



# Potato Seedpiece Size

## Key to Maximizing Yield and Profit

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A very basic factor governing potato yields and profits is the performance of seed as related to seedpiece size.

A survey conducted in 1970 revealed that most potato growers in Idaho are suffering potential yield losses averaging 50 to 60 cwt. per acre directly as a result of planting undersized seedpieces. Unfortunately, few growers really are aware of the kind of a seed cutting job they are doing.

### Seed Size Affects Yield

Both research and field observations have demonstrated that seedpiece size greatly influences the yield potential of that seedpiece. Within reasonable limits, the larger the seedpiece the greater its productivity, and thus its profit potential (Fig. 1). Spacing of seedpiece within the row also influences total yield potential. Size of seedpiece influences the spacing somewhat, since larger seedpieces produce stronger, more vigorous plants.

In addition, potato stand is partially dependent on size, as well as uniformity in size, of the seedpieces planted. Poor stands have been identified as one of the factors most limiting to potato yield in the State of Idaho.

Research at the Aberdeen Experiment Station also reveals that performance of various size seedpieces depends on level of soil fertility (Table 1) and on planting date (Table 2).

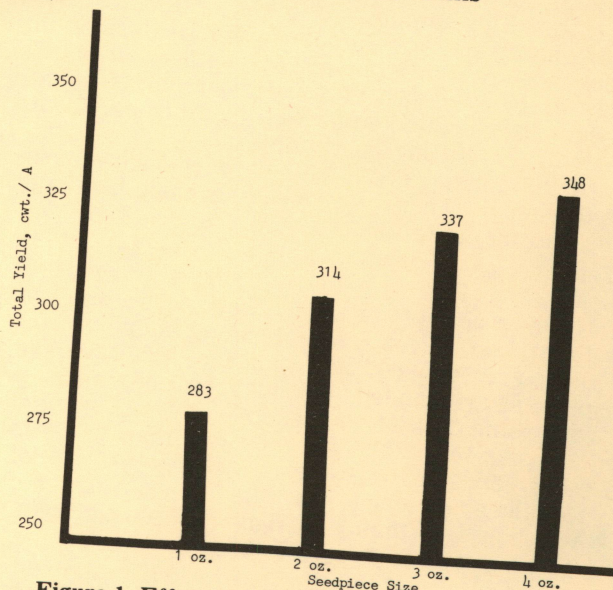


Figure 1. Effect of Seedpiece Size on Yield in Idaho

Table 1. Effect of Soil Fertility Level on Performance of Seedpieces

Fertility Level	Yield in cwt./A of seedpieces weighing			
	1 oz.	2 oz.	3 oz.	4 oz.
Low	290	313	340	341
High	348	384	394	407

Table 2. Effect of Planting Date on Performance of Seedpieces

Planting Date	Yield in cwt./A of seedpieces weighing			
	1 oz.	2 oz.	3 oz.	4 oz.
Early I - May 15	310	326	351	—
Late I - May 21	278	310	314	—
Early II - May 22	348	384	394	407
Late II - June 3	327	367	380	395

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Assuming other factors are not limiting yield, early planting date and adequate soil fertility levels are required to realize the maximum yield potential of larger seedpieces.

The same relationship between seed size and yield potential exists with uncut (single drop) seed as exists with cut seed.

As the results of field trials, the University of Idaho recommends planting seed weighing between 1½ - 2 oz. Results of demonstration trials conducted in the State of Washington has led to a similar recommendation for that area. In the Columbia Basin, yield level for seedpieces weighing less than 1½ oz. averaged only 66% and as low as 40% of that obtained with seedpieces weighing over 1½ oz. \*

## Results of 1970 Seedpiece Size Survey

What are potato growers in Idaho achieving concerning seedpiece size in their seed cutting operations?

To answer this question, a survey was conducted in 1970, involving 32 cutting operations. A 12 lb. sample of cut seed was collected off the end of the seed cutter. This sample was analyzed to determine average seedpiece size, proportion of seedpieces in various size categories, and percentage of uncut (single drop) seed. The size of seed tubers going into the cutter was noted as well as other pertinent aspects of the cutting operation (speed and volume of seed flow, crew, etc.). This survey made it possible to pinpoint where improvements could be made in the cutting operation.

The average unsorted seedpiece size for all 32 samples was 1.55 oz. However, on the average, slightly over 50% of the sorted seedpieces weighed less than 1½ oz. Even more alarming, some 22% of the seedpieces weighed less than 1 oz. The average seedpiece size of the best cutting operations was 2.04 oz. with some 26% of the seedpieces weighing less than 1½ oz.; only 8-10% weighed less than 1 oz. On the other hand, in the poorest cutting job, 77.7% of the seedpieces weighed less than 1½ oz. with over 40% weighing less than 1 oz. This lowered the average seedpiece size to only 1.17 oz.

How about hand cutting operations? Contrary to popular opinion, the survey failed to indicate any definite advantage in hand cutting as far as seedpiece size alone was concerned. Certainly there was far less wastage with hand cutting. For hand-cutting operations, the average seedpiece size was 1.51 oz., with slightly over 50% of the seedpieces weighing less than 1½ oz. There were fewer chips and slivers and a lower percentage of seedpieces weighing less than 1 oz. On the other hand, there was also a smaller percentage of single drops coming through the hand cutting operations.

Data from the 1970 survey point out a simple, effective way to minimize the proportion of seedpieces weighing less than 1½ oz. In 24 of the 32 cutting jobs surveyed, the average seedpiece size was less than 1¾ oz. In 20 of the 24, almost 60% of the seedpieces weighed less than 1½ oz. However, in cutting

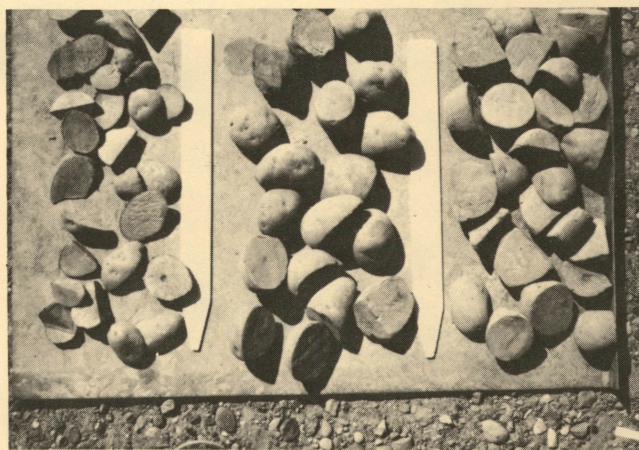
jobs producing an average seedpiece size of 1¾ oz. or larger, an average of only 34.4% of the seedpieces weighed less than 1½ oz. The average seedpiece size, then, must be increased in order to minimize the proportion of seedpieces weighing less than 1½ oz.

**Therefore, the University of Idaho is now recommending a minimum average seedpiece size of 1¾ oz.**

This may be best obtained by eliminating undersized seedpieces produced in the cutting operation. If the mechanical and seed cutter is readjusted to produce seedpieces averaging 1¾ oz., take care that oversized seedpieces are recut on the hand knives.

While undersized seedpieces have inferior yield potential, oversized seedpieces may create problems in the planting operation.

**Therefore, uniformity of seedpiece size is most important.**



Manage for uniformity in seedpiece size. Left hand lot of seed weighs less than 1/2 oz., middle lot weighs greater than 1-1/2 oz., and right hand lot ranges from 1/2 to 1-1/2 oz. in weight.

In most jobs, too many single drop size tubers and slab-type seedpieces were being cut, accounting for a large proportion of the seedpieces weighing less than 1½ oz. If a 3 oz. seed tuber or seedpiece is cut, invariably half the resulting seedpieces will weigh less than 1½ oz. since the tuber will seldom be cut exactly in half.

The length and adjustment of the single drop eliminator on the cutter is of prime importance. Dirt buildup on the rollers can prevent proper elimination. The survey demonstrated that where eliminator size seed tubers having a 6-8 oz. top are being cut, at least 15% of the seed coming through the cutter should be uncut.

Chips and slivers are always a matter of concern. Such seedpieces have a very low yield potential, and they can be primarily responsible for poor or spotty stands. Data from the survey indicate that growers on the average are losing at least \$20 per acre in potential returns because of chips and slivers. In some individual operations, as much as 10%-15% of the seed pieces were chips and slivers weighing less than ½ oz. Most machine cutters of recent vintage are equipped with chip eliminator

\*8th Annual Washington State Potato Conference Proceedings.

rollers that, if properly adjusted, can virtually eradicate the chip problem.

During the survey growers reported that any chips and slivers coming off the cutter would be eliminated in subsequent handling operations and that few, if any, would reach the planter. However, in one case a sample was collected off the end of the loading boom as the seed hoppers on the planter were being filled and 5.7% of the seedpieces were chips and slivers weighing less than ½ oz.

Many growers feel that seedpieces having only one cut surface will tend to produce a better stand because of less seedpiece decay and will have a higher yield potential than seedpieces having more than one cut surface. Evidence from the survey indicates that any such effect may be related as much to seedpiece size as to number of cut surfaces. Seedpieces weighing less than 1½ oz. are much more likely to have more than one cut surface but because of less weight they inherently have a lower yield potential.

Slab-type seedpieces are particularly misleading they appear large but seldom weigh enough to provide adequate food reserves to support optimum growth.

Uniformity of seedpiece size has assumed new importance recently with the advent of cup-type planters. Undersized seedpieces result in doubles and triples, oversized seedpieces fall off the cups producing skips.

The survey revealed that, on the average, some 40% of the seedpieces coming out of the cutters were in the extreme size categories. In 80% of the cases where small-top (6-8 oz.) seed was being cut, a significantly smaller percentage of the seedpieces were in the extreme size categories.

Manage for optimum uniformity of seedpiece sizes. Manage your seed cutting operation to decrease the percentage of seedpieces weighing less than 1½ oz. or over 3 oz.

## Seed Treating

In most cutting operations the seedpieces were treated with a fungicide to reduce potential losses due to seedpiece decay. With few exceptions the material was applied with a "gandy-type applicator", with or without an auger mixer underneath. Invariably, less than half of the seedpieces were adequately covered with the material. Usually, the grower was applying only half as much material per volume of seed as recommended. In general, a very high rate of application was required to obtain adequate coverage with a "gandy-type applicator". Rolling drum treaters gave far better coverage, with a lower rate of application, although cut edges on the seedpieces tended to be battered by the rolling action.

In conclusion, the results of the survey demonstrated that proper adjustment of the mechanical seed cutter and top-notch management are the keys to success in a seed cutting operation. Analyzing a sample of cut seed is essential in improving the quality of the operation. Every effort should be made to maximize the number of seedpieces weighing over 1½ oz. and to obtain an aver-

age seedpiece size of 1¾ oz. Be familiar with every point of adjustment on the mechanical seed cutter and learn how to put together the best set of adjustments for the particular lot of seed being cut. Use sized seed or seed having a relatively small top if possible — it will be much easier to do a good cutting job. Recognize the effect that even a single major adjustment can have (Figure 2).

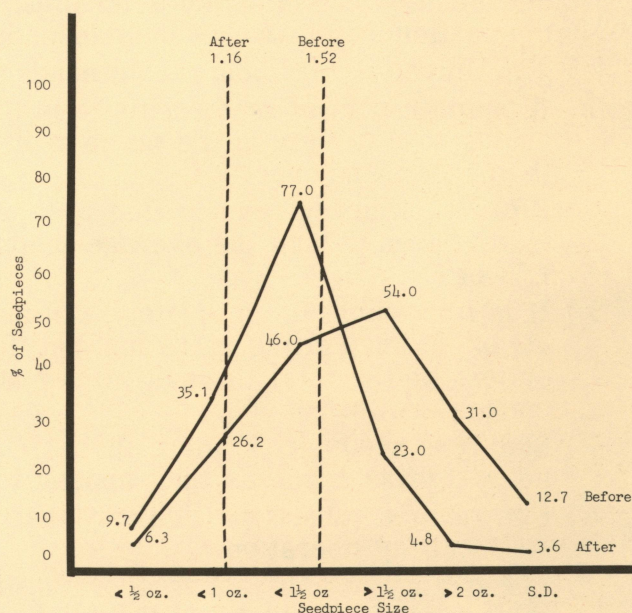


Figure 2. Effect on Quality of Cutting Before and After Installation of Middle Cutting Knife in Cutter

## Seed Cutting Tips

- a.) Keep the cutting discs sharp.
- b.) Slow down the rollers.
- c.) Slow down the rate of flow.
- d.) Learn how to get the most out of the chip eliminator and single drop eliminator.
- 3.) Watch the crew, especially those on the hand knives. Remember, a 3 oz. size seedpiece or tuber must be cut precisely in half to get two 1½ oz. seedpieces. It might be well to let more of those go through without cutting.
- f.) When installing the middle cutting blade, readjust the cutting disc assembly so only the largest seedpieces are cut again.
- g.) If seed tubers are not being cut clear through, move the cutting disc and positioning roller assemblies closer together.
- h.) Above all, get a bucket and hand scales to weigh out a 12 lb. sample — there should be no more than 109 seedpieces, indicating an average seedpiece size of at least 1¾ oz.

Number of seedpieces in 12 lb. sample	Average seedpiece size
96	2.00 oz.
109	1.75 oz.
128	1.50 oz.
154	1.25 oz.
192	1.00 oz.

Then sort the seedpieces into size categories and separate out the single drops. The results

will indicate what adjustments to make in machine and/or crew.

- i.) A good average rate of application for fungicidal seedpiece treatment is 1 lb. per 100 lbs. seed. If the bulk truck holds 350 cwt. of seed and the seed-treating material comes in 50 lb. bags, then 7 bags of seedpiece treatment should be used per truckload of seed.

## Summary

- 1.) Seedpiece size is a prime determinant of yield potential (stand, stems per acre, vigor) particularly if the seed comes under stress.
- 2.) The University of Idaho recommends a minimum average seedpiece size of 1¾ oz.
- 3.) A prime aspect of seedpiece size in the planting operation is uniformity of size — reducing to a minimum the number of cut seedpieces in extreme size categories (less than 1½ oz. and over 3 oz.).
- 4.) 1970 Vogt Survey reveals that 50% of seedpieces planted in 1970 weighed less than 1½ oz. even though the average seedpiece size over all 32 cutting jobs surveyed was 1.55 oz.
- 5.) It is impossible to completely eliminate production of seedpieces weighing less than 1½ oz. in any cutting operation, but the proportion of such seed can be reduced to 25% or less of the total through proper adjustment of equipment or supervision of hand cutting crews.
- 6.) Slab-type seedpieces (more than 1 cut surface) are misleading — they generally do not weigh as much as they appear to.
- 7.) Size of seed tubers, particularly the range in size, is important to the quality of any seed cutting operation.
- 8.) The quality of any cutting operation is also dependent on the ability of the operator to properly manipulate all the points of adjustment on the cutter individually and collectively. Of similar importance is the adeptness and conscientiousness of the crew on the cutter.
- 9.) Regardless of the spacing you use for planting, increasing seedpiece size from 1½ oz. average to a 1¾ oz. average will require about 3 more sacks of seed per acre.
- 10.) Be concerned about seedpiece treatment coverage. Complete coverage of the cut surfaces is vital to obtaining good results. A rolling drum-type treater seems superior to most “gandy-type applicators” or applicator-auger combinations.

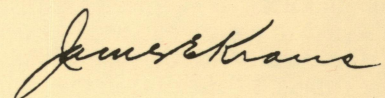
Financial Assistance — Extension Potato Programs funded in part by the Idaho Potato Commission.

Acknowledgements — Data included in Tables 1, 2, and 3 obtained from research conducted by Dr. James E. Kraus and Walter C. Sparks, presently Director, University of Idaho Cooperative Extension Service and Research Horticulturist, University of Idaho Aberdeen Branch Experiment Station, respectively.

Note: The term “gandy-type applicator” is a generic term used only descriptively and does not refer to any specific brand name applicator.

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PUBLISHED AND DISTRIBUTED IN FURTHERANCE OF THE ACTS OF MAY 8 AND JUNE 30, 1914,  
BY THE UNIVERSITY OF IDAHO COOPERATIVE EXTENSION SERVICE, JAMES E. KRAUS,  
DIRECTOR, AND THE U. S. DEPARTMENT OF AGRICULTURE, COOPERATING.



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