Floral Initiation and Development in Carnation

Lehong Cheng and R. W. Langhans of Cornell University recently published results of basic work with carnation in the Journal of American Horticultural Science 96 (4). They looked at the effects of photoperiod on the different stages of plant development. The developmental cycle was divided into the vegetative, floral initiation, and floral development stages. The effect of photoperiod on each stage was investigated. The length of the vegetative stage was related inversely with photoperiod; i.e., the longer the photoperiod, the shorter the vegetative stage. This explains the value of dusk-to-dawn lighting compared to other photoperiods. Daylength had no effect on the period of floral initiation, but did on the period of floral development. In this case, the longer the photoperiod, the longer the time required from floral initiation to flowering.

Stem elongation was not related to photoperiod in quite the manner that many of us had previously believed. The effects of photoperiod on eventual stem length were entirely confined to the vegetative stage, or certainly terminated with floral initiation. Plants grown under 13-hour photoperiods or longer during the vegetative stage elongated significantly faster than those grown under the 9-hour photoperiod. The rate of stem elongation of flowering plants (those in the post-initiation or floral development stage) was completely independent of photoperiod.

This should change our thinking a bit. The main effects of temperature, nutrition, water stress, and photoperiod have already determined the number of cells in the final stem by the time flower buds are initiated. So most of the post-initation effects on stem length are on the elongation of cells already there.