

MECHANICAL TREE PLANTING MANUAL

Mechanical tree transplanting is an extremely efficient way to transplant large quantities of trees very quickly. It is perfect for transplanting 1-0 bare-root dormant seedlings. The success and survivability of the planting is INCREDIBLY dependent on the skill and attentiveness to detail of the transplanting crew.

Conditions when planting the nursery stock are always different, from site to site: differing soil types, tilled ground vs sod, mowed sod vs unmowed sod, lots of woody roots, surface debris, quantities of rocks, and soil moisture, etc. The transplanting machine cuts a slot and lightly packs it with the packing wheels after the tree has been placed by the “setter.” Only when conditions are perfect for the transplanter in question do the trees go in simply with no “tamper”.

Typically in the early part of the season, soil conditions are moist and temps are cool. By the end of the season, temps are hot and soil conditions may be drier. The behavior of the transplanter is different with different conditions and the crew has to adjust accordingly.

Nothing of what a transplanting crew will experience this spring is out of the ordinary. The presence of pre-existing woody roots (multiflora rose, etc), rocks and surface debris all are NORMAL. They are to be expected. Instead of not planting trees on those sites, the crew needs to adjust accordingly.

A mechanical transplanting crew consists of at least four roles...

- 1) The tractor driver,
- 2) The “logistics” person
- 3) The “setter” (the one (s) setting the trees in the slot).
- 4) The “tamper”

- 1) The “**tractor driver’s**” role is probably the simplest..
 - a) drive the tractor slowly enough so the setters can place the trees at the proper spacing and depth without being excessively hurried.
 - b) adjusting the 3pt hitch tilt, offset, forward or rearward pitch and depth in order for transplanter to function properly.
 - c) the tractor driver listens to the feedback provided by the rest of the crew and adjusts accordingly. It is the drivers responsibility to make sure that the “setters” are able to easily place the seedlings at the specified in-row spacing.

- 2) The “**setters**”: The tree setter’s role is to place the trees into the transplanter knife slot and to ensure that they are held still momentarily (to directionally straighten the out roots, preventing “J-roots”), placed at the proper depth, (all roots in the slot and the “ground line” of the stem of the transplant at ground level) and as vertical as possible. Momentarily pushing the tree downward too deep then lifting it up to the proper ground level during the “pause” phase, ensures that a maximum number of roots are in the transplanter slot and oriented down or behind. NOT up. A conscientious setter will make “Tamper’s” role much easier. Flip the transplant forward to straighten the roots, push the transplant into the slot-opener deeper than its final depth, lift the transplant to the proper depth, (ground line of transplant at ground level) pause and hold stem straight until it reaches the packing wheels, release... flip, push, lift, pause, release...If these phases can’t be accomplished in time to accomplish the proper plant spacing, then the tractor is going too fast, the setter is too slow or both. Clear communication between “setter” and “driver” is essential.

3) The “**logistics person**” prepares the trees and delivers them to the “setters” and places them in the transplanter trays according to how the individual “setters” want them. When “logistics” ensures that the “setter” always has trees in front of them, the entire job runs more smoothly. “Logistics” is responsible for the on-site care of the tree seedlings. Boxes/bins are kept in the shade, and the seedlings in those boxes/bins are kept moist; ie covered with wet sawdust, burlap, canvas or cardboard to retain moisture and provide some evaporative cooling.

When transplanter trays are full of trees, “Logistics” joins the “tamper”. A goal of “logistics” is to keep the tractor moving with no “setters” waiting for trees.

4) The “**Tamper**’s” role is arguably the most critical of all. The “Tamper” ensures that the seedlings are as straight as possible, planted at the proper depth, that all roots are in the ground, and that the transplanter knife slot is completely closed and tightly packed with as much force as possible. Even when soil conditions are such that the “tamper” doesn’t appear to be doing much, they are to walk along the top of the closed slot and ensure that it is packed **FIRMLY!** Not just around the seedling and not merely tapped with the toe. The entire slot must be **firmly** packed in order to prevent the slot and tree roots from drying out. Until and unless **ALL** of the roots of the seedlings are in the slot, and the seedling is at proper level according to the ground-line of the seedling, it has not been properly planted. It is up to the “tamper” to communicate to the “setter” and “driver” whether the trees are set too deep, too shallow, at the proper within-row spacing etc.

Clear communication between the “tamper” and the rest of the crew is essential!

A goal for the transplant crew is for it to act as a single entity providing itself with clear internal communication and feedback so that when the last member of the crew has passed by, the seedlings are planted in the ground at the proper depth, the specified in-row spacing and as straight as possible. Stem straightness is not as essential with shrub species such as hazelnuts, elderberries and currants, but is critical with fruit trees, chestnuts and timber trees.

If the tractor “gets ahead” of the tampers, then it is going too fast, or the tamper’s job is excessive which means that the setters aren’t doing their job properly according to the conditions and that communication and feedback between the roles is not occurring properly.

If the tree spacing isn’t what was specified to the client within a reasonable margin of error, (2ft, 7ft, 4ft, 3ft is NOT 3 ft spacing) then the tractor is going too fast for the setters and feedback is not coming from the tamper to the driver and setters to explain the situation in order to correct the issue.

There are times when the transplant slot does not close completely even after proper foot-packing by the tamper. Under these conditions, upon completion of one row, the tractor driver should return to the beginning of the row by driving immediately next to the transplant row to help pack the slot with the tractor’s wheels.

The following images will show some examples of proper and improper mechanical tree transplanting.





Here's an image of the site conditions encountered on a project in Maine. The site was an autumn olive thicket that had been chipped with a forestry mulcher. Roots constantly clogged the transplanter knife and the pizza cutter often rode up over especially thick roots. As long as the tractor driver kept adjusting the knife and the setter kept adapting to feedback coming from the tamper, the crew moved along quite well with minimal re-burying. Every site is different.

The result of the transplant crew passing by is a row of properly planted seedlings... Push, lift, pause, release. Straighten, tamp, bury scuffle...

FINISHED when the crew passes by...

In case you were wondering... The longest rows that RAD has planted were over ½ mile long through roots and brush and rocks...

THIS quality of planting is the standard. It is the baseline. The minimum expectation...

This is the “take away” message:

If the trees and all of their roots are not in the ground at the proper depth, reasonably straight, and the slot is not firmly packed along its entire length, then THE TREES HAVE NOT BEEN PROPERLY PLANTED!

Their survival is at stake which is expensive for the landowner, expensive for whoever has to pay to fill in the gaps where the spacing was off, or where trees died because they weren't planted properly .

On this site, in a little less than two days, a tractor driver, one setter and one tamper put in 4500 trees through roots and brush. All of them were properly planted.

Transplanting success is NOT about the total numbers of trees slapped into a slot in a day, but is about how many trees were PROPERLY TRANSPLANTED.





In this photo, the slot is closed and tamped firmly immediately next to the seedling, but the slot between trees is not closed adequately. If this happens, the “tamper” should firmly tamp the soil next to the tree, then have the tractor driver return alongside the slot in order to close and tamp it adequately.



This tree is planted at the proper depth with all of the roots in the slot. The slot is not quite closed tight enough. The “tamper” should walk & bounce firmly along the length of the slot in order to properly pack the slot tight. If the slot does not close completely, the tractor

driver should be instructed to drive alongside the row to close and pack the slot.



This multi-stemmed hazelnut was planted at the proper depth with all roots in the slot, but for whatever reason, the slot did not close completely.

The “tamper” should walk along the slot, closing it completely and sealing it firmly. If this occurs more than just occasionally the “tamper” should instruct the tractor driver to drive alongside the slot and tamp it in from the side with the wheels of the tractor.



This tree was planted too shallow with extensive roots exposed and is leaning too far from vertical.

The “tamper” should immediately communicate to the “setters” that the plants need to be set DEEPER.

The “tamper” is to open the slot, place the tree deeper in the slot, straighten its stem, then close and pack the slot firmly.



This tree was not planted deep enough. The finger points to the “ground line” of the tree. The ground line of the tree should be planted AT ground level. With multi-stemmed shrubs such as hazelnut, currant

and elderberry, the ground-line may be planted slightly below ground level with no harm to the plant.

The “tamper” is to pull open the slot, place the tree deeper in the slot then close and pack it firmly. The “tamper” should immediately communicate to the “setters” that the plants need to be set DEEPER.



This tree needs to be straightened, have its exposed roots tucked in and the slot needs to be firmly planted.

“Tamper” should immediately communicate to the “setter” to correct this.

By no means does this little manual illustrate all of the issues that a transplant crew will encounter. On any particular project one may encounter radically different planting conditions from seriously compacted, to clay, rocky, sandy or wet soils. Communication between crew members is essential in order to adapt to the conditions.