SOME OTHER FACTORS IN OBTAINING GOOD PLANT STANDS

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In the 1982 Washington State Potato Conference Proceedings Dr. Tom Schotzko presented a discussion of the value of having potato seed of the appropriate size and drew some conclusions as to what could be invested by the industry to achieve the changes that would be required to obtain the desired seed piece size. Here we present another way of looking at the value of the correct seed piece size, the value of the discarded small seed pieces, and what the return to the producer would be if the undesirable size seed was not planted.

Figure 1 shows the response in return per acre of various seed piece sizes. From this figure it is obvious that there is a range of seed size that is the most desirable. The seed pieces that are most desirable are between 1 oz. and 2 - 5 oz. in size (Fig. 2) or another way to state this is that this is the zone of highest return (Fig. 3). The most desirable seed size distribution to plant would be one that had all seed pieces within the "highest return zone."

Unfortunately there are very few if any seed lots being planted that have been observed to be entirely within the desired zone. Three seed size distributions that were measured during a recent planting season are shown in Figure 4. Note that Distribution A and Distribution B both average 1.8 oz. size seed pieces and would from the point of average size be identified as being the same. However, where the distribution of size is considered they are distinctly different. What would be the value of changing any one of these distributions in seed size so that all the seed pieces fell within the "highest return seed size zone?" If we look at what would be required to change seed Distribution A so that all seed pieces planted would fall within the high return zone by discarding the undersize seed (that less than 1.0 oz. in size) and cutting the seed pieces over 3 oz. in size the change is as shown in Fig. 5. The material discarded, its costs, and its value are shown in Table 1.

Table 1.

COST AND VALUE OF CHANGING SEED SIZE DISTRIBUTION A

SEED DISCARDED = 25 LBS. (1/4 CWT)
VALUE OF DISCARDED SEED @ $9 / CWT = $2.25
INCREASED RETURN / A = $43.75*
RETURN / DOLLARS WORTH OF SEED DISCARDED = $19.44
RETURN / CWT OF SEED PLANTED @ 20 CWT SEED / A - $2.19

*For details of the method of establishing the values see 1982 Washington Potato Conference Proceedings p. 51.

The value of the 25 pounds of seed that would be discarded if seed cwt and treated ready for planting is $9/cwt is $2.25. The value of having those seed pieces that are under 1

This Presentation is part of the Proceedings of the 1983 Washington Potato Conference and Trade Fair

ounce in size replaced by a seed piece that is over that size has been determined to be $43.75, or for each one dollar worth of seed that is removed (discarded) there is an increase in value of $19.44. If 20 cwt of seed are being planted per acre then the value of each cwt of seed that does not contain seed pieces of less than 1 ounce in size is $2.19 greater than if they contained seed of the size shown in Distribution A. In other words a grower has $2.19 more that he can spend to purchase seed that has all seed pieces within the high profit zone as compared to seed represented by that in Distribution A.

If the distribution of seed that is being used is like that shown in Distribution B then the change to the high return zone is shown in Fig. 6 and the details of cost and value are shown in Table 2.

Similar information for the change required for seed Distribution C is given in Figure 7 and Table 3.

Table 2.

COST AND VALUE OF CHANGING SEED SIZE DISTRIBUTION B

SEED DISCARDED = 75 LBS. (3/4 CWT)
VALUE OF DISCARDED SEED @ $9 / CWT = $6.25
INCREASED RETURN / A = $39.25
RETURN PER DOLLARS WORTH OF SEED DISCARDED = $5.81
RETURN / CWT OF SEED PLANTED @ 20 CWT / A = $1.97

Table 3.

COST AND VALUE OF CHANGING SEED SIZE DISTRIBUTION C

SEED DISCARDED = 125 LBS. (1/4 CWT)
VALUE OF DISCARDED SEED @ $9 / CWT = $11.25
INCREASED RETURN / A = $46.75
RETURN PER DOLLARS WORTH OF SEED DISCARDED = $4.15
RETURN / CWT OF SEED PLANTED @ 20 CWT / A = $2.34

With anyone of the three distributions discussed it would be worth approximately $2.00 per cwt of seed to be able to change the seed that is within the high return zone, or another way to look at it is that seed size distribution other than those that are in the highest return zone cost growers $2.00 for each sack of seed planted. The Washington State Potato Commission annually reports the amount of seed received by growers in Washington. In 1982 it was over 2,000 CWT. If all this seed were planted as seed pieces within the high return zone there would be a substantial increase in return to potato growers in Washington assuming that Distribution A, B, & C represent the seed that is now being planted.

The annual potato planting job that is asked of the mechanical planter is no doubt a difficult one. The difficulty begins when we take potato seed tubers that are not uniform in size or shape and send them through mechanical cutters that to say the least are not designed to accommodate the variability that they are asked to cope with. This results in seed pieces that vary in size and shape. The "normal" seed size distribution of a seed lot that is on the average

between 1.5 and 2.0 ounce (the seed size generally recommended for use) usually will vary from less than 1/2 ounce to over 3 ounces and the proportion of the seed pieces in any given size category will run from equal amounts in every size to high amounts of a few sizes but in all cases there will be a lack of uniformity. This variable mass is then placed in a mechanical planter (either pick or cup) and that machine is asked to place the seed uniformally throughout the field, and this just doesn't happen.

Although there are various adjustment and management alternatives the machines are simply incapable of uniformally distributing the extremely non-uniform seed piece size that it is provided. The results can be observed in various ways. The simplest is to wait until after the plants emerge and then count the plant population in a given distance of row and get an average plant spacing. This can be as misleading as determining only average seed piece size. All that is known is how many plants there are in an area and nothing is known about the actual distribution of the seed pieces. Another but more difficult way of determining seed pieces is to uncover the row following planting, find each seed piece and measure the placement. This is time consuming and hard work but it does give the kind of information that is needed if the performance of the planter is to be known and modified if not satisfactory.

Another way to get an estimate of what a planter is doing is to wait until the plants have emerged and dig in the areas in the rows where plants are absent, i.e. determine if seed pieces were placed there or if other factors are responsible for plant absence. In one such study recently in Washington it was determined that 96% of the missing plants in Russet Burbank fields and 86% in Norgold fields were missing because no seed piece was placed where the plant was desired. This method of analysis of planter performance does not determine if the seed pieces intended for those spaces was placed somewhere else; i.e. as a double.

If planters are not placing seed pieces where they are desired what are the factors that a grower can change? As indicated in the preceeding paragraph the uniformity and size of the seed should be evaluated but in addition to that there are several factors that influence seed placement. These factors are somewhat different depending on whether the planter is a pick or cup type planter. However, both types of planters are effected by the forward speed or planting rate that is being used. There is no one correct forward speed at which to plant. The proper speed must be determined for each operation with each seed lot and each planter setting. However, in general speeds in excess of 4 MPH are questionable. One reason for questioning these high rates of speed is that even in the planter mechanism is designed and adjusted so that the seed is brought into the planter shoe at the proper spacing the force imparted to the seed piece as it falls free of the planter into the opening shoe is so great that the seed rolls excessively before it comes to rest or is covered by the covering disks. This excessive movement will result in poor seed spacing.

With pick planters there are two additional operator controlled parameters for affecting seed placment. The most obvious is pick size and arrangement. Each pick arm has the option of several pick placements. The proper arrangement depends on: 1) seed piece size, 2) seed piece shape, 3) pick length(s), and 4) number of picks used. As with planter speed, there is no one pick arrangement and size that works for all seed sizes and shapes. Each operator must determine this for his specific operation. Further, it would be a good idea if each producer knew what the seed lot he was planting was like, i.e. size distribution and average size so that he could determine a pick arrangement and length for various seed lots. Although this may seem like a lot of trouble the research results available indicate this is a good way to increase net profit with only a minimum of investment of time and capital.

The level of filling of the picker bowls is also a factor that influences how well the planter places the seed pieces in the row. If the bowl is not filled full enough the picks cannot pick up the seed pieces and many skips will occur. If the picker bowl is filled too full the picker arms will flip excess seed over into the drop tubes and numerous doubles will result. The best bowl filling height is again different for each situation but a medium bowl is appropriate for more situations than any other level. Factors which cause uneven bowl filling, i.e. over fill part of the time and under fill part are just as costly.

Cup planter performance is effected by several adjustments: 1) cup size, 2) overall cup chain tension, 3) shaker idler tension, 4) type of shaker idler i.e., sprocket or spool type, and 5) bowl fill level. As with forward speed and pick planter adjustments there is no one set of conditions that are right for all cup planters under all conditions. As was suggested for picker planter operation each operator should define the conditions of cup size, chain tension, idler shaker type and tension and bowl fill for the seed he has to plant. This means that in order to prevent "experimenting" with each change in seed lot the size of seed (average size) and distribution should be identified and the best planter "set up" for that type of seed lot recorded so the next time seed of a similar type is to be planted, the needed planter adjustments are better identified.

Figure 1. Effect of Seed Piece Size on Returns.

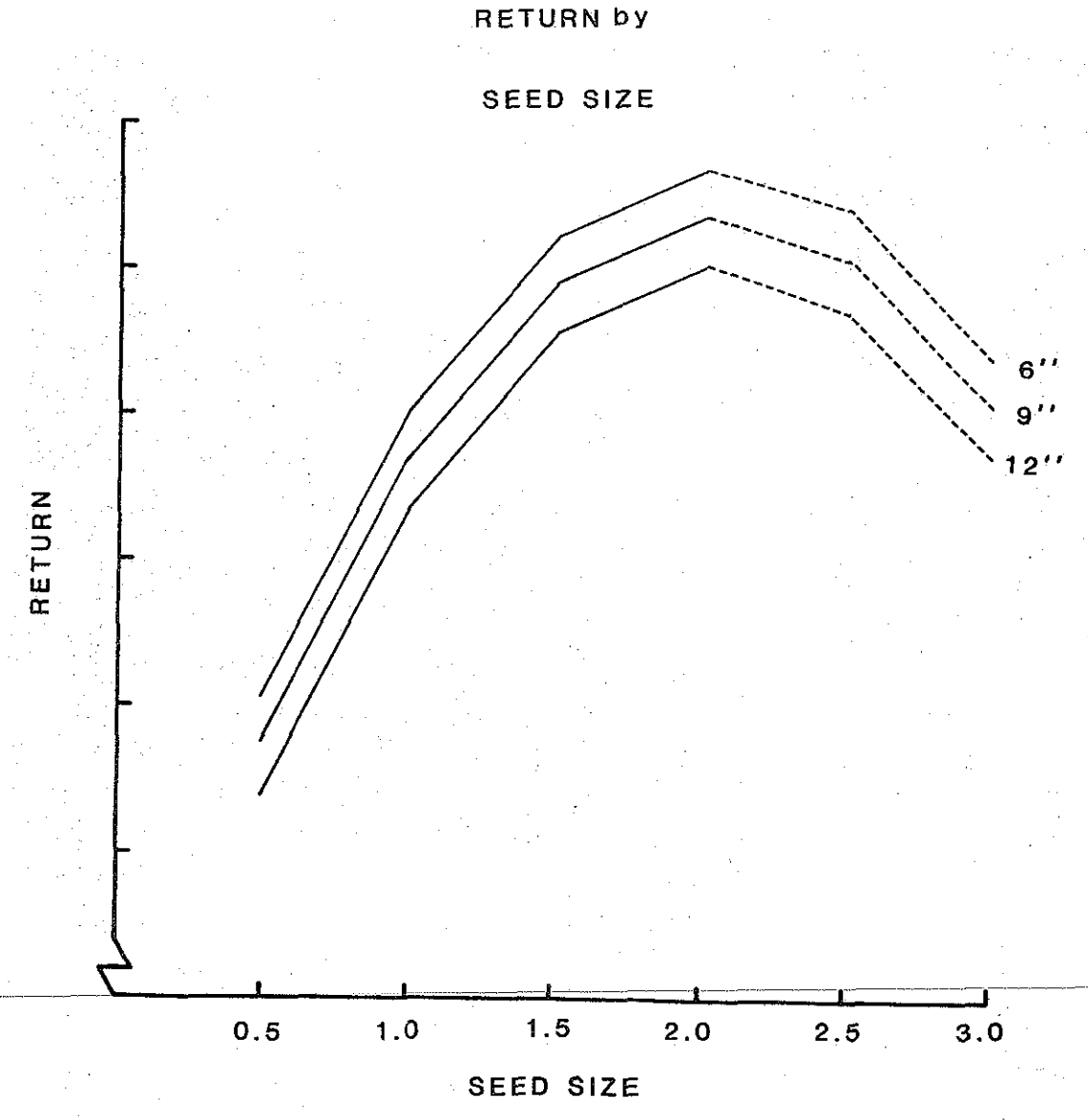

Figure 2. Area of Highest Return from Seed Size Effect.

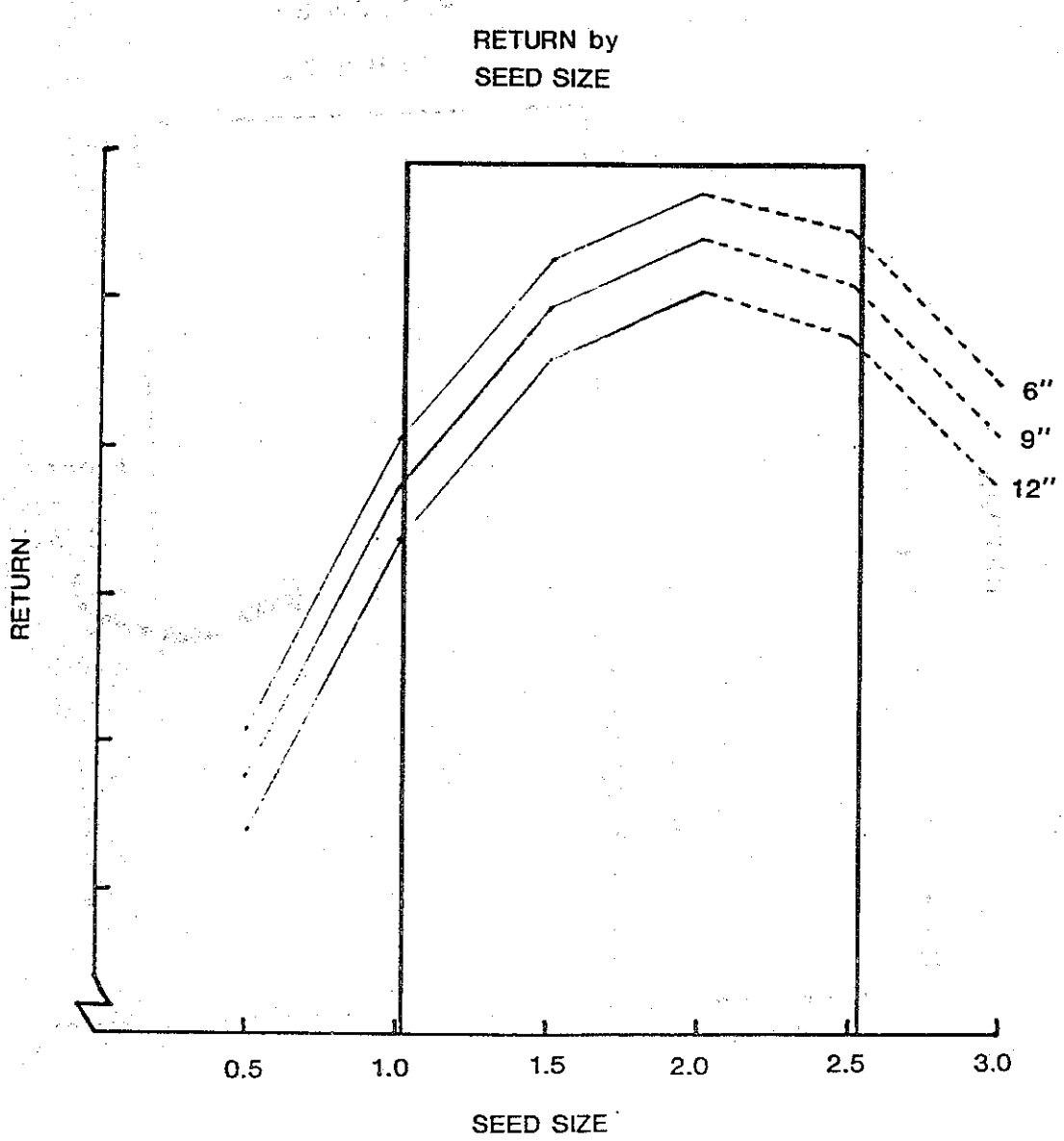

Figure 3. Highest Return Zone.

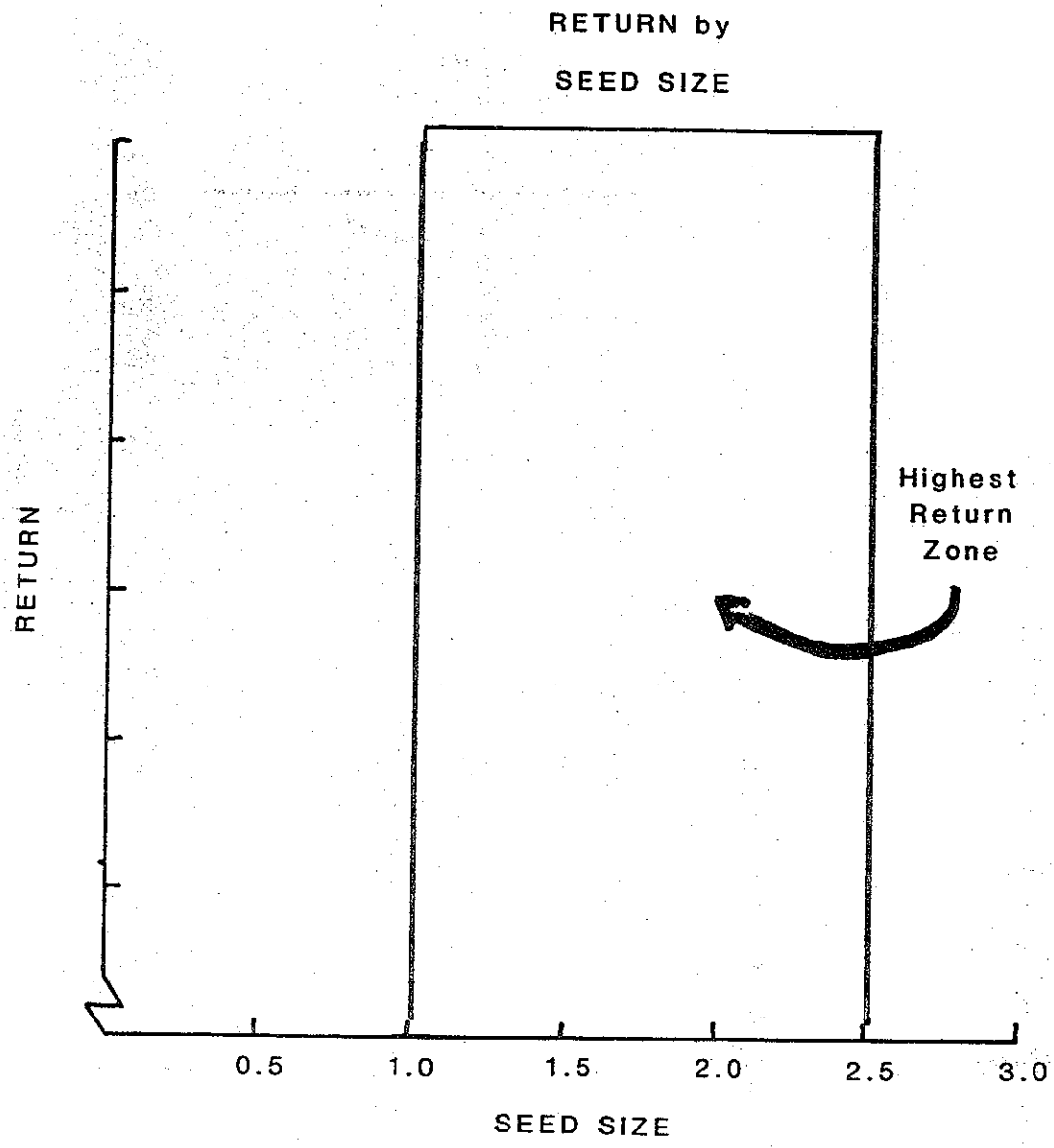

Figure 4. Three Seed Size Distributions Found During Recent Survey.

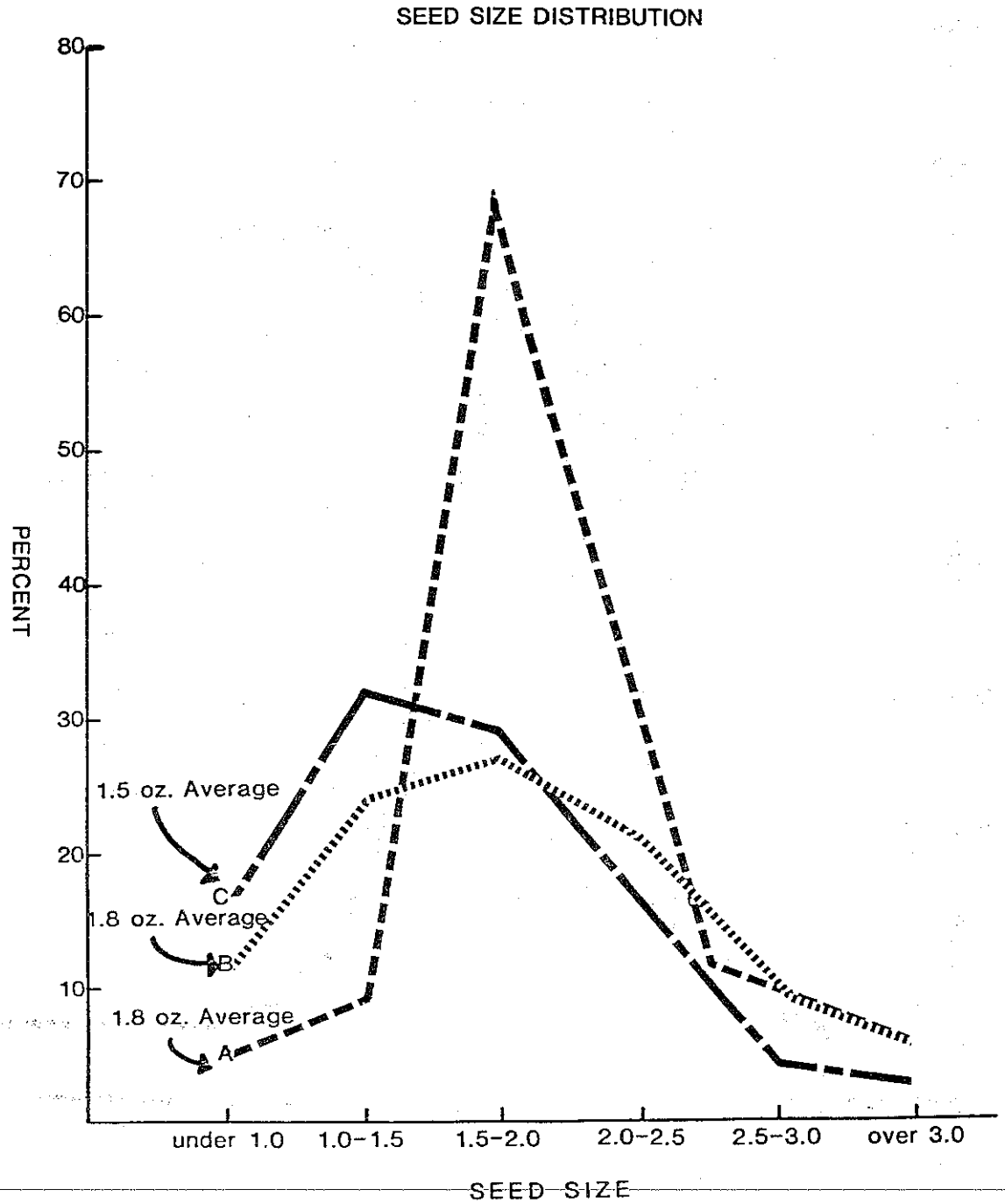

Figure 5. Seed Size Distribution A versus High Return Zone.

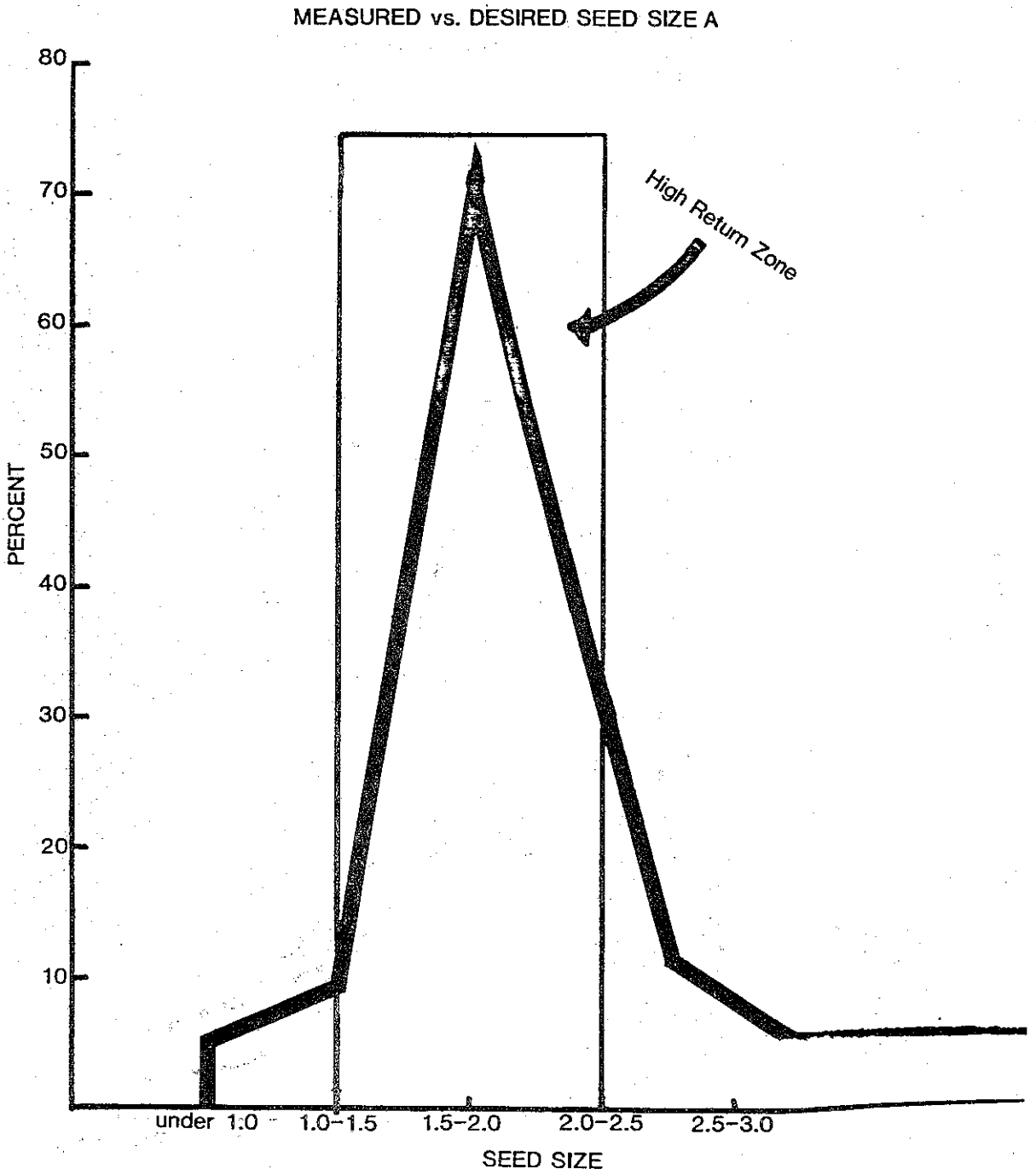

Figure 6. Seed Size Distribution B vs. High Return Zone.

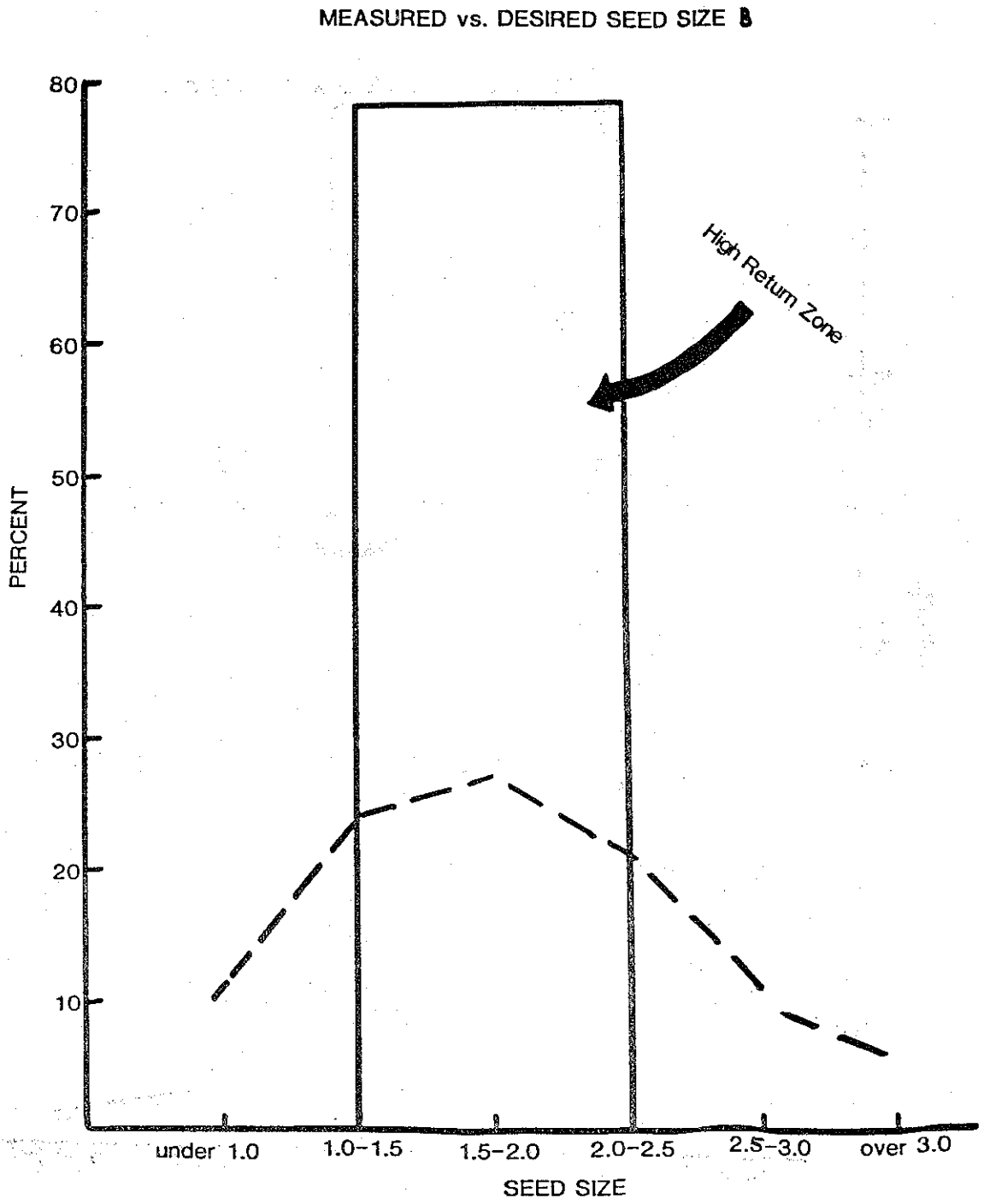

Figure 7. Seed Size Distribution C vs. High Return Zone.