# WASHINGTON POTATO SEED LOT TRIAL
A Review and Summary

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## SUMMARY

Samples of potato seed used for planting commercial potato fields have been planted in a seed lot trial annually since 1961. Even with this long term effort, there are misunderstandings about the purpose, the methods and the results of these trials. The objectives, methods and a brief summary of the results are included.

## INTRODUCTION

Since 1961 samples from potato seed available for planting commercial potato fields in the state of Washington have been planted by Washington State University at the Othello Research Unit in what is referred to as the Washington Seed Lot Trial.

Since the beginning of these trials 14 years ago, a number of significant changes have been made. These changes were made to improve the results of the trials and to make the results as meaningful as possible to the Washington potato industry. These seed lot trials were reviewed at the Annual Potato Conference in 1969. The intent of this review was to increase understanding of the seed lot trial for anyone using the results so that the maximum benefit could be gained with a minimum of misunderstanding.

However, not everyone participating in the seed trials is fully aware of the recent changes. In addition, the results since the 1969 review have not been summarized and presented to the industry. In an attempt to acquaint the industry with the seed lot trials, there are four questions that need to be discussed. They are: 1) what is the Washington Seed Lot Trial; 2) why is the seed lot trial carried out; 3) how is the trial conducted; 4) what are the results of the trial.

## WHAT

The Washington Seed Lot Trial, simply described, is a planting of samples consisting of single tubers from seed used to plant seed or commercial potato fields in the state of Washington. The samples are available through the Washington State Seed Quarantine Law which stipulates that the Washington State Department of Agriculture will retain a sample, at no cost to it, of each lot of certified seed produced or received in this state for seed or commercial production. Such samples will be retained for entry in Washington seed lot trials.

## WHY

Since at least 90 percent of the seed used in Washington each year comes from outside the state, the seed lot trial provides a convenient means to make side by side observations of seed from the various seed areas. The comparisons possible by these side by side observations could be made by field observations, but this would be less convenient and require a great deal more investment of time and effort by anyone desiring these comparisons.

The major objectives of side by side comparison are: 1) determine the disease content of seed lots being planted in the state of Washington; 2) inform the Washington Potato Industry concerning the differences in seed from various sources; 3) assist seed growing areas by encouraging improved seed quality.

## HOW

The Washington Seed Lot Trial is a cooperative effort between the Washington State Potato Commission, the Washington State Department of Agriculture and Washington State University. Each of the three state agencies performs a separate and vital role in the success of the endeavor.

### SAMPLING

Samples of seed for the trial are made up of 300-400 single whole tubers from each seed lot to be planted in Washington. The sample collecting is done by the seed receiver. The seed receiver is responsible for the identification of the sample as to variety and source. The seed lots are collected from the receivers throughout the state by representatives of the Department of Agriculture or the Potato Commission. It is extremely important for the seed receiver to recognize that identification of the seed lots submitted to the trial is his responsibility. The completeness and accuracy of the identification must be assured when the seed sample is collected. Any information that is not complete or accurate will result in a sample that has little or no meaning. Once the seed samples are taken, tagged and collected, they remain in the original container with identification tags intact until they are planted.

The samples collected by the Department of Agriculture or the Potato Commission are delivered to the WSU Research Unit at Othello where they are held in refrigerated storage till planting. From this point on, the seed lot trial is conducted by WSU.

### PLANTING

In early May the seed samples are removed from cold storage and warmed up for planting. The samples are taken to the planting area in the original containers with the original identification tags on them.

At planting, the identification information on the tags of individual samples is recorded in on a planting plan. The identification tag on each sample is numbered to correspond to the row number of the plot. The sample is placed on the planter before the tags are removed. When the numbered tag is removed from the sample, it is retained in order of the plantings. These tags and the planting plan are cross checked at least twice more before the final report is made.

After placing the samples on the planter, removing and retaining the tags every fifth row is identified with a numbered stake that remains in the row throughout the season. All handling procedures during planting are designed to reduce, if not eliminate, sample mix-up and identification error.

### READING

Approximately 60 days after planting, the individual rows are closely checked for diseased plants, variety mix and any other information that would be valuable to either the seed receiver or the grower. These readings are the responsibility of WSU with the assistance of the Washington State Department of Agriculture certification inspectors. All diseased plants recognized during the readings are staked with colored flag stakes for ease of observation at the following field day. Final identification of diseased plants is made only when there is no question about the presence of the disease. The diseased plants in each row are recorded and become a part of the final reading only after they are rechecked to be sure the count on the report corresponds with the staked plants in the field. During the field readings, the only identification of the seed lots is by row number.

All certification agencies who have seed in the trial are invited and encouraged to have representatives present during the readings. If they have concerns over the conduct of the trial or the identification of disease, they are requested to discuss these at this time. The final identification of the disease content and the conduct of the trial, however, is Washington State University's.

Disease readings include the following observations:

Major

| Leaf Roll | Black Leg |
|---|---|

Minor

| | |
|---|---|
| Weak Plants | Calico |
| Variety mix | Mosaic |
| Spindle tuber | Haywire |
| | Witches broom |

No attempt is made to determine presence of Ring Rot. This is primarily due to the difficulty in reading plant symptoms at the stage of plant development when the readings are taken. Considerable misunderstanding about the intent and value of the seed lot trial surround this fact. There are cases where ring rot readings are requested to supplement field diagnosis and to use in legal considerations. This is not the intent of the seed lot trial.

## RESULTS

Results of the field readings are printed as the Washington Seed Lot Trial Report and are distributed to those in attendance at the Annual Seed Lot Field Day. Copies of the readings are sent to all seed certification agencies with samples in the trial. The intent and hope is that these be made available to all seed growers from the various areas with seed lots in the trial. Additional copies of the report are available from the Washington Potato Commission and Washington State University.

The public is invited to the Annual Seed Lot Field Day held during the first few days of July each year. The primary purpose of the field day is to make the seed lot results available. The readings are distributed and discussed and the lots are available for public observation.

In addition to observing the seed lots, the seed lot field day is used for additional efforts. These may or may not be seed related. These have included demonstration plots on seed size and spacing, seed born leaf roll in volunteers as influenced by area aphid control, effect of sprout inhibitors on volunteer potato germination and growth and others. The past several years, plots specifically for showing disease symptoms, have also been included.

In addition to the annual seed lot report being made available, a summary of each year's results are published in Spud Topics. The 1974 summary is included here.

**1974 Seed Lot Summary**

| | | | Leaf Roll | | Black Leg | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Russets | 257 | 73 (69)* | 67 | 26 (15) | 63 | 25 (20) |
| Norgold | 70 | 20 (25) | 10 | 14 (21) | 30 | 43 (60) |
| Kennebec | 22 | 6 (4) | 3 | 14 | 7 | 32 |
| Norchip | 1 | <1 (1) | 0 | 0 | 0 | 0 |
| Minnesota Russet | 2 | <1 | 2 | 100 | 0 | 0 |
| Total Lots Entered | 352 | (291) | | | | |
| Local Firms | 54 | (47) | | | | |

| Seed Source | Seed Samples Total | RB | NR | % Leaf Roll RB | NR | % Blackleg RB | NR |
|---|---|---|---|---|---|---|---|
| Montana | 42 (44) | 57 | 1 | 29 (15) | 0 (0) | 27 (20) | 100 (50) |
| North Dakota | 22 (22) | 6 | 83 | 0 (40) | 12 (15) | 19 (20) | 40 (60) |
| Idaho | 13 (9) | 17 | 0 | 23 (15) | -- (--) | 14 (15) | -- (--) |
| Washington | 9 (8) | 5 | 10 | 43 (25) | 0 (42) | 21 (25) | 29 (67) |
| Oregon | 7 (6) | 10 | 1 | 16 (6) | 0 (--) | 40 (24) | 100 (--) |
| Canada | 2 (1) | 3 | 0 | 43 (0) | -- (--) | 14 (--) | -- (--) |
| California | 2 (1) | 2 | 0 | 40 (100) | -- (--) | 20 (100) | -- (--) |
| Minnesota | 1 (2) | 0 | 3 | -- (100) | 50 (50) | -- (100) | 100 (50) |
| Colorado | 0 (2) | 0 | 0 | -- (29) | -- (--) | -- (43) | -- (--) |
| Wyoming | <1 (0) | 0 | 1 | -- (--) | 100 (--) | -- (--) | 100 (--) |
| Unknown Origin | <1 (4) | | | | | | |

*Figures in parentheses are 1973 comparisons

## Leaf Roll and Blackleg Summary

Twenty six percent of the Russet lots contained one or more plants of seed borne leaf roll compared to 15% in 1973. This 11% increase in leaf roll content occurred in spite of the fact that in 1974, 80% of the Russet seed lots came from the top four seed areas (as identified by seed lot performance from 61-74) and in 1973, 79% came from the top four seed areas. Leaf roll content in the Norgold variety decreased 7% (from 21 to 14%) as the percent of seed lots from the top four states increased from 83% to 87%.

Twenty five percent of the 1974 Russet lots showed one or more plants of blackleg on the day of the readings compared with 20% in 1973 even with an increase from 80 to 82% of the seed lots in the trial coming from the top four seed areas. Blackleg incidence in Norgold decreased 17% (from 60% in 1973 to 43% in 1974) which may indicate that seed producers and certifiying agencies are more cognizant of the blackleg problem in Norgold and are putting more effort into its control than they are in the Russet variety.

Additional Observations:

1. Lot Identification:

   Identification of a few seed lots was again of concern, but the number of seed lots which were delivered with an unknown origin decreased from 15 in 1973 to a single lot in 1974. Five lots were received which did not contain the identification of the seed producer and nine lots did not identify the in-state source of the sample. This compares to 14 without seed grower identification and zero without receiver identification in 1973.

   Lot identification as provided by the receiver was assumed to be correct and no attempt was made to varify this identification by the Washington State Department of Agriculture Horticultural inspectors, Washington Potato Commission or Washington State University personnel. The seed lot report noted that lot identity as reported was as supplied by the receiver.

2. Disease Reading Training:

As has been the case for the past several years, the seed lot reading was used as a training session in reading field symptoms of diseases for WSDA and WSU personnel. This is considered a worthwhile and desirable side benefit of the seed lot trial effort, but not one of its primary objectives.

3. Seed Certification Area Participation:

Seed certification agency personnel from three seed areas in addition to Washington were present during the readings. The four seed areas thus represented accounted for 72% of the seed lots in the 1974 trial. The individuals from seed areas other than Washington do not participate in the official disease determination, but are encouraged to and do contribute to discussions concerning the disease diagnosis of the individual plants.

A question often asked concerning the seed lot trial is, has it had any influence on the seed quality purchased by the Washington Potato Industry? Analysis of the seed lot results over the years of the trial may be of value in answering that question.

Graphs showing comparisons for leaf roll (Figure 1) and Blackleg (Figure 2) indicate that as the seed lots in the trials from the four areas with the highest leaf roll free percent increase, the overall percent of diseased lots in the trial decreases. One can only assume this is also the case in commercial plantings. One major exception to this is 1974. Although the percent of the seed lots from the top four leaf roll areas increased so did the percent of the lots with leaf roll. The cause of this is only speculation, but hopefully, it is not a trend for the coming years.

## HOW TO ENTER A SAMPLE

Since the success and usefulness of the seed lot is dependent on accurate information and the collecting and identifying of the samples is the responsibility of the seed receiver, a review of how to sample and what identification is required seems in order.

To enter a seed lot in the trial, three key activities are involved: Collect, Identify and Notify.

Collect 300-400 single drop tubers (approximately 3-4 ounces in size) randomly throughout the lot. This can best be accomplished at time of delivery, however, sampling can be done at cutting if the lots are received in a manner that allows certain and accurate identification at cutting.

Identify the sample by seed source (seed grower and state) by variety and by receiver. The information needed is not the responsibility of the State Department of Agriculture or the Potato Commission person who picks up the sample, although they will aid in doing this if time permits.

Notify the horticulture inspectors office nearest you or the potato commission office. They will transport the sample to Othello. Receivers who are receiving more than single lots or are taking more than one sample from a lot should not hold these samples in their facilities for long periods of time. They have a way of disappearing and/or begin to sprout. They can be stored in refrigerated facilities at Othello.

REMEMBER THE INFORMATION GAINED FROM THE SAMPLE IS ONLY GOOD IF: THE SAMPLE REPRESENTS THE LOT, IS CORRECTLY AND THOROUGHLY IDENTIFIED, IS DELIVERED TO THE STORAGE.

Figure 1. Summary of Seed Lot Trial 1961-74.
Relationship of leaf roll in seed lots and percent of seed lots from top four (4) seed areas as indicated by trials is shown.

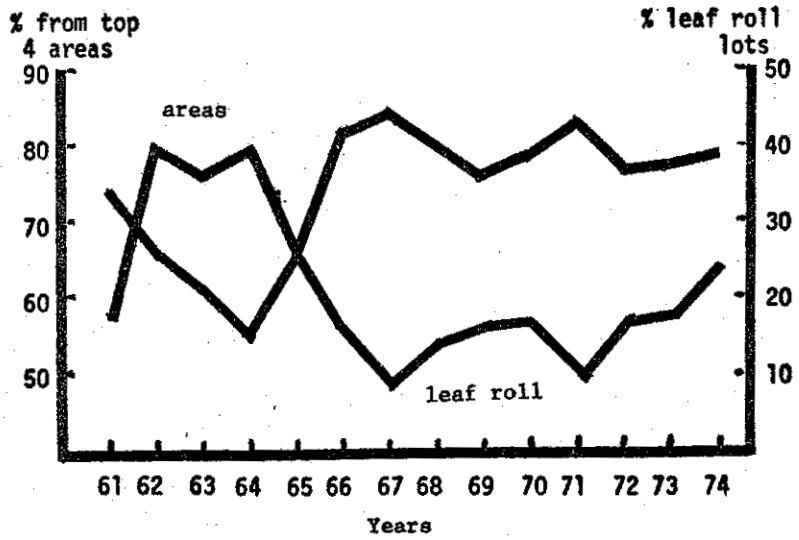


Figure 2. Summary of Blackleg Readings for Seed Lot Trial 1965-74.
Relationship of blackleg incidence in seed lots and percent of seed lots from top four (4) seed areas as indicated by trials is shown.