A COMPARISON OF COSTS INCURRED IN THE NURSERY PRODUCTION OF IMPROVED AND REGULAR SOUTHERN PINE SEEDLINGS

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The title of this paper and the subject to which I will address myself are merely circumstantial and perhaps even coincidental. Because in the modest opinion of this speaker, a more appropriate and far-reaching subject would be to identify and discuss some of the problems and techniques involved in producing the highest quality southern pine seedling possible in our forest tree seedling nurseries today. You will note that I did not include in the latter any reference to costs or any other imputation that may have stipulated within "acceptable economic limits". For that matter, we don't know what these limits may be on the part of the buying public until some framework of definitions is established and that we can identify exactly what this highest quality seedling that can be grown or produced will do for the planter or landowner in terms of these definitions.

I'm sure we all realize that the containerized seedling approach will, at some not too distant future, play a very large part in the nursery operations picture. We have been studying this facet of nursery seedling production for several years and my file is several inches thick now with bibliographic material. We have spent a few thousand dollars over the past few years compiling it...it is world-wide in scope from the INDO-EUROPEAN countries to the Far East and back to North America. Our Canadian forestry friends have researched this subject, too, over the past several years with no conclusive recommendations.

Containerized planting should not only permit year-round planting but should give the nursery manager an opportunity to produce a higher quality seedling through more sophisticated cultural treatments; for example, frequent and careful monitoring of micro and macro nutrients and soil (growing medium) moisture levels, as well as disease and insect control mechanisms. Indications are that containerized seedlings will cost in the neighborhood of $100-$200 a thousand to produce on a commercial basis. Of course this involves a lot of "iffies", depending upon the capital outlay required to produce the seedlings.

Accurate cost figures are a must in any type of business and as much so in the operation of a forest tree seedling nursery. The data that I will cite, of course, speaks only for our state nurseries in Texas and obviously may not be compatible with other state and industry nurseries.

Since the early 1960's, more than 14 million improved southern pine seedlings have been produced in our nurseries and while not an inordinate quantity in terms of total nursery production, it has in some years represented approximately 20 percent of the yearly production.

A corporate balance sheet or a company annual financial statement offers little appeal to the average reader but is quite interesting to corporate and company management and financial officers. The same principle applies to nursery production costs. With your forbearance, I will refer to certain nursery production costs in a broad, generalized way for an overview and to establish some sort of realistic framework for postulating other costs that may appear on the nursery horizon. These figures are shown in detail in the paper and will not be repeated in this presentation in the interest of time.

There are certain fixed nursery costs which will occur regardless of the type of nursery operation .... These are the usual classified employees whose salary and expenses are tantamount to any operation, whether you are producing 20 to 50 or 100 million trees. For our type of operation, fixed costs represent approximately 15 to 17 percent of production costs or approximately $1.66/M trees.

Seasonal nursery workers are the backbone and literally the work-horses of any nursery operation. In the winter, while shipping the seedling crop, they are the ones who get cold, wet and dirty bringing the trees in from the field. They can make or break the nursery on operating costs if they so mind. Nursery seasonal labor investment in the seedling crop before it is lifted, graded and packed for shipment will generally run approximately $1.78/thousand plantable trees while shipping costs will run about $1.97/thousand trees. The wage scale for our seasonal workers is the federal minimum plus incentives and tenure. Details on seasonal workers wages and other costs for the most recent shipping season are spread below.

Seasonal Workers	Cost/M Trees
Lifting	$0.87
Grading	.83
Packing & Shipping (standard size bale was 2/M trees; shipping in 1/M unit bales increased costs by $0.78/M or bale, including wages and shipping materials.	.27
Seedbed preparation, etc.	.26
Weeding	.52
Miscellaneous	1.00
Total	$3.75

Tree seed, petroleum products, fertilizer, fumigants all contribute to the cost of seedlings. In fact, almost as much as seasonal workers or approximately $2.98/M plantable trees. Details are shown below.

Items	Cost/M Trees
Tree seed	$1.26
Petroleum products	.13
Mineral Spirits (Nerbicide)	.19
Fertilizer, insecticides, fungicides	.05
Fumigants, polyethylene cover & glue	.59
Shipping materials	.37
Mulch (groundwood fiber)	.14
Miscellaneous	.25
	$2.98

An interesting statistic is the cost comparison between wood fiber mulch and the nominal pine straw or respectively, 144/M and 20¢/M, the latter which is obviously shown under a seasonal wages item rather than as a purchased item. This represents approximately a 43% increase for the use of pine straw.

Other costs including travel, general expense, repairs and alternations, i.e., buildings, equipment, grounds, etc., (and I'm sure there are times when we would like to repair and later our seedling crop before shipping!!) and depreciation on capital outlay items generally totals approximately $1.58/M or a grand total of $9.97/M. It stands to reason that you wonder about the apparent inordinate costs this past year, and I'm sorry to say we lost approximately 28% of our seedling crop from the use of what I will refer to as a non-pine straw mulch. Ordinarily, without this loss of seedlings, production costs would have been nearer a norm of $7.80/M. You must remember, too, that hourly wages have increased tremendously these past 5-6 years from the nominal $0.75 to a minimum $1.60. However, in the opinion of the speaker, this is only just; these workers have earned it and it is only right that they enjoy the fruits of their labor. Obviously this year we have returned to the customary pine straw except for continuing pilot studies with groundwood fiber on approximately one acre of seedbeds.

Of the above, tree seed is the enigma! Commercial tree seed of the southern pines will cost within the range of $5-$7.50/pound. With a nominal 45-55 tree percent, a pound of slash and loblolly pine seed should yield respectively, on the average, from 5,000-7,000 and 6,250-8,000 plantable seedings. In terms of cost/thousand plantable trees, the $1.26 figure cited above would be somewhat excessive with the normal range being somewhere near $0.75-$1.10/thousand. With improved seed, however, this will not hold true. Seed orchard and seed production area cone collections are not only more expensive, i.e.,

ranging from $7.69 to $55.06/pound this past year, but in younger seed orchards, seed yield/bushel of cones is quite low, viz., as low as one-quarter pound with the median value around one-half i pound. Seed orchard seed in the younger orchards are also low in viability....germination percentages ranged from 20 to 53 for improved loblolly and from 62 to 73 for improved slash for the 1971 cone collections. In addition, seed orchard seed are generally larger than seed from regular collections, so the potential for plantable seedlings/pound of seed orchard seed is less than for regular seed. On the orther hand, one acre of a fully mature pine seed orchard, i.e., minimum age 25 years, should produce in plantable trees, from 250,000 to 375,000 and from 315,000 to 450,000, slash and loblolly pine, respectively. This will probably be more appropriate for second generation seed orchards (although this does not always hold true) since first generation orchards are severly rogued throughout their life because of low cone production and other undesirable attributes or as much as one-half of the clonal lines in any given orchard. However, the quantitative genetic gain potential from seed orchard seed offers unlimited opportunities to the landowner to improve his growing stock at a reasonable cost. With a modest 10 percent genetic gain in growth from improved seedlings, approximately 50 additional board feet of wood fiber may be produced/acre annually. With stumpage carrying a value of $65/MBF, th increased production would return annually $3.25/acre and for a rotation age of 35 years a total increase of $113.75 is returned to the owner which, if discounted at 7 1/2 percent, would yield a present value of $9.05. The wood fiber quality genetic gain realized from improved seedlings is also of inestimable value to the landowner but is difficult, if not impossible, to assess. Now, assuming one pound of higher yielding improved seed will plant from 12 to 16.5 acres on a spacing of 8'X10' (544 trees/acre) therefore, 16.5 acres (the higher value!) times discounted value of the increase of wood fiber would return to the owner an additional income of $149.33. On this basis, the owner would be foolish not to consider total use of improved seedlings and an increase in the nursery price of seedlings of $5-$10/thousand would not be unreasonable if the cost of harvesting seed orchard seed justified the increase. What I have been trying to say these last few minutes is that the principal increase in cost of producing improved seedling stock may be attributed solely to the increase in cost of seed orchard seed. There are other minor additional costs for producing improved seedlings which may be summarized as follows:

1. When the forest tree seed and seedling certification standards were prepared several years ago with the Texas Department of Agriculture's Seed and Plant Board, several constraints were included in the criteria for the production of both genetically improved seed and seedlings which add certain administrative costs to this material.

a. The State Seed and Plant Board requires an annual fee for certifying seed orchards in the amount of $10 for handling the application for certification plus $2/acre of seed orchard; for certifying seedlings, the $10 fee is duplicated plus $35 for each nursery inspected.

b. A 10-foot buffer zone must be maintained in each seedbed between seedlings of different genetic quality which means theoretically a reduction in production area of approximately 1200-1500 seedlings or an estimated loss of $11-13 in income. This multiplied by the number of buffer zones could amount to several hundred dollars over a year.

The State of Texas Certification standards for forest tree seed, seedlings and propagules are contained in a manual issued by the Texas Department of Agriculture and are updated as revisions are made to the standards.

Nursery managers and administrators may be in relative polarized positions, with competition for program funds being somewhat limited. In this context, improvements in nursery operations may be visualized and detailed planning already accomplished by the manager but the restraints on funding limit their implementation.

Now, lets look at the other side of the coin and discuss very briefly what are some of the problems and techniques involved in producing the highest quality seeding possible today, improved seed notwithstanding.

1. Determine physiological qualities of seedlings to complement morphological criteria currently in use as a frame of reference for establishing standards that will permit highest quality seedling selection in the nursery.

2. Scientific study of application of refrigerated seedling storage to improve seedling quality and its resultant plantability.

3. Scientific study of macro and micronutrients for optimum development of highest quality seedling.

4. Scientific study of soil and plant tissue analysis techniques in conjunction with optimum application rates of both macro and micro nutrients for the development of this prime grade seedling.

5. Application of remote sensing principles and technique as a nursery management tool. The ramifications of this relatively new tool in ursery management are infinite.

6. Establishment of a permanent and sustaining or continuing research type screening study of insecticides, fungicides and herbicides, perhaps on a regional basis, for improving overall seedling quality.

These are only a few of the speakers observations on possible approaches to improve the quality of forest tree seedlings being produced in the nurseries today.