BETTER SURVIVAL WITH OVERSIZE HOLE DIGGING

Roland Rotty
Chief, Branch of Tree Planting Cooperation, U. S. F. S. Washington 25, D. C.

Another practice which I think accounts in large measure for the excellent survival in the plantations of Spain is one of digging holes several times larger and deeper than required to accommodate the little tree itself. Specifically, their technique is this -

At some convenient time after the close of a field planting season a crew of laborers with mattocks digs holes for the trees to be planted the following spring. These holes are 12 to 16 inches cube in size, and are checked for adequacy by a foreman carrying a wire cube of the required dimensions. Another crew then follows as convenient and fills the holes, discarding the larger stones if enough soil can be found to nearly fill the hole, without them. During either this filling or the planting operation itself a basin, hereinafter called by its Spanish name of "casilla, " 39 inches or more in diameter and about 6 inches deep is dug around but 6 to 8 inches off center of the hole. On sloping sites the workmen dig into the hill and build up the downhill edge to form the casilla that will trap and hold water until it can be absorbed into j the subsoil (fig. 1).

Such casillas with their deeply dug holes will intercept and hold until absorbed all except the most torrential downpours. Thus the trees receive the benefit of all the water that falls; no water runs uselessly to the stream beds and the sea. During the ensuing months the soil in the filled holes settles and absorbs moisture. Because the casilla is off center from the hole, the tree when finally planted stands a little way up the slopes so that if a pool of water collects the tree itself will not be flooded.

When the trees are planted their roots encounter a loosened and moistened zone into which they can elongate quickly rather than a dry, hard subsoil that might confine them to a shallow top layer. By the time the drought begins the trees are established with deep roots and nearly all of them survive the fierce, rainless summer. What a different situation than when the roots are placed in a hole barely big enough to accommodate them so that they must push themselves into solid, undisturbed subsoil, and when scanty rains run off the slope before they can penetrate to the roots. No wonder the trees grow in Spain. Would they not do as well in America on our dry western slopes if planted in the same manner?

Admittedly this kind of site preparation requires a tremendous amount of hand labor and because of the wages paid American laborers the cost would be great indeed. In fact it might be difficult to employ as many laborers as this would require on a really large planting project.

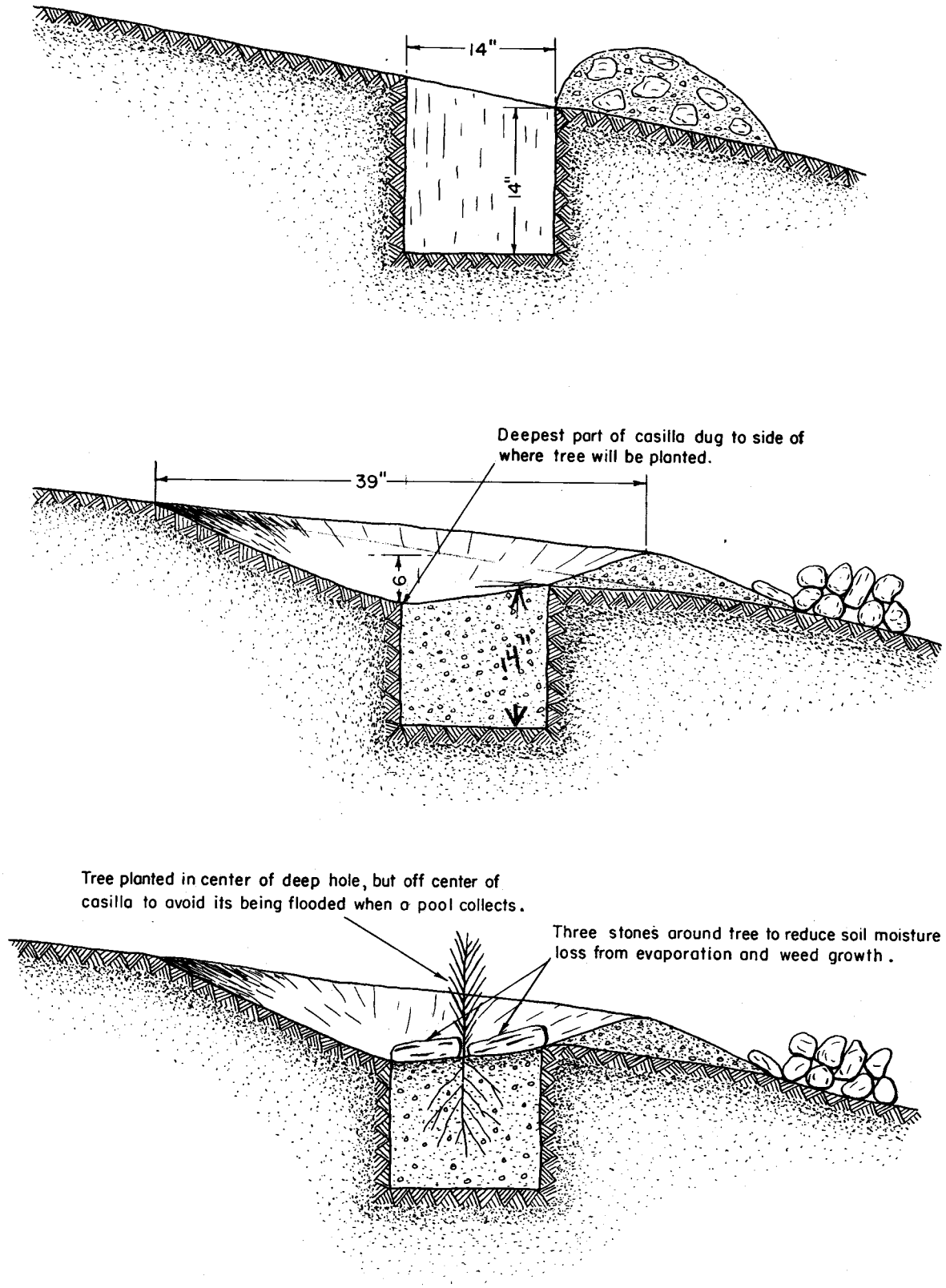

Figure 1. - Hole and casilla prepared for planting.

Choice must be made between. added survival at high cost and less survival at a lower cost. Possibly the technique can be expected only on small jobs with unusual landowner interest and demand for excellent survival. To get it into common use will require a machine that will replace most of the hand labor.

A machine to do this has now been built by the U. S. Forest Service and is being field tested. In brief, it is nothing more than a large diameter rotatable bit hanging from a powered posthole digger carried on arms behind a tractor. It plows up a big deep area without removing much soil from the hole.

The digger is driven from the power takeoff of the tractor. It is raised and lowered hydraulically from the three-point suspension hitch of the tractor. At work the tractor comes to a full stop, lowers the bit and drills the hole, raises the bit, and goes forward to the site of the next hole.

The hole prepared by the present machine has at the top a 36-inch-diameter circle within which all the brush and herbaceous vegetation and roots are chopped up and the soil is thoroughly plowed by the rotating blade and disks. Beneath this scarified area there is a second hole 9 inches deep and 9 inches in diameter, and beneath that another one tapering to a point in 9 inches more (figs. 2 and 3).

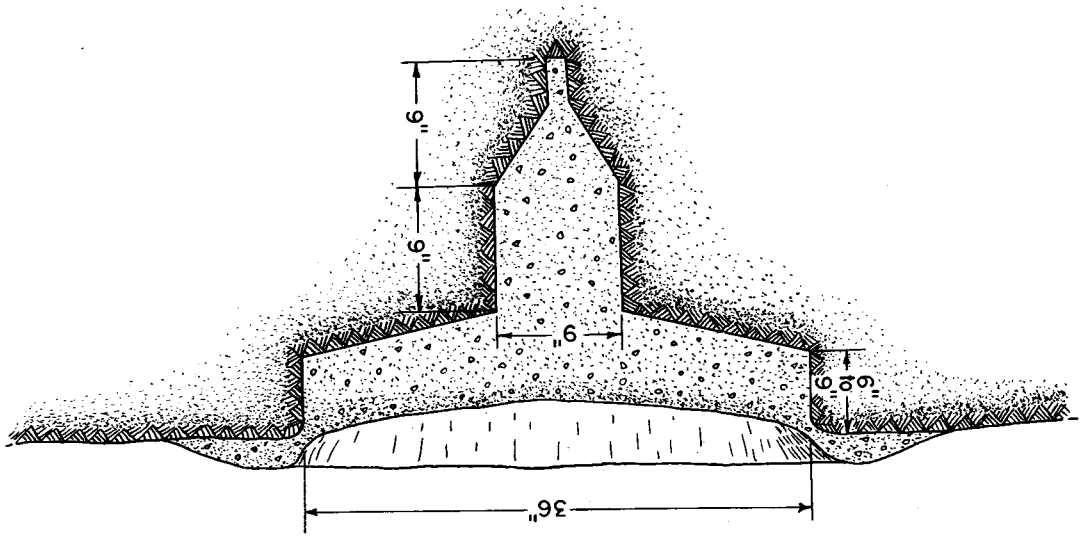

Figure 2 - Cross section of machine made hole.

Figure 3. - Three views of machine for digging special planting hole.

The size hole, of course, is determined by the diameter of the bit. Since the bit is not of complex design, any well equipped machine shop can make it to drill holes of whatever size the local site conditions require.

Whether the bit leaves most of the loosened soil in the hole or ejects it depends upon the design of the bit and the speed of rotation. If rotated slowly, the bit removes only a little soil and piles it in a berm around the periphery of the hole. An excellent casilla with its center depressed several inches from the original ground level results. At planting time a laborer could easily give final shape to the casilla with just a few strokes of his planting hoe or mattock, and open a hole for the tree in the deeply stirred soil.

If there is merit in the idea of a casilla to hold surface runoff until it can soak down to the bottommost roots, and the idea of a deeply plowed subsoil to facilitate deep root penetration during growth, then this machine has much to recommend it to people willing to give new devices a trial.

On appropriate sites a sufficiently powerful tractor could also be fitted with a bulldozer blade in front. Thus for little added cost it could clear a way through continuous brush, or flatten a terrace, as it proceeded across the terrain digging holes.

The machine is not intended to keep ahead of a gang of laborers. Field tests thus far do not promise a speed of more than 40 or 50 holes per hour, and probably less on many site-s. One workman could easily plant trees much faster than the machine can prepare holes for them. Neither is the machine intended for use only during the planting season. The mere cost of owning and depreciating such a machine and its tractor requires that it operate steadily. The machine was developed with the idea that it would be kept at work all during the field season, plowing holes and leaving them to settle and absorb water during subsequent months. It is felt that an overwinter wait to let the loosened, aerated soil settle back into place will be beneficial to the newly planted tree.

Admittedly there are sites so steep that this machine will not operate in safety upon them, or so rocky that it will have difficulty in finding spots where its drill can enter to acceptable depth. For such sites no machine yet devised is as good as a determined man with a mattock.

Also, there are brushy sites so densely covered with stems of large diameter that this machine would be helpless. On such sites a 36 inch diameter circle, even if the machine were able to clear one, would be insufficient space for the tree to survive in. Such brush fields require the total elimination of all existing vegetation by bulldozing with heavy machinery. The machine might be useful after clearing but not before.

But there are millions of acres of other sites where the machine would be well worth while. The adaptability of the machine to any given site is something for the local planting administrator to determine.

Working drawings and specifications for construction of the machine are available. Address requests to:

Equipment Development Center U.
S. Forest Service Arcadia,
California

or to

Chief
Forest Service, U. S. D. A.
Washington 25, D. C.

Letters reporting the experiences of people making and using the machine will be appreciated. From the knowledge of how the machine performed under a variety of conditions, we will be able to evolve a better, more versatile machine. Send such letters to:

Chief
Forest Service, U. S. D. A.
Washington 25, D. C.