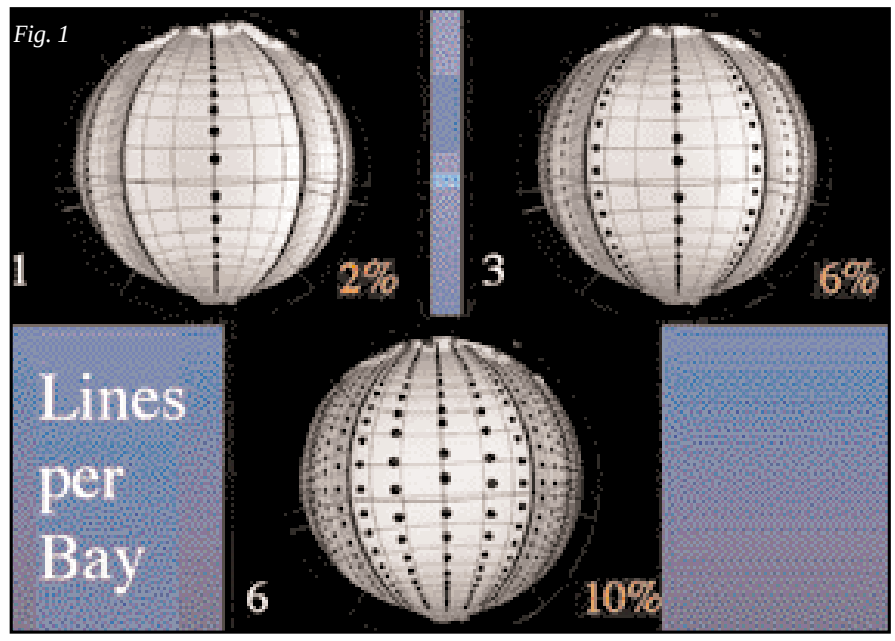
Are Hanging Baskets Keeping Your Bench Crops In the Dark?

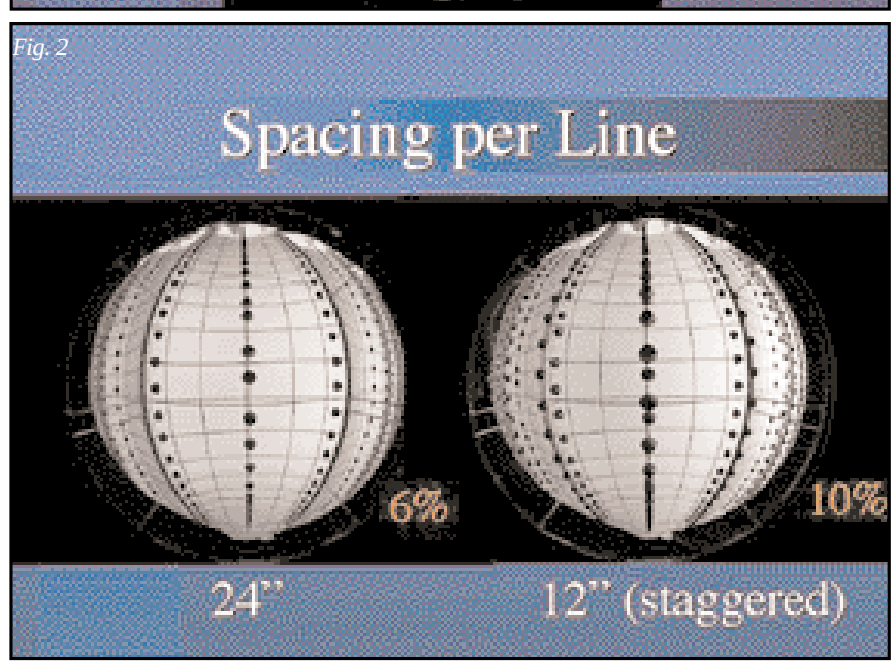
Growing hanging baskets above a bench crop might be an efficient use of space, but without considering the ways this will impact light distribution, you could end up with unsalable plants.

By James E. Faust and Pamela C. Korczynski

When it comes to producing hanging baskets above a bench crop, growers rely on trial and error to reach a balance of optimizing their greenhouse space without sacrificing the quality of the bench crop. If too many hanging baskets are placed overhead, the amount of light reaching the bench may not be enough to produce a high quality crop.

So, how many baskets can you really afford to hang over a bench crop? In order to shed some light on this issue, we hung baskets in four bays of a gutter-connected greenhouse and measured the percentage of light being transmitted through the canopy of hanging baskets. In this article, we will demonstrate which factors are the most important to consider when deciding how many hanging baskets you should really be growing.





We hung 10-inch hanging baskets in a block of four 21-foot x 72-foot bays. Light measurements were taken below the hanging baskets and in a similar greenhouse containing no baskets to determine the percentage of light intercepted by the baskets. Comparisons were made between several variables including:

- the number of hanging basket lines per bay (1, 3 or 6 lines per bay);
- spacing within the line (12 inches or 24 inches);
- pot color (green vs. white); and
- empty pots vs. pots with plants in them.

The net result was a comparison of 24 different hanging basket treatments.

FACTORS TO CONSIDER

Hanging basket lines per bay. Figure 1 demonstrates our three line densities at 24-inch spacing per line and no plants in the baskets. The arrangements shown in the photos were equivalent to 42, 14 or 7 square feet of greenhouse space per basket (Table 1). (Note: the six lines per bay designation actually had five lines in the bay and one under each gutter.) At these densities, the one, three and six line per bay treatments intercepted 2, 6 and 10 percent of the available light. Keep in mind that the actual percentage of light interception is dependent on additional factors to be covered in this article, thus the relationship between the treatments is as important as the actual percentages. In this case, the differences between the treatments are quite obvious. For example, three lines per bay intercepted three times more light than one line per bay and six lines intercepted almost twice the light intercepted by three lines.

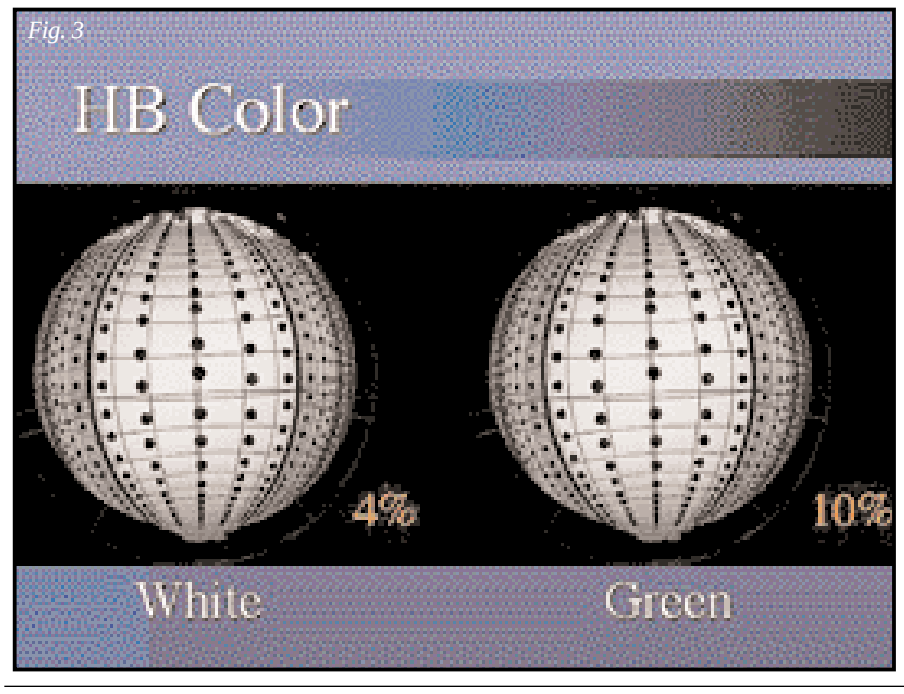
Basket spacing per line. Baskets were spaced either at 24-inch centers along the basket line or at 12-inch centers. The 12-inch spacing was staggered so that every other basket was hung from an S-hook. As one would expect, the 12-inch staggered spacing had twice as many baskets as the 24-inch spacing, so the 12-inch spacing intercepted almost twice the light compared to the 24-inch. Figure 2 (see pg. 20) demonstrates 24-inch and 12-inch spacing when three lines were hung per bay and no plants were in the pots. In this example, the 24-inch spacing intercepted 6 percent of the light while the 12-inch spacing intercepted 10 percent.

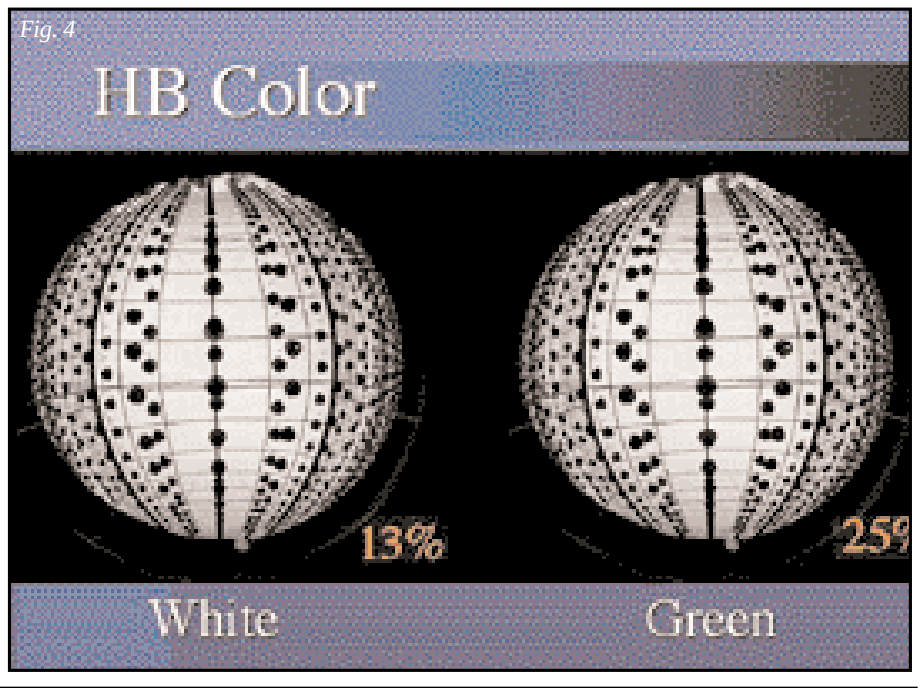
Container color. In addition to spacing, we also examined container color, comparing green hanging basket containers to white baskets. The white containers reflected more light to the underlying bench than the green containers. In fact, the green containers typically intercepted twice as much light as did the white containers. Figures 3 and 4 (see below) demonstrate the effect of pot color under two different situations. Both situations compare five lines per bay spacing and no plants in the baskets. Figure 3 compares white and green pots at 24-inch spacing. The white containers intercepted only 4 percent of the light, while the green containers intercepted 10 percent. Figure 4 compares white and green containers at 12-inch staggered spacing. The white containers intercepted 13 percent of the light while the green containers intercepted 25 percent. In both situations, the green containers intercepted approximately twice the amount of light compared to white containers placed at the same density. Although container color is primarily market driven, if you have flexibility in this regard, white pots are a particularly good choice during low light conditions or if hanging basket density is very high.

Table 1. The area occupied by one hanging basket in each of our six hanging basket densities.

	Hanging basket density (sq. ft. per basket)	
Lines per bay	24-in. spacing	12-in. spacing
1	42	21
3	14	7

Plant Size in the Hanging Basket. Plant size in the hanging basket has a major impact



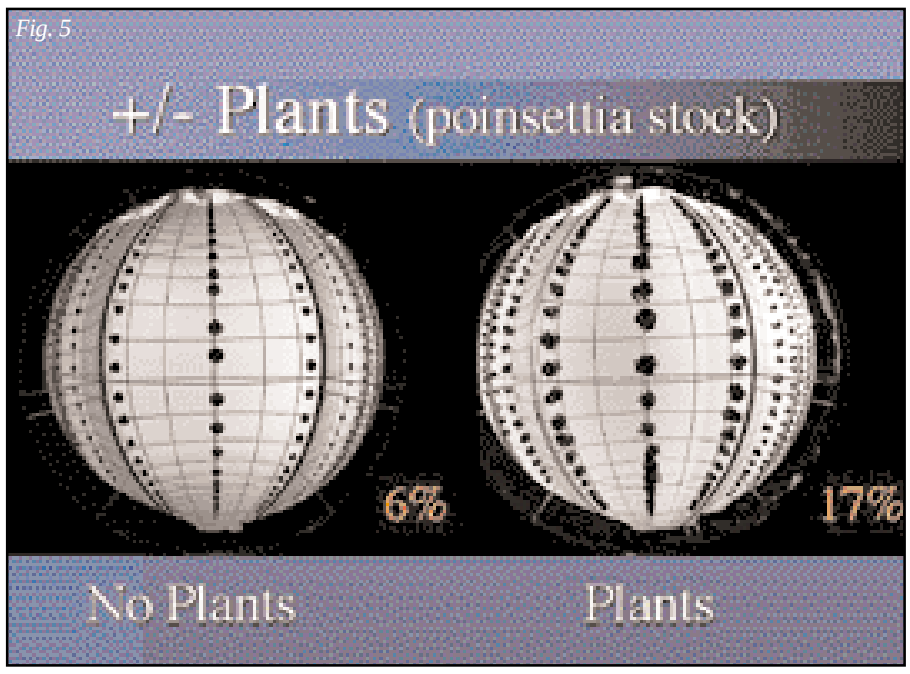


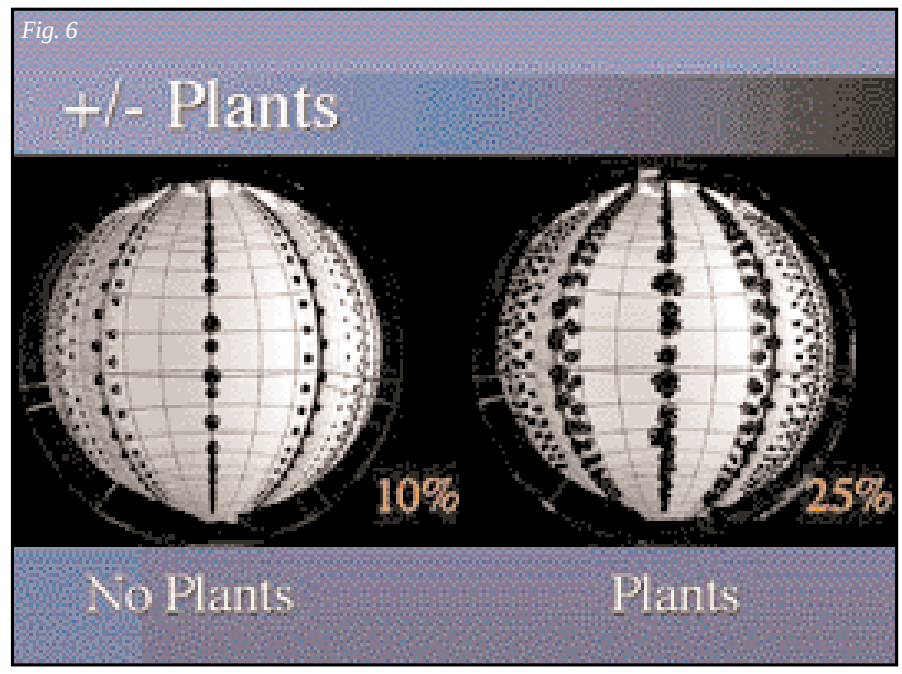
on light interception. The exact effect will certainly depend on the size of the plant in the hanging basket.

For this study, we used poinsettias that were roughly equivalent in size to large 6-inch poinsettias or small 10-inch poinsettias. Figures 5 and 6 (see below) demonstrate the effects of baskets, with and without plants in the baskets, placed at 12-inch staggered spacing of either three or five lines per bay. At three lines per bay, the baskets without plants intercepted 10 percent of the available light, while the baskets with plants intercepted 25 percent of the light (Figure 5). At five lines per bay, the baskets themselves intercepted 25 percent of the light, while the baskets with plants intercepted 42 percent of the light (Figure 6). In general, having plants in the baskets typically doubled the amount of light intercepted, although higher light interception percentages are possible if larger plants are grown in the baskets.

A dogma in the greenhouse industry is that hanging baskets overhead will decrease the red to far-red ratio of light delivered to the bench crop, resulting in increased stem elongation by the bench crop. We did not measure any significant difference in the greenhouse light quality when plants were placed in the hanging baskets. It appears that the plants in hanging baskets would have to be large enough to prevent almost all of the direct sunlight from penetrating the canopy in order to significantly alter the light quality delivered to the bench crop. If the hanging basket canopy was dense enough to change the red to far-red light, then there would not be an adequate amount of light to produce a decent bench crop. Thus, our data suggests that the major impact that hanging baskets have is to reduce the light quantity, not alter the light quality.

Height above the Bench or Floor. The distance between the overhead baskets and the bench crop does not impact the amount of light intercepted by the baskets; however, it does influence the distribution of light. For example, a basket hung 10 feet above the bench intercepts approximately the same amount of light as a basket that is five feet above the bench. However, the shadow of the lower basket is darker and moves more slowly





over a given area of the bench. Thus, baskets hung low will cause poorer uniformity of light on the bench, i.e., there will be darker areas and brighter areas compared to baskets which are hung high, providing a more uniform light distribution on the bench.

Line Orientation. The orientation of hanging basket lines can also affect the light distribution. East-west arrangements may reduce light distribution in the same way an east-west greenhouse can cause stationary shadows along the north side of a gutter. So, hanging basket lines running north-south are preferred because they will produce a more uniform growing environment on the bench, especially during the winter months at northern latitudes.

USING THIS DATA IN YOUR GREENHOUSE

Every greenhouse business has a unique way of arranging their hanging baskets. Since our arrangement patterns will obviously differ from most of yours, here is a way to roughly translate our data to your individual situation. The following table displays greenhouse area occupied by one hanging basket in each of our treatments, i.e., the number of square feet per hanging basket. For example, one line per bay at 24 inches between baskets equals 35 baskets in our 21-foot x 72-foot bay (1,470 sq. ft.). Thus, 35 / 1470=0.0238 baskets per sq. ft. Take the reciprocal to calculate the number of square feet per basket (1 / 0.0238=42 sq. ft. per basket).

In conclusion, many factors influence how much light a hanging basket crop intercepts. Obviously, the density of baskets (number of lines x baskets per line = density of baskets) has an impact on light interception. The figures and table in this article should provide growers with a means of estimating the percentage of light intercepted by their baskets.

Although, we expected the white containers to reduce light interception, the differences that we observed between white and green pots were much greater than anticipated. Theoretically, one could hang twice as many white baskets in a greenhouse bay as green baskets and still get the same percentage of light interception.

Finally, plant size in the hanging basket can have a tremendous effect on light interception. Fuchsia baskets will obviously intercept more light than an impatiens basket.

Greenhouse light levels typically increase by 50 to 70 percent from February to April, so growers should develop strategies that allow for relatively low light interception in late winter, followed by ever-increasing light interception by baskets as ambient light levels increase through the spring months.

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