GRAYCO LIFTER MODIFICATIONS

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Last year, at the meeting of the Western Forest Nursery Council in Portland, I reported experience with and modifications on the Grayco lifter during 1974 at the Coeur d' Alene Nursery. I assume that some of you were there and some of you were not. Therefore, I will review that report for you.

In 1972, the Nursery received an advertisement in the mail about the Grayco "Tiny Tim" tree lifter. The machine was being built by a Canadian potato digger firm in Ontario. A short time later we saw a brief film about the lifter at the 1972 Western Forest Nursery Council Meeting in Olympia. After acquiring further details about the lifter from the company, we found an early model was undergoing trials in Arcata. Arrangements were made to route the lifter from Arcata to the Mt. Sopris Nursery, then to Lucky Peak, on to Coeur d' Alene, then to Wind River and Bend, finally returning it to Arcata. These trials were conducted in the fall of 1972.

Some opinions about the machine's value to the various nurseries that tried it were not entirely positive, but the impression it left at Coeur d' Alene was that it was simple, relative to some lifters, and feasible to use. Consequently, further correspondence with the company led to a meeting with Ralph Gray to work up specifications and establish a price for budgetary purposes that would lead to purchase in Fiscal Year 1974 (after July 1, 1973). At that time the company had just constructed, for Ashe Nursery in Mississippi, a "bulk handling unit" to attach to the rear of the basic lifter. This unit carried people along on it and they placed the lifted trees into tubs. The newest version of the machine also was all hydraulic or PTO-driven; no separate gasoline engines. Another inovation, at the time, was a power tongue arrangement to counteract the "dog-walking" tendency of the older units. We decided we wanted all of these new options.

A hydrostatic-transmissioned tractor is required to pull the Grayco, mainly to provide low enough ground speed. Also three hydraulic take-off or separate controls are needed when the "tongue-steer" option is bought.

Both a Grayco lifter and a tractor were ordered right after the first of July, 1973. The lifter was delivered in November, 1973.

Now, why was this lifter appealing to us? There were a number of reasons:

1. The price seemed right. $10,000 for the lifter and bulk handling unit; about $10,500 now. Reasonable labor savings in any operation of any scale can rapidly amortize that kind of investment.

2. The principle of the machine - potato digger - is tried and true. Trials had indicated the mode of action lifted trees with no damage and would handle variable bed densities.

3. The machine seemed simple enough for the average nursery to maintain and service with its own personnel. Parts were common and readily available.

Over the winter of 1973-74, we made a few modifications in the lifter and the bulk handling unit that were obvious without any experience in operating the machine.

It was apparent that a constant supply of field boxes must be made available to the people riding on the machine. Otherwise more time would be spent sitting idle, while full boxes were off-loaded and empties on-loaded, than would be spent actually lifting seedlings. Consequently, we constructed a platform mounted on top of the lifter with a "live" roll delivery of boxes to the people on the rear unit. A few other minor changes were made such as shielding exposed chain and sprocket drives, but nothing major.

When it became obvious our own hydrostatic tractor would not arrive in time to be used in the spring lifting and packing process, we found a hydrostatic IH 544 on a nearby farm and rented it. This rental unit had only two hydraulic take-offs (each controlled) instead of three, as was needed, so the power tongue could not be used. Also the hydraulic pump was standard (12 GFM) rather than high volume (17 GFM) which is specified to proper operation of the lifter. However, after trying the lifter on the tractor, we were able to determine there was just enough hydraulic volume to operate the Grayco Unit, but not at top efficiency.

When spring lifting began in March, 1974, initial work with the lifter brought to light several problems:

1. Digger links in the second section of the lifter chain were too flexible, and the degree to which they would "spring" when rocks were caught in them had to be limited to prevent breakage. This was done by welding every fourth link of a chain to each cross-link. This allowed the cross-link to flex to let rocks out of the machine, but not to the extent that it could be caught under the guide pulley in the center of the machine.

2. Rubber deflectors made of belting were installed to keep rocks out of the inter-change sprockets at each end of the interchange between the digger-chain and lifter chain sections.

3. The speed of the bulk handling unit had to be slowed. This unit was driven-direct by a Char-Lynn hydraulic motor. Sprockets and chain were used to reduce the speed of the unit to one-half the former speed (10 tooth to 28 tooth).

4. The box delivery roller was modified so only the last two people were filling boxes rather than all the people on the unit. The others were kept busy straightening, separating and arranging the trees for the "boxers".

5. Work platforms at the rear of the machine were modified and enlarged to provide larger work surfaces and larger areas to carry wet burlap.

6. Rubber deflectors were attached to the rear of the lifter to direct trees onto the deck of the handling unit without spillage.

All of these modifications were made during the course of the spring work in 1973.

One problem proved to be beyond us. Wet weather made the machine unusable when the soil reached a certain moisture content. At that point the rhythmic shaking of the machine tended to consolidate the soil into balls, with and without seedlings in them, rather than sifting out through the cross-links. This problem will vary from nursery to nursery depending on soil structure, texture, and the amount of precipitation received. The sandy loam at Coeur d' Alene has just enough mazama ash in it to cause problems this way. The soil in your nursery may not. We expect relatively few days with such conditions, however.

Economics of the lifter proved to be very favorable. The size of the crew directly involved in the lifting process was reduced from approximately 40 for hand pulling, to 13, a 68 percent reduction in labor.

During Fiscal Year 1974, the Coeur d' Alene Nursery shipped 8 MM tree seedlings. The savings differential with the lifter was $1.85 per M as given above, so a total of S14,800 was saved over the 8.1N volume. The lifter cost $10,000 so it is 148 percent amortized as of now.

The Grayco lifted about 250 to 300 M trees per day and we sometimes operated it for as long as ten hours per day to keep up with 45 sorters. Production levels are up for 1975 and 1976 so more lifting capacity will be required. Also, two machines will provide insulation against serious breakdown on one. Plenty of spare parts should be kept on hand. Breakage of cross-links is common (averaging one to three per day) and they are also rapidly worn-down by the eccentric cams which generate the shaking action. We plan to keep at least a full set of links, cam-shafts, sprockets and roller chain on hand for each machine. Spare hydraulic motors should also be kept handy. Such parts are not inordinately expensive and will be used sooner or later anyway. A set of cross-links and cam-shafts will last for about an 8 MM tree lift at Coeur d' Alene. This "wear rate" would vary from nursery to nursery, undoubtedly, but gives you something to go on at least.

Now, we found out some additional things and made further modifications in 1975; I want you to be aware of these things.

A mechanical draftsman from the Missoula Equipment Development Center, came to Coeur d' Alene and made a schematic diagram of the box supply

system developed for the Grayco lifter and bulk handling unit. Copies of this diagram and the necessary materials list are available from the Coeur d' Alene Nursery, Route 1, Box 245, Coeur d' Alene, Idaho, 83814.

Several other changes were incorporated in the second lifter:

1. The unit was ordered, after collaboration with Ralph Gray of Grayco, with one wheel on the lifter that could be hydraulically "leveled", like a combine's. When operating the standard lifter in a bed immediately adjacent to one that had already been lifted, the machine would tilt toward the recently-lifted bed. This would become accentuated as the lifter progressed down the bed. Also the lifted trees would all work their way to the low side of the lifter, causing half the other people on the handling unit to work very hard and leaving the other half without enough to do. Having the mechanical ability to level the machine solved the problem.

2. The rubber deflectors, mentioned earlier, that kept rocks out of the interchange between the digger chain and the lifter chain sprockets were removed. Small steel "ears" were welded-in which do the same job and require no maintenance.

3. The chain that was welded to every few digger chain links to limit "flex" and prevent breakage was removed. Substituted for this "jury-rig" solution was anew steel shaft, with wheels spaced at intervals across it, that ran across the entire width of the machine to guide the lifter chain as it picked up the trees from the digger chain.

4. A char-lynn hydraulic motor of proper speed design was ordered for the bulk handling unit, doing away with the need for a sprocket and chain to gear the speed of the motor down.

5. And, an arrangement was installed to provide a water mist on the trees on windy, dry days. This "system" consisted of:

    a. A water tank of about 200 gallon capacity mounted on the front of the tractor.

    b. A supply line to a pump installed on the agitator cam power shaft in the lifter.

    c. A regulator, pressure guage, and off-on lever on the lifter adjacent to the pump.

    d. Supply hoses from the pump to the spray booms at the rear of the lifter.

    el Two spray booms, About 4'long, mounted over the rear, of the lifter chain and 100 tween the lifter chain (top and bottom):

When this system is in operation, the booms spray water on the tops and roots of the trees just after most of the dirt has been shaken-off and before the trees leave the lifter and fall onto the bulk handler.

6. The first camshaft that vibrates the lifter chains was also changed. Most of the camshaft breakage was the first shaft. The size of the shaft was increased to 11/2" diameter. The cams themselves were widened to a 3" width to spread the contact area, and, consequently, the wear over a wider surface and preserve cam and chain-link life.

Many of these modifications were "learned" the hard way. If you buy a Grayco there is no need to learn them, yourself, the hard way. I suggest you contact Bud Mason at Coeur d' Alene for a "look-see" at the changes if you contemplate a Grayco purchase, or, perhaps, I can assist you at your nursery.

With costs of nursery labor steadily rising, mechanical lifters are becoming a must to preserve economic efficiency in a nursery operation. Even if you have a smaller operation you should do some pretty close Calculations; you may find you can afford one with less volume of business than you think.