# Effect of Light Emitting Diode on Growth and Flowering of Oriental Melon (*Cucumis melo* L. var *makuwa* Makino)

Shin, Y. S.*, Lim, Y. S.[1], Lee, M. J.[1], Han, Y. Y.[1], Park, S. D.[1] & Chae, J. H.[1]
[1]Gyeongsangbuk-do Agricultural Research & Extension Services, Daegu, 702-708, Korea, E-Mail: sys1962@korea.kr

Key words: Oriental melon, LED, Growth, Grafting, Female flower

## Abstract

*Investigation on oriental melon was carried out for 30 minutes starting at 7 PM every day from March 21 to May 24 to find out the effect of light emitting diode on seedling quality, grafting, growth and flowering of oriental melon. According to the result of the investigation, plant height was longer in Blue, Infrared, Red+Blue and Red treatment and leaf number was higher in Blue, Red+Blue and Infrared treatment than those of control. No big difference was identified between control and Yellow, Green, Ultraviolet treatments. Grafting rate was high in Green, Red+Blue and Green treatment. The number of flower every week in control was nine, the number was almost 1 higher in White and Ultraviolet A treatments, but it was 1 to 4 lower in the rest of treatments. The number of female flowers of control was 10, however, it was 21 in Infrared treatment, 17 in White, 15 in Ultraviolet, 13 in Red+Infrared, 12 in Blue and Red+Blue, 11 in Yellow and 8 in Green.*

## Introduction

Light is an energy source for photosynthesis of green plants and an information source for photoperiodic effect, photoperiodism and photomorphogenesis. It is reported that light can switch on unique characteristics of crops, if it is controlled appropriately. LED can be applied for controlling light quality of crops and semiconductor LED can be useful for intensive plant production system and light biology research. This study was conducted to find out the effect of light emitting diode, an environmentally friendly material, on growth and flowering of oriental melon.

## Material and methods

To identify the effect of LED on seedling quality and flowering of oriental melon, oriental melon "Obokggulchamoe" was grafted with "Ttuksimtojahobak", and their nursery plant was transplanted on March 31. The nursery plant was treated with LED 20cm above the ground 30 minutes every day at 7 P.M from March 31 to May 24. LEDs used for the treatment were Red (660nm, 16.7μ mol m-2s-1), Infrared (730nm, 6,148ws-1), Red+Infrared (660+730nm, 15.5μ mol m-2s-1), Yellow (595nm, 5.1μ mol m-2s-1), Red+Blue (660+470nm, 13.9μ mol m-2s-1), Green (530nm, 15.4μ mol m-2s-1), Blue (470nm, 10.5μ mol m-2s-1), UV (395nm, 413.6ws-1), White (14.7μ mol m-2s-1). Control and treatments were cultivated without heating. 100cm aluminum led lamp housing, consisting of two circuit boards, was used. The circuit board was made up of 50 LED lamps in total, 2 rows, each with 25 lamps, installed on the 3cm wide, 50cm long plastic.

## Results

Plant height was longer in Blue, Infrared, Red+Blue and Red treatment and leaf number was higher in Blue, Red+Blue and Infrared treatment than those of control. No big difference, however, was identified between control and Yellow, Green, Ultraviolet treatment. Grafting rate was high in Green, Red+Blue and Green treatment. The number of flowers weekly in control was nine, the number was almost 1 higher in White and Ultraviolet A treatment, but it was 1 to 4 lower in the rest of treatments. The number of female flowers in control was 10, however, it was 21 in Infrared treatment, 17 in White, 15 in Ultraviolet, 13 in Red+Infrared, 12 in Blue and Red+Blue, 11 in Yellow and 8 in Green.

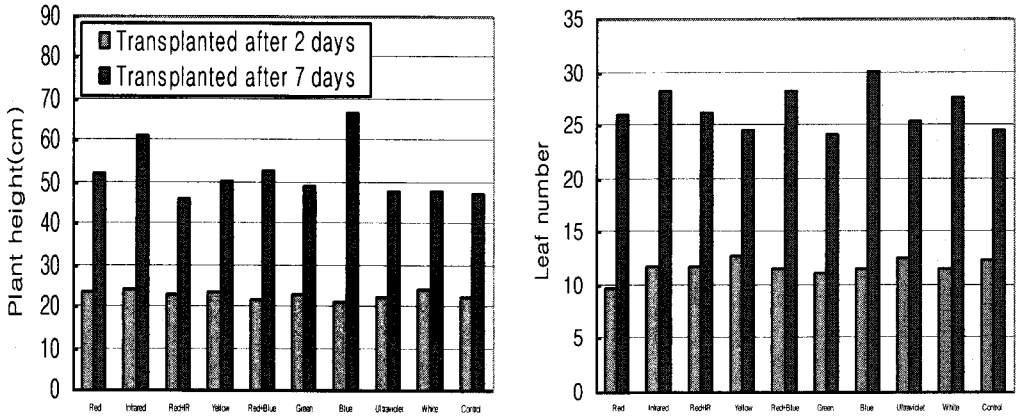


**Figure 1: Effect of LED on plant height and leaf number of oriental melon Obokggulchamoe, transplanted on March 31, 2009**

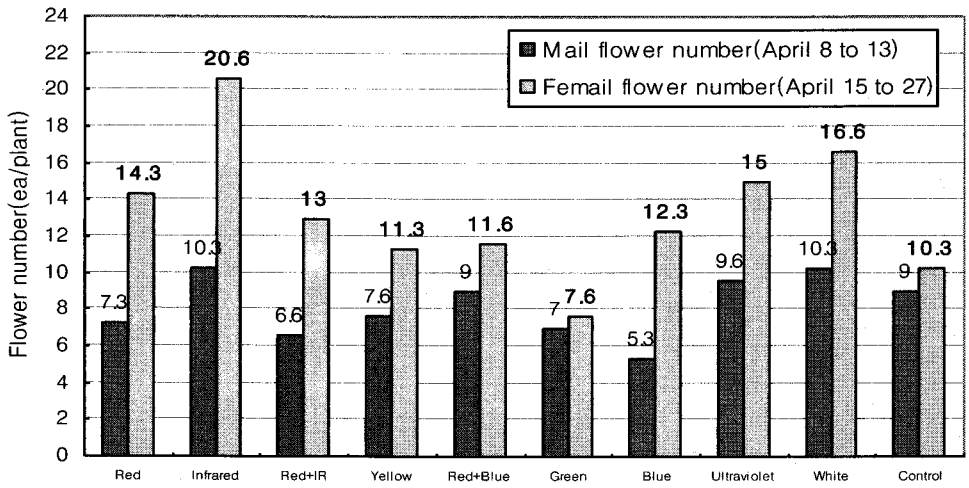


**Figure 2: Effect of LED on number of male and female flowers of oriental melon Obokggulchamoe. Transplanted on March 31, 2009**

## Discussion

Light Emitting Diode is a semiconductor light emitting element that converts electric energy into light energy. Its application was limited because it only controls some light colors such as red, blue and green, however, research on various light colors is conducted in many fields. According to the results of this study, infrared light is concerned with flower bud formation of oriental melon. This is in line with the report that harvest of strawberries is earlier due to increasing flowering.

## Conclusions

Given the result of the investigation, it is considered that single color lights such as Infrared, Blue, Red and White or dual color lights such as Red+Infrared and Red+Blue affects seedling quality and flowering of oriental melon.

## References


C. S, Brown, A. C, Schuerger, J. C, Sager. 1995. Growth and Photomorphogenesis of pepper plants under Red light-emitting diodes with supplemental blue or Far-red lighting. J. Amer. Soc. Hort. Sci 120(5): 808-813.

Donald Keiller, Harry Smith 1989. Control of carbon partitioning by light quality mediated by phytochrome. Plant Science, 63, 25-29.

Harry Smith. 1982. Light Qualiy, photoperception and Plant strategy. Annual Reviews. Plant Physiology 33: 481-518.

M. J. Kasperbauer, P. G. Hunt. 1998. Far-red affects photosynthate allocation and yield of tomato over red mulch. Crop Sci 38, 970-974.

M. J. Kasperbauer, D. E. Peaslee 1973. Morphology and photosynthetic efficiency of tobacco leaves that received end-of-day red or f-red light during development. Plant Physiology 52;440-442.

M. J. Kasperbauer. 1989. Far-Red light reflection from green leaves and effects on phytochrome-mediated assimilate partitioning under field conditions. Plant Physiology. 85. 350-354.

R. J. Bula, R. C. Morrow, T. W. Tibbitts and D. J. Barta. 1991. Light-emitting diodes as a radiation source for plants. Hortscience 26(2): 203-205.

T. Teklemarian, T. J. Blake. 2003. Effects of UV-B preconditioning on heat tolerance of cucumber (*Cucumis sativus* L.) Environmental and Experimental Botany. 26(2): 203-205.