The digging scene

The evolution of machines for B&B and bare-root production has made field harvesting more efficient and cost effective

By Miles McCoy

For a century, growing in the field was the only method nurseries had to produce plants. Then, the use of metal cans to grow plants first signaled a change was coming.

Containers — first clay and then metal cans called “plantainers” — were used for growing in the early 1950s. This was followed by increasingly sophisticated plastic can designs that quickly took over the industry.

Most statistics put container production at roughly two-thirds of the U.S. total nursery industry acreage, though containers account for a higher percentage of total sales. Accurate cost comparisons between nursery production systems are difficult to determine, however, due their extreme diversity of products.

A 2002 study by the University of Arkansas looked at the total production costs for a hypothetical 15-acre nursery with 10 acres in production over a three-year production cycle. It concluded that the overall costs were lowest for a field system, and higher for container and pot-in-pot (PIP) systems. However, both of these systems accommodate more plants over the same acreage.

When the figures were computed on an average basis, per plant harvested, the results were very different. The costs were lowest for pot-in-pot systems and highest for field production. Nonetheless, B&B field harvesting is still used in many specific industry segments.

Moving to fewer hands

One of the drawbacks of field production, historically, has been that it is labor intensive, requiring large hand crews.

Historically, with balled and burlap harvests, a root ball was first hand-dug. Then burlap was pinned and tied tightly around the root ball. This held the
soil in place around the roots. To save on costs, producers started looking to mechanization and automation of the digging process.

Over the past few decades, mechanical digging with a tree spade or bare-root digger became the standard harvesting technique. Though some producers still use hand digging, today there are several methods that can be used, depending on the crop, to extract the plant, root system and surrounding soil from the ground.

Bare root harvesting utilizes diggers that under-cut, lift, and shake the young tree, leaving little soil on its roots.

Growers also may use mechanized diggers that create a ball of soil around the roots. This provides some protection while the plant is transported and transplanted. Tree spades, usually equipped with three or four hydraulic blades, extract a cone of soil and roots which are placed in a wire basket lined with burlap and secured using pinning nails and twine.

These diggers and burlap-lined wire baskets made harvesting nursery stock in sandy soils more successful. Although mechanical harvesting is possible in less cohesive soils, it is still important for soil to be retained around the roots.

**Bare root tree digger design**

Bare-root tree diggers also appeared mid-century in various forms. Early versions were often modifications of John Deere equipment, raised and outfitted with a custom digging mechanism added.

Some mention Princeton Nursery of Allentown, Pa., as an early innova-
tor. That nursery's bare-root production took off in the 1950s, after owner Bill Flemer invented a raised caterpillar-digging machine. But, growers such as John Holman (Pacific Coast Nursery), Archibald McGill and J. Frank Schmidt Jr. all developed early models.

Early designs were adjustable, U-shaped scoops pulled behind a typical tractor. It was adjusted to travel under the plant's deepest root. A shaking grate attached to the rear and a hydraulic motor dislodged soil as the tractor moved forward.

Today's bare-root digging machines are much larger, designed especially for this process. Most are huge, U-shaped pieces of equipment that travel over tree rows, lifting and shaking trees that are then gathered by hand crews. They are built by numerous manufacturers, including GK Machine in Donald, Ore.

Ball and Burlap Diggers

For decades, the huge, cone-shaped blades of a tree spade were recognized as the ultimate choice in moving B&B stock. They worked relatively well, reducing labor significantly and controlling transplant shock.

Then in the last few years, a different approach to digging was introduced when Plant Oregon of Talent, Ore., bought one of the first Italian-made Holmac Diggers, which digs a round root ball, similar to an ice cream scoop. They now represent the company in the United States.

Owner Dan Bish said it dramatically improved their field digging process. It uses a rotating, vibrating blade that cuts under the plant, lifts it and places it on a wire basket frame covered with burlap. He said the Holmac extracts 30-60 balls per hour, 240 to 480 balls per day.

"This can radically reduce labor expenses, up to 75 percent," said Bish. "The blade vibrates at a very high speed and easily cuts through the ground."

An Oregon nursery bought one of their first machines and it was so suc-
The Holmac HZC 16-22 tree digger, imported by Plant Oregon, digs field-grown trees for B&B shipment, taking only as much dirt as the tree needs. Its makers say the treads of the machine are light on the ground and don’t compact the soil.

Research improves digging processes

Successful the nursery paid for the machine in three months, he said.

Andy Spinks of Jim Spinks Nursery in Gresham, Ore., is a fan of this technology. “It eliminates the hassles of trying to get a digging crew,” he said. “With the Holmac, each tree costs about 30 cents to dig, and it’s so quick.”

The machines comes in several models, from the HZC 16-22 at 60 inches long, and a narrow width of 36 inches to the largest machine, the Holmac HZC 29, 100 inches long, with a 36 to 55 inch width.

GK Machine is also introducing a digger with similar technology soon, according to its website.

Surviving the digging

Whatever the method, digging a living tree creates stress, even when it is dormant. Add the heat of summer, and freshly dug plants can use protection.

One solution is the use of anti-transpirants, which are compounds that are applied to the leaves, forming a short-term, protective layer that limits water loss.

There are several compounds in the market that have shown benefits. One of the best known is Moisturin, which is made by GSI Horticultural in Bend, Ore. It was introduced a decade ago based on research done at Oregon State University, under Dr. Les Fuchigami. Various Oregon growers have used it for many years.

Jim Glessner, owner of GSI, cited a thank you from Whitworth University grounds department. The staff had to move three 20-foot green ash trees in temperatures higher than 95 degrees. “The trees were sprayed with Moisturin in the morning and dug in the afternoon with a small track hoe, loaded into the back of a large truck,” the note stated. “Stored for 5 hot days and the tree makes other physiological adjustments, including dropping some leaves. Roots often grow through the burlap, helping to hold together the ball for handling, and providing more young roots for water absorption.

The University of Florida also published information on a recent innovation that could eliminate the need for synthetic burlap in a wire basket. Trees are dug, placed in natural burlap and then tied to hold the root ball tight. The intact root ball is lowered into a pre-dug hole lined with black nursery soil.

After regenerated roots grow partially through the fabric, it is secured to outside of the root ball. Trees can be held this way for many months, depending on the species and season. When they are lifted the sleeve on the outside of the ball will be intact. This holds the soil in the root ball until actual transplanting.
… staked and planted … in the ground for six weeks. The trees haven’t lost one leaf.

Another approach is applying one of many “transplant concentrates.” Again, there are many choices, some better tested than others. It is a rapidly expanding segment — and not always science-based.

One example is Bio-Plex, whose marketing team came up with a simple definition. It is a concentrated liquid complex of many “naturally occurring” organic compounds. These include, but are not limited to, cold-processed sea-weed extract, humic substances, numerous plant vitamins, enzymes, amino acids, nutrient chelators, root-specific growth stimulators, chelated iron and micronutrients, and a new, “state of the art” organo-silicone-based tissue and soil penetrant.

Many of these compounds have been shown to be beneficial, but read the product information carefully.

So, while field crops are a slowly diminishing segment, the modern digger equipment and other tools make production easier to accomplish than ever before.

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