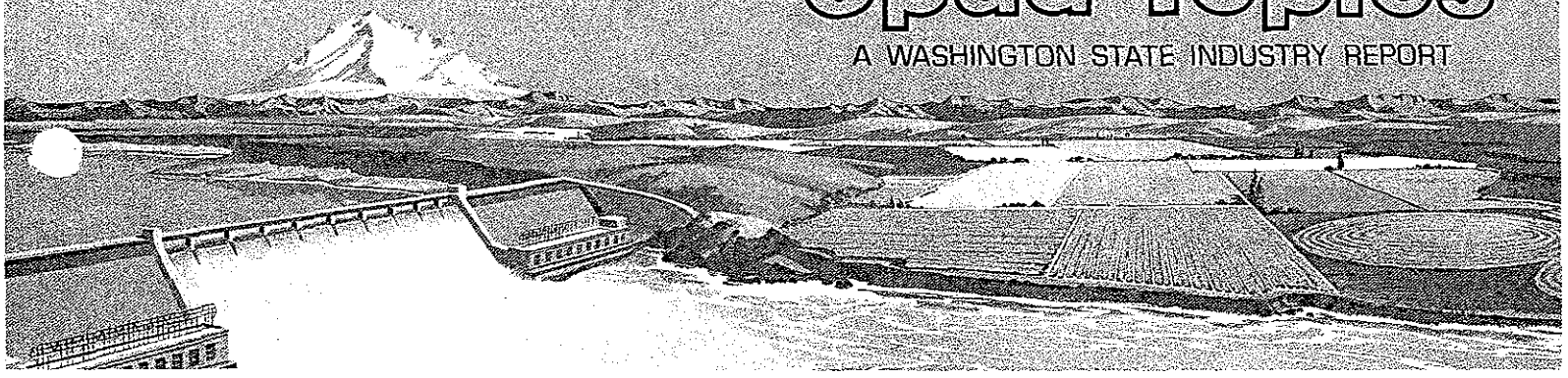
POTATO COUNTRY, U.S.A.

Spud Topics

A WASHINGTON STATE INDUSTRY REPORT



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Potato Planting For Precise Seed Spacing *

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There is no disagreement in the potato industry about the value of good seed potatoes, properly cut and precisely planted. Not everyone, however, is in agreement about what constitutes "good" seed or what it is that makes one cut seed profile more desirable than another. There are many opinions for that matter on how to achieve an improved job of planting. It is nonetheless well documented that each of these aspects is closely interrelated and inherently dependent on one another. Without good seed, you fight an uphill battle from the very start. The situation becomes even more complicated if the seed is poorly cut, since there is little chance the planter would be able to do an acceptable job.

Good seed means many things to different people. Genetics that favor vigor and productivity are certainly important. Disease free seed is now almost universally considered essential. Seed that is physiologically young and that has been handled gently and stored carefully is also very important. Another recently recognized factor is seed tuber size. Smaller tubers planted as uncut or single drop units are rapidly gaining popularity in the Northwest. "IF" properly selected and handled, they offer the highest yield and grade potential of all the seed types. Also seed tuber and seed piece bruise is just beginning to be recognized for the magnitude of it's importance. Problems with bruise are more severe both before and after cutting with the larger seed tuber sizes. The consequences of mishandled seed appear to be truly staggering.

As seed tuber size increases we also get progressively more cut surfaces and greater cut surface area per seed piece. Not only is this condition going to make a grower's job more difficult, it is going to significantly reduce his profits, all other things being equal. The trend in whole seed potato size has been consistently moving toward smaller tubers during the last five years in the Columbia Basin of Washington and other adjacent potato producing regions.

The size and shape of the seed that is put in a potato planter, regardless of whether it is a pick or cup style machine, has a major influence on the seed spacing accuracy that can be achieved. Smaller seed pieces, especially those below 1-1/2 ounce, contribute significantly to the number of doubles and triples being planted. Generally about 50% of this small (undersize) seed will go into the soil with another seed piece, i.e., a double. Seed pieces that weigh more than 3 ounces typically cause problems in the form of skips. Because of their size and weight they are more prone to fall off the picks or out of the cups prematurely.

* To be put in the Seed section of the Washington Potato Growers Handbook.

Sometimes a large seed piece will fail to plant several times causing multiple skips from that one seed piece. Plant populations can be significantly reduced when too much big seed over 3 ounces goes into the planter.

The work we have done in the Northwest on a wide variety of planter makes and models has shown that they all require a minimum of 70% of the seed, cut or as single drops to be in the 1-1/2 to 3 ounce range. Planter performance very quickly deteriorates with seed lots below 70% in this desirable seed size range. When cut seed lots contain 70% or more of these acceptably sized seed pieces, the planter performance is greatly enhanced and is considerably easier to maintain at a high level of accuracy.

Hopefully you won't have to work with whole seed tubers bigger than 10 ounces. With seed from the acceptable larger seed size range (7-10 oz.) we expect to get cut seed with surfaces that are at right angles to one another. This occurs because the upper level of seed cutting machines where the larger potatoes are cut have both vertical and horizontal knives cutting the tubers. When the count of seed pieces of this type exceeds 50% in a cut seed profile, planter performance deteriorates significantly and progressively as this count increases.

When we have done all that is reasonably practical to select the best seed possible and cut it as correctly as it can be done, we still have a formidable challenge in getting it planted properly. There are a considerable number of adjustments that one can make to the setup and operation of a planter that can each have an important impact on how uniformly the seed is spaced in the row when planted. Any one of these factors can seriously effect the performance of the planter. This will occur in spite of all the efforts made to ensure that each of the other factors is precisely correct.

I am going to discuss the influence of one variable, planter ground speed, to illustrate this point. It must be recognized that ALL of the other major variables and a considerable number of minor adjustments have already been corrected to their optimum condition before we begin and as already stated any one of them can have an equally dramatic effect on planter performance.

We begin with a ground speed of 4.14 MPH, which is what the grower had selected prior to our arrival. The result of the evaluation as shown in Figure 1 was a 25% acceptably spaced (plus or minus two inches) planting job. The grower in this case had selected a 10 inch seed interval. Therefore any seed interval between eight and twelve inches is considered "acceptable". While this level of performance leaves a lot to be desired, it is not at all unusual in the industry. Our first change was to slow the ground speed to about 4 MPH. At a measured 3.97 MPH we found no significant change in performance as Figure 2 shows. The number of large skips, some up to 42 inches in length, did in this case reduce the seed rate and plant population. When we slowed the planter to 3.66 MPH we again saw no significant change in performance, Figure 3. Note the height of the columns for each seed spacing interval here. They are all nearly equal suggesting a "random" distribution. WE HAVE FOUND IN FACT THAT THERE IS NO PLANTER CURRENTLY MADE OR AVAILABLE IN THE NORTHWEST THAT WILL CONSISTENTLY DO BETTER THAN A RANDOM SCATTERING OF SEED AT GROUND SPEEDS ABOVE 3.5 MILES PER HOUR. We also know that ground speed has almost no effect on the seed rate per acre since planter mechanisms work very well when operated at rates up to the equivalent of 5 MPH ground speed. It is seed piece roll after it hits the ground that we are actually working with. To be successful we must find a speed where the seed that wants to roll the most (rounder shapes and larger sizes) behaves very much like seed that wants to roll the least (flat shapes and smaller sizes).

The important factors are seed size, shape and momentum (roll). The next reduction in speed was to 3.09 MPH, Figure 4. At speeds somewhere below 3.5 MPH we normally begin to see a bell shaped seed spacing distribution, appearing with the growers desired spacing being at or near the top of the bell curve. We also will generally get something just above 50% of our seed piece intervals in the acceptable, plus or minus two inch, range. Figure 5 shows continued improvement with a reduction in speed to 2.86 MPH. Slowing to 2.55 MPH, Figure 6, showed a noticeable reduction in widely spaced seed intervals (skips) and more acceptable seed spacing intervals. By slowing down another one tenth of a mile per hour to 2.45 MPH we got a big improvement, Figure 7. Again this is the normal result rather than an exception. All planters, in my experience, are this sensitive to ground speed in terms of seed spacing uniformity. One tenth of a mile per hour on either side of the optimum planter speed will have a major negative effect on performance. With this seed lot, which was a round red variety, this was the best we were able to achieve. Long varieties are always easier to cut into blocky seed piece shapes than round varieties and for that reason are generally easier to plant with a high degree of precision. With long varieties I would not normally be satisfied with a performance level in the low 80 percent range. We can and usually do get better results.

If you slow the planter any further, the percentage of correctly spaced seed drops dramatically. Figure 8 shows that slowing ground speed another .09 MPH caused a drop from 82% to 49% acceptably spaced seed. This clearly demonstrates that planters can be run too slow as well as too fast for best results. Again, all planters exhibited this response. The problems in this case were mostly due to extra seed being planted. I cannot overemphasis the critical importance of determining and maintaining the optimum ground speed for a given planter and seed profile. This optimum speed will very likely change with another seed lot or variety. Furthermore, no two planters typically have exactly the same adjustments for optimum performance. The results shown here apply ONLY to the planter we examined and 2.45 MPH may or may not be even close to the correct speed for your machine. Chances are good in fact that this is NOT your optimum speed. Only by conducting an in-field evaluation and adjustment series can one identify the best combination of adjustments for your individual planter(s).

The benefits of planting precise seed intervals vs. "seed scattering" are: 1) yield increases averaging 5%, 2) increased plant populations averaging 7% and, 3) improved quality averaging a 20% increase in U.S. No. 1's. The economic advantages of this approach are: no significant increases in the costs of production and any increased returns are largely grower profit.

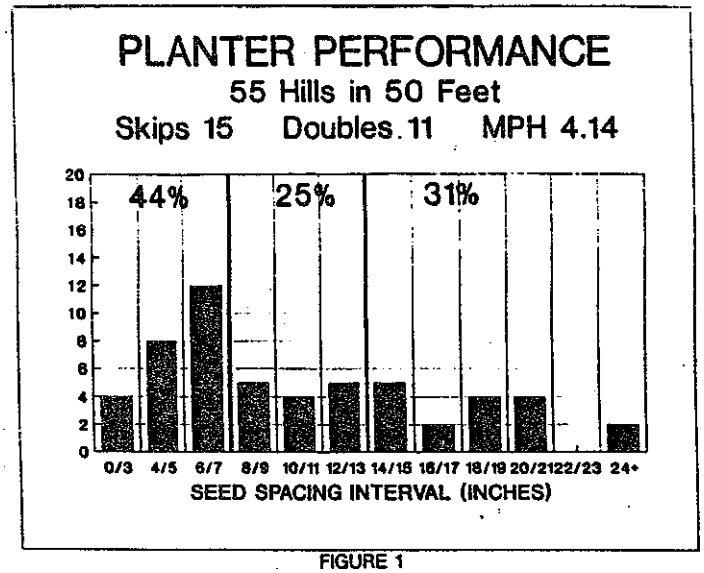

FIGURE 1

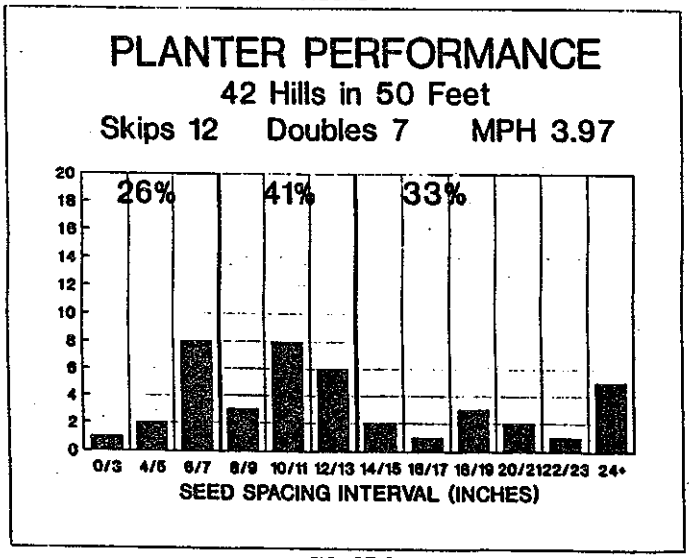

FIGURE 2

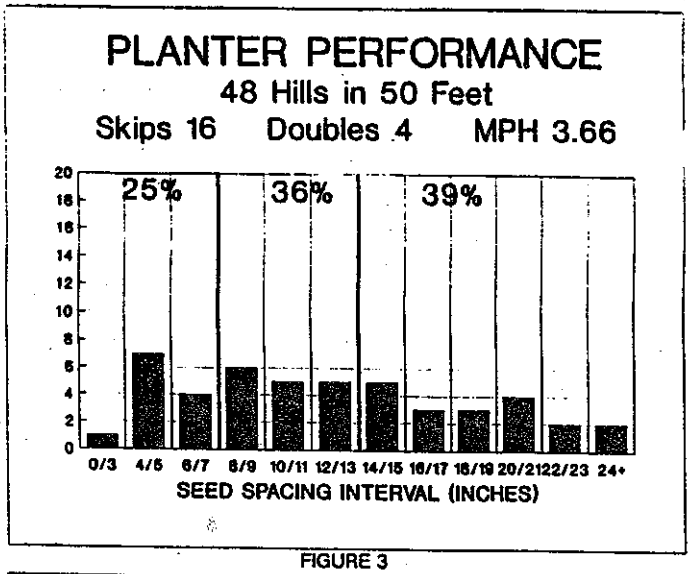

FIGURE 3

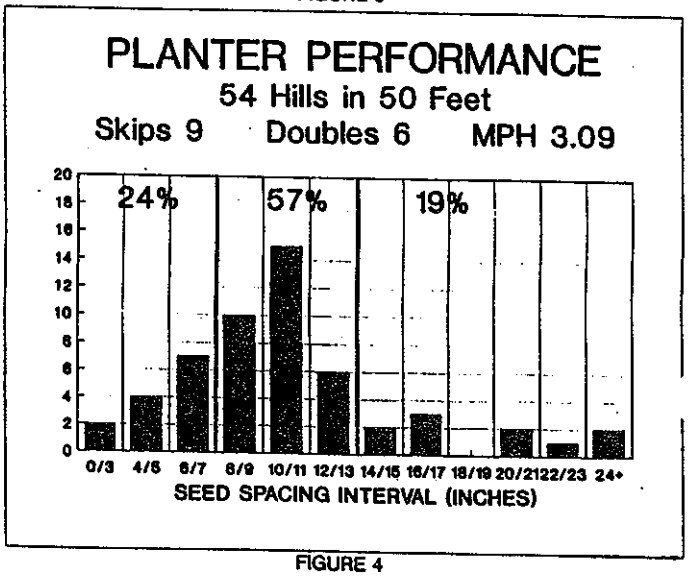

FIGURE 4

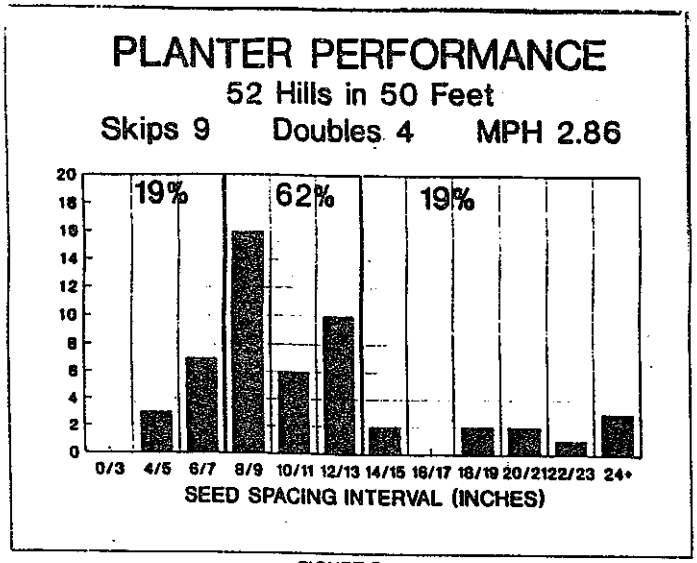

FIGURE 5

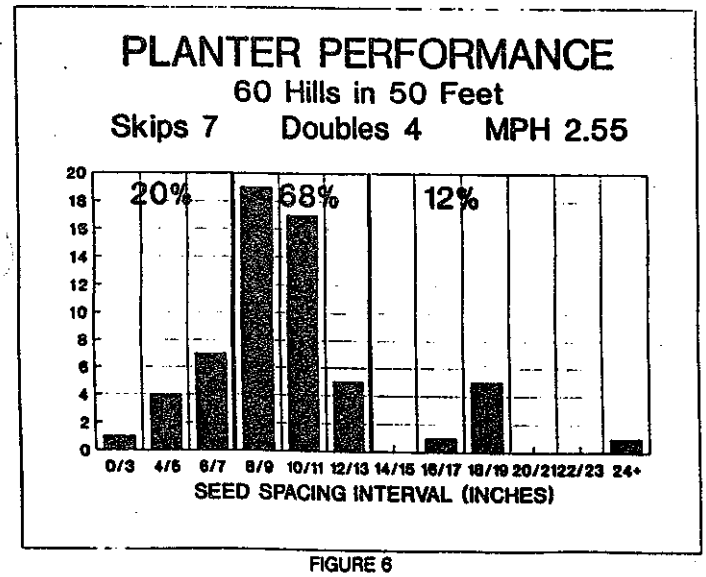

FIGURE 6

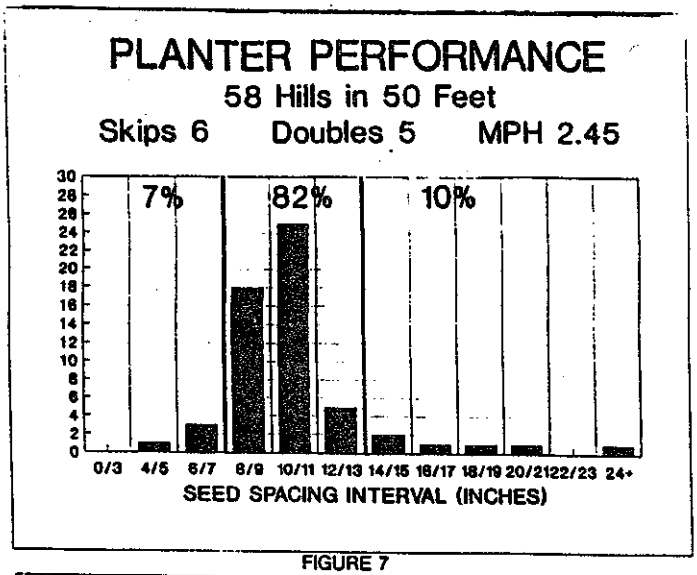

FIGURE 7

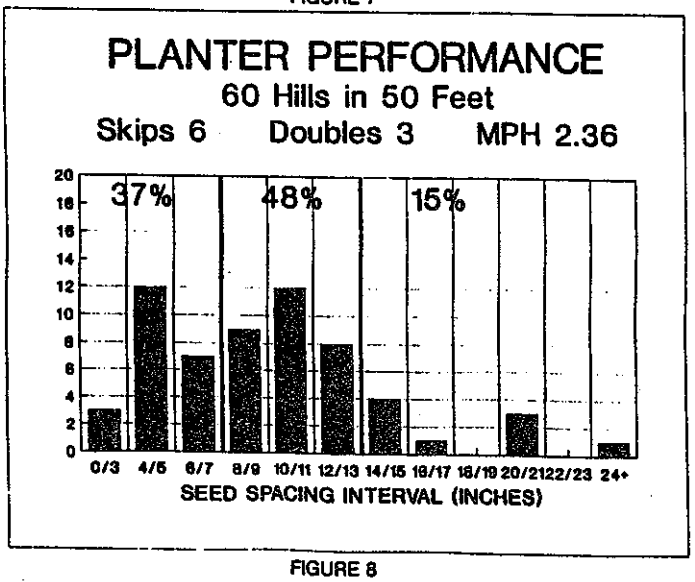

FIGURE 8