

Mean Daily Temperature Regulates Plant Quality Attributes of Annual Ornamental Plants

Mean daily temperature (MDT) and the mean photosynthetic daily light integral (DLI) control growth and development of plants as well as plant quality characteristics such as flower number and size, branch number, plant height, and plant biomass. In the horticulture industry, temperature is often regulated to produce ornamental crops for specific market dates. We quantified how MDT between 14 and 26 °C influenced quality characteristics of 15 common bedding plant crops.

The crops used were American marigold (*Tagetes erecta*), cup flower (*Nierembergia caerulea*), diascia (*Diascia barberae*), flowering tobacco (*Nicotiana glauca*), geranium (*Pelargonium hortorum*), globe amaranth (*Gomphrena globosa*), heliotrope (*Heliotropium arborescens*), nemesia (*Nemesia foetans*), New Guinea impatiens (*Impatiens hawkeri*), osteospermum (*Osteospermum ecklonis*), pot marigold (*Calendula officinalis*), snapdragon (*Antirrhinum majus*), stock (*Matthiola incana*), and torenia (*Torenia fournieri*). They were grown under two mean DLIs (9.0 and 18.0 mol·m⁻²·d⁻¹) with a 16-h photoperiod.

As MDT increased from 14 to 26 °C, flower or inflorescence number decreased for nearly all crops (Fig. 1). In six crops, flower or inflorescence size decreased as MDT increased, whereas in five crops, there was an initial increase in flower size with an increase in MDT and then a subsequent decrease at MDT greater than 20 °C. In 10 of the crops, shoot dry weight at flowering decreased linearly or quadratically with an increase in MDT (Fig. 2). Branch number was inversely related with MDT in eight crops and was positively correlated with an increase in flower number. We conclude plant quality decreased as the MDT increased. Therefore, there is often a tradeoff between faster crop timing and higher plant quality, especially for plants with a low estimated base temperature (T_{min}) for development.

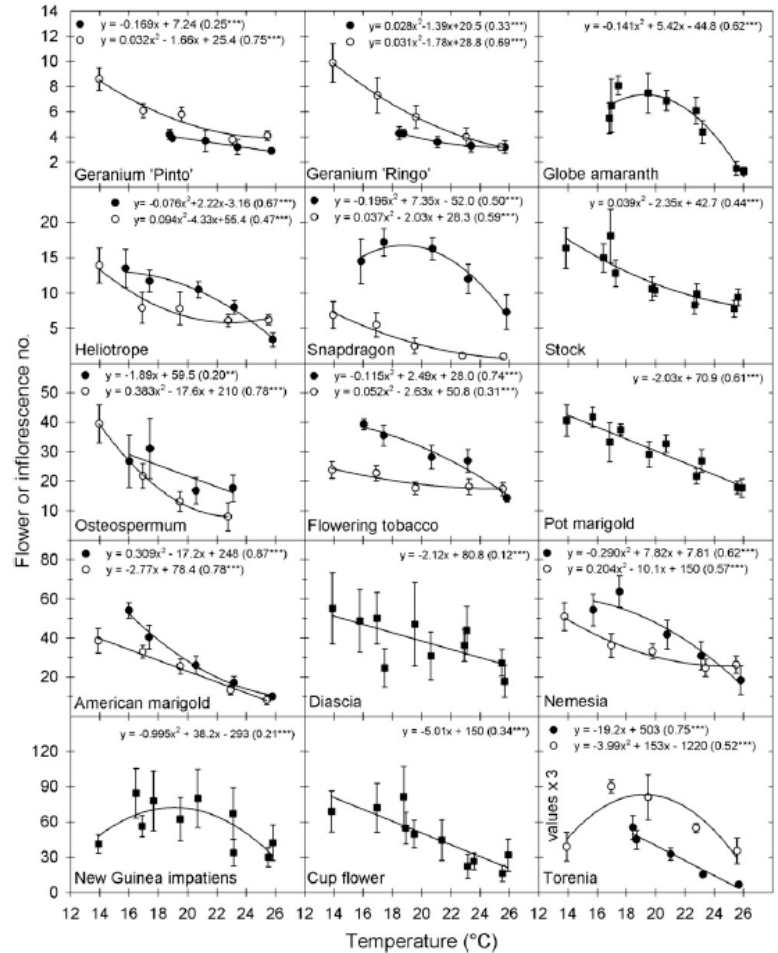


Fig. 1. The effect of mean daily temperature on flower or inflorescence number in 15 ornamental annual crops modeled for the spring (●) and fall replication (○).

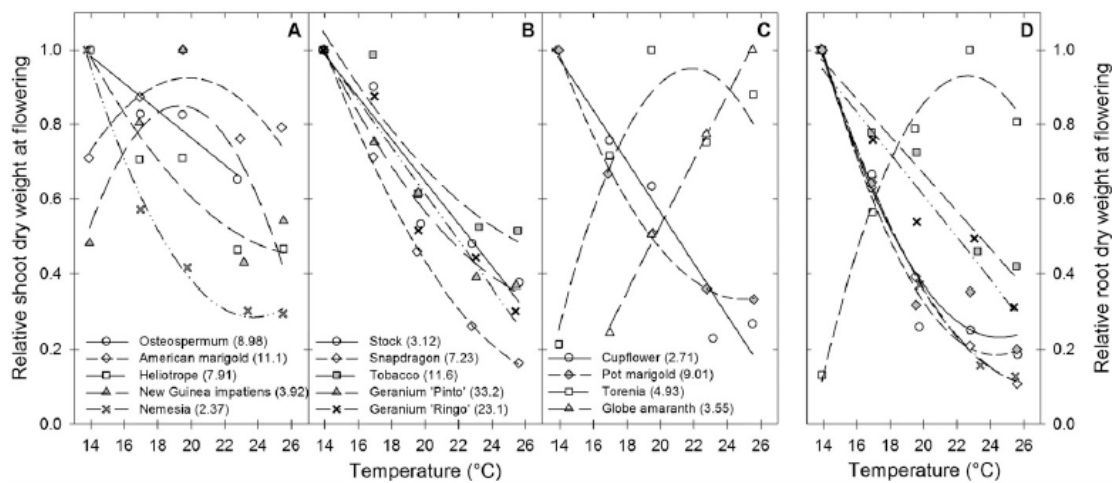


Fig. 2. Relative shoot (A–C) and root (D) dry weights at flowering of 14 and seven ornamental annual crops, respectively. In the legend, values in parentheses refer to the greatest shoot dry weight (mg) among the temperature treatments.