

TASTE AND TEXTURE OF POTATO CULTIVARS AND CLONES  
USED BY THE PACIFIC NORTHWEST POTATO INDUSTRY

by  
Robert E. Thornton, Horticulturist  
Washington State University  
Pullman, Wa.

Shortly after the russet skinned potato cultivar Norkotah Russet first was produced in Washington State and the other Pacific Northwest potato producing states there were reports, often unconfirmed, of consumer dissatisfaction due to "taste". As a result of the question about the acceptability of the "taste" of new cultivars compared to that of Russet Burbank, an informal taste comparison was initiated. This comparison was composed of providing relatively uniformly sized tubers of potato cultivars and clones grown at the Washington State University Othello Research Unit to individuals in attendance at the December Quarterly Meeting of the Washington State Potato Commission. Those who received the sample tubers were asked to cook them as they normally would and to evaluate the taste. The primary cooking method of interest was baking but other methods of use were also evaluated by some participants. Evaluations of baking taste were the only ones utilized for comparison due to lack of response of the other methods of use. Participants were not instructed as to how to bake the tubers (i.e. both conventional and microwave ovens were used). They were asked to rate the taste in one of the following categories: Bad, Poor, OK, Good, Very Good. These ratings were then converted to numerical values 1 - 5.

#### 1986

In 1986 the participants ranked five cultivars and one numbered clone (this clone has since been named). The numbered clones, A7411-2, and Russet Burbank received the highest and equal average ranking. Norgold Russet and Russet Norkotah were ranked lower but nearly equal. HiLite Russet was ranked the lowest, considerably lower than A7411-2 and Russet Burbank (Figure 1). A7411-2 had noticeably higher percentage of evaluators who judged it to be very good (35%) than any other entry (Table 1). It and Russet Burbank had no ratings of "Bad". This was also the case with HiLite Russet, but it also had no ratings of "Very Good". Russet Norkotah and Norgold Russet were ranked by some evaluators in each of the taste categories.

#### 1987

The average ranking in 1987 was higher overall (Figure 2). Russet Burbank and A7411-2 were ranked the same as in 1986, but all other entries were ranked considerably higher in 1987 compared to 1986 (Table 2).

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The only entry that did not receive a "Bad" ranking by some evaluators was A7411-2. All others were ranked "Bad" by some evaluators and there was very little difference in the percent of the evaluators ranking them as "Bad". A7411-2 again was among the entries having the highest percent of evaluators ranking it as "Very Good" (27%) this, however, was considerably lower than the percentage ranking it "Very Good" in 1986 (35%). HiLite Russet which in 1986 was not ranked "Very Good" by any evaluators was ranked "Very Good" by a high percent in 1987 (29%). One noticeable feature of the evaluations in 1986 versus 1987 was that a large number of the individuals made additional comments about either the taste or texture of the tubers of individual entries. As a result the decision was made that in the future, evaluators would be asked to rank taste and texture separately.

### 1988

There were two additional entries included in 1988 (Figure 3). The evaluators were asked to rank both taste and texture into one of the five categories. When they felt they were unable to distinguish taste and texture, they were to give both the same ranking. All the entries were ranked differently for taste than texture (Figure 3) except Norgold Russet; indicating that the evaluators were able to distinguish between the two. Century Russet (A74212-1) and Russet Burbank were ranked higher in taste than texture. Norgold Russet was ranked the same and all other entries were ranked higher in texture than taste. In order to make year to year comparisons as was done in 1986 and 1987, the values for taste and texture in 1988 were averaged to come up with a ranking called the 'approval rating' that would allow comparison to the two previous years (Figure 4). As in 1986 Russet Burbank and A7411-2 were ranked highest of those which were evaluated in all three years. Century Russet, however, was ranked even higher than either of these. Frontier Russet (A74114-4) was ranked similar to Russet Norkotah and Norgold Russet. The 1988 average ranking (Table 3) were in the same relative range as 1987 and higher than in 1986. HiLite Russet was ranked above both Norgold Russet and Russet Norkotah as it was in 1987 (Table 2). This was not the case in 1986 (Table 1) when HiLite Russet ranked lower than all other entries. Russet Burbank's high average ranking comes from the fact that few rank in as "Bad" or "Poor" even though its "Very Good" percentage is not high. HiLite Russet, A7411-2, A74114-4 (Frontier) and A74212-1 (Century) all had 20% or over of the evaluators who ranked them as "Very Good" (Table 3). A74114-4 (Frontier) also had over 8% of the evaluators who ranked it as "Very Bad". All other entries were ranked "Very Bad" by fewer than 2% of the evaluators and Norgold Russet, Russet Norkotah and A7411-2 were not ranked as "Very Bad" by any evaluator.

### 1989

Evaluation of both taste and texture were again reported (Figure 5). The difference in ranking of the two parameters was not as great as in 1988 (Figure 3) and the overall ranking was lower in 1989 compared to 1988. Only HiLite Russet, A7411-2 and Frontier showed a difference between taste and texture and in all of these, texture was ranked higher than taste (Figure 5).

A7411-2 was ranked lowest of all entries for both attributes contrary to the previous years when it was one of the highest ranked entries. When taste and texture ranking were combined to give the overall approval rating (Figure 6) Russet Burbank and Russet Norkotah were ranked highest followed by Frontier Russet, Century Russet and Norgold Russet. These were followed by HiLite Russet which was only slightly lower in rank. As pointed out, A7411-2 received the lowest approval rating of all entries.

In 1989 a number of evaluators sampled the entries at two different locations one week apart. One was at a low elevation (Table 4) and one at a high elevation (Table 5). All entries except A74212-1 (Century) were ranked higher when evaluated at the low altitude. Century was ranked the same at both locations. At the low altitude the tendency was to have fewer evaluators give "Bad" ranking than at the high elevation. Norkotah Russet and Frontier Russet (A74114-4) were the only entries that had higher percent "Bad" ranking at low altitude compared to high altitude.

All entries had a higher percentage that ranked them "Very Good" at the low altitude evaluation except A7411-4 and Frontier Russet (A74114-4). Both of these had substantially lower "Very Good" percentage ranking at the low altitude compared to the high altitude evaluation. Substantial difference in the percent of evaluators ranking in each of the other three categories also occurred between the high and low altitude evaluation but no consistent pattern(s) appeared.

### Overview and Conclusions

The evaluations over the four years of the study (Figure 7) indicates that there was definitely a year to year difference in the values. This could have come from the fact there was some change in the people who were involved in the evaluation since no attempt was made to stabilize the participants who were involved. It also could be that the perception of flavor and texture are not the same for all individuals from year to year and/or that flavor and texture are influenced by whatever difference occurred between the years (primarily climate since with rare exception all entries were grown in small plots where some level of uniformity would be expected). Russet Burbank tended to have a more uniform ranking over time than any of the five entries that were evaluated all four years. HiLite Russet was erratic over time as was A7411-2.

When the values for the years' tests are grouped into a single value (Table 3) three entries are ranked above all the others: Russet Burbank, A74212-1 (Century Russet), and A7411-2. Norgold Russet and Russet Norkotah were ranked slightly above HiLite Russet and A74114-4 (Frontier Russet).

The following conclusions are drawn from this study:

1. Evaluators can differentiate taste from texture.
2. Evaluators do have different preference in both taste and texture.
3. Evaluators ranked entries differently on different years indicating a year to year difference in preference in taste and texture.

Figure 1. Taste Panel Approval Rating of five Russet skinned clones in 1986. Tubers were derived from WSU test plots with identical cultural practices.

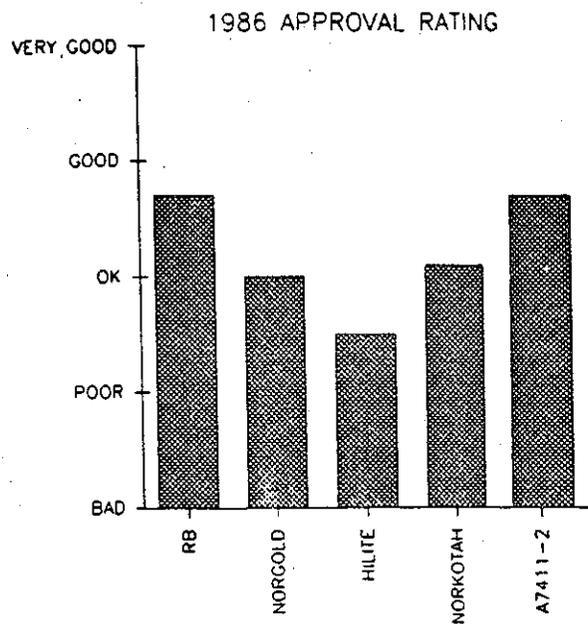


Figure 2. Taste Panel Approval Rating 1987.

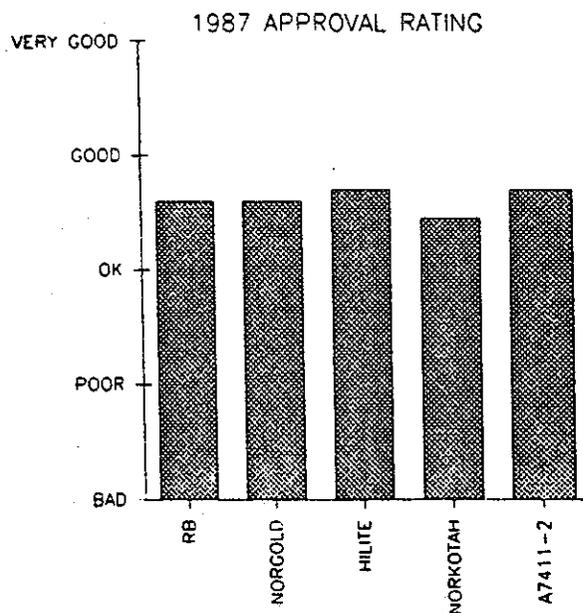


Figure 3. Approval Rating for Taste and Texture 1988. Frontier and Century tuber samples were not from same plots as other entries.

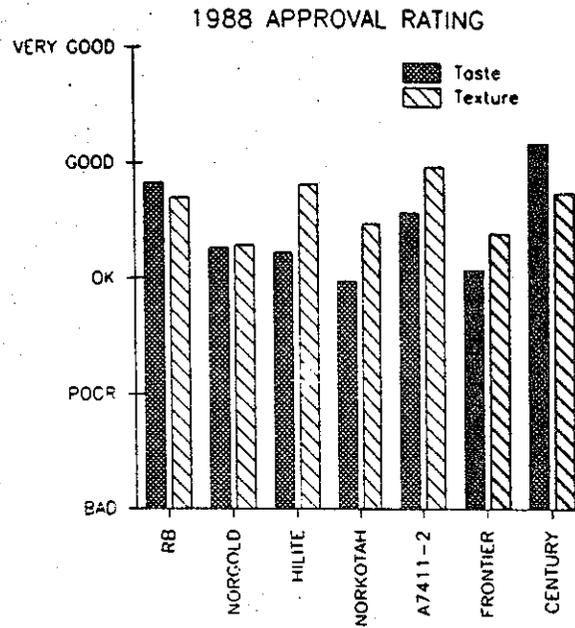


Figure 4. Approval Rating 1988 obtained by combining the values of taste and texture.

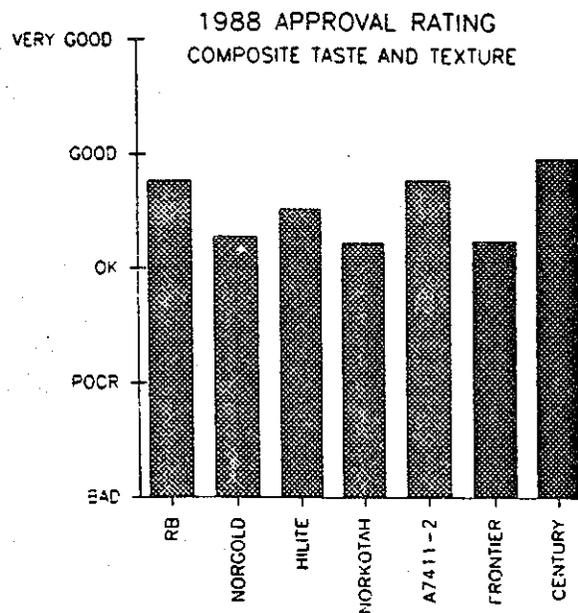


Figure 5. Taste Panel Rating of Taste and Texture 1989.

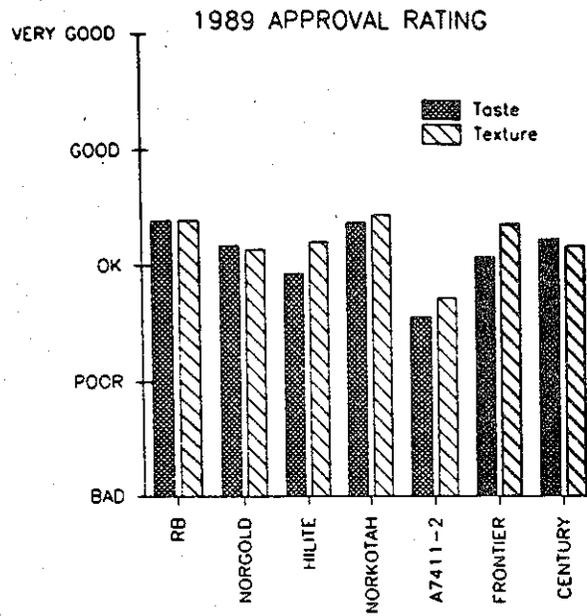


Figure 6. Overall Approval Rating 1989 obtained by combining taste and texture values.

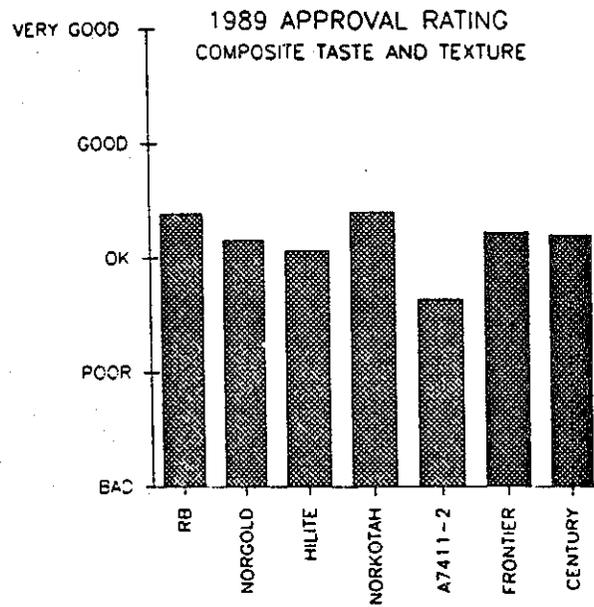


Figure 7. Preference Ratings of Russet Skinned Clones evaluated over the four year evaluation period.

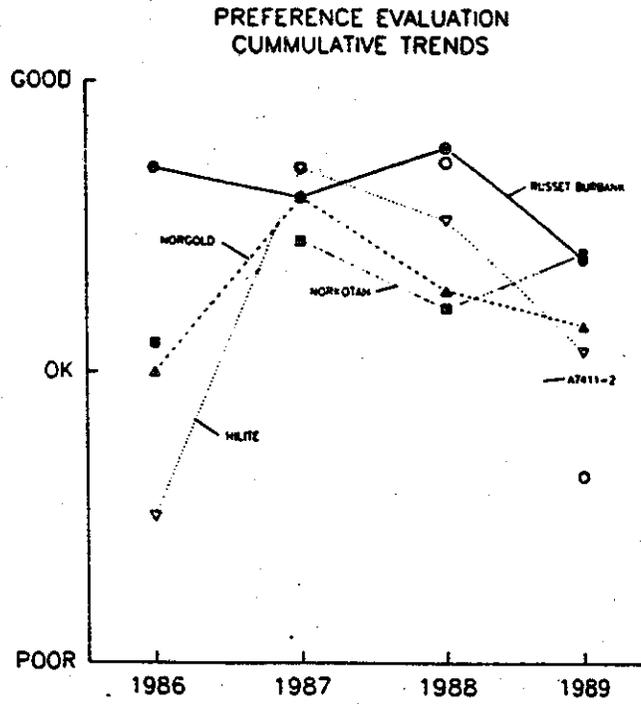


Table 1. Taste panel ranking of Russet skinned potato clones in 1986. Average ranking and percentage evaluation in each category.

VARIATION'S IN RESPONDENT EVALUATIONS (%)						
1986						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	0	17.6	11.8	52.9	17.6	3.7
NORGOLD	6.3	25.0	31.3	18.8	18.8	3.0
HILITE	0	60.0	26.7	13.3	0	2.5
NORKOTAH	5.9	23.5	41.2	17.6	11.8	3.1
A7411-2	0	23.5	17.6	23.5	35.3	3.7

Table 2. Taste panel ranking of Russet skinned potato clones in 1987. Average ranking and percentage evaluation in each category.

VARIATION'S IN RESPONDENT EVALUATIONS (%)						
1987						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	4.3	4.3	34.8	39.1	17.4	3.6
NORGOLD	4.5	9.1	27.3	40.9	18.2	3.6
HILITE	4.8	4.8	38.1	23.8	28.6	3.7
NORKOTAH	3.0	7.5	41.1	30.6	15.6	3.5
A7411-2	0	9.1	22.7	40.9	27.3	3.7

Table 3. Taste panel ranking of Russet skinned potato clones in 1988. Average ranking and percentage evaluation in each category. Note: A74114-4 and A74212-1 tuber samples were not from same location as other entries.

VARIATION'S IN RESPONDENT EVALUATIONS (%)						
1988						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	1.7	1.7	23.4	65.0	8.4	3.8
NORGOLD	(0)	12.9	53.3	27.4	6.5	3.3
HILITE	1.7	22.6	30.6	12.9	32.3	3.5
NORKOTAH	(0)	23.2	35.7	37.5	3.6	3.2
A7411-2	(0)	6.7	30.0	43.4	20.0	3.8
A74114-4*	8.1	22.6	33.9	9.7	25.8	3.2
A74212-1*	1.2	5.2	15.5	50.0	27.5	4.0

\* Data taken in 1988 and 1989 only

Table 4. Taste panel ranking of potato tuber cooked and evaluated at a low altitude location. Evaluators were the same as at high altitude.

SELECT 1989 EVALUATIONS DONE AT LOW ALTITUDE (%)						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	(0)	25	20	20	35	3.7
NORGOLD	10	10	45	30	5	3.1
HILITE	10	15	50	15	10	3.0
NORKOTAH	15	15	30	25	15	3.1
A7411-2	5	35	15	45	(0)	3.0
A74114-4	20	20	35	20	5	2.7
A74212-1	5	40	15	15	25	3.2

Table 5. Taste panel ranking of potato tubers cooked and evaluated at a high altitude location.

SELECT 1989 EVALUATIONS DONE AT HIGH ALTITUDE (%)						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	15.4	19.3	19.3	27.0	19.3	3.2
NORGOLD	11.6	30.8	42.4	11.6	3.9	2.7
HILITE	27.0	7.7	30.8	27.0	7.7	2.8
NORKOTAH	11.6	34.7	23.1	30.8	(0)	2.7
A7411-2	23.1	19.3	23.1	27.0	7.7	2.8
A74114-4	15.4	23.1	23.1	15.4	23.1	3.1
A74212-1	11.6	27.0	15.4	23.1	23.1	3.2

Table 6. Average taste panel ranking of clones over the four years of the evaluations.

FOUR YEAR CUMMULATIVE VARIATIONS IN RESPONDENT EVALUATIONS (%)						
VARIETY	(1) BAD	(2) POOR	(3) OK	(4) GOOD	(5) VERY GOOD	AVG. ON A 1-5 SCALE
RB	2.7	11.4	22.7	47.7	15.5	3.6
NORGOLD	5.0	16.1	36.7	28.2	14.1	3.3
HILITE	6.4	25.8	32.1	19.2	18.0	3.2
NORKOTAH	4.0	17.4	35.8	30.6	19.5	3.3
A7411-2	5.5	16.3	23.1	33.5	21.7	3.5
A74114-4*	8.7	21.8	31.0	17.1	21.7	3.2
A74212-1*	5.7	16.3	19.1	36.4	23.9	3.6

\* Data taken in 1988 and 1989 only

The following paper was not available for publication in the 1991 Proceedings:

Thiourea and Gibberellin Seedpiece Treatments to Increase Stem Numbers of Shepody and A-7411-2 - by: Loretta Mikitzel, WSU.