Artificial Light for Seedlings and Cuttings

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It is more than a century ago that the first pioneers used artificial light on greenhouse crops. Faulty ideas and poor light sources slowed down further development, but with the development of the fluorescent tube and the modern mercury lamp we should be in a period where artificial light is a necessary factor in intensive plant propagation.

Incandescent lamps for day-lengthening are widely used, but must not be confused with lamps for photosynthesis. This requires high light intensity.

Fluorescent tubes for photosynthesis

At high light intensity the possible harmful effects of a lamp are magnified. You should not use the incandescent lamp for photosynthesis because it converts about 95% of the applied electricity to heat which may burn the plants or elongate them excessively.

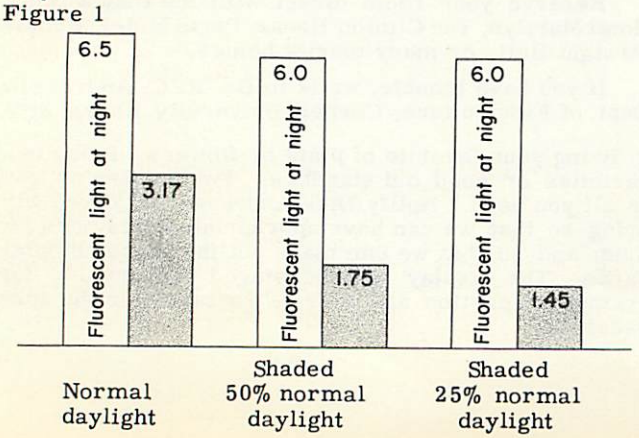
The fluorescent tube has no such harmful radiation. If you use 8-10 watts per square foot, we can almost guarantee a good result. Using 8-10 watts per square foot means that a 40 watt tube should light 4-5 square feet of bench area. A distance of 8-10 inches over the plants will be right.

If the plants are grown under mist, the fluorescent tubes will prove impractical because the ballast cannot stand the moisture. Instead, use high power mercury lamps (400 watts each). One such lamp can irradiate 40-50 square feet and can therefore be placed high enough over the plants that the mist can operate normally without harming the lamp.

Light for both seedlings and cuttings

All plants get too little light during the wintertime. It would be too expensive to help the bigger plants, but when they are small and stand close together the cost of artificial light per plant is smaller. Seedlings and cuttings which are given additional light during the first 3-4 weeks of their life will often respond with a more than 100% gain in size and quality and the time from germination to transplanting can be cut considerably.

Figure 1



Give light at night

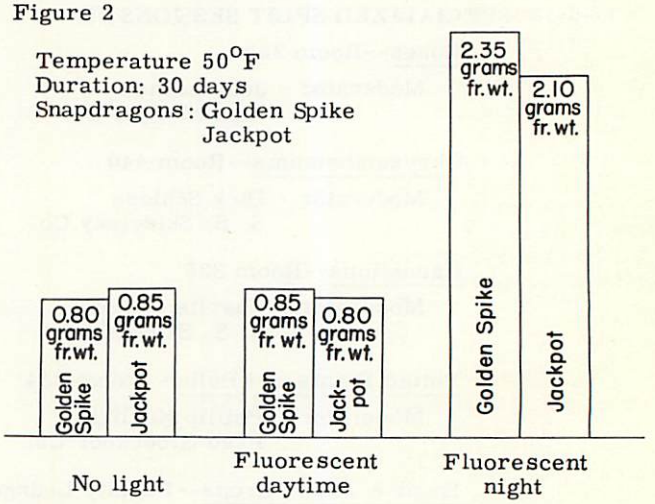
It is not so much the low light intensity during the wintertime that makes the plants grow slowly. The short daylength is much more important. The plants suffer a loss of carbohydrates during all 24 hours of the day, due to respiration. When the days are short there is not much time to build up dry matter, and the loss during the dark period becomes very significant.

If you apply extra light to plants during the daytime, you will not get much response with the recommended 8-10 watt per square foot. You would have to give many times as much and that would be uneconomical. But if you apply the light at night, you will get a tremendous response. Following experiments illustrate these viewpoints:

Fig. 1 (light at night, different intensity during day)
Fig. 2 (results from 1955 experiment)

Both experiments were carried out with snapdragons. The first experiment shows the importance of daylight, but it is also obvious that added light compensates very well for lack of daylight. Experiment 2 shows that added light in the daytime is a waste of money. On the other hand, light at night gives a surprising result.

Figure 2



24 hour day

Most plants grow very well with normal daylight + artificial light all night through. We are, of course, only speaking of the first 3-4 weeks of their life. After transplanting, there will be too few plants per unit area, so artificial light would not be economic anyway. In order to save on investment and electricity it will be necessary in many cases to have light on for only 6-8 hours in addition to the daylight. If the lamps are moveable, they can be placed over one half of the bench from late afternoon to midnight and then moved to the other half from midnight to late morning.

Con't on page 3.

Artificial Light--Con't from page 2.

Light only the best plants

Artificial light makes plant production very intensive. A good result is almost absolutely sure, but the economy may, in some cases, be doubtful. If the added expense shall be repayed, only the best plants should be treated. Additional light given, as mentioned above, results in at least 100% higher fresh and dry weight and much faster development. The extra growth in the shorter period should pay your electricity bill and the equipment. It will never pay to give light to poor plants to make them look as good as your neighbors' which don't get light. Throw away all poor plants. It is not very expensive when they are still in the seed pan. But it is expensive to waste labor, heat and light on a second class plant. A poor and good plant will both double their weight in a given time, but the small one will still be the smallest.

Artificial light can only be economical if it is used to improve a crop which otherwise cannot be better. It't a waste of money to use light to make a poor crop look normal.

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