brown.

Flower stalk elongation in 'Squire' and 'Premier' began on 4 Mar. and 1 Apr. re-

spectively, a difference of 28 days (Fig. 1). Further, because of increasing stalk lengths, 'Squire' and 'Premier' were last considered commercially marketable 22 Mar. and 1.5 Apr. respectively, a difference of 24 days. While the period from the beginning of flower stalk elongation until the beginning of flowering was about the same for both cultivars, the period of flowering and seed development was 27 days shorter in 'Premier' than in 'Squire'. Because complete silique maturity of 'Premier' was only 3 days later than that of 'Squire', the concern that seed maturity might be so late in 'Premier' as to interfere with normal seed production schedules was unfounded. 'Premier's' slow bolting is an economically useful trait with the potential to provide greater flexibility in marketing and higher spring yields of overwintered biennial cole crops.

Gill and Vear (1958) believed that 19-chromosome *B. napus* is a synthetic species derived through the natural hybridization of nine-chromosome *B. oleracea* and 10-chromosome *B. rapa* accompanied by chromosome doubling. We verified this hypothesis by crossing nine-chromosome *B. oleracea* L. (*Botrytis* Group) (broccoli) with 10-chromosome *B. rapa* L. (*Pekinensis* Group) (Chinese cabbage) and doubling the chromosomes to produce a partially fertile, 19-chromosome, synthetic *B. napus* plant. A third generation selection from this material was pollinated with 'Dwarf Siberian' kale and from this cross biennial selections have been made that resemble collard and Scotch kale. Using this material and 'Premier' as parents it should be possible to develop horticulturally acceptable collard and Scotch kale types having the extremely slow flower stalk development typical of 'Premier'.

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Fig. 1. Flower stalk elongation over time in 'Squire' and 'Premier' kale. F, beginning of flowering; S, maturity of siliques. For each cultivar, each determination is the mean of the same 20 plants. Vertical bars indicate SD. Zero day was 1 Mar. 1991.

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