

MATERIALS AND METHODS

One hundred ninety-two snapragon cv 'Winchester' seedlings (McGregor Greenhouses) were transplanted from plugs into 4" plastic pots in a soilless medium consisting of 50% sphagnum peat, 5% perlite, and 25% vermiculite at the 2 leaf stage. Plants were fertilized throughout the experiment at each watering with a solution composed of 200-0-100 ppm (N-P-K). Fertilizer consisted of calcium and potassium nitrate.

The uppermost leaf on each plant was marked to identify the stage of development of a plant at the initiation of the experiment. Forty-eight plants were placed in each of 4 growth chambers. Lighting was delivered with cool white fluorescent lamps only. The chambers were maintained at constant 68°F. Chamber photoperiods were maintained at 8, 10, 12 or 14 hours. Photoperiod was extended as a day-extension treatment as opposed to a night-interruption treatment.

Chamber photoperiods were maintained at 8, 10, 12 or 14 hours.

Each group was placed at a different irradiance level (light intensity) within each chamber.

Plants were divided into 4 groups of 12 plants each within each growth chamber. Each group was placed at a different irradiance level (light intensity) within

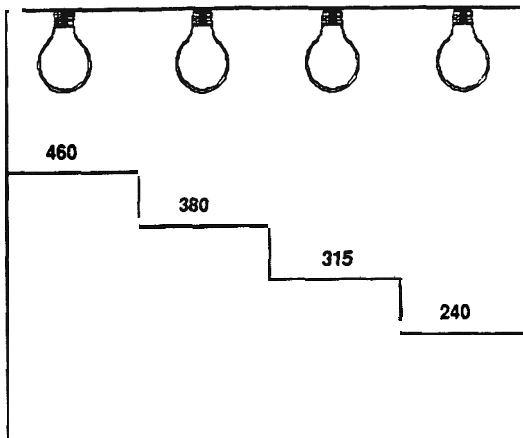


Figure 1. Irradiance levels used ($\mu\text{mol m}^{-2}$).

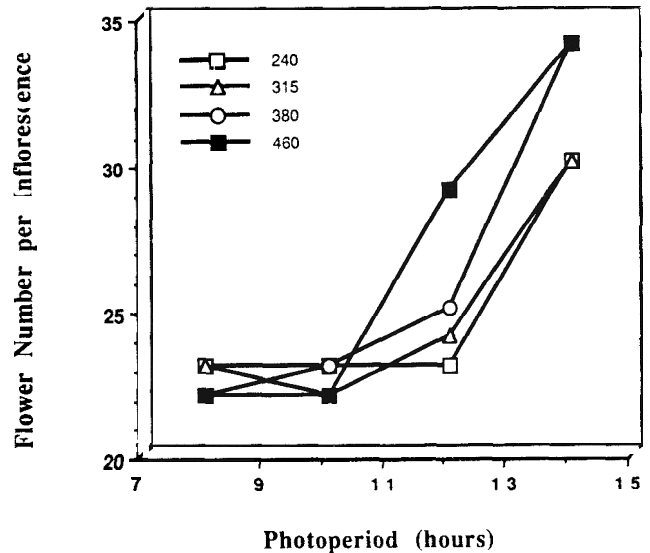
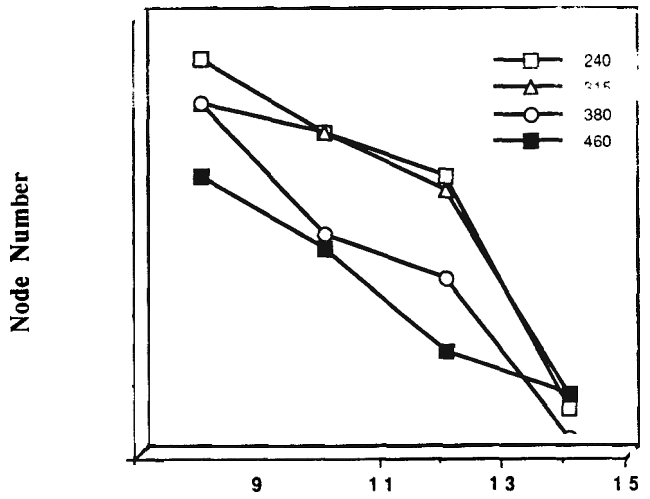


Figure 2. Node number and flower number per inflorescence as affected by photoperiod.

each chamber (Figure 1). Irradiance levels (light intensities) were 240 (1,200 footcandles), 315 (1,575 footcandles), 380 (1,900 footcandles) and 460 $\mu\text{mol s}^{-1} \text{m}^{-2}$ (2,300 footcandles). Three plants were removed from each irradiance level within each chamber on day 7, 14 and 21 days after the initiation of the experiment. Plants were then placed in a greenhouse maintained at constant $68^\circ\text{F} \pm 4^\circ\text{F}$. Photoperiod and irradiance were that of natural conditions for Minneapolis, Minnesota from January 15 to February 15, 1991. Data were collected when all flowers were visible on an inflorescence. Data were col-

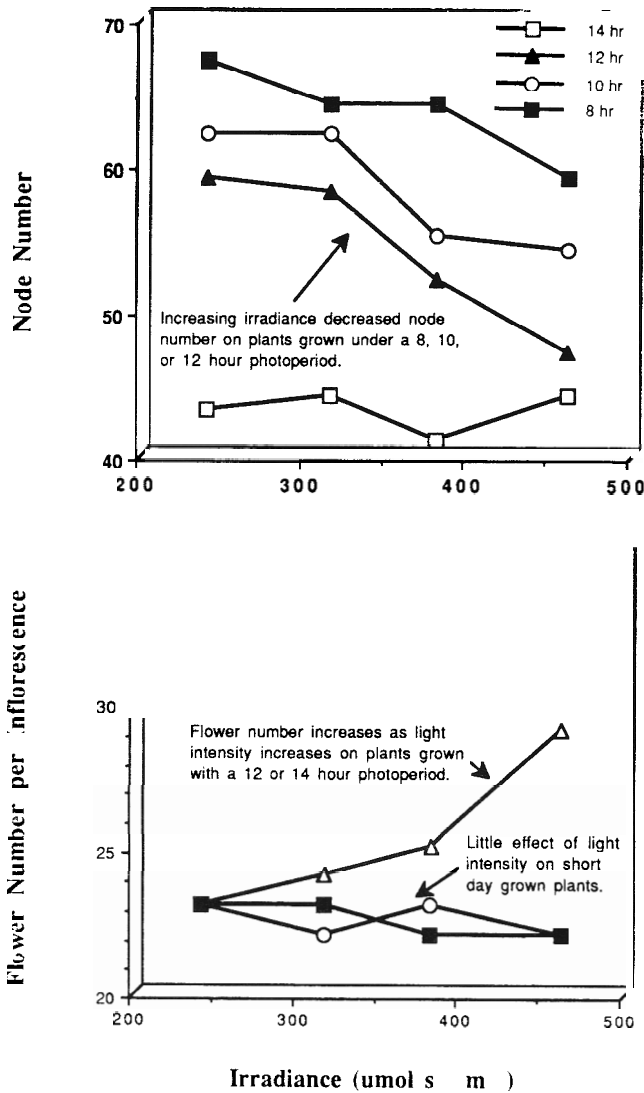


Figure 3. Node number and flower number per inflorescence as affected by irradiance.

lected on flower number and the number of nodes from the dotted leaf to the first flower.

RESULTS

Flower Initiation

Both photoperiod and light intensity affected snapdragon flower initiation and flower number per inflorescence. Flower initiation occurred significantly earlier on snapdragon seedlings grown under a 14 hour photoperiod compared

to plants grown under 12, 10 or 8 hour photoperiod (Figure 2). We can tell flower initiation occurred earlier because there were fewer nodes which formed from the time of the initiation of the experiment (identified by the dotted leaf) until the first flower. Node number decreased from 67 to 43 nodes at the lowest irradiance of 240 $\mu\text{mol s}^{-1} \text{m}^{-2}$ (1200 footcandles) as photoperiod increased from 8 to 14 hours. Similarly, node number decreased from 59 to 44 nodes on plants grown at the highest irradiance of 460 $\mu\text{mol s}^{-1} \text{m}^{-2}$ (2300 footcandles) as photoperiod increased from 8 to 14 hours. These results are consistent with previous reports on the effects of photoperiod on snapdragon flower initiation (Cockshull, 1985).

Flower Number

Flower number increased as photoperiod increased (Figure 4). Flower number increased from 23 to 30 flowers per inflorescence as photoperiod increased from 8 to 14 hours per day.

Flower initiation occurred significantly earlier on snapdragon seedlings grown under a 14 hour photoperiod compared to plants grown under 12, 10 or 8 hour photoperiod.

Flower initiation occurred earlier on plants which received a higher light intensity when plants were grown with an 8-12 hour photoperiod.

Light intensity had no effect on the node number of plants of plants grown with a 14 hour photoperiod.

Flower number increased as photoperiod increased.

Light intensity had little effect on flower number in the range of intensities studied in this experiment.

The time which plants were maintained under 'inductive' conditions had a significant effect on both node and flower number on plants grown under a 12 to 14 hour photoperiod.

Flower number increased from 22 to 31 flowers per inflorescence as the time plants were treated with a 14 hour photoperiod increased from 7 to 21 days.

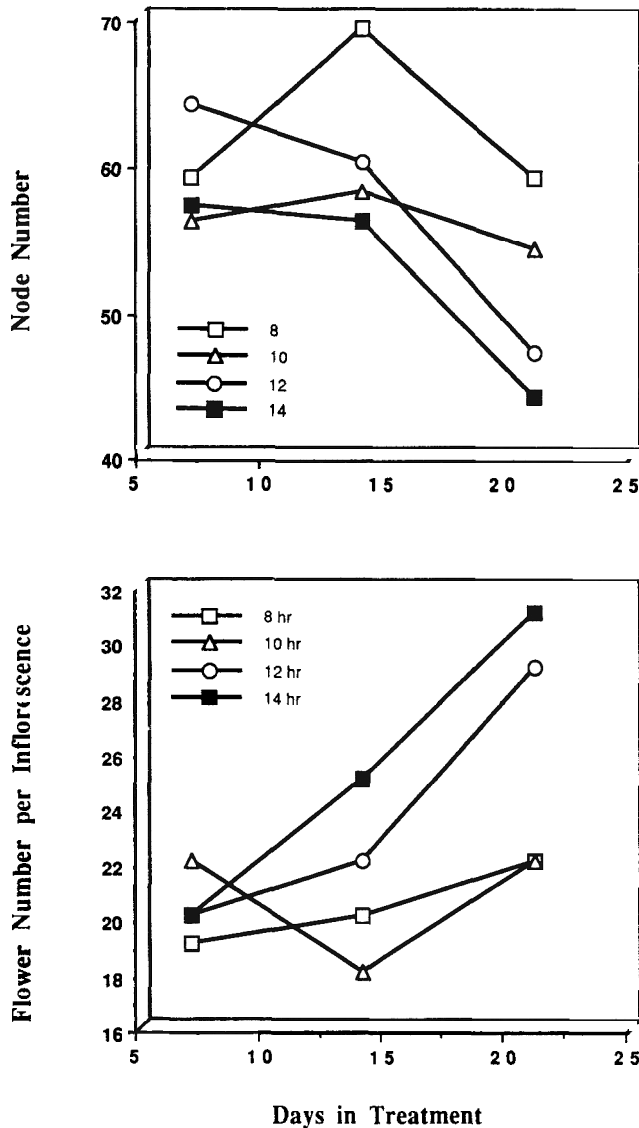


Figure 3. Flower number per inflorescence and node number as effected by days in treatment.

Light intensity had little effect on flower number in the range of intensities studied in this experiment (Figure 5). However, flower number tended to increase slightly as light intensity increased when plants were grown under 12 and 14 hour photoperiods. Since flower initiation occurred earlier on plants grown under long photoperiods versus short photoperiods total photosynthates may be limiting under long day grown plants which have fewer nodes at the time of flower initiation.

Time Necessary For Flower Initiation

The time which plants were maintained under 'inductive' conditions had a significant effect on both node and flower number on plants grown under a 12 or 14 hour photoperiod. For instance, node number decreased from 57 to 44 nodes below the inflorescence as time in the inductive treatment increased from 7 to 21 days on plants grown under a 460 $\mu\text{mol s}^{-1} \text{m}^{-2}$ irradiance. In contrast, node number was unaffected by the time in short day conditions. These results contrast previous research which suggested that a 2 day long-day treatment was as effective as a continuous long-day treatment on flower initiation (Hedley and Harvey, 1975).

Flower number was also effected by the time which plants were treated in the growth chambers. For instance, flower number increased from 22 to 31 flowers per inflorescence as the time plants were treated with a 14 hour photoperiod increased from 7 to 21 days. In contrast, flower number essentially stayed the same on plants grown under short day conditions.

Practical Implications

These data suggest the following conclusions on cut snapdragon production:

1. Flowering is most rapid and inflorescence size is greatest when the photoperiod is extended from 8 to 14 hours as a day extension.
2. The flower number per inflorescence increases as irradiance increases from 240 to 460 $\mu\text{mol s}^{-1} \text{m}^{-2}$ when flower initiation occurs under a 12 or 14 hour photoperiod. The effects of

