The Target Seedling Concept: Potential Marketing Tool

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Speak with any grower of plants who is in the wholesale or retail business and it isn't very likely you will run into one who says they sell poor quality stock More than likely you will hear about past problems that have been overcome I know of no one in the propagation business who hasn't had some problem some time and who isn't currently working on this year's crop of problems. If growing plants were easy, there would be no need for all of the societies founded around plant propagation, soils, fertilizers, and genetics.

This paper is about the **Target Seedling Concept** (Rose et al., 1990) and its use as a marketing tool First, what is the definition of the target seedling concept? In a forestry context it means to target specific physiological and morphological seedling characteristics that can be quantitatively linked with reforestation success. The idea is that for whatever purpose the plants are intended, it is important that they are physiologically and morphologically prepared to grow well in their destination environment. The key word in the definition is "quantitative," as opposed to "qualitative." It is vital that there be quantitative *criteria* by which the seedlings are measured.

How can the **Target Seedling Concept** be used as a marketing tool? In most cases marketing a product includes telling the customer what makes this product better than some other. Criteria are set, standards are put in place, and the definition of a good product emerges As customer needs change, so do the criteria for a successful product. Targeting characteristics for success is one way of letting customers know you have standards and criteria for success. They can expect to get a good product.

For years in the forestry business tree improvement and genetics have been used as marketing tools Seedling bags and refrigerated trucks have had company symbols and slogans like "Seedlings from Superior Trees" put on them in large block letters to let buyers know that they are getting "superior" seedlings Customers expect these seedlings to grow faster, be more disease resistant, have good form, higher density wood and be ready to harvest earlier than woods-run seed. Granted, the customers expectations may not always be correct, the assumptions about the seedlings unproven, but tree improvement does work very well as a marketing tool. It certainly is true that genetically improved seed is better than woods-run seed so there is a sound basis for marketing seedlings this way.

SEEDLING TRAITS TO CONSIDER

It needs to be made clear that a key element in the **Target Seedling Concept** is that many seedling traits operate together to produce the desired field response. Thus, each of these traits affects many others It is a matter of getting all of the best traits to overlap (Figure 1).

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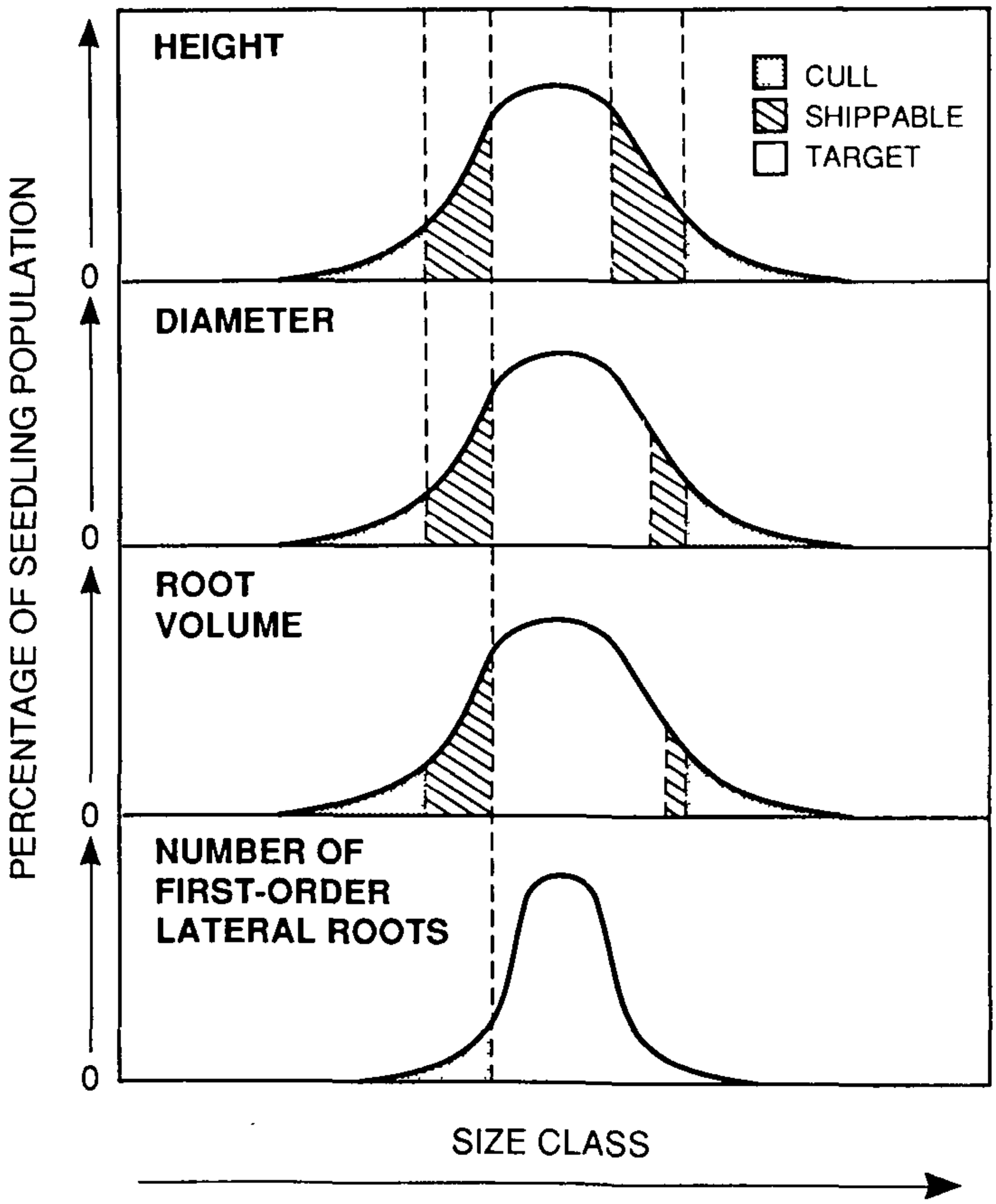

Figure 1. Schematic of different seedling parameter distributions with cull factors

Height. The greater the height of a seedling, the greater the leaf area available for photosynthesis and transpiration and the greater the seedling's weight and bulk. Greater weight and bulk, of course, decrease the number of seedlings that can be carried by a person during planting. Height affects the shoot/root ratio of seedlings The limiting factor in setting a practical height is actually the amount of root that can be planted properly.

Diameter. Diameter is closely related to seedling vigor, partly because average diameter of a seedling population at any one time is correlated with the average size of its root system Furthermore, stems with larger diameters tend to have larger buds (unless they have been top-pruned). Such buds contain larger numbers of pre-formed leaf primordia that will elongate to become the first flush of growth after planting. Seedlings with larger diameters also have larger xylem cross-sectional areas for water transport, although during establishment the size of the root system is the limiting factor for the process (Carlson, 1986).

Size of the Root System. In addition to increasing the potential for water uptake, larger root systems within a single genetic source also have a higher root

growth potential. The size of a root system can also affect the rate of transpiration and gas exchange. Small-rooted seedlings are water-stressed because not enough water is absorbed by the roots to balance transpiration losses from the needles. If this condition is chronic, then currently available photosynthate can become the limiting factor for root growth High root volume has been shown to improve growth after planting (Rose et al , 1990).

Cold Hardiness. Nursery managers have long known that a seedling's dormancy status and cold hardiness affect the time it should be lifted and handled (Lavender, 1984) Changes in such phenological traits as date of bud set, bud size, needle color, and degree of root suberization, are now being used to estimate the dormancy status of seedlings prior to lifting them in the fall and spring for transplanting or outplanting. Unlike morphological measures, however, dormancy and cold hardiness have not often been considered as operationally useful target characteristics. By putting seedlings through a pre-set freezing cycle, one can quantify their LT_{50} (the lethal temperature at which 50 percent of them sustain some sort of bud, cambium, or needle damage).

Mitotic Index. Mitotic Index or MI (number of dividing cells/total number of cells) is used by researchers to investigate bud dormancy (Carlson et al., 1980). It has also been used successfully on roots (Dunsworth et al , 1982) A squash mount of a bud or root observed through a microscope at 400X magnification allows the number of dividing cells to be counted MI tends to decrease rapidly in the fall in some species.

Days to Bud-Break. Terminal and lateral buds of seedlings are now viewed as potentially useful indicators of whether a seedling has had its chilling requirement met. Seedlings require chilling to break dormancy in the spring. The number of days before terminal and lateral buds break is being used successfully to target the best time to life seedlings (Ritchie, 1983)

Plant Moisture Stress. Plant moisture stress is used as a target characteristic. As moisture stress in a seedling increases, there is a corresponding degradation of the photosynthesis mechanism and an impairment of future growth. Most nurseries try to lift their seedlings when the water potential of stems, branches, or needles is below -10 bars. It is equally important to plant seedlings when stress levels are low.

Variable Chlorophyll Fluorescence. This very new technology is still in its infancy, yet it holds great promise as a target parameter. The hope of this tool is that it will tell us if seedlings are fully dormant. It also has promise to tell us if seedlings are only marginally alive after severe frost Time will tell.

Who Sets the Target? Different targets are established for different reasons—as a public service, for profit through the sale of seedlings, or for profit at final harvest. Various cultural practices are applied to achieve the desired target. As these practices can result in a wide range of seedling morphologies and physiological conditions, nurseries must decide what practices to employ to achieve their goal. Ideally, no matter what goal, every nursery should be growing seedlings that survive and grow well after outplanting. The proper place to rate the quality of cultured seedlings is in the forest plantation.

CONCLUSION

The **Target Seedling Concept** has potential as a marketing tool in the same way that tree improvement and genetics are being used currently Emphasizing targeted criteria to meet a customer's needs would seem to have much more impact than current statements about growing quality plants Stating that the plants have been hardened-off to an LT_{50} of -18° C would seem to carry more weight with a customer than making the blanket statement that the plants are dormant or cold hardy. Adhering to a target system of criteria would appear to: 1) tighten the quality controls used to grow plants, 2) give both grower and customer more confidence in plant performance, and 3) lead to the best marketing advantage a business can have—a good reputation.

LITERATURE CITED

Carlson, W.C. 1986 Root system considerations in the quality of loblolly pine seedlings South J Appl For 10 87-92

Carlson, W.C., W.D. Binder, C.O. Feenan, and **C.L. Preisig.** 1980 Changes in mitotic index during onset of dormancy in Douglas-fir seedlings Can J For Res 10 371-378

Dunsworth, B.G., and **J.W. Kumi.** 1982 A new technique for estimating root system activity Can J For Res 12 1030-1032

Lavender, D.P. 1984 Plant physiology and nursery environment Interactions affecting seedling growth In Duryea, J L , Landis, T D eds Forest Nursery Manual 133-142 Netherlands Martinus Mijhioff/Dr W Junk Publishers

Ritchie, G.A. 1983 Effect of freezer storage on bud dormancy release in Douglas-fir seedlings Can J For Res 14 186-190

Rose, R., M. Atkinson, J. Gleason, and **T. Sabin.** 1990 Effect of root volume on survival, growth, and nutrient uptake of Douglas-fir seedlings after outplanting (In review)

Rose, R., S. Campbell, and **T. Landis** (eds) 1990 Target Seedling Symposium Proc Combined Meeting Western Forest Nursery 1990 August 13-17, Roseburg, Oregon Gen Tech Rep RM-200 Ft. Collins, CO USDA Forest Service, Rocky Mt Forest and Range Exp Sta 286 p

Rose, R., W.C. Carlson, and **P. Morgan.** 1990 The target seedling concept In Target Seedling Symposium, USDA Forest Service, Gen Tech Rep RM-200, 1-8