

SEED QUALITY - FACTORS BEYOND CERTIFICATION

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Potato seed costs are one of the largest single costs in potato production. Reducing the cost of seed by purchasing lesser quality may result in increased costs of disease or insect control and/or decreased revenue because of reduced potato quality. Therefore it is very important to start the season with the best possible quality of seed so that additional production costs are not incurred during the rest of the season due to substandard quality seed.

The subject of this presentation is which quality factors other than certification should be assessed before purchasing potato seed. The factors I have chosen to discuss are:

- 1) Geographic location
- 2) Grower history
- 3) Grower technology
- 4) Sanitation
- 5) Facilities
- 6) Grade or shape of the tubers
- 7) Tuber size

GEOGRAPHIC LOCATION

Washington growers receive seed from primarily six (6) locations.

Table 1.

	<u>% of Washington Seed Purchases (All Varieties)</u>	<u>% of U.S./Canada Russet Seed Acreage</u>
Montana	49%	7
Idaho	16%	47
Washington	11%	<1
North Dakota	8%	4
Canada	6%	<1 (B.C.)
Oregon	6%	4

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Some of these areas are frequented by early fall frosts which may make seed supplies less stable. Areas of high snowfall may result in significant amounts of volunteer potatoes (not usually reported by growers or certification agencies). Although volunteers found within a field are treated as the rest of the crop in terms of inspection, plants growing in adjacent fields of alternate crops are not evaluated for disease and are not usually removed. These may be a significant source of diseases such as leafroll. Only through personal inspection by the buyer or discussions with the grower can the knowledge of volunteers be obtained.

GROWER HISTORY

As with most of life's experiences, growing seed potatoes must be learned. The accumulation of positive experiences usually results in high quality output. A seed grower who has learned how to grow disease free seed will have a more consistent product than someone who does not yet understand or care about the details of being a good seed grower. Published records of seed lot tests such as each state's certification records and the WSU or Oregon State seed lot trials are good sources of information about the consistency of a large number of seed growers. Obtain copies of these publications to have a record of your seed source and to compare this aspect of seed quality to other growers.

TECHNOLOGY

The seed industry has progressed rapidly in the past 10-15 years. Tests in the late 1960's and early 1970's indicated a value of planting seed free of PVX or PVY. These results along with the stem cutting, meristem and tissue culture propagation techniques and rapid reliable tissue testing in the form of ELISA have provided the impetus for a greatly improved seed supply.

Although many seed growers will have lengthy discussions about the merits of stem cutting vs meristem vs tissue culture vs greenhouse tubers vs hill selection, the debate must end with the conclusion of the receipt of clean seed stock by the grower. It may not matter that the seed grower use a "new" technique for his seed source, but he should be familiar with the various methods and their advantages so he can evaluate his options.

The use of chemicals such as Temik and Monitor for control of Green Peach aphids has reduced leafroll spread in seed fields. Ask the grower how he controls insects in his fields.

Does the seed producer rogue his fields? What does he look for and how many times does he rogue? There are some quality factors such as the percentage of giant hill which are often overlooked by seed producers and buyers as well. Because of the difficulty of identifying this disease with a high degree of confidence, some seed growers have chosen to ignore it in the past. During the past 3-5 years, renewed interest in removing this disease has occurred and therefore, seed quality is being improved from some growers. If you have more than 1.5% of your plants occurring as giant hills, you need to check on the roging practices of the seedsman. If a grower tells you he never finds any disease in his fields, he is not looking hard enough.

New harvesting, handling, and storage technology has given growers the ability to sell a higher percentage of the crop which they have grown. Does the grower have good equipment and know how to reduce seed damage by bruising? Some seed growers are very progressive and thrive on having new technology while others only want to do it the way preceding generations have. Perhaps it does not matter whether new technology or old is used, however, it is very important that the seed crop be produced and maintained in optimal condition.

SANITATION

Any seed grower can now purchase pre nuclear seed stock which is free of the critical potato diseases. However, without careful sanitation procedures the seed will not remain disease free for very long. High quality seed growers have developed sanitation procedures at every step of the operation.

Sanitation includes disinfecting all equipment involved in handling and cutting the seed. It also requires cleaning of trucks, storages and other facilities. Often times it is readily apparent how well a grower sanitizes his equipment when one visits the farm. Checking the seed cutting equipment, storages, and harvesting equipment for cleanliness are a few ways to determine if the grower is paying attention to sanitation details.

Contamination of the crop can occur at many junctures and only the fastidious grower can reasonably assure purchasers of consistent high quality seed. Ask the grower what he uses to disinfect equipment. Clorox is probably one of the best disinfectants but other options need to be considered for specific instances such as treatment in a high soil environment and specific disease control. Sharing equipment or allowing outside vehicles to travel on the farm can be a problem for sanitation. Seed growers have been provided with specific treatment recommendations during the annual North American Seed Seminars. Ask them what they use.

Over half the life of the seed crop is spent in storage after harvest and before replanting. The condition of the tubers purchased by the commercial grower can be dramatically influenced by the storage conditions. The 1985 seed crop will serve as a prime example of how good a seed growers storage management practices are. Early frosts this fall caused extensive damage to seed crops all over the Pacific Northwest. Although most growers attempted to remove tubers damaged by the frosts, some partially frosted potatoes are being stored with the rest of the crop. Proper storage management will allow this seed crop to be sold in the spring while poor storage facilities and/or management will result in considerable loss.

In addition to management of storages, the ability of seed growers to grade and ship seed in appropriate volumes at the allotted time is important in the overall seed program. Capacity of conveyors and other handling equipment should be examined when assessing a seed growers program. If you need three (3) loads of seed per day, be certain the grower can deliver the required quantity.

GRADE

Although there is a U.S.D.A. seed grade, not all seed is graded alike. Some growers pack grades superior to the U.S.D.A. grades and other may have difficulty grading their crop to competitors standards. The external appearance may seem to be relatively unimportant but there are some items worth considering. First of all, the shape of potatoes will influence the ability of the seed cutter to perform properly. Since all seed cutters presently rely on the potatoes rolling straight on a moving conveyor, crooked potatoes will not be transferred to the cutting blades properly and either improperly cut seed will result or the volume of seed cut will be significantly reduced or both. Secondly, top grade seed contains minimal adhering soil. If seed has adhering soil, it may trap pathogens against the tubers surface which may serve as a source of inoculum when the seed is cut.

TUBER SIZE

Most seed contracts specify that not more than 3% of the seed be below a minimum size of $1\frac{1}{2}$ " in diameter and upper limit specifications of not more than 5% of the seed be over 12 ounces. The reason for these sizes being established appear to be somewhat subjective. These specifications allow the seed grower to sell the majority of his crop with some degree of confidence that the purchaser will be able to effectively use this size range as good quality seed.

Little work has been done on the ability of presently available seed cutters to cut varying sized seed tubers into the seed for planting. A preliminary study was conducted at UI Farms in 1982 to determine if delivered seed size has a significant influence on the ability of seed cutters to cut appropriately sized seed pieces. A sample of seed tubers was divided into four (4) size grades for cutting. A stacked Milestone seed cutter equipped with $1\frac{1}{2}$ " spaced blades on the top deck and 2" spaced blades on the bottom deck was used for the study. The grading table was set to drop seed of four ounces and less through to the second deck and seed $2\frac{1}{2}$ ounces or less through to the single drop conveyor.

The results of these tests indicate that seed smaller than 3.25 ounces tends to get cut somewhere in the machine resulting in smaller than desired sizes of seed pieces or falls through as single drop as appropriate sized seed (Table 2). The largest percentage of a normally sized seed lot 3.25 to 6.4 ounces is cut reasonably well with only 7 or 8% of the seed pieces being too small or too large. Seed in the 6.4 to 10 ounce size group are also cut reasonably close to the desired size. Seed over 10 ounces however tends to be cut into larger seed pieces (11% over 3 ounces). Examples of average seed lot weights and cut sizes for a commercial operation are presented in Figure 2.

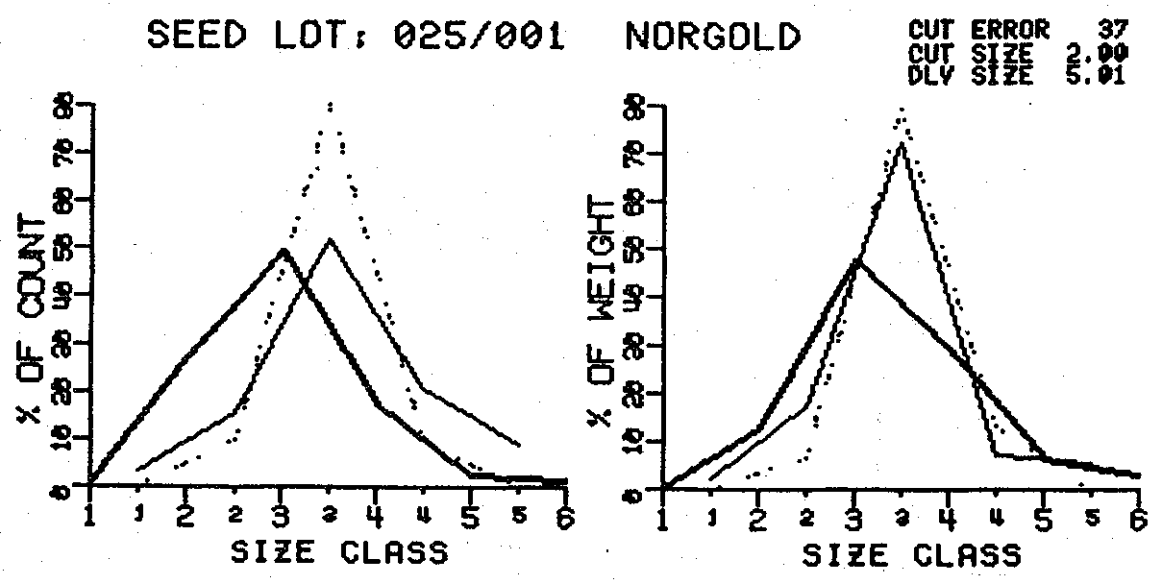
When large seed is used for planting a number of scenarios may occur. The first is that a larger potato crop will result from the larger size of seed piece planted. Of course, production costs will be higher as a result of using larger seed pieces and therefore more CWT planted per acre. For instance, if the normal planting rate is 20 CWT/Acre for well cut seed, an increase of 2% average seed weight as a result of cutting larger tubers will result in a planting rate of 20.4 CWT/Acre or a cost increase of $\$9.50 \times .02 = \$0.19/\text{Acre}$ or \$85.50 for a 450 acre farm.

Scenario number two could be a reduced stand due to the inaccuracy of some planters when large seed is placed in them. Cup style planters appear to be more subject to error with the larger seed size (over 2- $\frac{1}{2}$ ounces) Fig. 3.

Table 2. Percent of Seed Pieces in Five Size Classes Resulting From Cutting Varying Whole Seed Sizes.

<u>Whole Seed Size</u>	<u>Cut Seed Size</u>				
	<u><1 oz</u>	<u>1-1.20 oz</u>	<u>1.30-2.29 oz</u>	<u>2.3-3.0 oz</u>	<u>>3.0 oz</u>
1.5 -3.25 oz	16	15	54	14	1
3.26-6.5 oz	7	11	55	19	8
6.5 -10 oz	7	7	59	20	6
10 -12 oz	6	4	49	30	11

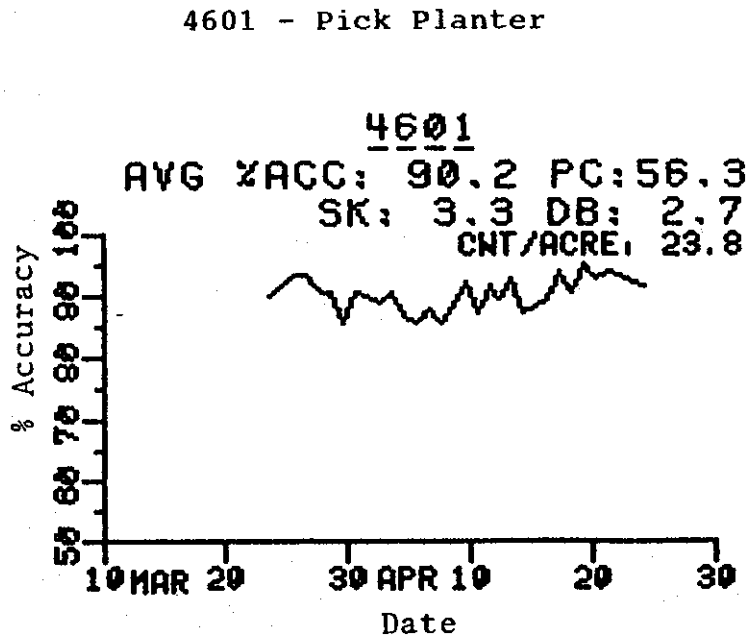
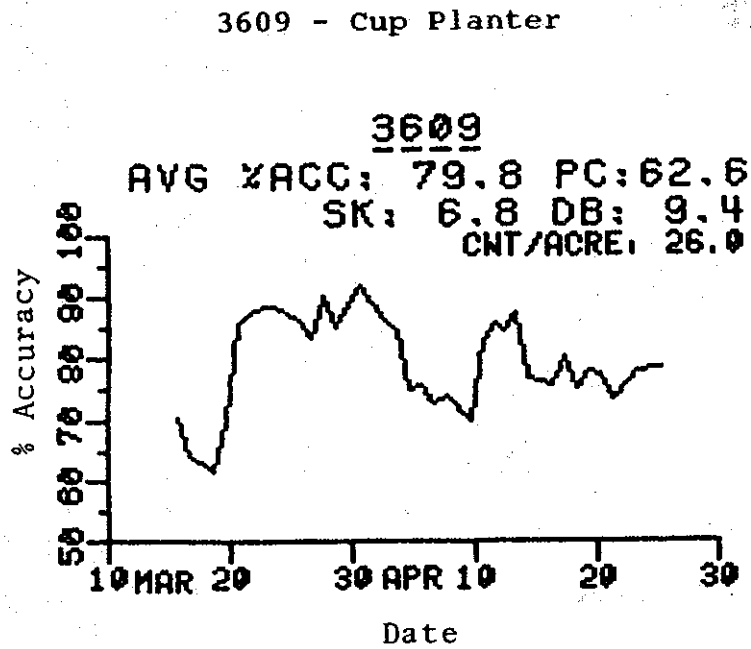
Fig. 2.



Delivered Size
 Cut Size

- | | |
|-------------------|-----------------------|
| 1) <1.5 oz | 1) <1 oz |
| 2) 1.5 - 3.2 oz | 2) 1 - 1.45 oz |
| 3) 3.2 - 6.4 oz | 3) 1.45 - 2.2 oz |
| 4) 6.4 -10 oz | 4) 2.2 - 2.75 oz |
| 5) 10 -12 oz | 5) >2.75 oz |
| 6) >12 oz | |

Fig. 3. The Effect of Seed Size and Planter Type on Planter Accuracy.



There are many factors which determine the quality of potato seed. Certification is a mandatory specification for Washington seed buyers while other criteria are at the discretion of the individual. Demanding and expecting quality seed is not unreasonable, and the higher the standards, the better the seed industry will perform.

In summary, follow a few logical steps and your seed quality should be satisfactory.

- 1) Know the seed producer personally
- 2) Check the growers knowledge and technology
- 3) Help the seed grower by letting him know what is important to you.