# CUTTING POTATO SEED WITH GREATER PRECISION

by
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Not all seed is equally desirable. The size of the mother tuber has considerable influence, not only on the shape of cut seed, but also potentially on both yield and quality. (Figure 1).

Typically cut seed from larger mother tubers greater than 10 ounces is:

1. Slower to emerge
2. Has Greater decay potential
3. Likely to produce eratic stem numbers
4. More difficult to plant with precision spacing
5. Etc. (There are at least 12 more undesirable characteristics that have been identified).

Currently there are several methods used to evaluate how well seed is cut. Randomly collecting precisely weighed ten pound samples of cut seed (Figure 2) and counting the total number of seed pieces is one technique. This is a common and useful method of determining the average seed piece weight.

Using a little arithmetic or a chart similar to Figure 3 will tell you what you need to know, i.e., your average seed weight.

The average seed piece weight, however, doesn't always tell the whole story. This is illustrated with several examples.

Figure 4 shows a hypothetical sample where half of the seed is too small yet this sample does have the selected 2.0 ounce average. This is clearly an UNacceptable cut profile. In most cases, growers would not want to receive this seed profile if they had ordered cut seed with a 2.0 ounce average weight.

Another equally UNacceptable profile (Figure 5) has an equal amount of each half ounce seed size category. This too has the selected 2.0 ounce average. What most good potato growers really mean when they say they want a 2.0 ounce cut seed profile is probably something like that shown in Figure 6. This is an excellent cut seed size distribution and one that was actually measured in the Columbia Basin in 1989.

Another seed evaluation technique involves the weighing of 100 seed pieces, one at a time. I use a small $3 scale (Figure 7) for this process and it works well. This is a field technique I call the "Tailgate method". (Figure 8).

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To use this procedure, randomly collect seed from the truck load, the planter or from the loading elevator, at the seed cutting location. From this method, a very good assessment of the size distribution of the cut seed is possible. (Figure 9). If we find that problems exist in the seed profile then we can go back to the cutter to make corrections. It is often hard to know what parts of the cutter to change and which way the adjustment should be made. To help identify the appropriate part of the cutter to adjust and which way to make the change, I have found that by segregating the cut seed by weight, as before, and also by which part of the machine the cut seed came from, I could identify which level, on the cutter, my problem seed was coming from. See Figure 10.

Knowing what happens when this machine's sizing rollers are opened or closed, on each level of the modern cutter, one can then identify the action needed and the correct adjustment direction. By making a change and re-evaluating the cut seed one can make changes until the desired result is achieved.

Chip eliminating is perhaps the second most common problem associated with mechanical seed cutters throughout the Columbia Basin. Chips are, by my definition, any seed piece size that will not produce a profitable crop for the grower. These are generally less than $1\frac{1}{2}$ ounce in weight and almost always less than 3/4 inch thick.

An easy technique you can use to confirm this for yourself involves cutting ends from seed potatoes of various sizes. Start with cuts 3/4's of an inch from the tuber ends. An easy way to do this is to use a 3/4 inch thick guide. (Figure 11) I find a roll of 3/4 inch masking tape or a 3/4 inch thick 1x4 board works well for this purpose. Cut and weigh end caps from whole potatoes weighing $3\frac{1}{2}$ to about 8 ounces. Do the same for potatoes larger than 8 ounces except cut them in half as does the horizontal knife at the top level on the cutter. Next weigh the pieces you have cut. If your results are similar to those in Figure 12 you may then want to open your cutters chip eliminator rollers so there is at least a 3/4 inch space between them to begin with. Use a 1x4 board as a gauge. For most seed lots of long variety types the rollers may need to be even wider.

Another commonly seen problem is overloading the chip rollers on the seed cutter. Whenever there is more than one and one-half layers deep of cut seed on the rollers their capacity to separate small seed pieces out quickly becomes limited. Much of the small seed tends to "float" on top of the larger pieces and is therefore carried along over the rollers where it should have fallen thru to be discarded.

There is a very important relationship between seed piece size (weight) and the crop yield at harvest. In this comparison I have used data I have collected over the last 4 years. (1986-1989). There are, in fact, several hundred fields included in this comparison.

Figure 13 illustrates the average seed size distribution for about 130 seed lots that were cut to a 1.75 ounce average.

The important aspects of this information are its large percentage (25%) of seed that is under 1½ ounce and the yield range of 28 to 32 tons per acre. It is very likely that one of the important reasons the yield is as low as it is, is the limiting impact of the undersized seed pieces.

Figure 14 shows the same type of information with several important differences. First, the cut seed size average is 2.0 ounce. Second, there are 210 fields of seed lots reported in this data, and the average yield is 30-34 tons/acre. It is important to note that this 1/4 oz. seed size increase, as compared to that shown in Figure 14, is a net increase of 300 lbs. of seed planted per acre and a net yield increase of 2 tons per acre. In this instance there was an average of 15% of the seed smaller than 1½ ounces.

Figure 15 shows the seed size distribution from 40 seed lots that had a 2½ oz. cut seed size average. Only 5% of the seed was less than 1½ oz. The yield range for this data was 33 to 40 plus tons/acre.

Finally, I want to discuss some seed profile data collected in 1989, in part by the Cooperative Extension Service - Washington State Potato Commission, as reported in Spud Topics on May 24th, 1989, and from my results with 25 commercial growers throughout the Columbia Basin. The purpose of this comparison is to extrapolate the relationships shown in Figures 13, 14 and 15 to the industry in its present form and to point toward a direction of improvement. Figure 16 shows the composite results of 9 seed lots evaluated by Co-op Ext-Potato Commission samples. Some of these were commercial cutting operations and others were grower operations. The most obvious areas of concern in this data are the high incidence of seed below 1½ oz. (35%) and the less than 70% level (actually 60%) of desirably sized seed (1½ to 3 oz) necessary for planters to function at or near their optimum level of performance. One might expect both these factors to have additive limiting influences on growers yields and quality.

Figure 17 is a composite of 25 growers whose seed lots I had an opportunity to evaluate. Many of these seed lots underwent cutter adjustments before the data in its final form was recorded. The net result was a reduction in seed less than 1½ oz. (20%) and an increase in 1½ to 3 oz. "desirably sized" seed (74%). The actual average yield for these 25 seed lots exceeded 35 tons per acre as reported by the growers themselves.

The data shown in Figure 18 is the actual numeric values in this comparison.

This importance of this discussion is to emphasize the impact of seed piece size on yield and to re-emphasize the relationship between the cut seed size profile and the performance of the potato planter as discussed in 1987 at this conference.

Figure 1. Not all seed is equally desirable.

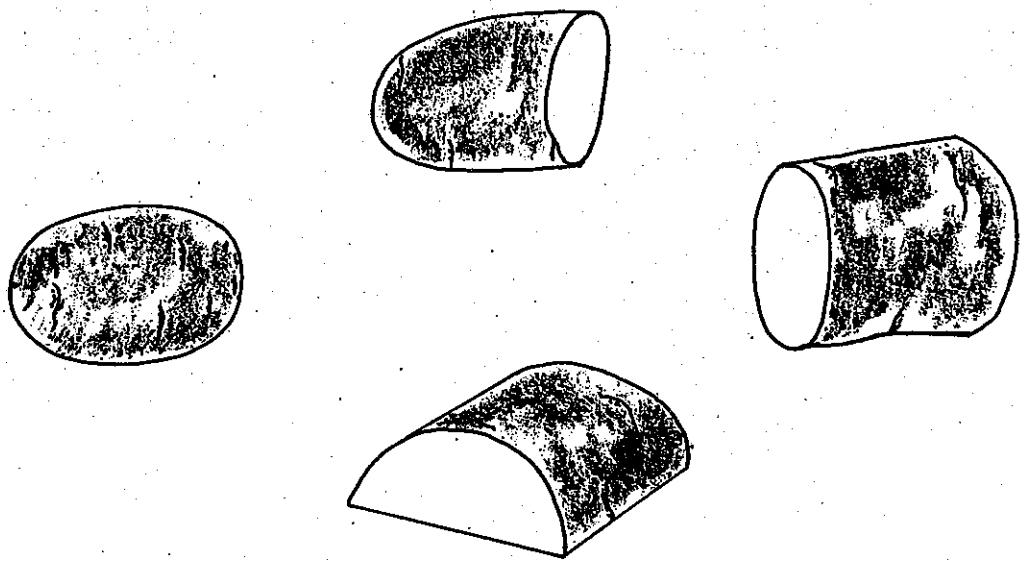

Figure 2. The ten pound averaging method.

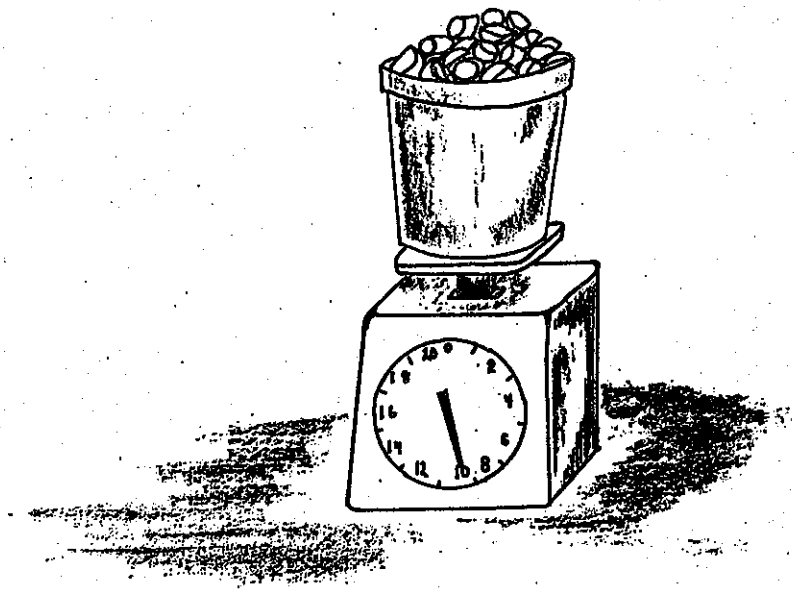

Figure 3.

## Seed Piece Average Size
### Count per Ten Pounds

| AVERAGE WT. | COUNT |
|---|---|
| 1.5 oz. | 107 |
| 1.75 oz. | 91 |
| 2.0 oz. | 80 |
| 2.25 oz. | 71 |

Figure 4.

## An UNacceptable Seed Profile
### 80 Count = 2.0 Ounce Average

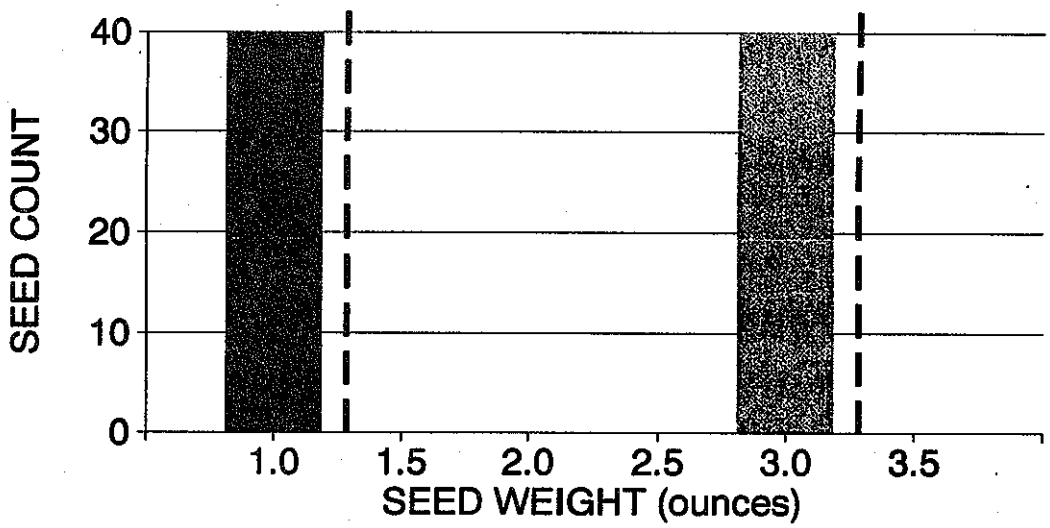

Figure 5.

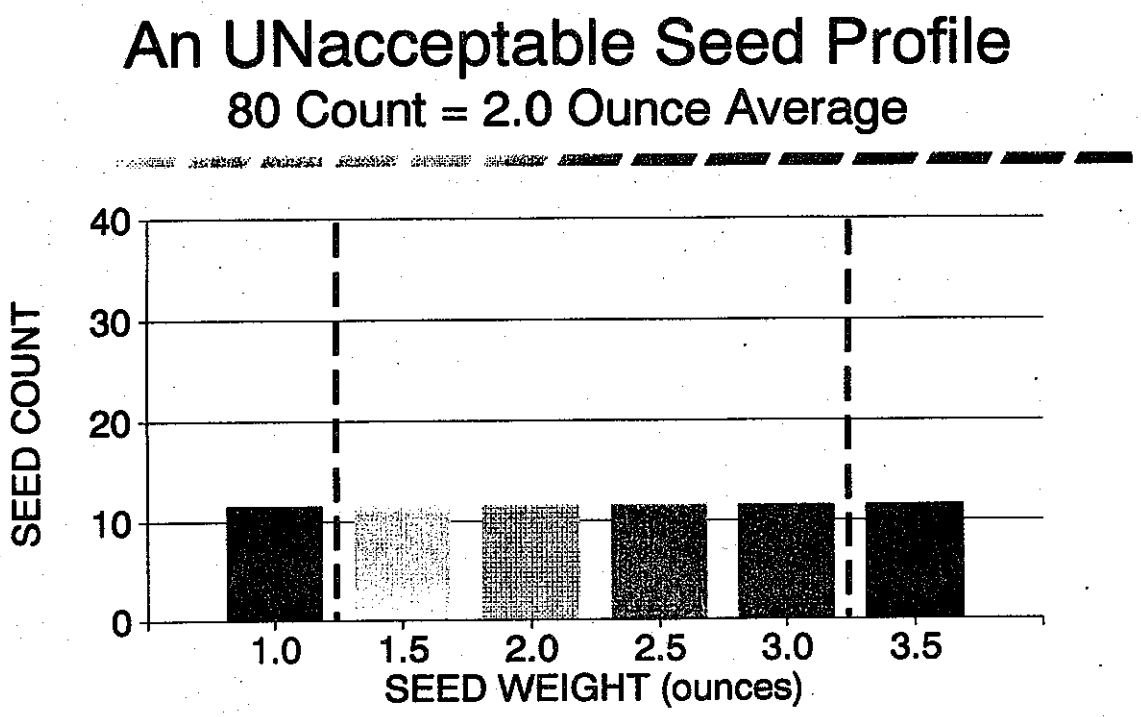


Figure 6.

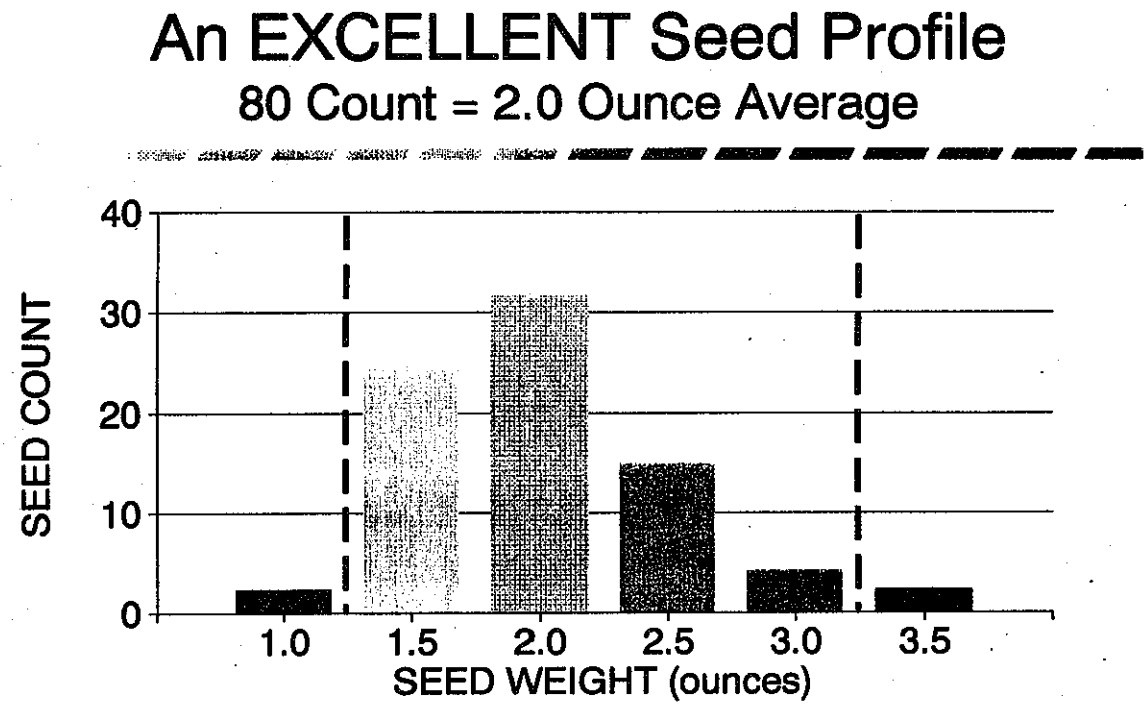

Figure 7. Weigh each seed piece separately.

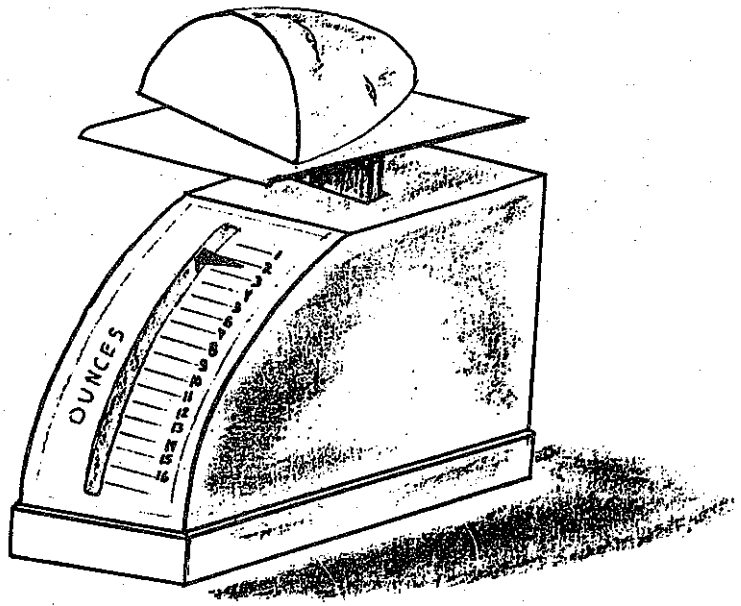


Figure 8. The Tailgate seed sorting technique.

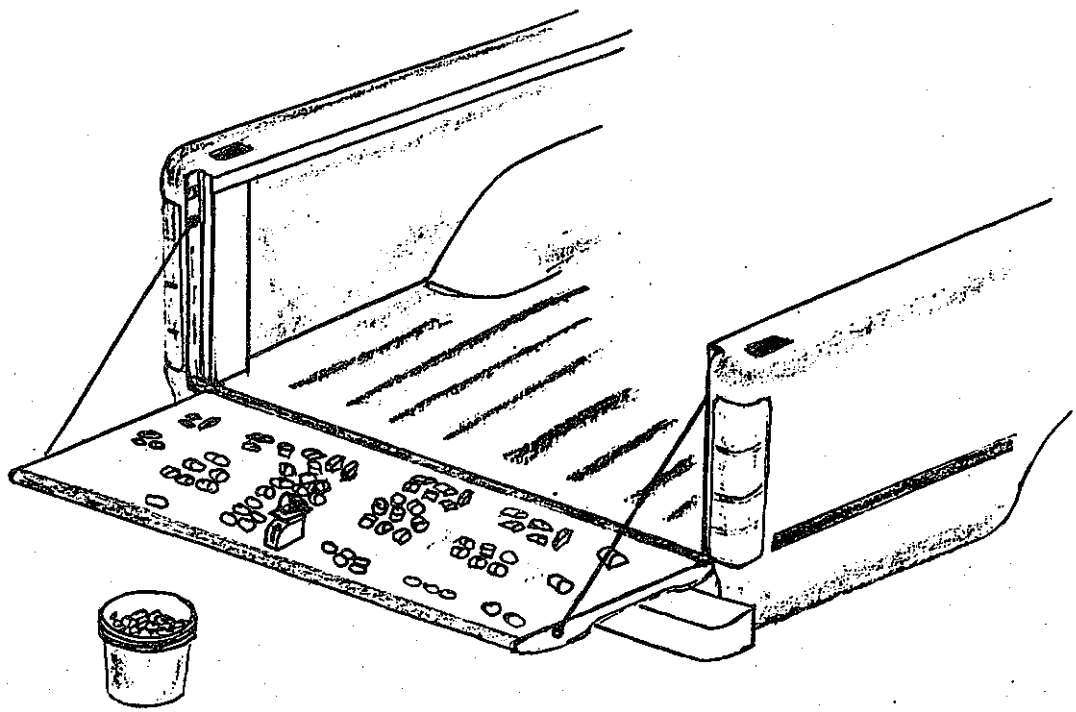

Figure 9. Seed size distribution separation by weight.

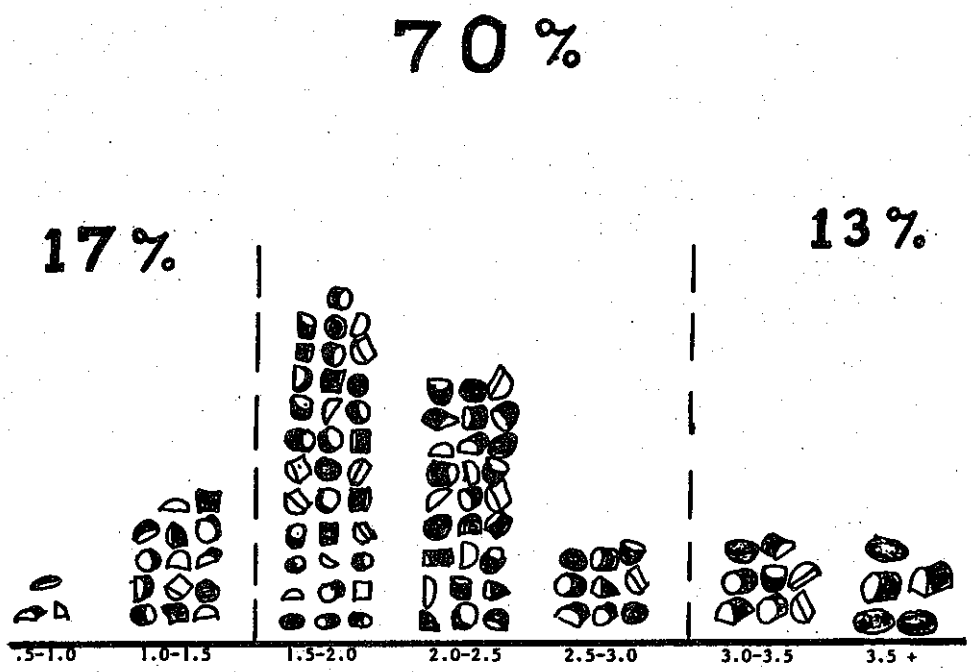


Figure 10. The new method includes sorting by seed size and from which part of the cutter it came through.

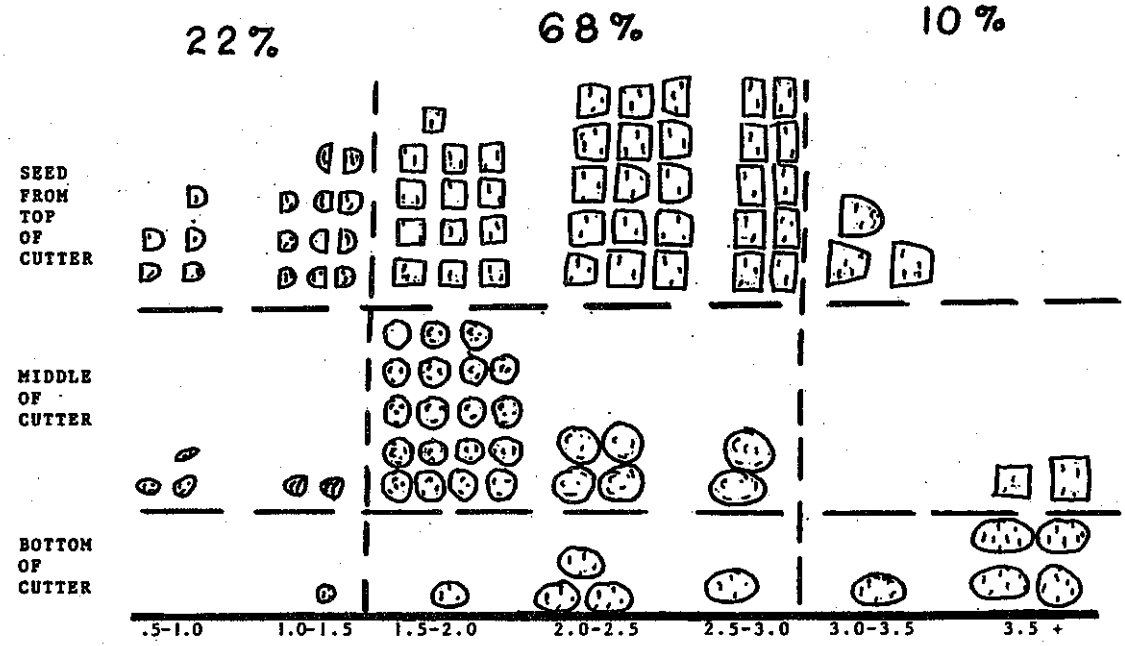

Figure 11. Cut and weigh end pieces from whole tubers beginning with 3/4" thick cuts.

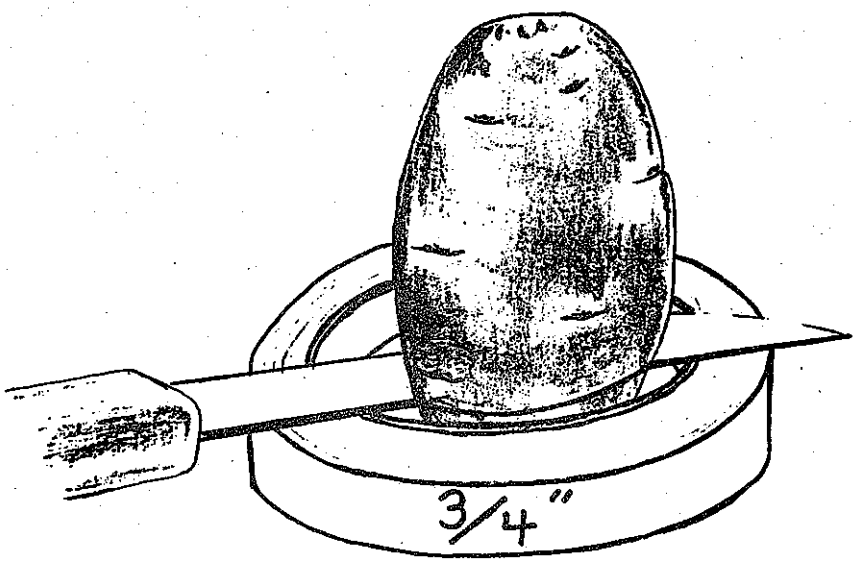


Figure 12.

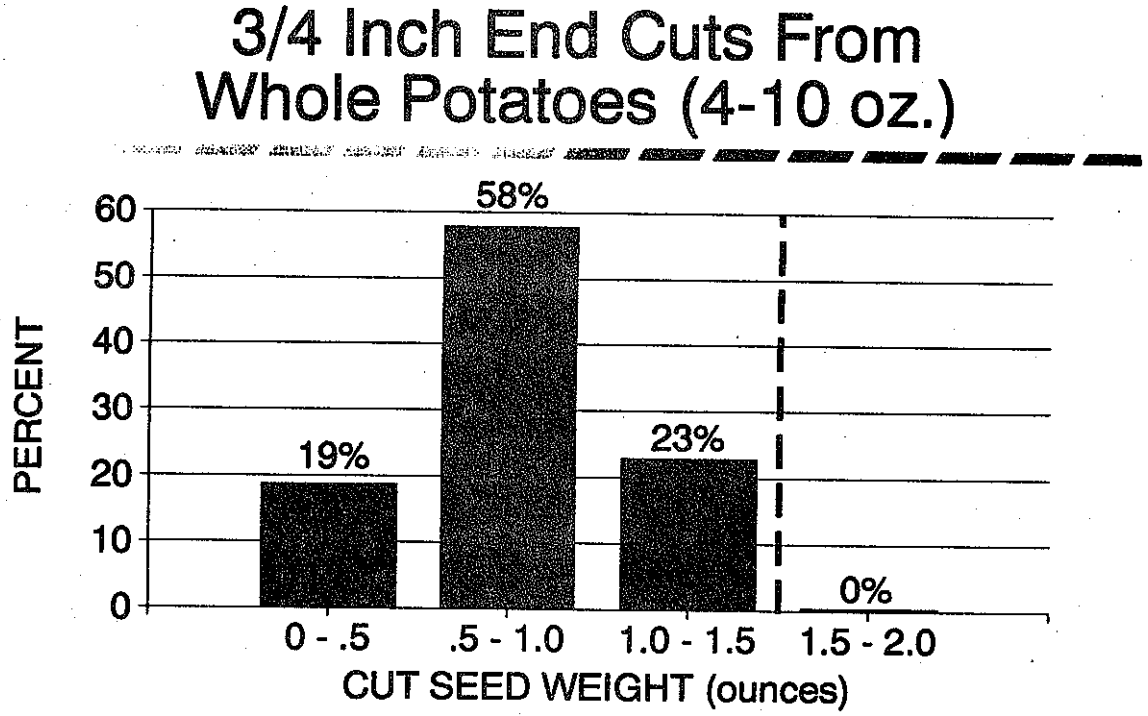

Figure 13.

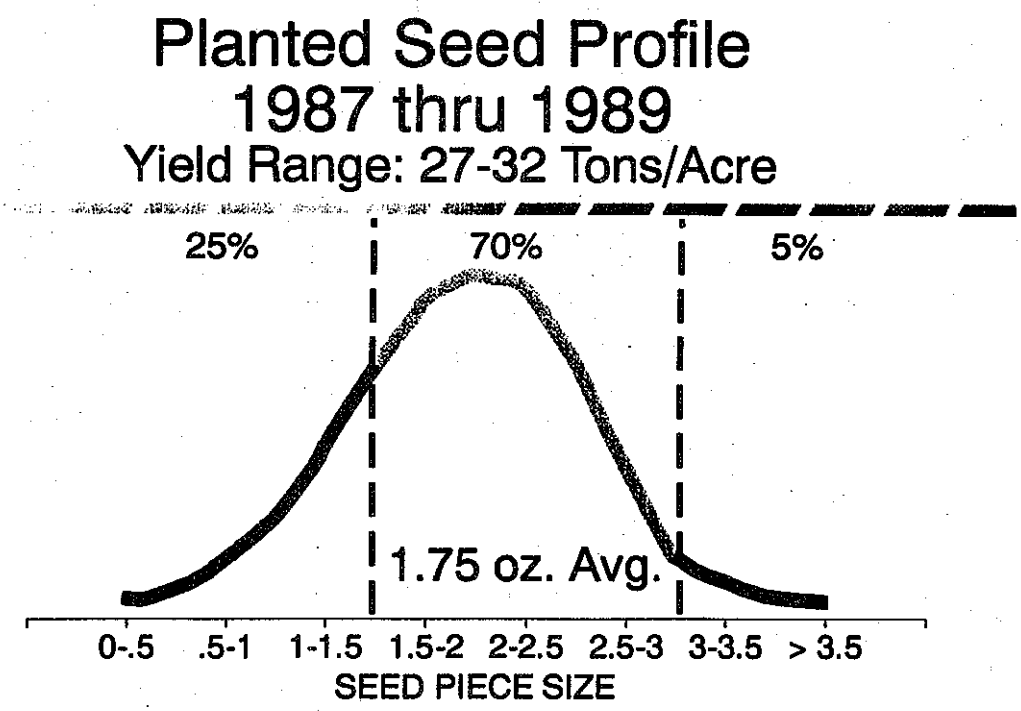


Figure 14.

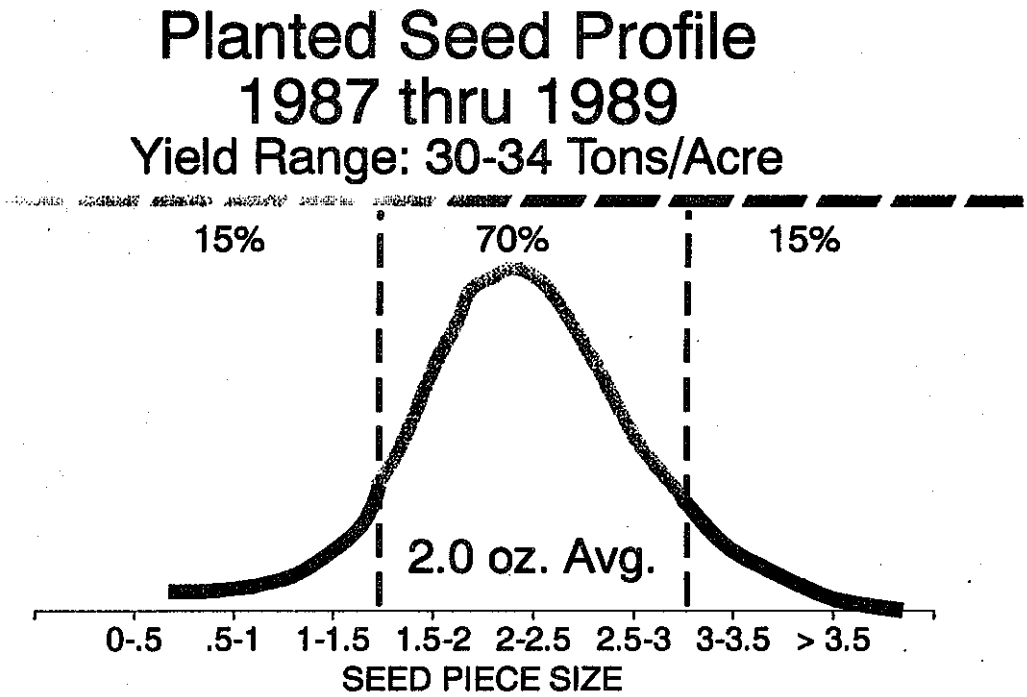

Figure 15.

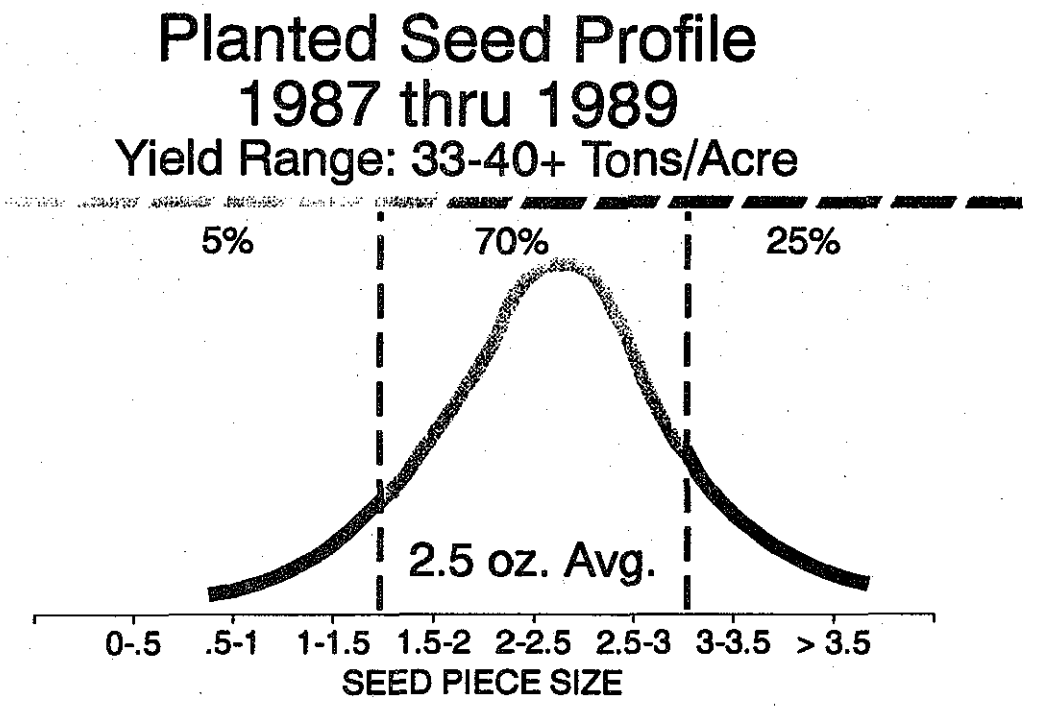


Figure 16.

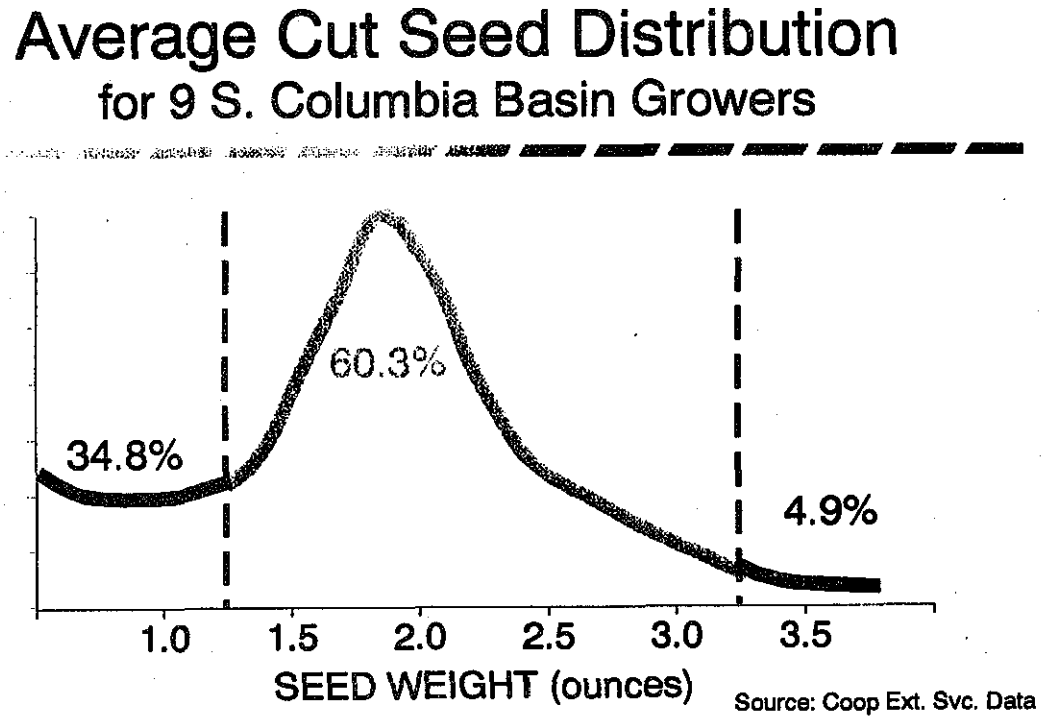

Figure 17.

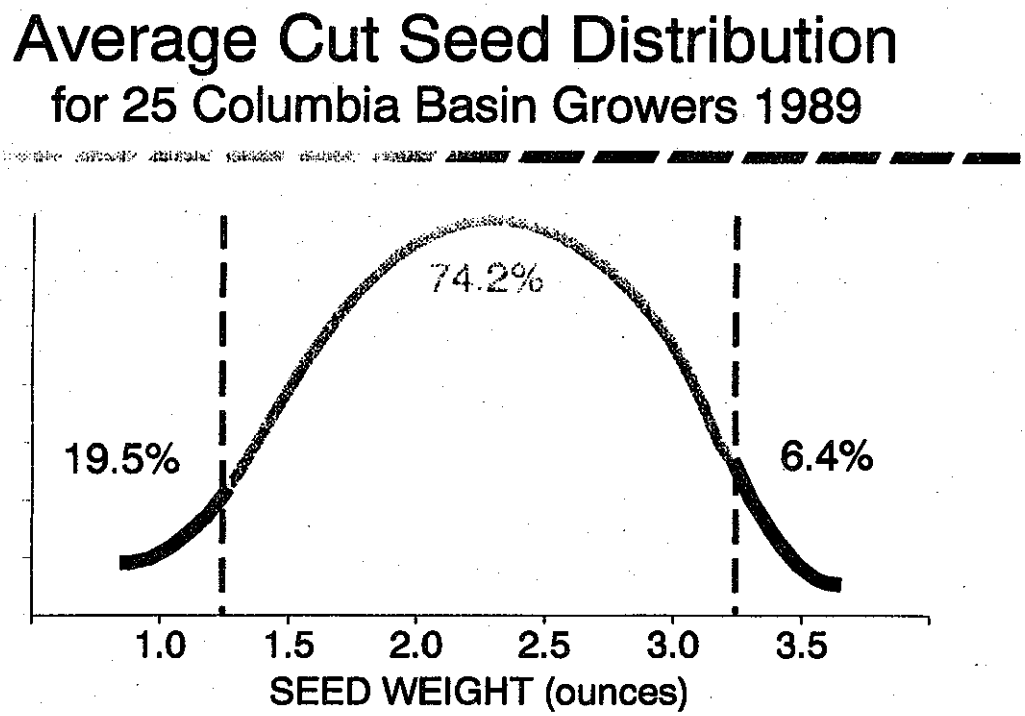


Figure 18.