

2022

Klamath Basin Potato Variety Development Summary



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Introduction

Since its inception in 1985, the Tri-State variety development program has primarily focused on the development of processing and dual-purpose (process and fresh) russets. Recent breeding efforts have focused more on improving genetic resistance to various pests and diseases as a means of lowering production costs. During the past decade, Oregon has been the lead state in the release of eleven russet varieties. Although the development of russet varieties remains the primary focus, recent efforts have included red-skinned and specialty-type selections. Many of these selections offer unique skin and/or flesh color combinations along with enhanced nutritional qualities including elevated antioxidant and Vitamin C content. In total, more than 25 new varieties have been released by the Tri-State variety development program since 1985. More recently Klamath Basin growers have identified the need for chipping potatoes suitable for export markets. Trials were initiated in 2008 and 2009, with funding from the Oregon Potato Commission, to identify acceptable chipping varieties using advanced selections and recently released varieties from the Tri-State, Southwest, North-central, and Eastern breeding programs.

Screening for resistance to various species of nematodes and related diseases is being accomplished at several locations. The Klamath Basin Research and Extension Center (KBREC) routinely screens selections for resistance to root-knot nematode (*Meloidogyne chitwoodi* and *Meloidogyne hapla*) and corky ringspot disease (CRS) resulting from infection of Tobacco rattle virus which is vectored by stubby-root (*Paratrichodorus* spp.) nematodes. Other cooperating sites within the Tri-State area also work on resistant screening and other production limitations most suited to their respective location. The overall objective is that future releases will offer genetic resistance to many economically important pests and diseases which will help reduce production inputs as these costs continue to rise.

The Klamath Basin Research and Extension Center (KBREC) also serves as an initial field screening location for first-generation selections of russet, specialty, and chipping clones (single-hills). Second-year evaluations of four-hill red/specialty and chip selections also take place in Klamath; however, russet selections are currently sent to the Central Oregon Agricultural Research Center (COARC). Breeding progeny are supplied by programs at the USDA Agricultural Research Service (ARS) facility in Prosser, Washington, and Aberdeen, Idaho, as well as, Oregon State University (OSU), Colorado State University, and North Dakota State University.

The purpose of this summary booklet is to report the results of our variety trial efforts. In 2009, KBREC participated in the following research trials: Russet Preliminary Yield 2 (PYT-2), Statewide Russet, Tri-state Russet, Western Regional Russet, Red/Specialty PYT- I, Statewide Specialty, Tri-state Specialty, Western Regional Red/Specialty, and a modified Western Regional Chip Trial. A brief summary of weather during the growing season, insect trapping results, and single-hill selections.

Acknowledgements

The ultimate goal of variety development at OSU-KBREC and cooperating Tri-state partners is the development and commercialization of new potato varieties to benefit the Northwest potato industry. The effect of the Tri-state Potato Variety Development Program on the Northwest potato industry has been substantial. The fresh market industry, French fry processors and chippers have incorporated many varieties developed through this program into their businesses. Ranger Russet, Western Russet, Umatilla Russet, and Alturas are examples of russet cultivars released from the Tri-State program that have greatly benefited the Northwest potato industry, being the 3rd, 5th, 7th, and 8th most widely grown cultivars in Oregon and accounted for 27% of total acreage. As expected, recently released russet varieties have found greater adoption by Northwest processors compared to fresh market usage in the Klamath Basin. However, several varieties have found fresh market niches in the Klamath Basin including GemStar Russet, Premier Russet, and most recently Classic Russet.

Varieties recently released by the Tri-State program are now produced on over 140,000 acres in the Pacific Northwest with value to growers estimated at approximately \$390 million. A recent economic analysis of the Tri-state breeding effort revealed that every dollar invested in the program results in a \$39 return (Araji and Love, 2002). The current focus of Tri-state variety development efforts is to develop improved varieties that increase quality and production efficiency while decreasing fertilizer and pesticide inputs.

The success of OSU-KBREC potato variety development is made possible with funding from USDA CREES, USDA ARS, and the generous support of the Oregon Potato Commission. In addition, the Klamath Potato Growers Association annually contributes to OSU-KBREC research and Extension activities.

References

Araji, A.A. and S. Love. 2002. The economic impact of investment in the Pacific Northwest potato variety development program. **Amer. J. Potato Res.** 79:411-420.

Special Acknowledgment

OSU-KBREC plagiarized the design and layout for this publication from the WSU Potato Cultivar Yield and Postharvest Quality Evaluation publication. This is an excellent publication which provides a vast amount of data in a 'grower friendly' venue. The publication below, by the Washington State University Potato Research Group, can be found at the listed website.

Mark Pavek, Rick Knowles, Zach Holden, Nora Fuller. 2009. Washington State University Potato Research Group, Pullman, WA. **2009 Potato Cultivar Yield and Postharvest Quality Evaluations.** <http://www.potatoes.wsu.edu>

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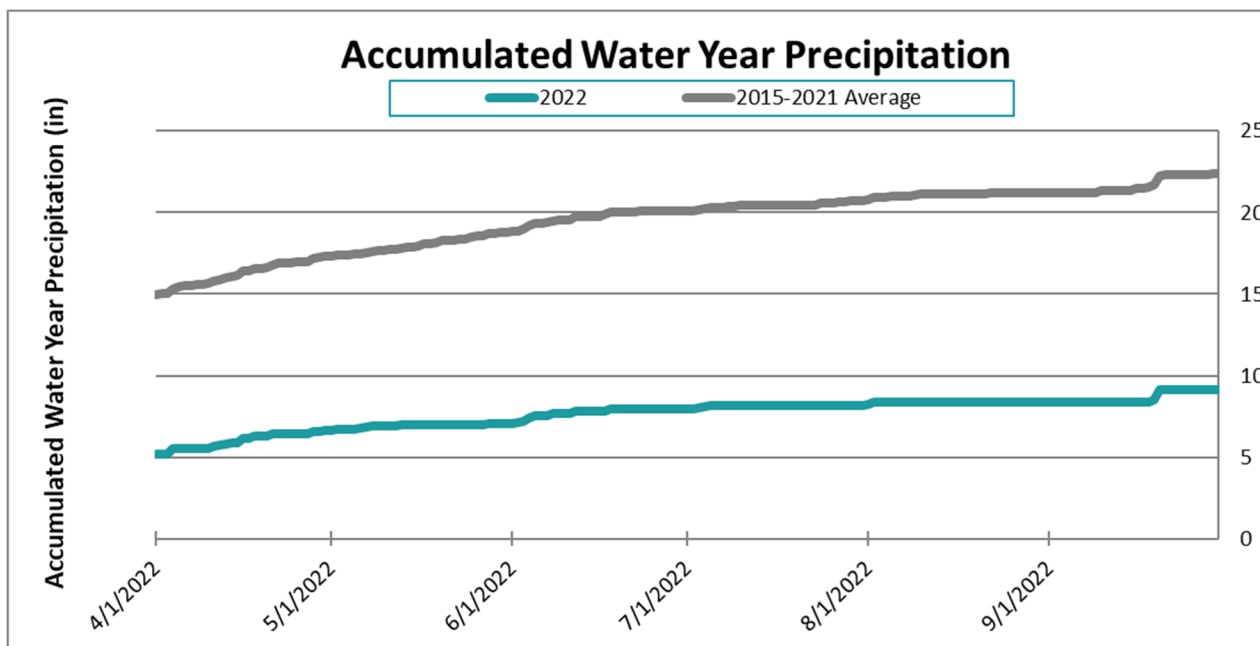
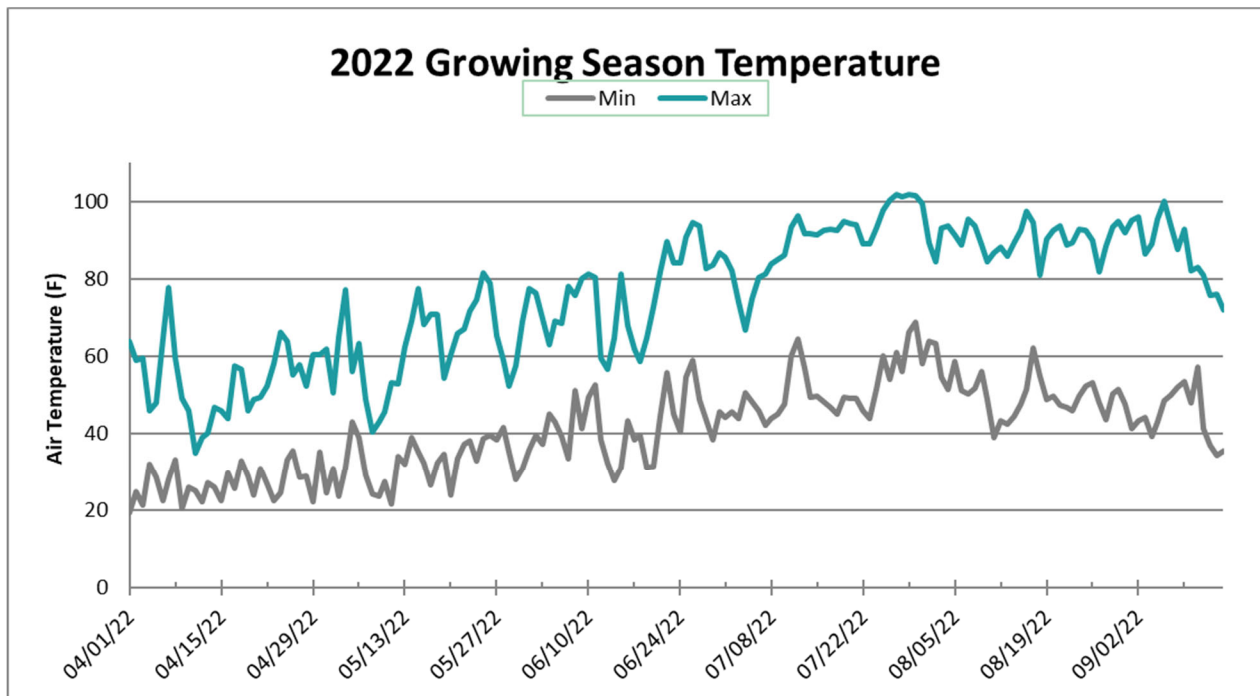
Cam Curtiss, Klamath Falls, OR

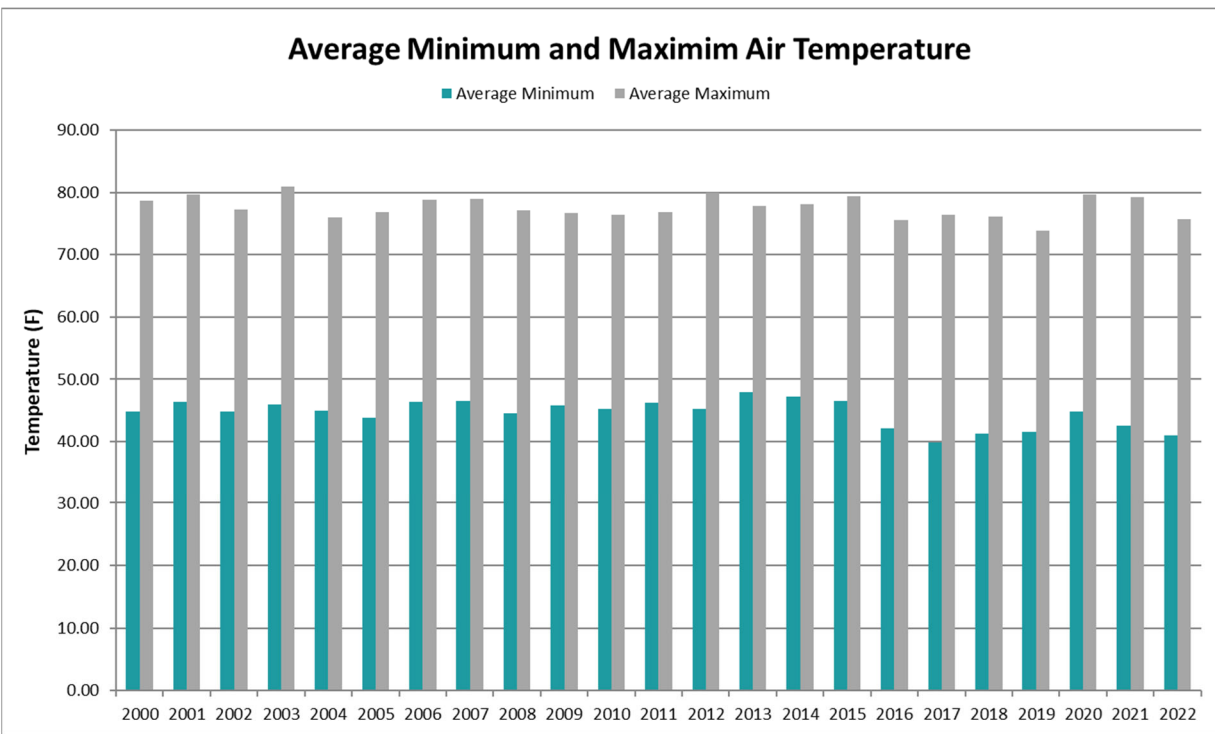
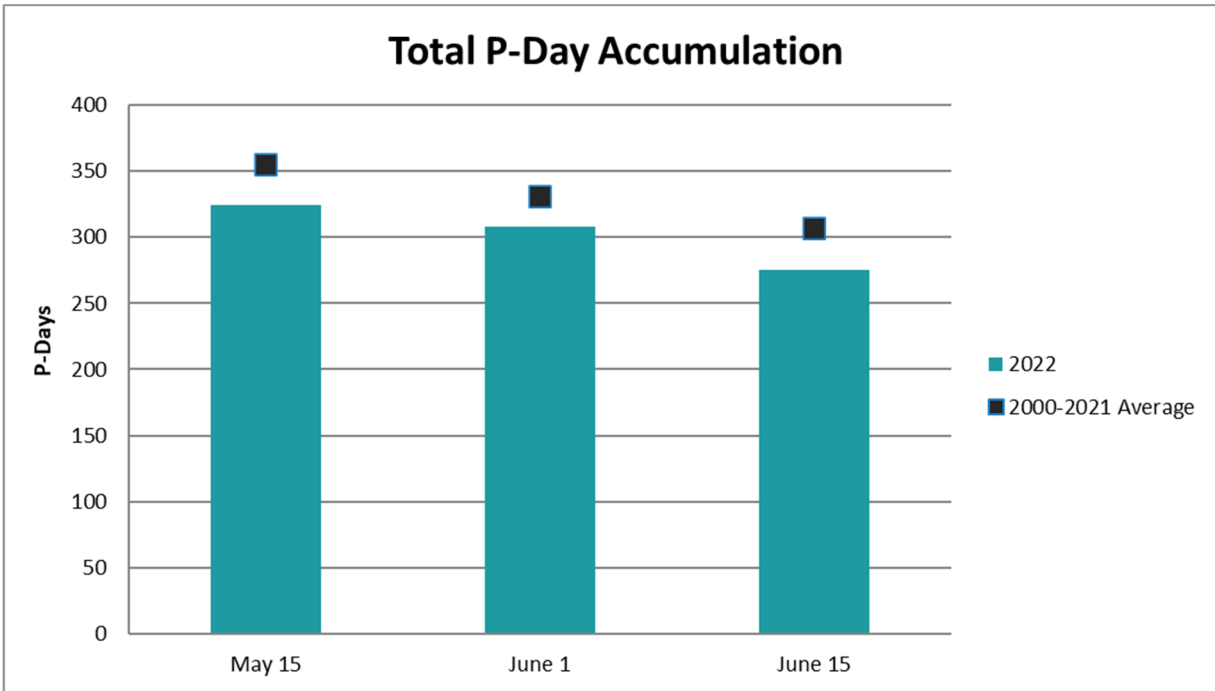
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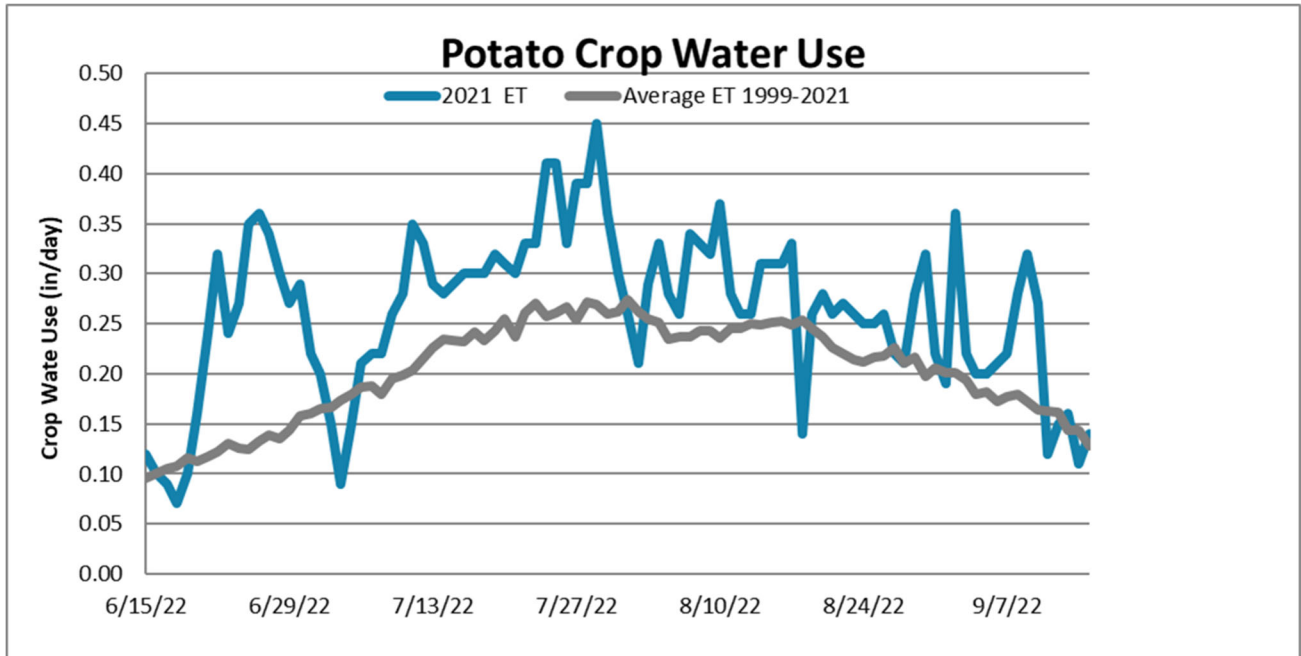
Bill Brewer, Jennifer Fletcher, Judy Schwartz, Oregon Potato Commission, Portland, OR

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Weather Data

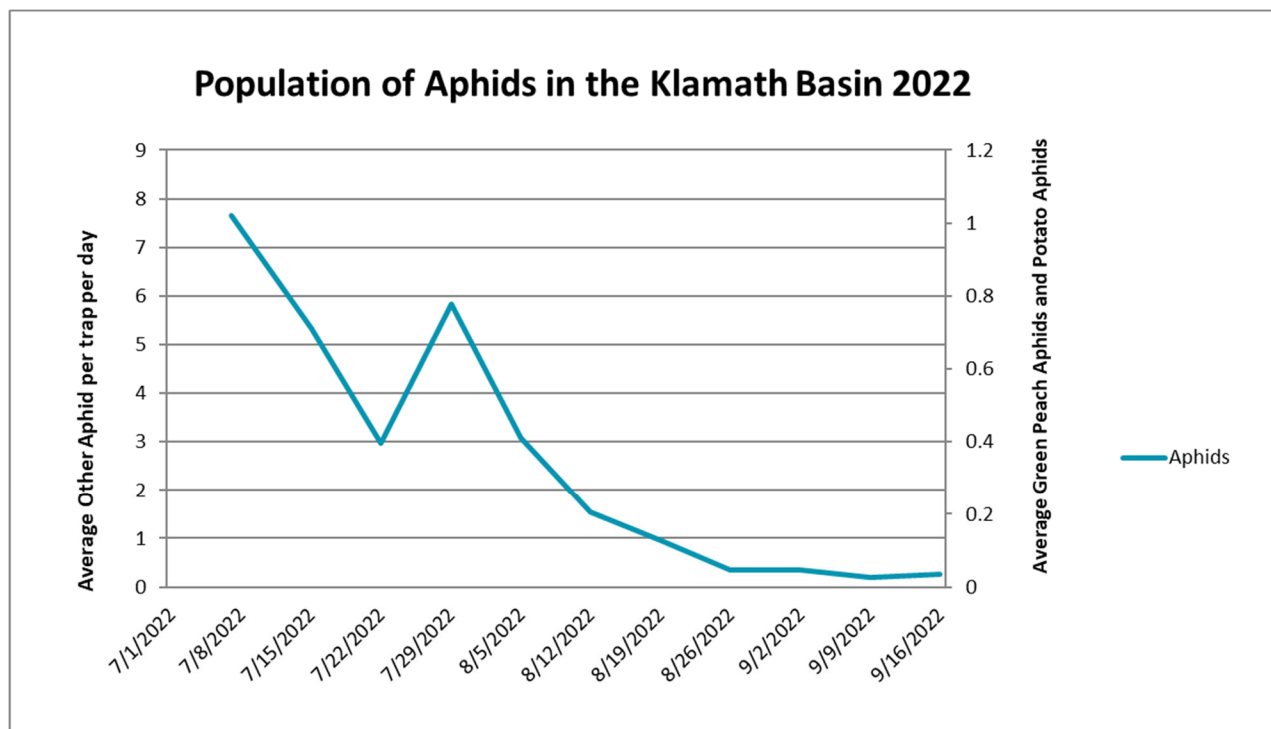


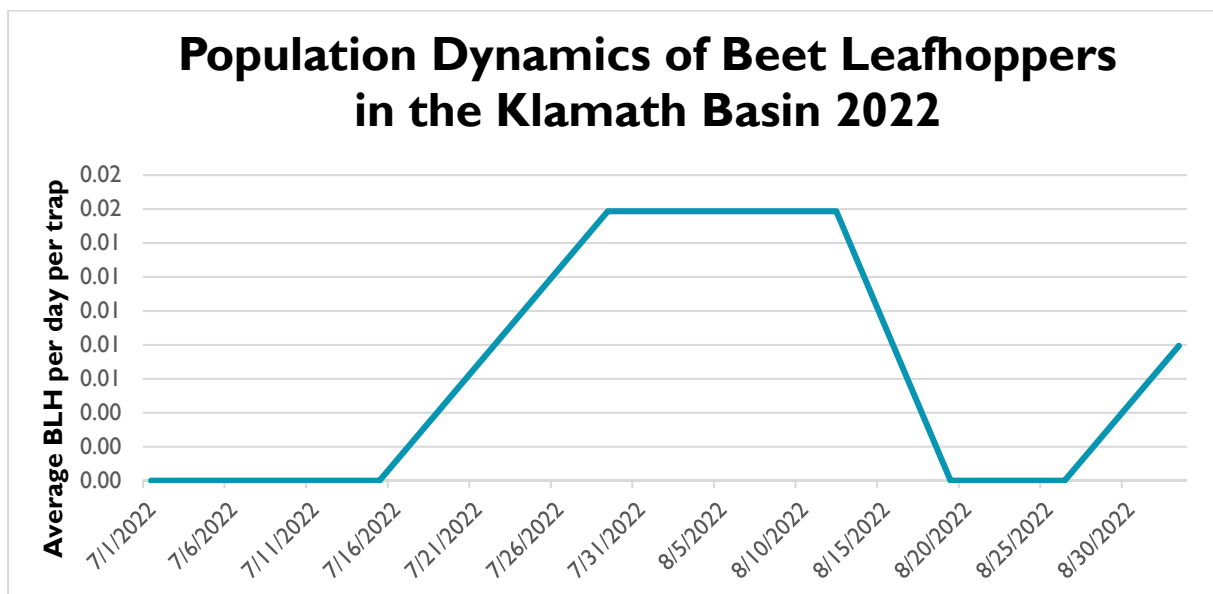
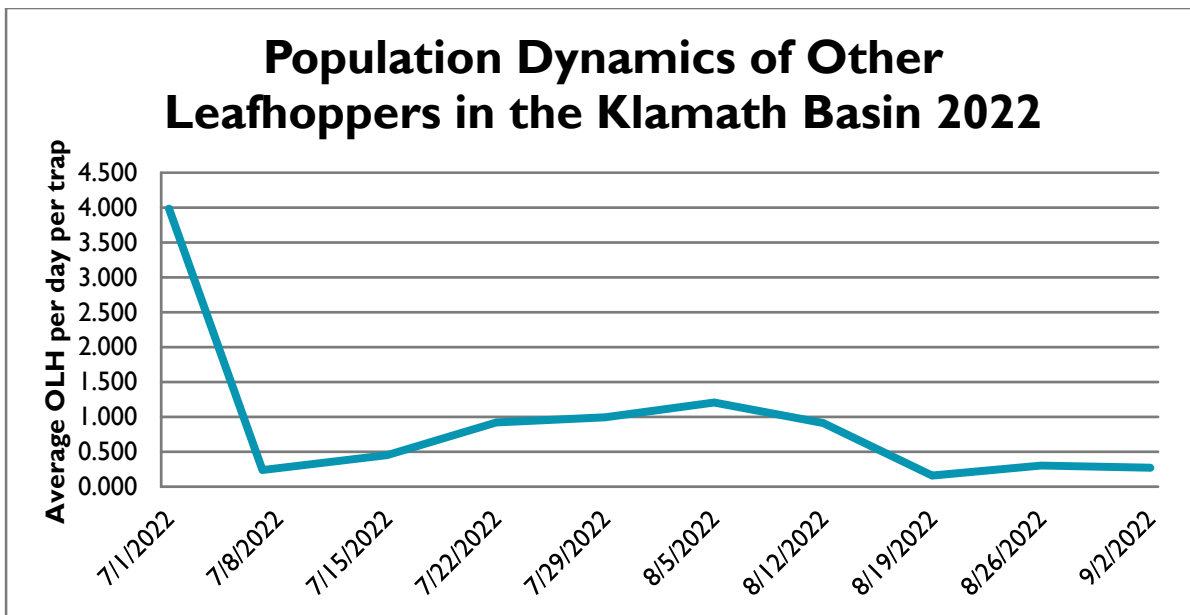




2021 Insect Trapping Results

Potato tuberworm was first detected in the Klamath Basin in late August of 2005. KBREC initiated an extensive trapping program the following year (2006) and have continued this effort annually. In 2009, we expanded our trapping efforts to include aphids, leafhoppers, and psyllids. Eighteen Delta traps (tuber moth), ten yellow water-pan traps (aphids), and eighteen sticky cards (leafhoppers and psyllids) were placed in growers' fields shortly after crop emergence. Traps were checked weekly during the growing season and results were tabulated and made available to growers, crop consultants, and other industry personnel electronically in a newsletter titled *Potato Bytes*. This newsletter was also published on the KBREC website at <http://oregonstate.edu/dept/kbrec/>. Collected data provided Basin producers with pertinent information to improve pest management strategies. The following graphs show population dynamic trends for aphids and leafhoppers throughout the growing season.





Guide to Clone Designation

Example: AC99375-IRU

AC99375-IRU	Breeding Program (A berdeen, ID)
AC99375-IRU	Selection Site (C olorado)
AC 99 375-IRU	Year of Cross (1999)
AC 99375 -IRU	Cross Number (375)
AC99375-IRU	Tuber Selection (I)
AC99375-IR U	Russet (Ru)

Location Codes

Designation	Breeding Program	Selection Program	Other
A	Aberdeen, Idaho	Aberdeen, Idaho	
AO	Aberdeen, Idaho	Oregon	
AOA	Aberdeen, Idaho	Oregon	
AOR	Aberdeen, Idaho	Oregon	
ATX	Aberdeen, Idaho	Texas	
BTX	Beltsville, Maryland	Texas	
CO	Colorado		
MWTX	Madison, Wisconsin	Texas	
NDA	North Dakota	Aberdeen, Idaho	
NY	New York		
PA	Prosser, Washington	Aberdeen, Idaho	
POR	Prosser, Washington	Oregon	
TC	Texas	Colorado	
TE	Tetonia, Idaho		
TXA	Texas	Aberdeen, Idaho	
TXNS	Texas		Norkotah Strain

Miscellaneous Designations

LS	Low Sugar
P/P	Purple skin/Purple flesh
R	Red skin
R/R	Red skin/Red flesh
R/Y	Red skin/Yellow flesh
Ru	Russet
W/Y	White skin/Yellow flesh
LB	Late Blight resistance
PW/Y	Purple skin with White eyes/ Yellow flesh
P/Y	Purple skin/Yellow flesh
P/PW	Purple skin/Purple and White flesh

Single Hill Results

Approximately, sixty thousand (60,000) greenhouse-produced seedling tubers were planted at a Rock Creek Ranch five miles west of Running Y Ranch on May 24, 2022. Located about 20 miles west of Klamath Falls, soils are approximately 6.1 percent organic matter and a pH of 6.3. The location provides good isolation from other potato production areas and intensively fumigated soils allow us to harvest very clean material for seed increase. Progeny included 119 families from Oregon State University; 45 from USDA, Prosser, WA; 107 from USDA, Aberdeen, Idaho; 21 from North Dakota State University 19 families from New York and 23 families from Colorado. Several crosses included russet parents with virus, late blight and potato tuber worm resistance.

Tuber families were lifted with a two-row, level-bed digger on October 5th. A selection team including researchers, extension agents, growers and industry personnel selected desirable clones from various families immediately after lifting. As expected, selection was based primarily on external appearance; however, internal evaluation was performed on a limited number of selections. All retained material was transported to Klamath Falls, Oregon for storage at the Klamath Basin Research and Extension Center (KBREC). The following table outlines the number of single- hills provided by each breeding program and selection rate.

Location	General Cross Types	Number of Progeny Planted	Number of Progeny Selected	% Selection Rate
ARS Prosser, WA	Disease resistance, pigmented	5,652	106	1.8
Oregon State University	Disease resistance, mixed type	22,695	334	1.4
ARS Aberdeen, ID	Disease resistance, russet	22,387	439	1.9
North Dakota		4,079	14	.3
New York		3,215	12	.3
Colorado		2,783	65	2.3
Total		60,811	970	1.6

Preliminary Yield (PYT-1) Russet Screening

Six hundred and fifteen (615) selections from 2021 single-hills were planted in 16-hill seed increase plots at Rock Creek Ranch. Potato tubers were lifted using a two-row, level-bed digger on October 5, 2022. A team of about 20 research and industry personnel selected 69 clones for further evaluation based on market potential and possible disease resistance. Tubers from these selections were retained and stored at KBREC for seed increase. This material will be evaluated in a Preliminary Yield Trial (PYT-2 Russet) conducted at KBREC and other locations throughout the Pacific Northwest in 2023.

Preliminary Yield (PYT-1) Specialty Screening

Thirty eight (38) selections from 2021 single-hills were planted in 16-hill seed increase plots at Rock Creek Ranch. Potato tubers were lifted using a two-row, level-bed digger on October 5, 2022. A team of about 20 research and industry personnel selected 0 clones for further evaluation based on market potential and possible disease resistance. Tubers from these selections would have been retained and stored at KBREC for seed increase. This material would have been evaluated in a Preliminary Yield Trial (PYT-2 Specialty) conducted at KBREC and other locations throughout the Pacific Northwest in 2023.

Preliminary Yield (PYT-1) Chip Screening

Ninety two (92) chip selections from 2021 single-hills were planted in 16-hill seed increase plots at Rock Creek Ranch. Potato tubers were lifted using a two-row, level-bed digger on October 5, 2022. Research and industry personnel selected 21 clones for further evaluation based on chipping potential and possible cold sweetening resistance. Seed of these selections was hand collected and stored at the KBREC potato facilities. This material will be evaluated in a Preliminary Yield Trial (PYT-2 Chip) conducted at KBREC and other locations throughout the Pacific Northwest in 2023. KBREC will also be increasing seed for future evaluation.

2022 Preliminary Yield (PYT-2) Russet Trial

Location: OSU KBREC – Klamath Falls, OR

Planting Date: May 24

Harvest Date: October 5

Fertility: 100-50-250

Vine Kill Date: September 5

Days to Vine kill: 97

In-Row Spacing: 9.25 inch

The PYT-2 Russet Trial evaluates recently selected clones, often only three years removed from single-hill selection. Retained entries are further evaluated in replicated trials at several Oregon locations before advancing (if applicable) to the Tri-state trial which includes testing locations in Washington and Idaho. This trial included 3 standard varieties and 191 new entries. The Oregon Potato Variety Development Team chose to advance 4 selections to the Statewide Russet Trial in 2022 and discarded the remaining selections due to poor performance. **Only retained selections are listed.**

Clone	Female Parent	Male Parent
AOR18005-4	A07098-4	A10007-3
AOR18008-4	A07769-4	A10007-3
AOR18008-5	A07769-4	A10007-3
AOR18021-2	A10007-3	La Belle Russet [A06021-1T]
AOR18022-2	A10007-3	Western Russet
AOR18028-2	A10450-1LB	Western Russet
AOR18039-4	A10471-7LB	A06084-1TE
AOR18045-8	A10471-7LB	A09022-4
AOR18053-5	A11132-1TE	A02060-3TE
AOR18053-7	A11132-1TE	A02060-3TE
AOR18055-2	A11132-1TE	A11167-1
AOR18511-1	A12083-2	A01025-4
AOR17002-1	A06084-1TE	A10007-3
AOR18004-2	A06084-1TE	Mountain Gem Russet
AOR18043-3	A10471-7LB	La Belle Russet
AOR18125-1	Teton Russet	Mountain Gem Russet
COOR18107-2	CO10087-4RU	AOR07821-1
OR18052-2	OR05039-4	AOR06070-1KF
OR18002-2	OR13SPC101-9CRKN	Gemstar
OR18H039-1	PA07NCK12-61	A06021-1T
OR18H062-2	PA07NCK12-61	OR05039-4
POR20015-2	PA99N82-4	INNOVATOR
AOR18494-4	Reiche (sto)	La Belle Russet [A06021-1T]
OR18044-2	AO06822-2sto	AOR06070-1KF
OR18198-2	PA95A11-14	A00614-6PVY
OR18H017-2	POR15V1-28	Dakotah TB

OR18H018-1	POR15V1-28	Premier Russet
OR18H019-2	POR15V1-28	A06021-1T
POR20028-1	POR16V1-24	LABELLE
AOR17067-1	BRS Ana	A98345-1
COOR18107-1	CO10087-4RU	AOR07821-1
AOR16035-3	A07088-6	AO01114-4
AOR16066-5	AF4320-7	Prospect
AOR16070-5	AO01114-4	CW08071-2
AOR16071-6	AO01114-4	Crestone Russet
AOR16097-6	W9742-3rus	OR05039-4
AOR16113-3	Crestone Russet	OR05039-4
AOR15422-3	MN09152BW-01Rus	A10210-7T
AOR11908-2	A02782-2	AO02183-2
AOR1322-8	A06565-11LB	CO99053-3Ru

2022 Preliminary Yield (PYT-2) Chip Trial

Location: OSU KBREC – Klamath Falls, OR

Planting Date: May 24

Harvest Date: October 7

Fertility: 100-50-250

Vine Kill Date: September 5

Days to Vine kill: 97

In-Row Spacing: 9.25 inch

The PYT-2 Chip Trial evaluates recently selected clones, often only two years removed from single-hill selection. Retained entries are further evaluated in replicated trials at several Oregon locations before advancing (if applicable) to the Tri-State trial which includes testing locations in Washington and Idaho. 14 selections were evaluated with 5 retained for further evaluation.

Clone	Female Parent	Male Parent
AORI6147-3	A01143-3C	A11506-1C
AORI6152-3	AC01151-5W	Etb 6-5-5
AORI6159-2	NDA081453CAB-2C	A11506-1C
AORI6159-4	NDA081453CAB-2C	A11506-1C
AORI6164-1	Lamoka	A11506-1C
AORI5304-7	A01143-3C	Lamoka
COORI7160-3	AC00206-2W	Lamoka
COORI7161-3	AC01144-1W	AC11494-6W
COORI7165-1	AC01151-5W	CO02321-4W
AORI5313-4	CO03243-3W	Sandy

2022 Preliminary Yield (PYT-2) Specialty Trial

Location: OSU KBREC – Klamath Falls, OR

Planting Date: May 24

Harvest Date: October 5

Fertility: 100-50-250

Vine Kill Date: September 1

Days to Vine kill: 97

In-Row Spacing: 9.25 inch

The PYT-2 Specialty Trial evaluates recently selected clones, often only two years removed from single-hill selection. Retained entries are further evaluated in replicated trials at several Oregon locations before advancing (if applicable) to the Tri-State trial which includes testing locations in Washington and Idaho. This trial included 3 standard varieties and 7 entries. The Oregon Potato Variety Development Team chose to advance 1 selections to the Statewide Specialty Trial in 2023 and discarded the remaining selections due to poor performance. **Only retained selections are listed in the following tables.**

Entry	Female Parent	Male Parent
POR20053-1	POR11PG48-1	ALASKA 15-3