

Editor: Laurel K. Matthes  
 764 Village Blvd. So.  
 Baldwinsville, New York 13027

## The Effect of Shading and Nutrient Supply on Degree of Variegation of Variegated Peperomia

Gloria W. Shen and John G. Seeley  
 Dept. of Floriculture and Ornamental Horticulture  
 Cornell University

EDITOR'S NOTE: This article is based on the research of Gloria Shen in partial fulfillment of requirements of the Master of Science degree. See reference 6.

Variegation of leaves is a valuable attribute of many decorative foliage plants. *Peperomia obtusifolia* has completely green leaves but there are cultivars with various degrees of variegation, usually cream to white coloration along the leaf margin (Fig. 1).

Usually green leaf color intensifies as shade increases (light intensity decreases) until excessive shade prevents adequate plant growth. Research in Florida showed effects of light intensity on plants with striped or variegated leaves. As light intensity decreased below 3000 footcandles (ft-c), the color intensity of *Cordyline terminalis* and *Codiaeum variegatum* was severely reduced (4). Foliage color of *C. terminalis* 'Baby Doll' was less intense when grown under 80% shade as compared to 60 and 40% shade, under Florida conditions (1).

*Dracaena sanderana* or *D. deremensis* 'Warneckii' produced wider stripes with light intensity of about 1500 than at 3000 ft-c (4). And with yellow-banded *Dracaena angustifolia* 'Honorariae', best foliage color was obtained with 80% shade (about 2500 ft-c) compared to the higher intensities with 40 and 60% shade (3). Interestingly, another foliage plant, *Epipremnum aureum*, had less yellow variegation when light levels were less than 4000 ft-c (4). *Areca palm* grown in full sun generally had light-green foliage with necrotic tips and best plants were produced under 40% shade (5).

In response to the question of possible effects of light intensity and nutrition on variegation of *Peperomia obtusifolia* under northern greenhouse conditions, two cultivars were grown in greenhouses in Ithaca in summer and fall months. 'Variegata' inherently has more variegation than 'Albo Marginata' (Fig. 1).

Various degrees of shading and resultant differences in light intensity were obtained by enclosing the plants with covers of plastic saran shading cloth of various rated densities (20, 47 and 73% light reduction). Air temperature was kept between 70 and 75°F on bright sunny days and 64 to 70° on cloudy days; night temperature was 60 to 62°.

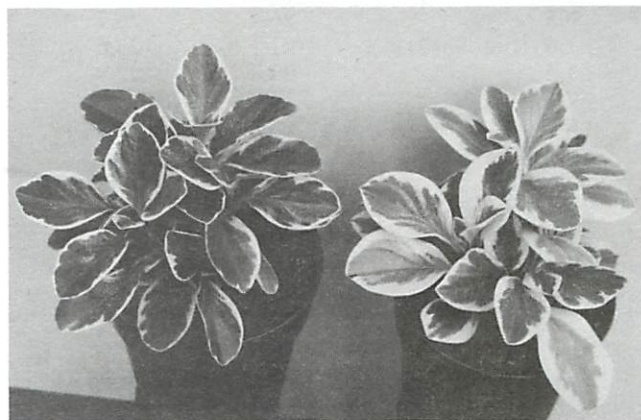


Fig. 1. Variegated *Peperomia obtusifolia* cultivars 'Albo Marginata' on the left, and 'Variegata'.

Rooted cuttings about 4½ to 5 inches long with about 8 leaves per plant were grown in quartz sand in 6-inch plastic pots irrigated with Hoagland's nutrient solution giving various levels and combinations of nutrients.

Variegation is the non-green area as a percent (%) of the entire leaf area. Thus a leaf with 25% variegation would have 25% of its area as white or cream color and 75% green.

### Effect of Shade and Light Intensity

**Experiment 1**—With 3 concentrations of Hoagland's standard nutrient solution, the amount of foliar variegation of the cultivar 'Variegata' was almost the same (38-40%) in the 73 and 47% shade treatments but decreased significantly to about 31-33% variegation, with the highest light intensity produced by 20% shade (Table 1).

TABLE 1. Effect of shade and nutrients on variegation of cultivar 'Variegata'.

Nutrient* treatment	Variegation		
	73%	47%	20%
0.5H	40	39	31
1.0H	40	38	33
1.5H	39	39	33

\*H is the normal concentration of Hoagland's nutrient solution.

**Experiment 2**—With 2 levels shade and 5 levels each of nitrogen (N), phosphorus (P) and potassium (K) and the cultivar (Albo Marginata), the percent of variegation was significantly greater for plants grown under 73% shade than with 47%, averaging 28% compared to 23% (Table 2) in 13 treatments. In 2 treatments the reverse occurred. Thus it again appears that lower light intensity favored an increased degree of variegation.

TABLE 2. Effect of shade and nutrition on variegation of 'Albo Marginata'.

Nutrient treatment*	Variegation (%) <sup>y</sup>	
	Amount of shade	
	73%	47%
<b>Nitrogen</b>		
0	23.9	21.6
0.25	26.6	27.3
0.5	25.3	27.3
1.0 (Standard)	31.1	23.6
1.5	27.9	22.6
<b>Phosphorus</b>		
0	29.7	27.5
0.25	25.4	22.3
0.5	26.2	25.7
1.0 (Standard)	31.1	23.6
1.5	29.3	22.9
<b>Potassium</b>		
0	26.3	17.2
0.25	27.2	18.7
0.5	29.3	19.2
1.0 (Standard)	31.1	23.6
1.5	36.1	27.0
<b>Averages</b>	28.4	23.3

\*Concentration relative to standard Hoagland solution.

### Effect of Nutrients

In general, nutrition did not have a significant effect on the amount of foliar variegation. With the cultivar 'Variegata', the percent of variegation was essentially the same with three concentrations of Hoagland's solution regardless of the amount of shade (Table 1).

In another experiment (data presented in reference 6), 'Variegata' plants grown under 20% shade showed no significant difference in the percent of variegation when supplied with 3 levels each of N, P, and K in the nutrient solution.

In the experiment with 'Albo Marginata', statistical analysis of the data presented in Table 2 showed no significant effect of nitrogen or phosphorus on the percent variegation. Plants with no nitrogen or low levels of potassium had a lower amount of variegation than with more normal levels of these nutrients.

The effect of potassium is interesting; the percent of variegation increased with each increment of K in the nutrient solution resulting in a difference of about 10% variegation between the lowest and highest concentration of K.

The variegated forms of *Peperomia obtusifolia* are relatively slow-growing. This may explain why growth was satisfactory even in some of the low nutrient treatments. The only deficiency observed was N; about 8 to 10 weeks after treatments began, dark green areas became light green, and were severely yellow as the experiments reached termination.

Apparently, nutrition does not have a great effect on percent of variegation of these cultivars but based on the

results with 'Albo Marginata', there should be a good supply of potassium as well as other nutrients.

### Effects of Total Growth

Fresh and dry weight of the plants increased with the greater amount of light produced lower levels of shade. Thus light levels favoring variegation were unfavorable for total plant growth. In Florida experiments, Conover and Poole (2) found that yields of cuttings of several foliage plants, including *Peperomia obtusifolia*, increased as shade was reduced from 80 to 60%. Plants under 60% shade gave 77% more cuttings than with 80% shade.

### Conclusion

Although reducing light intensity by shading increased the amount of variegation, the reduction in light decreased overall growth. Therefore it is logical to select cultivars inherently having a higher percent of variegation rather than try to increase it by control of light intensity. The results also indicate that the relatively low light intensities of the retail store and home should not detrimentally affect the amount of variegation. Since, in general, nutrition did not affect percent of variegation except for the potassium effect in one experiment, one should provide a good supply of all nutrients to maintain good growth and plant production.

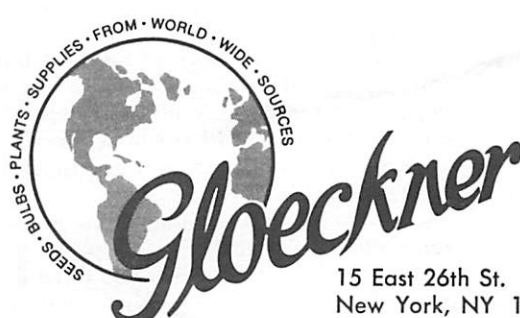
Create new decor for your home or make novel gifts with pressed-flower pictures using summer blooms from your garden of flowering wild plants. It's a 300-year old craft that you can do with household supplies and equipment.

Making successful pressed-flower pictures depends on selecting suitable plant materials and preparing them correctly. The procedures are easy to follow, and every picture you create will be original and unique.

Get a headstart on your holiday gift list by making several pressed-flower pictures this summer. They'll be especially appreciated as your own handbook.

Cornell Cooperative Extension specialists have compiled easy-to-follow directions and suggested designs in *Pressed Flower Pictures* (IB-34, \$2.00). Included are lists of preferred garden plants and field flowers, along with full-color illustrations.

Copies of *Pressed-Flower Pictures* are available from Cornell Distribution Center-PF, 7 Research Park, Ithaca, NY 14850, or from Your Cooperative Extension office.



15 East 26th St.  
New York, NY 10010  
212-481-0920  
Telex 425161