

# Transplanting: Decrease Fatigue, Increase Productivity

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**A**lthough automatic seedling transplanters are starting to come onto the market, it will still be several years before they are perfected to the point where they are in widespread use in the industry. Besides the greater than \$20,000 cost, most systems require changes to your present methods, such as new plug trays, special dibbles and dubbing, and the inspection and filling of blank cells to get a full seedling tray.

In the meantime, there are a number of things that you can do to increase the efficiency of hand transplanting. To be able to evaluate the effect of changes, a record of production, including number of flats per hour and cost of transplanting a flat should be kept.

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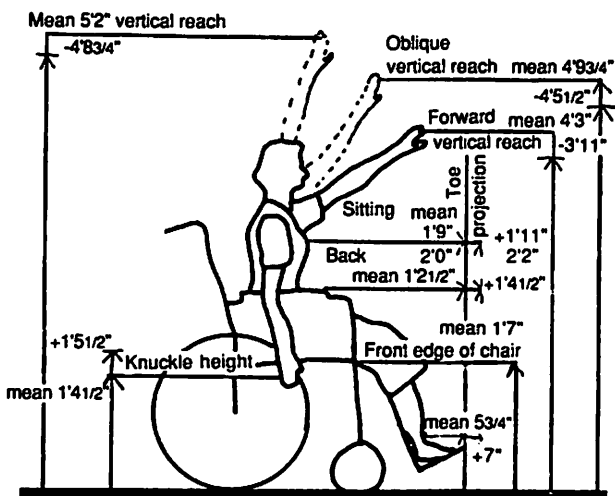
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If you are not currently using plugs, now is the time to start. Plug technology, whether you purchase or grow your own, is well established. The savings in labor comes from the ease of handling the plugs, as compared to the seedlings from a community tray. The slight extra cost is more than offset by quicker starting and more uniformity. Some of this advantage is lost if plugs become too large.

In transplanting, as in any operation requiring manual dexterity, the comfort of the transplanter and the convenience of the materials can have a major effect on production efficiency.

Table height, lighting, temperature and other factors need to be reviewed to ensure the best conditions for the workers.

Research done at Pennsylvania State University a number of years ago on work station design showed that maximum dexterity and performance occurs when the flat, seedlings and other items used are located within a 16-inch horizontal and 17-inch vertical radius of the normal elbow location. Objects that are placed outside this zone require reaching, which slows transplanting time. A shelf or rack can be located just to the side or rear of this zone to hold labels, a dibble or other tools. A convenient storage for nonplanted flats is also needed. For permanent installations, a roller conveyor located above the table works well.



Workstation height is also important. When possible, the most desirable arrangement is for the workers to have the option of being seated or standing. This requires adjustable table height, seat height or the platform they stand on. Most transplanters are most comfortable when the top of the flat is about one inch below elbow height. Tilting the top of the table slightly can also help, as it gives better visibility and matches the normal arm slope.

Once the flats have been transplanted, a system for moving them away from the transplanter is needed. A belt conveyor at the same level as the table is probably the most efficient. The flats are pushed on without lifting.

Carrying the flats to set them in the growing area, a system used by many small growers who transplant in the greenhouse, is efficient if the walking distance is kept short. It also eliminates one extra handling. Care should be taken that carrying distances are kept to a minimum. At a \$6-per-hour labor rate, every eight feet of walking adds about a cent to the cost of producing the flat.

The development of plug technology has opened the way for increases in transplanting speed. The singulation of broadcast seedlings takes time. Singulation is done for you when they are grown in plug trays. Seedlings can now be planted with both hands.

This lends itself to assembly conveyor methods, similar to that used in the electronics and other industries. Here the filled and dibbled flats are placed on one end of a slow moving conveyor belt either by hand or directly from the flat filler. Workers on one or both sides of the belt are responsible for inserting plugs into one section of the flat as it moves past. By the time the flat reaches the far end of the belt, all the spaces are filled. A greater accuracy results, as it is easier to stick a half dozen seedlings in the same area of each flat than to plant 20 to 40 over the whole flat.

On the other end, a method of handling up to six flats per minute is needed. An accumulating conveyor can be used to store the flats until they can be loaded onto carts for transport to the greenhouse. All motors should be variable speed to synchronize the conveyors and other equipment and to adjust for operator speed and transplanting conditions.

Why are some transplanters more efficient than others? It usually relates to technique. Placement of materials, grasping the seedlings and finger motion in sticking the plants all influence the production rate. Technique is also developed with experience. With the high rate of turnover of people in transplanting operations, try videotaping the techniques used by the best transplanters and showing it as part of the training process for new employees. This method has proven very successful in other industries.

This spring, pay a little more attention to the way your transplanting is done. A few changes may mean more dollars in your pocket at the end of the season.