

How hard is it to plant a bunch of trees? Well, it's not. Getting them to survive is another thing.

Many forest owners plant trees. The reasons vary. Planting a few fruit trees for "wildlife" is common. On the other end of the spectrum is establishing a plantation or adding tree species to the composition of an existing forest stand. The goals of planting will determine the process to follow in order to maximize tree seedling survival. Planting is more involved than simply sticking a few trees in the ground, although that sometimes works.

Tree planting is a risky business because young trees are quite vulnerable. In nature, the vast majority of seedlings die, billions of them each year. Only a few survive to reach sapling size. Correctly done, planting can shift the odds in the favor of survival.

Most of Michigan's forest types regenerate *naturally* following a harvest. Ensuring regeneration is, in fact, one of the primary goals of a silvicultural system. However, there are circumstances where planting is required, such as forest type conversion or when natural regeneration fails.

There are three major steps for a successful planting project.

1. Site preparation.
2. The actual planting.
3. Monitoring and vegetation control.

Afforestation: Establishing trees in locations where trees were not living before, like an old field.

Reforestation: Establishing trees in locations where a forest recently existed and was removed through either harvest or natural catastrophe.

Planning

A forest owner needs to have a goal in mind. Wildlife food or shelter? Reforestation? Forest health? Visual quality? Diversity? Matching the tree species to the soils, site conditions, hardiness zones, and forest owner goals is important. Trees have variable habitat requirements, mostly about soils, light, water, and vegetation competition for nutrients. These are biological constraints that cannot be ignored.

Planting projects can be done anytime during the non-frozen months. Common times are spring (dormant bareroot seedlings) and fall (containerized seedlings). Unless the project is simply a few apple trees in a sunny location, then a bit of math is needed to figure out how many trees are needed and how, spatially, they'll be planted in the landscape. Of course, even just a few apple trees need some additional thought, such as proper planting technique, watering, and caging from deer. Large projects may need extra labor, tools, and maybe a planting machine. Really large projects might need a commercial planting crew.

Finding a reliable source of planting stock is essential, after deciding which species and sizes to buy. Many Conservation Districts have tree seedling sales. Quite a few conservation nurseries have wide ranges of options and some will mail order. Ordering most any substantial quantity will need to be done in advance, often several months. Seedlings received should have moist (not wet) root systems and tops should appear healthy.

Planting under the canopy of an existing forest requires seedlings that are tolerant of shady conditions. Commonly, forest owners like to underplant with white pine or hemlock to enhance future habitat for songbirds and other species. Nursery stock has been well-nourished and is rich in nutrients. Browsers will often selectively eat planted seedlings over natural regeneration.

Working with a consulting forester with planting experience can be helpful. Much of the effort to successfully implement a project involves site preparation and follow-up treatments. Planting without site considerations and adequate planning is a recipe for failure. Lastly, remember that planting costs, up to \$10,000, are deductible on federal income taxes on a prorated schedule.¹

Site Preparation

Seedlings, and sometimes larger planting stock, cannot typically out-compete other vegetation for nutrients and water. Heavy sod, in particular, is a hostile environment. Therefore, mineral soil usually needs to be exposed before the trees are planted. Large projects are best prepared with ground-breaking machinery, but this can be expensive. An alternative is one person (or more) with a backpack sprayer can herbicide patches, a circle about 4-5 feet in diameter. The area would need to be flagged-out in advance to accommodate desired spacing requirements. A backpack sprayer works well with smaller project, too. Another alternative is scraping competing vegetation clear using hand tools. This is physically more difficult and takes more time but works for small projects. Killing competing vegetation is important for any site, either in an old field or under a forest canopy. Fencing or caging is often required when deer or rabbit densities are too high.

Planting Techniques

Planting can be done with a machine or by hand. Hand tools include a shovel, dibble, planting bar, post-hole digger, and other tools. The technology used will depend upon the project and personal preferences.

Bare-root seedlings, more than containerized stock, are subject to drying from exposure to open air, particularly on a sunny day. Stock stored in bags should always be kept in cool storage and in the shade until the actual act of planting. Sometimes, only a few minutes are needed to kill the delicate root hairs. Stock that will be planted within a few days should be stored in a cool, dry environment. For longer periods, the seedlings should be "heeled-in"; meaning the bundles of trees should have roots covered with soil and packed tight, as if planted.

Bareroot: Seedlings have exposed root systems after being pulled from nursery beds.

Containerized: Seedlings and soil are grown in small spaces in containers that hold multiple seedlings. The plug of both roots and soil is planted.

Ball & Burlap: For larger trees, packed individually with roots in a minimum of soil held together with a fabric, traditionally burlap.

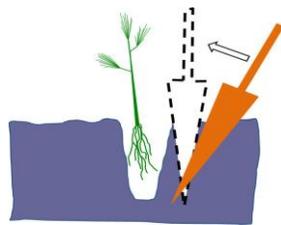
Planting holes need to accommodate the full length of the root system without bending the root ends (J-rooting). Soil needs to be firmly packed around the roots. Retain as much soil on the roots as possible. Do not rinse the roots. Planting depth should be to the root collar, a ring between the roots and the seedling stem, not too high and not too deep. For larger planting stock, it's better to put a one dollar tree in a ten dollar hole, than a ten dollar tree in a one dollar hole. Holes should be larger than the root ball, deep enough, and packed tightly. Again, proper depth is important.

If possible, the fresh planting should be watered, unless the soil is already saturated. Fall planting should be done at least two weeks prior to an anticipated frost.

When shopping for seedlings, buyers might find number codes that appear something like 2-0 or 3-1. These numbers define the age of the seedlings. The first number is the years the

Using a Planting Bar

One of the more common planting tools. The blade is pushed into the ground and then rocked back and forth. A seedling is carefully inserted into the open space. The space is closed by inserting the bar within a few inches parallel to the first hole, and then pushing the first hole closed. Tight closure is important. This tool can be difficult to use in sandy soils or saturated heavier soils.



seedling was in the ground. The second number is the years since the seedling was root-pruned. Root-pruning helps concentrate root systems in a smaller area, which facilitates planting and

increases seedling survival. So, "2-0" stock would be a two year old seedling that has not been root-pruned. The "3-1" stock would be three years old, with an additional year after root-pruning, for a total of age of four years. Older seedlings and root-pruned seedlings are usually more expensive but more likely to survive the planting process.

Post-Planting Care

Getting the trees in the ground is a great accomplishment but the job isn't over. For at least the first five years, the trees need to be monitored. Follow-up treatments are often necessary. Good site preparation can minimize the need for follow-up treatments. In droughty years, especially the first growing season, watering may be needed, if possible. Encroaching competing vegetation may have to be killed. The backpack sprayer may, again, come in handy but be careful not to spray the seedlings. Seasonal timing may be an issue. Unless the trees have been fenced or caged, watch for browse damage. If browsing becomes a significant factor, fencing or caging may be required at that point. Alternatively, critical buds can be protected using light cardboard and staples, or sometime duct tape. This works especially well with conifers. The covers need to be removed right around the time the buds begin to expand. Should losses occur, fill-in planting may be needed.

If you're working with a professional forester or other natural resource professional, expertise is readily available. If not, then information gathering may take a bit more energy, but can be done and should be done to reduce the chances of disappointment. The act of planting trees is neither the beginning nor the end of the story. The fruits of that labor will require more labor. However, a high level of satisfaction can be anticipated a few years down the road.

Care Errors

- Exposing roots to air and wind
- Overheated seedlings from direct sun
- Temporary storage covers blow away exposing seedlings
- Roots dry out from not planting soon enough
- Storage in a hot vehicle, garage, or out building

Planting Errors

- Soil packed too loosely
- Planting too deep or shallow
- J-rooting
- More than one tree per hole
- Second hole not closed (planting bar problem)
- Planting in duff rather than mineral soil
- Failure to allow good root spread in hole

Other Errors

- Poor site preparation
- Improper spacing (many potential long-term problems)
- Failure to control competing vegetation, especially grasses
- Planting in low spots and frost pockets
- Incorrect match of species and site
- Planting at the wrong time of the year
- Failure to provide full sunlight (at least with many species)

¹ **The Forest Landowners Guide to the Federal Income Tax.** USDA Agricultural Handbook No. 178. Chapter 5 "Cost Considerations" – Reforestation Tax Incentives. URL: <http://www.timbertax.org/publications/aghandbook/>