

Yield Quality and Bruise Susceptibility for Selected Russet Varieties

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Introduction:

Several Russet varieties were recently released for fresh market with higher yield potential, improved disease resistance, and lower input requirements compared to Russet Norkotah. However, many of these new varieties are more susceptible to shatter bruise, white-knot bruise, or blackspot bruise. Grower experience with these new varieties has been mixed. Some growers experienced excellent results and few problems, while others experienced significant crop loss due to bruising and storage rot. This study compared several Russet varieties yield and bruise susceptibility at three vine kill dates.

Trial Information

Location:	Intermountain Research and Extension Center, Tulelake, CA
Soil Type:	Tulebasin mucky silty clay loam
Planting Date:	May 21, 2014
Harvest Date:	September 29, 2014
Harvest Pulp Temperature:	56 °F
Irrigation:	Solid-set sprinklers
Plot Size:	2 rows (6 ft) wide by 30 ft long
Vine Kill Date:	4 week prior to harvest- August 29, 2014 3 week prior to harvest- September 5, 2014 2 week prior to harvest- September 12, 2014
In-Row Seed Spacing:	10 inches
Number of Replications:	4
Fertilizer per Acre:	204N-40P205-110K20-34S
Seed Treatment:	Agri-Fill Premium Fir Bark Dust, Maxim 4FS

Weed Control:	Prowl H ₂ O & Outlook (pre-emergence); Matrix (post)
Insecticides:	Admire Pro (in-furrow)
Fungicides:	Quadris, Omega F500, Bravo Weatherstik
Vine Kill Method:	Rolling vines followed by two applications of Reglone

Methods

Tuber yield and defects were evaluated at harvest and 60 days after harvest. Tubers were stored in controlled storage at 44°F. Blackspot and white-knot bruise were evaluated after 60 days in storage. Ten tubers were evaluated at both evaluation times. Blackspot bruise was evaluated using an abrasive peel method. Samples were peeled in a Hobart peeler for 30 seconds, then incubated for 24 hours at 60-70°F. Potatoes were then separated into 5 categories based on enzymatic discoloration.

Soil moisture was monitored using Watermark sensors placed at 6" and 12" depths in the potato hill from vine kill to harvest. Vine kill treatments were irrigated separately to keep soil moisture at approximately 70% available soil moisture until harvest.

Results

Vine kill date did not have a significant influence on yield or tuber bruising, so data from all vine kill dates for each variety were combined for analysis. Varieties differed in their yield and bruise susceptibility at harvest (Tables 1 and 2). TX296 Norkotah, ATTX91137-1RU had the highest total yield and US# 1 yield of the trial (Table 1). GemStar Russet, Teton Russet, and Russet Norkotah also produced high yields. Varieties with the largest tuber size included ATX91137-1RU and TX296 Norkotah. Classic Russet has historically produced similar or higher yields than GemStar Russet and Russet Norkotah in IREC trials, but Classic Russet yields were low this year for an unknown reason.

GemStar Russet and AC00395-1RU had the most severe lenticel scarring, while Russet Norkotah and Canela Russet had the least (Tables 2). COTX09052-2RU, TX296 Norkotah, and Russet Norkotah had the most severe black spot bruising at harvest (Figure 1). Interestingly, black spot bruise appeared to increase for several varieties including Classic Russet, Canela Russet, GemStar Russet, and Teton Russet after being stored for 60 days, while Russet Norkotah black spot bruising appeared unchanged (Figure 1). White Knot was evaluated 60 days after harvest with no significant incidence for all varieties and therefore was not reported. See Figure 2 for entry pictures and comments.

Table 1- Tuber Yield and Size Characteristics at Harvest

Description	Tuber Yield (cwt/A)				Average Tuber Size	Tubers per Plant
	US #1's	2's	Culls	Total Yield		
AC00395-1RU	285	6	22	364	5.74	5.7
ATX91137-1RU	406	12	35	480	7.94	5.6
Canela Russet	225	4	12	283	5.79	4.6
Classic Russet (S)	256	4	18	311	6.22	5.0
TX296 Norkotah (S)	393	27	30	487	7.27	5.6
COTX09052-2RU	150	2	5	257	3.95	6.6
GemStar Russet	338	27	27	421	7.58	4.7
Russet Norkotah	309	7	11	386	5.83	5.9
Teton Russet (A0008-1TE)	327	9	28	419	6.21	6.6
Average	299	10	21	378	6.28	5.6
95% Conf. Interval	63.37	9.96	6.73	64.68	0.62	0.78

*Classic Russet yield is lower than historic average at IREC. Norkotah and Teton Russet yields were similar to the historic average at IREC.

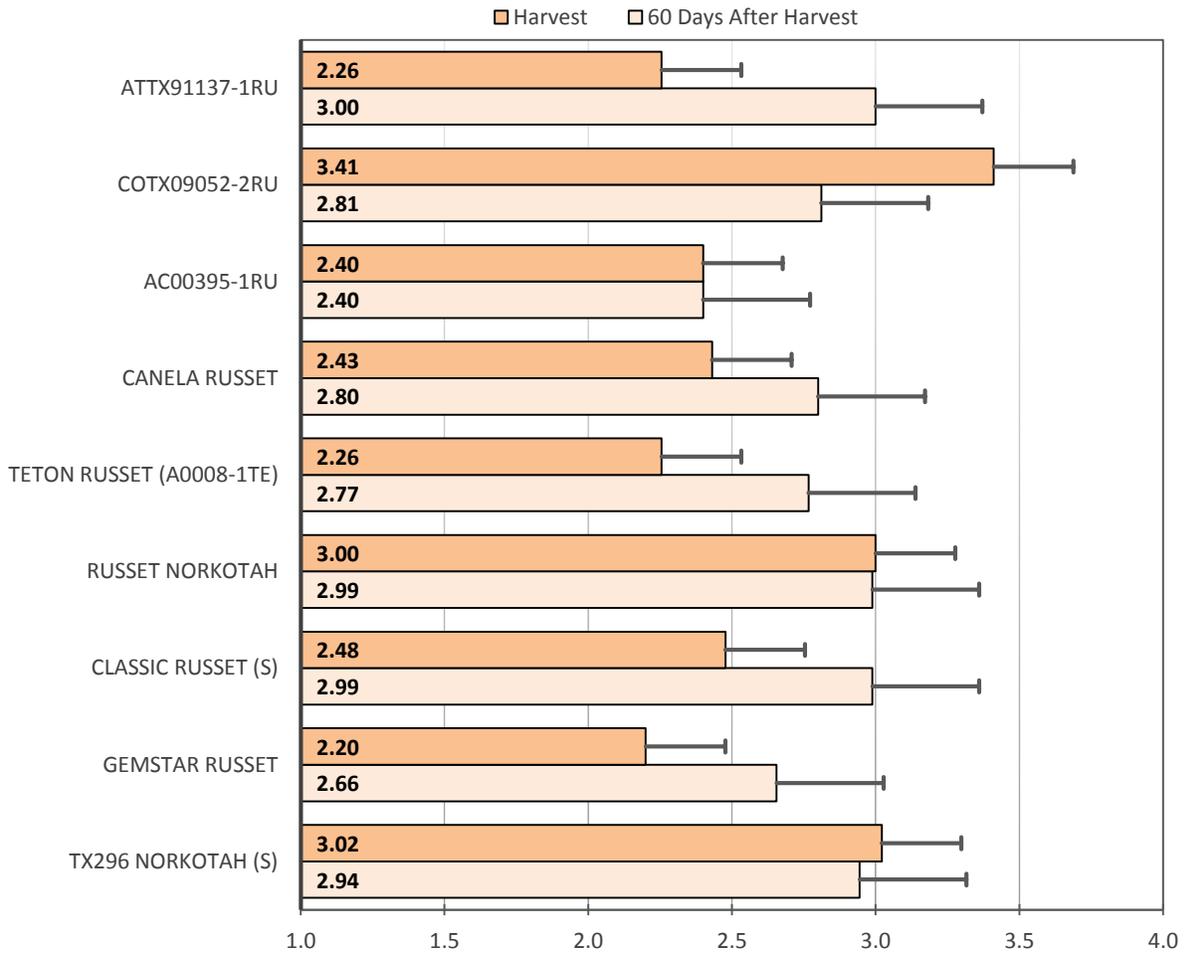
Table 2- Internal & External Defects at Harvest

Description	Percent of Total Tuber Count					External Evaluation			
	% Knob	% G. Crack	% Green	% Irr. Shape	% Total Culls	Skinning ¹	Lenticel Scarring ¹	Shatter Bruise ¹	Specific Gravity
AC00395-1RU	0.6	1.8	1.1	1.3	6.2	3.4	3.5	5.0	1.092
ATX91137-1RU	1.2	3.8	0.4	2.1	7.6	3.3	3.6	4.9	1.079
Canela Russet	0.8	0.6	2.2	1.1	5.1	3.1	4.1	5.0	1.093
Classic Russet- (S)	1.5	1.3	1.8	0.7	5.9	3.8	3.6	5.0	1.086
TX296 Norkotah (S)	2.7	1.5	1.3	4.3	9.9	3.7	4.0	5.0	1.082
COTX09052-2RU	0.7	0.3	0.4	0.6	2.1	3.3	4.0	5.0	1.088
GemStar Russet	2.5	1.3	1.3	4.1	10.3	3.9	3.0	5.0	1.091
Russet Norkotah	1.1	0.4	0.4	1.6	3.9	3.6	4.2	5.0	1.077
Teton Russet (A0008-1TE)	1.7	2.2	0.9	2.1	6.9	3.8	3.8	4.9	1.085
Average	1.4	1.5	1.1	2.0	6.4	3.6	3.8	5.0	1.086
95% Conf. Interval	0.89	0.77	0.72	1.44	1.97	NS	0.23	NS	0.005

¹10 tuber sample at harvest. Based on a 1-5 scale, 1 = most severe, 5 = no incident

Figure 1.

Black Spot Bruise Severity at Harvest and 60 Days after Harvest in Storage at 44°F



*Based on a 1-5 scale. 1= Most Severe, 5 = No Incident

**Data was analyzed per variety by vine kill date. This showed no statistical significance and was not reported. Also, 60 day evaluations were not statistically different and therefore cannot be compared.

Abrasive Peeling – Black Spot Bruise Evaluation Scale

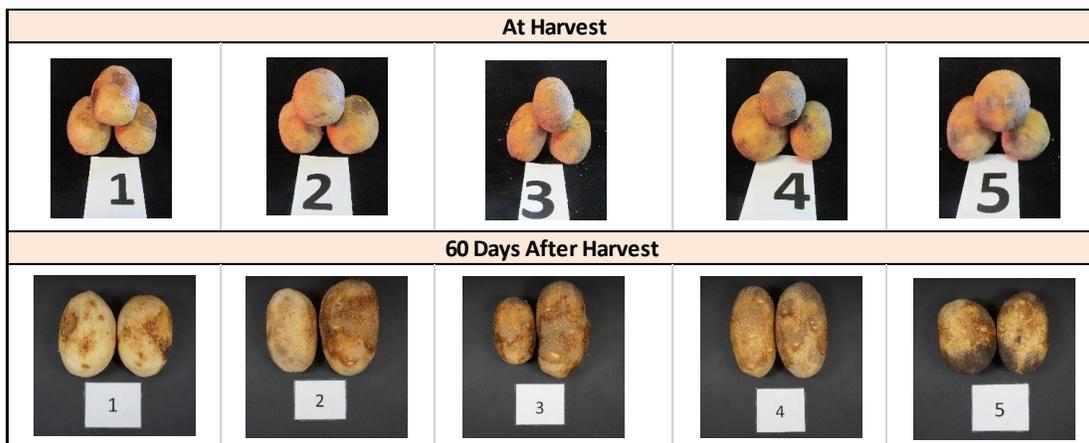
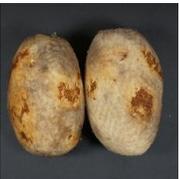


Figure 2. Entry Pictures and Comments

Entry		Tulelake Notes	Entry		Tulelake Notes
AC00395-1RU			ATTX91137-1RU		
Washed	Post-Hobart	<ul style="list-style-type: none"> • High Specific Gravity • Consistently Low Black Spot Bruise Severity 	Washed	Post-Hobart	<ul style="list-style-type: none"> • High Yield • Large Average Tuber Size • Low Specific Gravity
					
Canela Russet			Classic Russet (S)		
Washed	Post-Hobart	<ul style="list-style-type: none"> • Low Tubers per Plant • High Specific Gravity • Minimal Lenticel Scarring 	Washed	Post-Hobart	<ul style="list-style-type: none"> • Increase in Black Spot Bruise in Storage • Lower Yields Than Historic Average • Minimal White-Knot Bruising This Year
					
TX296 Norkotah (S)			COTX09052-2RU		
Washed	Post-Hobart	<ul style="list-style-type: none"> • Higher Yield Than Russet Norkotah • More Culls Than Russet Norkotah • High Black Spot Bruise Severity at Both Evaluations 	Washed	Post-Hobart	<ul style="list-style-type: none"> • Low Yield • High Black Spot Bruise Severity
					
GemStar Russet			Russet Norkotah		
Washed	Post-Hobart	<ul style="list-style-type: none"> • High Culls Due to Irr. Shape and Knobs • Minimal Skinning 	Washed	Post-Hobart	<ul style="list-style-type: none"> • Least Amount of Lenticel Scarring • Low Specific Gravity • High Black Spot Bruise at Both Evaluations
					
Teton (A0008-1TE)					
Washed	Post-Hobart	<ul style="list-style-type: none"> • Nice Mix of Tubers per Plant and Tuber Size • Low Black Spot Bruise Severity at Harvest, but Increased in Storage 			
					