The Use of the J.E. Love Model 816SL Seed Sower at Union Camp Nurseries

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Abstract

In Union Camp nurseries, Model 816SL seed sowers from the J.E. Love Company have provided more precise seed placement on the nursery beds, resulting in improved seedling quality. Discussion of the machine includes calibration, sowing accuracy and the advantages and drawbacks found in using the machine during the past two sowing seasons.

Background

In the late 1970's Union Camp took a critical look at seedling quality at the Company's Bellville Nursery facility. Seedling evaluations indicated most of the planting stock produced was grade two as defined by Wakely (1954) with mean root collar diameters falling on the low end of the acceptable category.

As a result of the review of the seedling evaluations (Godbee, 1980), several decisions were made to insure continued production of quality seedlings. One of those decisions was to find a "precision sower" capable of precise seed placement on the nursery beds.

A Love-Oyjord sower was bought with the anticipation that it would be an improvement over the Whitfield machine then in use. The sower was used for several years, but it did not plant with the precision expected.

The number of seed found seldom seemed to be consistent from drill to drill. The seed in each drill would not be evenly spaced. Groups of three or more seed would often be found in a "clump" adjacent to an empty space where the seed should have been placed. Also, at times the machine seemed to plant heavy to one side of the bed with more seed found in the right four drills.

When it was learned that J.E. Love Company was building a sower based on Weyerhauser Company's vacuum machine, Union Camp decided to try one.

The Model 816SL

The J.E. Love Company model 816SL vacuum seed sower is an eight paired-row (double-drill) machine. The seed is picked

up by a vacuum plate and spacing is regulated by a chain-gear drive system operated off the wheels of the machine. Double furrows are cut into the bed by metal furrow bars attached to free floating skid plates.

Seed Pick-Up

A vacuum pump is operated from the PTO on the tractor used to pull the machine. Each row (double drill) has its own seed hopper and two vertical 90 hole vacuum plate metering mechanisms. A vacuum is applied to the holes causing seed to adhere to the hole as the plate rotates through the seed. As the plate comes out of the hopper it passes by a device called a "singulating knife". The knife is supposed to reduce the number of seed clinging to the hole to a single seed. The excess seed, as they are knocked off, fall back into the seed hopper. The plate rotates until it reaches a position just above the ground where the vacuum is broken and the seed falls to the ground, a distance of one to two inches.

The idea is simple. (It is also different from the machines like the Oyjord and Whitfield where the seed fall through pipes or tubes for about three feet.) Because there are two plates to each row (double drill), or 16 plates total, the operation seems confusing at first. However, the machine is well engineered, resulting in few operational problems.

Calibration

Calibration is easy. A series of chains and sprockets regulate the speed at which the vacuum plates rotate. (The vacuum system only pertains to holding the seed onto the plates.) The chain drive operates off the wheels on the machine. By changing sprockets at one or two locations within the system, the speed with which the vacuum plates rotate can be adjusted. The speed of the rotating plates will determine how many seed are dispersed per linear foot of bed. Sowing rates range from 75 to 268 seed per linear foot. Since there are only 20 settings, there is not an infinite range between the high and low number as with the Oyjord. Each sprocket combination yields a specific density based on one seed being dropped for each hole on the vacuum plates. If there are blanks, or more than one seed per hole, it affects the accuracy of the operation. To calibrate for sowing, all that must be done is to determine number of seed desired per linear foot of bed and then pick the appropriate sprocket combination from the calibration chart. During 1985 sowing operations at Bellville it was found that the machine actually sowed at about 85% of the stated values on the calibration chart.

The best way to calibrate is to pick the most likely sprockets, start sowing and count seed behind the machine. If the counts are different than expected, then change to what seems the more likely sprocket. It takes about three minutes to change sprockets.

Advantages

When Union Camp bought the 816SL, two improvements were being looked for. The first was more consistent seed counts from drill to drill. The second was that the seed would be more evenly distributed along each drill. That is, there would be fewer clumps of seed or large empty spaces found within each drill.

A comparison of plots taken behind the Oyjord machine in 1984 and behind the 816SL in 1985 was made to look at seed dispersal between drills. Based on 33 plots evaluated behind each machine, (Rakestraw, 1986) the Oyjord had about 1.8 times more variation in the average deviation of drills around the plot means. That is, for every seed an 816SL drill had above or below the average for the eight drills on the plot, the Oyjord would have 1.8 seed above or below the average. The difference between the number of seed in the lowest count drill and number of seed in the highest count drill was also evaluated. For the 33 plots behind the Oyjord when the low count was divided into the high count it averaged 1.9, for the 816SL plots, 1.6.

No studies were done on seed dispersal along drills, but the large clumps of seed were seldom seen. Doubles, and to a lesser degree, triples were occasionally found.

The double drill seems to provide a benefit by spreading the seed out and giving each seed more room to grow. The machine is set-up on six inch centers for the eight paired rows (double drills) with the two drills being about one and one-half inch apart. The double drill caused no problems during lifting operations using a single-row lifter. The paired row (double drill) lifted as if it were a single row.

Drawbacks

The greatest drawback of the machine is that it plants slowly, a maximum of two miles per hour. At speeds greater than two miles per hour, seed placement accuracy falls apart. For faster ground speeds, the whole chain drive system moves faster so that the proper number of seed can be dropped per linear foot of bed. The vacuum plates begin to spin so fast that there is not enough time for the holes to pick up seed as the plate passes through the seed hopper. At faster speeds, the singulating knives are more prone to knock all the seed off the holes. As a result, a large number of blanks

show up on the vacuum plates resulting in large skips in the drill. In addition to this, as speed increases there is an increased tendency for the seed to bounce out of the furrows.

The machine is more sensitive to inclement weather. Because the holes in the plates tend to clog more easily in wet ground, it becomes necessary to stop sooner if it rains and wait longer after a shower before resuming planting.

The machine needs a tractor that can operate at PTO speed and still have a ground speed of less than two miles per hour.

The machine must be monitored a little more closely than other machines. Someone must constantly monitor all 16 vacuum plates to be sure they don't clog up.

The plates work better if cleaned at lunch time and either the last thing in the evening or first thing in the morning. The plates tend to clog up a little as the sowing progresses and after several hours, enough holes are clogged that cleaning is necessary. Cleaning a single plate can take as little as a few minutes. Cleaning all the plates can take up to an hour.

Seed must be as clean as possible. The holes accept anything that will cling to them as being seed. If the seed has a lot of trash (rocks, pieces of cones, broken seed), the machine will plant the trash as if it were seed. Small pieces of trash will lodge in the holes in the vacuum plates and cut off the vacuum so that no seed will stick to the hold causing skips in the drill.

Summary

The 816SL vacuum sower has done a better job sowing seed at the Union Camp nurseries in Georgia and Alabama than the previously used Oyjord sower.

The number of seed placed in each drill was found to be more consistent, both within and between drills.

Although slower to operate than the previously used Oyjord, the benefits are felt to far outweigh the drawbacks. It is felt that the machine has aided in improving seedling quality through better seed distribution.

References

Godbee, J. F., Jr. 1980. Seedling Quality Evaluation, Bellville Nursery. Union Camp Corporation Research Progress Report.

Rakestraw, J. L. 1986. Union Camp Woodlands Research. Personal Communication.

Wakely, P. C. 1954. Planting the Southern Pines. USDA. Monog. 18, 223p.