



## Characteristics of Good Quality Transplants

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Transplant quality and size influence plant establishment, initial growth and eventually yield. If you're planning to use transplants this spring make sure the season gets off to a productive start by planting good quality transplants. While terms like "good quality" leave room for some subjective interpretation, there are characteristics that can be defined to aid in determining if the transplants are of good quality.

One characteristic is healthy roots. Roots of healthy transplants should be white and actively growing. If the plants have been over-watered, injured by excessive soluble salts, infected with disease or stressed in other ways, the color may be tan or brown. Root breakage results in severe transplant shock and plants sit in the field for several weeks before they start to actively grow. This period of sitting extends the time to harvest and defeats the earliness purpose of using transplants. So make sure the roots are healthy.

A second characteristic of good quality transplants is healthy green color. Look at the leaves and stems of the transplants. The leaves should be green, not chlorotic. Yellowed or chlorotic leaves could indicate the transplants have not been fertilized properly and are suffering nutritionally, likely from nitrogen deficiency. Purple leaves would indicate phosphorous deficiency. Transplants that are nutritionally stressed, especially with limited nitrogen, have long-term reductions in earliness and total yields. Avoid the other extreme of very lush and soft over fertilized plants. They will be subjected to more breakage by the wind and other problems. Typically nitrogen concentrations of 30 to 50 ppm if fertilized daily will provide adequate growth but higher rates of 200-300 ppm will be needed if fertilized weekly. This will vary too with the plant type

Another characteristic is lack of insects and diseases. Inspect the foliage for signs and symptoms of insects and diseases. Planting transplants in the field already infested with aphids is planting problem. The leaves should also be free of lesions and spots because they could indicate the presence of disease and you may be planting plants that are already suffering from disease.

Also note how many leaves are present. Transplants with few leaves will be slower to establish or develop normally when planted. In tomato, it has been noted that in plants that lost their cotyledons, flowering was delayed by 4 days with one lost and 10 days if both were lost. Once again a 10 day delay could offset the benefits of using transplants for earliness.

Thick stems are an additional desirable characteristic. Note the thickness of the plant stems. Plants that are tall and spindly will suffer more from wind breakage. Thick stems on transplants are an indication that they have not been grown too rapidly and that there is a good root to shoot balance of nutrients. Other problems with the stems such as lesions or girdling near the roots can delay field establishment.

If purchasing transplants try to determine the age of the plants. If they are so old that they are flowering or have set fruit already then they will probably take longer to establish and will be slower to yield a crop. Be sure to remove fruit from any transplants that are being set in the field to help alleviate delays. Transplants that have been in containers for long enough to become root bound will suffer greater root breakage during planting. As noted earlier, root breakage has been associated with transplant shock. For tomato transplants 6 to 8 weeks is an ideal age. Plants that are 10 weeks or older will still produce fruit but typically produce less than their full potential.

Before planting in the field, transplants have historically been hardened off to make them acclimated to the change from the greenhouse to the outdoor world. The overall objective is to slow the plant's growth, thicken the cell walls, and allow the plants to withstand outdoor conditions. Practices to accomplish hardening include 1) less frequent watering to allow the plants to wilt slightly between watering 2) increased ventilation 3) applying more potassium relative to nitrogen and 4) lowering the temperature but no more than 5 to 10°F as more recent studies have shown increased catface in tomatoes with day temps of 60-65°F and night temps of 50-60°F for one week or more.

While growth does need to be slowed, you don't want to totally stop the growing process by over doing it. Over-hardening will require too much time for growth to resume and earliness will be delayed.

Hopefully, you have a quality transplant supplier or you are growing your own good quality transplants. Earlier crop production can be achieved by using young, properly hardened transplants with no nutrient deficiencies. Be sure to do a soil test before planting into the field to apply the proper fertilizer rates pre-plant and to follow up with additional nutrients needed either by sidedressing or applying through the irrigation system to keep the plants growing and producing at the optimum level.