HOW SHOULD NURSERY STOCK BE GRADED

by

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This topic is one that has been talked about for at least twenty-five years and as a. preliminary to a discussion of the subject we should ask ourselves a few questions.

1. What is grading of nursery stock? Is it synonymous with culling or is it a further refinement after obvious culls have been eliminated at the time of lifting?

2. Are any of you nurserymen actually grading stock or are you just setting up a few more specifications for culling?

3. If we are going to differentiate between culling and grading how can any nursery, shipping over one million trees, keep up with the requirements of the planting projects and segregate the stock into two or three grades.

You may say put on more staff, but there should be a reasonable limit to your costs of stock. Most nurserymen are very jealous of their costs per thousand seedlings and at times it is difficult to get some to cull their stock heavy enough.

If grading or culling *is* done in the field, very few of the large number of seasonal employees show any interest in their work other than the pay cheque, so that only the most obvious and simple rules can be laid down for cull ing, grading is an impossibility.

If a belt is used, culling or grading is usually done by a reliable

employee who does a very conscientious job but under pressure to keep up with the belt or to keep up with the production, of stock to meet shipping requirements This makes it only possible to cull for breakage of roots or tops and for specifications for size of stock or poor form.

This is all that is physically possible for any nursery staff to do and any further improvements in quality of stock must be done by the soil specialist or research forester. Experimental work done by them can do a great deal to improve deficiencies in quality of seedlings produced. The older the nursery the more important it is to keep this type of work going year after year.

Grading of planting stock should start in the seedbeds and in the nursery soil. That is for proper sowing for good spacing per square foot of seedbed and with good soil fertility the need for grading could be eliminated. Drill sowing is the most popular technique used in forest nurseries at the present time and that automatically looks after spacing so that soil fertility is the major factor to be controlled to give good planting stock. We should also add germination of seed - delayed germination is responsible for most of the culls and there are a good many arguments in favor of some sort of stratification to give prompt germination.

Wakeley, in his excellent bulletin, "Planting Southern Pines" has shown from actual experimental planting how hopeless it is to grade stock by appearance. The physiological qualities which he mentions are so complex and still unknown so that there is a lot of research work still to be done to determine just, what is going to give us the best survival on planting sites. Our original concept of growing nursery stock was to try and duplicate forest condition not "baby" the trees too much, particularly after the first season. Now we are thinking in terms of more fertilizer and water to give us more vigorous stock.

In 1949 one of our projects planted stock from two different, nurseries but not as an experiment. The stock from the second nursery was shipped to complete the seedling requirement for the area. At the time of planting the trees from one nursery averaged 3 to It inches top height the other stock averaged 8 to 10 inches. Two years after the small stock was 8 inches high as compared to 24 inches for the larger. Five years later the height growth was 18 inches as nompared to 48 inches. Re know 'that at the time the soil fertility at the one nursery was much lower than the other but the smaller stock looked very healthy and had an excellent root system. In spite of very heavy culling of the small stock survival was **30% less** than the large trees

It is not a question of **seed** provenance but one of quality of planting stock and a quality which can not be arrived at by culling or grading the seedlings.

(A) Should m have selected stock for certain planting sites? No. Your nursery should be producing the highest quality planting stock possible and good enough to give reasonable survival on poor sites and correspondingly better survival on good sites. We assume s of course s that the seed from which the stock is grown is from the same provenance as the planting site.

We might modify this rather abrupt negative answer by adding that your only selection should be age of stock. On yellow pine sites you should get better survival with 1-2 or 2-1, stock than with 1-1 or 2-0.

(B) Is 1-1 stock better for planting than 2-0 root pruned stock? This question must refer to yellow pine since coast fir is either 1-0 or 2-0 and east of

the mountains it must be 2-1 or 2-2. Our experience indicates that 2-0 is a much better and a more vigorous tree.for planting cut than 1-1 stock. The main reason is that we have too many culls in our 1-1 seedlings. Actually we have stopped transplanting 1-0 but we are taking the small 2-0 stock and setting them out for 2-1 trees, In this way we are going to have fewer culls and good sturdy stock at three years. If you like to call it grading it will be a case of shipping the best quality 2-0 trees to planting projects and holding the weaker ones for another year. Transplanting does set back a tree and your 2-0 stock usually is much sturdier and more vigorous than 1-1 seedlings.

(C) Should older stock 2-1 be used on tough planting sites? As we all know the roots on a seedling are the most important factor for survival. On tough planting sites whether it be from competition or extreme drought conditions a three year old tree is going to have a mush greater chance of survival than a two year old seedling.

DISCUSSION:

QUESTION: Do you think the fact you have a shorter growing season makes a difference in whether you use 1-1 stook or 2-0 stock?

MR. McWILLIAMS: Could be. Oar frost free period in our yellow pine nursery is ninety days.

QUESTION: Have you tried sending some of your seed down here to see how it works?

MR. McWILLIAMS: No. I hadn't thought of that. Do you think that has any merit? If the seed would be from the proper province it would possibly give them a better start. Practically, it is not feasible. You have customs and we have customs

QUESTION: How did your 2-1 grow in comparison to 2-0 in a similar site?

MR. McWILLIAMS: We have just started experimenting this year. We started an experiment two years ago but unfortunately it was a washout. This might be off the topic but if each one of you consider the survival of seedlings planted under the best conditions-- in '48 planted trees in the Douglas fir region had 90% survival. Next year we had 60% survival. It was so dry. Under ideal conditions what is your survival? 1953 planting survival was in the 90's.

M. McDANIEL: Have you changed your size of cull?

MR. McWILLIAMS: Minimum size. Down to 3-inch top. Back up to 5 inches now.

DR. STONE: On what do you base these decisions?

MRo MCWILLIAMS: From our survival of planting.

DR. STONE: You would have to have a whole series of plantings.

MR. McWILLIAMS: It is a question of setting up a series of plantings. It

is a question of each region or each nursery. We did set out one other year a variety of plantings from each nursery but it was such a favorable planting year we did not get any data. Then it is uncertain exactly.

MR. SCHUBERT: At the Experiment Station we have run tests by grading into three height classes and three diameter classes. Not too much difference in height but there is in diameter classes. We have suggested on the culls that the lower third is below eleven hundredths. If it is smaller than that it is nulled according to size. As long as you have survival in the 90s it is difficult for you to say that your 1-1 and 2-0 is better. From an economic standpoint 2-0 is cheaper. From our standpoint, if you were to plant 2-0 stock you would get poor survival. Our survival is much lower. It is about 50%. It is true that 1-2 stock is superior to 1-1 stock and should be planted on the tougher plots.

QUESTIONS: I wondered if you changed your grading with diameter in relation to the height.

ANSWER: Height was not the primary factor in grading. It could be a shorts thick seedling. If it is both short and thick it became one of the culls. Culling should be a little heavier.

DR. STONE: 1 still think this is a little illogical. We need some basic research as rapidly as we can get it financed.

MR. McWILLIAMS: In 1948 and 1953 our survival was in Douglas fir on the coast. One fall we had 18% survival. Our spring planting in yell= pine is three weeks in spring so we have to do some fall planting. In 1951 and 1952 we set out a few thousand seedlings to see what the score was. We got fairly decent results from it.

MR. VAN WAGNER: May I ask what type of labor you have in field planting?

MR. McWILLIAMS: Men. Poor. Casual labor.

MR. VAN WAGNER: There is a factor we often overlook. Being from the south and disconnected from the rest of the forest workers, I was up north to a plantation. On one row there was a different rate of survival than on the other two. From my experience I knew what had happened. He had all trained men presumably doing the work. I was wondering if you experienced the same conditions as where I come from-untrained, casual labor.

MR. McWILLIAMS: Yes. It requires constant supervision.

CONE PRODUCTION ON PONDEROSA PINE, SUGAR PINE AND WHITE FIR ON THE STANISLAUS NATIONAL FOREST, CALIFORNIA - FROM 1926 TO 1953

Mr. Gilbert H. Schubert of the California Forest and Range Experiment Station informally discussed the above subject and illustrated his discussion with slides.