FACTORS AFFECTING BEHAVIOR AND PRODUCTIVITY OF RUSSET BURBANK SEED

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The primary consideration of my talk today is for you to understand a little better some of the factors which can affect the subsequent growth and behavior of a potato plant before the seed tuber is even planted. What I am talking about is, how potato seed tubers are handled during the growing and harvesting process, how it is handled during storage and when it is replanted is going to affect how it behaves or its productivity.

As I look into the future of the potato seed industry, I foresee that the seed growers are going to be asked, or forced to, due to competition, conduct more services for the seed buyer in regard to care in growing, harvesting and storage of seed. On the other hand, the seed growers should be compensated for the extra services which they perform in keeping seed at a high productive level.

Have you ever wondered why on some seed pieces you get only one or two stems while on other seed pieces of the same size, up to 8-10 stems are obtained. If you have not wondered about these things you are not a very observative grower.

The data which I am going to present today was obtained at the University of Idaho Aberdeen Branch Experiment Station where I worked on seed productivity the past three years prior to coming to Pullman. The information may or may not be applicable to Columbia Basin growing conditions. You make up your own minds about this. The important thing is, as I mentioned before, that you become aware of the fact that many things can affect seed tuber behavior before it is planted.

I have compared in the greenhouse and field 22 different lots of certified seed from all of the major seed producing areas of Idaho and have found differences in rate of emergence, number of stems, time of tuber set, and differences in yield in the field. Why should this be so. These were all stored together a month after harvest, so we can rule out storage conditions as a cause for the differences.

I am going to introduce a new term to you and that is physiological aging. A potato tuber is a living organism and therefore it physiologically ages just like you and I do. When we age we get white hair, wrinkles on our faces, we are more liable to get sick and we don't recuperate as fast. Did you ever think that potato tubers may react in the same general way, when they get old.

A Dutch research worker has suggested that changes in sprouting capacity can be used to measure the physiological age of seed tubers. The sequence associated with aging which he has outlined is - one sprout stage, multiple sprouting stage, branching stage and small tuber forming stage.

Now if this criteria is true for measuring physiological age, then there must be factors other than chronological age which causes tubers to physiologically age prematurely. You draw your own conclusions as to whether I am right. Let us look at some of the factors which cause physiological aging.

1. Chronological age. Comparisons were made in the greenhouse between seed stored for 3 months after harvest and seed stored for 8 months. Plants from the younger seed emerged much later, averaged fewer stems, set tubers later and ultimately developed an overall larger foliage and root system (had the potential for higher yields) than plants from the older seed tubers. In the field, the younger seed had fewer stems and produced significantly higher yields of 10 oz and over size tubers. Although the total yield was higher for the younger seed, it was not statistically different.

2. Effect of maturity. Tubers dug while vines were still green were compared to tubers from vines killed several weeks before harvest. The plants from the immature seed behaved similar to plants from chronologically older seed. That is, they emerged sooner, had more stems, set tubers earlier and tended to mature sooner. According to European research workers, over-mature seed tubers (tubers from vines which have died prematurely and are not dug) also are less productive than mature seed.

3. Comparison of single drop to cut seed. Plants from cut seed emerged sooner, had more stems, averaged smaller foliage and root systems in the greenhouse than did plants from whole seed. The magnitude of differences such as between plants from cut and whole seed appear to get less as seed gets physiologically older, because of poor storage conditions or other factors.

4. Comparison of pre-cut to fresh cut seed. Seed cut in December and allowed to suberize was compared to seed cut fresh just prior to planting in the greenhouse in February. The seed allowed to suberize behaved similar to single drop seed. That is, emergence rate was slower with fewer stems, which ultimately developed into larger foliage and root systems than plants from fresh weight seed.

5. Bruising of seed. Seed tubers dropped on a concrete floor from a height of 2.5 feet and also others bruised by gouging with a knife were compare to non bruised seed. Plants from bruised seed emerged sooner and averaged more stems per seed piece than non bruised seed.

6. Effect of seed source. Seed produced at Tetonia Branch Experiment Station University of Idaho under relatively cool growing conditions was compared to seed (noncertified) from the Aberdeen Branch Experiment Station which has a milder climate and is located in the commercial growing area. The Tetonia seed produced plants with significantly less number of stems in the greenhouse and 50 cwt higher total yield in the field.

7. Effect of storage temperature. Certified Russet Burbank seed tubers were stored at constant temperatures of 35, 40 and 45 F. Those stored at 40 and 45 F produced plants with significantly less number of stems in the greenhouse than those stored at 35 F with significantly higher yields of 10 oz and over size tubers in the field. Results of two years research would favor 40 F storage over 35 or 45 F. Although 45 F stored seed performed about as well as 40 F stored seed; under some conditions there would be danger of sprouting in storage.

It is obvious from these results that many factors can affect the performance of seed. In the future, more attention will have to be paid to number of stems obtained per seed piece. Stem numbers have considerable influence on yield and percent grade out of potatoes.

The recommended number of stems in one area may not necessarily be desirable for another area. England and other European countries favor small boiling size potatoes. Therefore, they regulate seed storage and other conditions to obtain approximately 6 stems per seed piece. (Personal communication with Dr. W. G. Burton.) Large potatoes are a premium in some of the production areas of Idaho, therefore, less stem numbers are desirable. In Washington, many potatoes get too large because of high temperatures and a longer growing season. It would appear that somewhat higher stem numbers would be desirable under Columbia Basin growing conditions. Although single stem plants were superior in the greenhouse over multiple stem plants, they would not be recommended because of unpredictability of results. However, under the present regime of seed tuber production, of harvest in the fall and replanting in the spring, single stem plants are not likely to be obtained.