

Plug production for bedding plants

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The production and use of plugs in the bedding plant industry continues to grow in popularity. Plugs offer several important advantages over the technique of sowing seed into flats (bulk seeding) and then transplanting (see Table 1).

Table 1. A comparison of two seedling production methods

Criteria	Plugs	Bulk seed/transplant
Crop uniformity	High	Low
Transplant shock	Low	High
Ease of crop scheduling	High	Low
Relative rate of growth	Higher	Lower
Wasted seed	Low	High
Need for strict environmental control	Critical	Less critical
Need for strict water control	Critical	Less critical
Equipment cost	Higher	Lower

No one formula exists for successful plug production. Quality crops can be produced using a wide range of materials and equipment. However, regardless of the equipment available, a successful grower must start with good seed, maintain a clean, uniform environment and avoid unwanted stress conditions on the crop. The exact cultural practices used will vary with the stage of plant development, the plant species and varieties grown, the natural light and temperature levels and the desired growth response.

The development of the seedling, in a plug production system, can be divided into four stages including: germinations of the seed, emergence of the seedling, development of the first true leaves and the finished transplant. Plant response to moisture, temperature, light, media composition, fertility, oxygen, carbon dioxide and relative humidity will vary with each stage of development.

Plug Seed Germination

In the germination phase, moisture availability to the seed and the temperature in the plug (growing media) are most critical. The optimum temperature for germination is species specific. This information is available on the seed package or from the seed producer for each species. The optimal temperature should be maintained; however, the use of primed seed will improve germination when optimum temperatures can not be maintained. Moisture availability is particularly important to seed germination. Ideally the seed should remain moist. However, the seed should not stand in water. This situation can be achieved with an intermittent fine mist, a fog water delivery system or a sweat box germinator; resulting in available water without waterlogging. The seed should be placed in the center of the plug cell and should remain on top of the growing media or under a very thin coating of vermiculite. Fertilizer applied at a rate of 50 ppm nitrogen from potassium nitrate (KNO_3) will enhance germination of some species.

Seedling Emergence

Emergence of the seed leaves above the rooting media signals the end of the germination phase. The time required for a seed to germinate is reduced in a plug tray system. As soon as the seed leaves emerge light must be provided. Light intensity should increase gradually starting at 500 foot-candles and progress toward full sun as the plants develop.

Once the seeds emerge, the humidity should be reduced to encourage water uptake by the plant. Strong root development will result from a well-aerated media which is allowed to dry in-between watering. Heat supplied from both above and below the plug trays will facilitate air movement about the plant. Water should be supplied frequently and in low quantities, with a mist or fine spray provided on a cyclic basis. Fertilizer should be applied at an initial rate of 100ppm nitrogen from a 20-10-20 formulation after emergence.

True leaf stage

Once the plant canopy covers the plug tray, growth regulators should be applied to prevent stretching. Depending on the species grown, the growth regulator cycocel, B-Nine or Bonzi can be applied at the appropriate rate. The fertilizer program should consist of both a 20-10-20 and a 15-0-15 supplemented with calcium (calcium nitrate) and magnesium (epsom salts) if

these elements are not available in the fertilizer formulation. The plants should now be moved to full sun in the greenhouse or to higher light levels in the growth room.

Transplant stage

Prior to transplant, growth can be regulated by controlling available water, fertilizer, temperature and light. At the transplant stage the roots should be very well developed and the plant should be strong and healthy, a soft plant is not desirable. The plants will experience some shock upon transplant due to the physical disruption of roots. Thus, the plants should be watered in, but fertilizer and fungicides should be withheld until root development has resumed. If the transplants are moved to a new environment, a period of acclimatization may be required prior to transplant.

References:

Agnew, Nancy Howard. "Get a Good Start with Plugs." Greenhouse Grower. February 1986. pg. 76-78.

Koranski, David. "Plug Production in the Bedding Plant Industry." BPI News September 1985. pg 1-3.