University of Idaho Extension

Aberdeen Potato IPM Field Day

16 August 2023

With your smartphone camera, scan the QR Code below for the online PDF version of this booklet:

Projects highlighted (Principal Investigators):

Kasia Duellman, Ph.D., Seed Potato Specialist
Phillip Wharton, Ph.D., Potato Pathologist
Pamela J.S. Hutchinson, Ph.D., Potato Cropping Systems Weed Scientist
Xi Liang, Ph.D., Cropping Systems Agronomist
Rhett Spear, Ph.D., Potato Variety Development Specialist
Jonathan Whitworth, Ph.D., USDA Potato Pathologist

Aberdeen Potato IPM Field Day – August 16, 2023
Program Highlights

Table of Contents:

Potato Vine Kill Speed and Tuber Maturity at Application Time: Impact on Blackspot Bruising.

Pamela J.S. Hutchinson, Potato Cropping Systems Weed Research and Extension Specialist;
Brent R. Beutler, Research Associate, Potato Cropping Systems Weed Research and Extension Project.

Situation: Blackspot bruise is related to starch content in the tuber tissues. As potato vines mature/naturally senesce, the tubers belowground are maturing – sucrose is converting to starch. The higher the starch concentration, the greater likelihood of blackspot bruise.

Some potato varieties, such as Ranger Russet, are susceptible to blackspot bruise at lower starch concentrations than others e.g., Russet Burbank.

- Recommended vine kill time for R. Ranger is before natural senescence reaches 20% and for R. Burbank - when vines are approximately 40% senesced.

Should vine-kill speed be different for immature vs mature tubers in order to reduce incidence of blackspot bruise? Coordinating vine-kill timing and field harvest can be challenging. Growers in the Pacific Northwest have expressed concern that getting through harvest on a schedule influenced by many obstacles such as delay due to weather could result in the vine kill application past optimum % natural senescence for a given variety.

There are various vine-kill products that provide a relatively "fast-," "medium-," or "slow-kill." *Could a fast-kill product such as sulfuric acid stop sugar conversion quickly enough to still avoid a high amount of blackspot bruising in a sensitive variety*? *even if the timing is "too late?"*

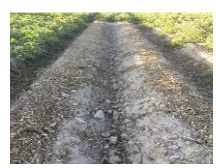
2021 IPC/2022 NPRC-funded vine kill speed x vine-kill timing field trial (non-funded repeat in 2023):

- Fast-kill, sulfuric acid; medium-kill Reglone® (diquat); slow-kill, Vida® (pyraflufen ethyl), (mowing was added in 2022) were applied to R. Burbank and R. Russet in at the UI Aberdeen R&E Center at two maturity timings:
  - 10% or less naturally senesced or when they were 40% senesced.
- Tubers were harvested from a treatment two weeks after 95% overall vine kill was achieved. Tubers from nontreated plots were also harvested for comparisons.
  - Average time to 95% vine kill was 3 days, 1 week, and 2 weeks for sulfuric acid, Reglone and Vida, respectively.

Ranger Russet vine kill 1 week after early-application timing.



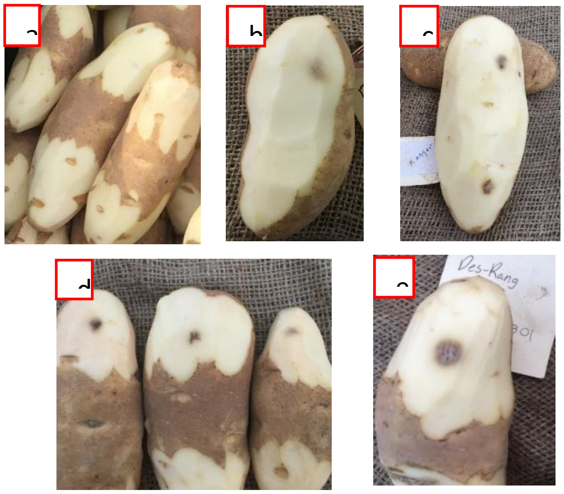




nontreated sulfuric acid Reglone Vida Mowing

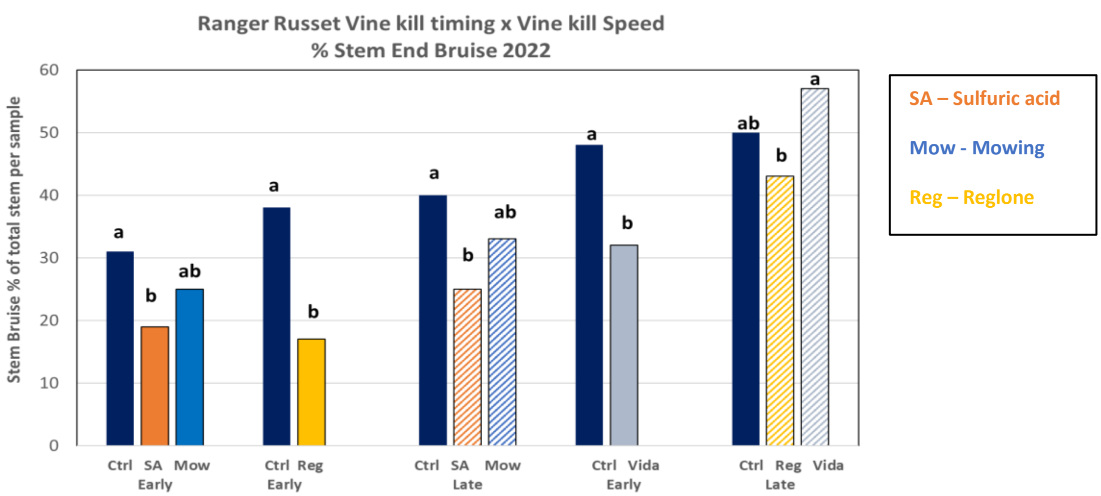
- Harvested tubers were subjected to impact by a dropped weight from a controlled height.
- After 24 to 48 hrs, tubers were peeled to assess incidence of blackspot bruising.

Results: *Vine-kill speed x vine kill timing research shows promise that bruise incidence is still relatively low when the fast vine-kill sulfuric acid is used on R. Russet with vines at 40% natural senescence* – mature i.e., *sugar conversion to starch stopped quick enough that bruise might be at an acceptable level.*



Ranger Russet tubers from the 2022 vine-kill speed x vine-kill timing study at the University of Idaho Aberdeen R&E Center: **a)** little to no blackspot bruise detected from fast vine-kill of sulfuric acid applied early (natural senescence at or less than 10%); **b)** blackspot bruise on tuber from sulfuric acid applied at the late-timing (40% senescence); **c)** Bruise on tuber from nontreated control harvested the same date as the late-timing sulfuric acid; **d)** blackspot bruising on tubers from Reglone or Vida applied at the late timing; **e)** tuber from the nontreated control harvested on the same date.

Stem end % bruise on Ranger Russet tubers at the UI Aberdeen R&E Center after harvest from sulfuric acid, mowing, Reglone, and Vida application at an early timing (10% or less natural senescence) or late timing (natural senescence 40%).



Potato Cropping Systems Weed Research and Extension Project – What else?

Weed Control with new and standard herbicides; **H**erbicide tolerance with new potato varieties; **F**ield demonstrations of 2- and 3-way herbicide tank mixtures for herbicide resistance management; Simulated excess rainfall – impact on potato herbicide injury; **H**erbicide sprinkler incorporation and chemigation; **H**erbicide Site of Action Demonstration - Multiple Crop Injury; **I**ntegrated pest management; IR-4 Quinoa Herbicide Screening;

Industrial Hemp Trials: planting timing x variety, fiber and dual-purpose hemp herbicide tolerance,

IR-4 trials.

Innovative Agriculture and Marketing Partnership (I-AMP)

Innovative Agriculture and Marketing Partnership

A Public, Private, Tribal Partnership building climate-smart markets and increasing the adoption of climate-smart practices in Idaho.

IAMP

iamp.uidaho.edu

About the I-AMP Idaho Project

I-AMP Idaho is a Public, Private, Tribal Partnership building climate-smart markets and increase adoption of climate-smart practices on more than 200 farms in Idaho through the provision of financial and technical assistance to producers, with a focus on **barley, beef, chickpeas, hops, potatoes, sugar beets and wheat.**

The U of I-led project will receive $55 million from the U.S. Department of Agriculture to fund the five-year effort. More than half of the funding will be used to incentivize Idaho's voluntary farmers and ranchers to adopt agronomic practices intended to improve soil health and keep greenhouse gases from entering the atmosphere.

At least 30% of project participants will represent underserved communities. Funded partners include the Idaho Association of Soil Conservation Districts, the Nez Perce and Coeur d'Alene Tribes, The Nature Conservancy Agriculture Program in Idaho, Desert Mountain Grassfed Beef and Arrowleaf Consulting.

FAQs

What is Climate Smart Agriculture?

Climate smart agriculture "aims to enhance the capacity of the agricultural systems to support food security, incorporating the need for adaptation and the potential for mitigation into sustainable agriculture development strategies."

Who is Eligibile To Participate?

Farmers and ranchers of Idaho's major commodities located anywhere in the state are eligible to apply.

How Can Farmers & Ranchers Get Involved?

The program aims to enroll 200 farmers and ranchers who may contact funded partners to enroll. Funded partners include the Idaho Association of Soil Conservation Districts, the Coeur d'Alene and Nez Perce tribes, the Nature Conservancy and Desert Mountain Beef.

What Resources Are Available To Help Me Implement These Practices?

Funded partners will provide technical expertise and site visits for participating producers. University of Idaho Extension will produce educational materials and bulletins. An online dashboard and portal will share research findings about climate smart practices through text, video, audio and interactive resources.

How Much Will The Program Pay Farmers & Ranchers?

Average program payments are estimated at $60 an acre dependent on the crop and the practice involved. Some combinations of crops and practices will pay more, and some will pay less.

Which Practices Are Eligible For Compensation?

Covered practices will include cover cropping, cover cropping with livestock grazing, reduced or no-till, interseeding, precision fertilizer application, and partial nitrogen fertilizer replacement with biochar, among others. Growers will get to pick which practices they would like to try from the final approved list.

Can Farmers & Ranchers Already Using These Practices Still Enroll?

Yes — however, producers who are already receiving funding for the same practice on the same acreage through another program will not be eligible for duplicate practices.

Find more information at https://iamp.uidaho.edu

SCAN ME

Benefits to Idaho's Farmers and Ranchers

- A win-win partnership — a win for the climate by reducing greenhouse gas emissions from our agriculture, and for growers by improving sustainability and profitability.
- Expanded markets and revenue streams for farmers and ranchers and commodities across the industry.
- Approximately 31,000-70,000 metric tons of carbon dioxide equivalents prevented from entering the atmosphere annually while replenishing organic matter in cropland soils.
- Generating data that will help inform future carbon credit trading for producers.
- Idaho's producers will be represented with all other funded projects nationwide through this program to inform policy for climate-smart agriculture and food systems.

Partners

Coeur d'Alene Tribe · Nez Perce Tribe · IASCD · The Nature Conservancy · Desert Mountain 100% Grass-Fed Beef · Arrowleaf Consulting

Supporting Partners

Commissions and Cooperatives

- Idaho Barley Commission
- Idaho Brewers United
- Idaho Potato Commission
- Idaho Wheat Commission
- Montana Seed Potato Certification
- Potato Sustainability Alliance
- Potatoes USA

Processing and Marketing Industry

- Amalgamated Sugar
- Anheuser-Busch
- Hillside Grains
- Idaho Brewers United
- JR Simplot Company
- Magic Valley Produce
- Mart Produce
- McCain Foods
- Zacca Hummus

Federal

- USDA-ARS (Pullman, Wa and Kimberly, Id)
- USDA-NRCS
- USDA-Climate Hub

Others

- Salmon Safe
- Wave Foundation

This project is funded by the U.S. Department of Agriculture, through its Partnerships for Climate-Smart Commodities Program, award ID # NR233A750004G038

Find more information at https://iamp.uidaho.edu

SCAN ME

Cereal Intercropping Systems Under Well-Watered and Drought-Stressed Conditions

Plant Sciences

Cereal Intercropping Systems under
Well-Watered and Drought-Stressed Conditions

Xi Liang

Department of Plant Sciences, University of Idaho,
Aberdeen Research & Extension Center
208-844-6319 xliang@uidaho.edu

Barley-Pulse Cropping Systems

Field Experiments to Incorporate Pulse Crops in Cropping Systems and Assess Soil Health and Plant Water Use Efficiency

- Objective:
  - Evaluate the effect of including pulses on barley production
  - Assess the impact of water stress on pulse-barley production and soil health
- Experimental design:
  - 2 water regimes: 100 and 50% ET throughout the growing season
  - 7 cropping systems

Pulse-Barley Cropping Systems

Treatment	Year 1 (2020)	Year 2 (2021)	Year 3 (2022)	Year 4 (2023)
Barley	Barley	Barley	Barley	Barley
Lentil-barley rotation	Lentil	Barley	Lentil	Barley
Chickpea-barley rotation	Chickpea	Barley	Chickpea	Barley
Pea-barley rotation	Pea	Barley	Pea	Barley
Lentil-barley intercropping	Lentil+barley	Lentil+barley	Lentil+barley	Lentil+barley
Chickpea-barley intercropping	Chickpea+barley	Chickpea+barley	Chickpea+barley	Chickpea+barley
Pea-barley intercropping	Pea+barley	Pea+barley	Pea+barley	Pea+barley

Grain Yield under Well-Watered Conditions

Treatment	2020		2021		Total	
	Barley	Pulse	Barley	Pulse	Barley	Pulse
	g m2					
Barley	686 b	—	301 ab	—	987 c	—
Lentil/barley	—	86.4 a	**501 c**	—	501 a	86.4 a
Pea/barley	—	450 b	**424 bc**	—	424 a	450 b
Lentil+barley	592 ab	25.5 a	209 a	42.9 a	732 b	68.4 a
Chickpea+barley	—	—	181 a	6.94 a	—	—
Pea+barley	524 a	71.3 a	232 a	98.0 b	756 b	170 a

Failed to establish chickpea plots due to soil-borne diseases in 2020.
Pulse seeds were treated with fungicide in 2021.

Grain yield under Drought-Stressed Conditions

Treatment	2020		2021		Total	
	Barley	Pulse	Barley	Pulse	Barley	Pulse
	g m2					
Barley	538	—	199	—	737 b	—
Lentil/barley	—	153 b	**250**	—	250 a	153 b
Pea/barley	—	373 c	**207**	—	207 a	373 c
Lentil+barley	546	11.7 a	159	21.4	704 b	33.1 a
Chickpea+barley	—	—	187	7.03	—	—
Pea+barley	470	37.2 a	163	22.5	633 b	60.0 ab

Average Grain Yield of Barley-Pulse Intercropping Treatments from 2020 to 2022

Cereal-Pea Intercropping Systems

Cereal-Pea Intercropping Systems as A Profitable Cropping Strategy to Organic Transitions and Soil Health

- Objective: to develop cereal-pulse intercropping systems under low water availabilities for enhancing agroecosystem sustainability and productivity

- Experimental design:
  - 2 water regimes: 100 and 50% ET throughout the growing season
  - 11 cropping systems: cereal-pea intercropping at different seeding rates

United States Department of Agriculture
National Institute of Food and Agriculture

Cereal-Pea Intercropping Systems

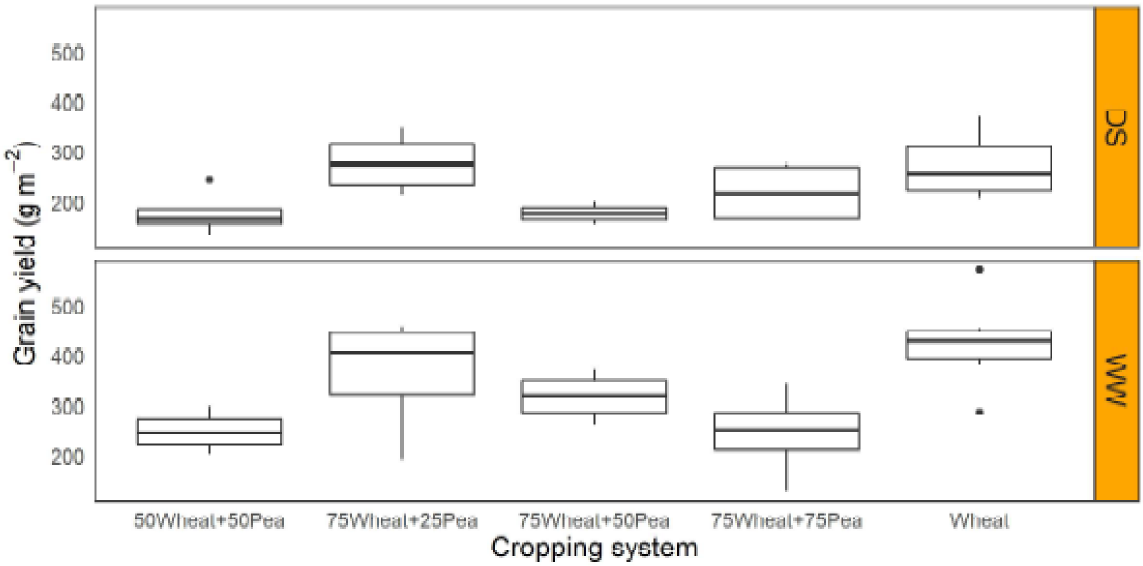
Treatment	Description
1	Monoculture wheat at the recommended seeding rate of 247 seeds/m^2
2	Monoculture barley at the recommended seeding rate of 198 seeds/m^2
3	Monoculture pea at the recommended seeding rate of 86 seeds/m^2
4-7	Wheat-pea intercropping at recommended seeding rates of[†] • 75% wheat + 75% pea • 75% wheat + 50% pea • 75% wheat + 25% pea • 50% wheat + 50% pea
8-11	Barley-pea intercropping at recommended seeding rates of • 75% barley + 75% pea • 75% barley + 50% pea • 75% barley + 25% pea • 50% barley + 50% pea

2 water regimes:
- 100% evapotranspiration (ET)
- 50% ET throughout the growing season

Monocropping wheat | 75% wheat + 75% pea | 75% wheat + 50% pea | 75% wheat + 25% pea | 50% wheat + 50% pea

Monocropping barley | 75% barley + 75% pea | 75% barley + 50% pea | 75% barley + 25% pea | 50% barley + 50% pea

Wheat Grain Yield under Drought-Stressed (DS) and Well-Watered (WW) Conditions in 2022

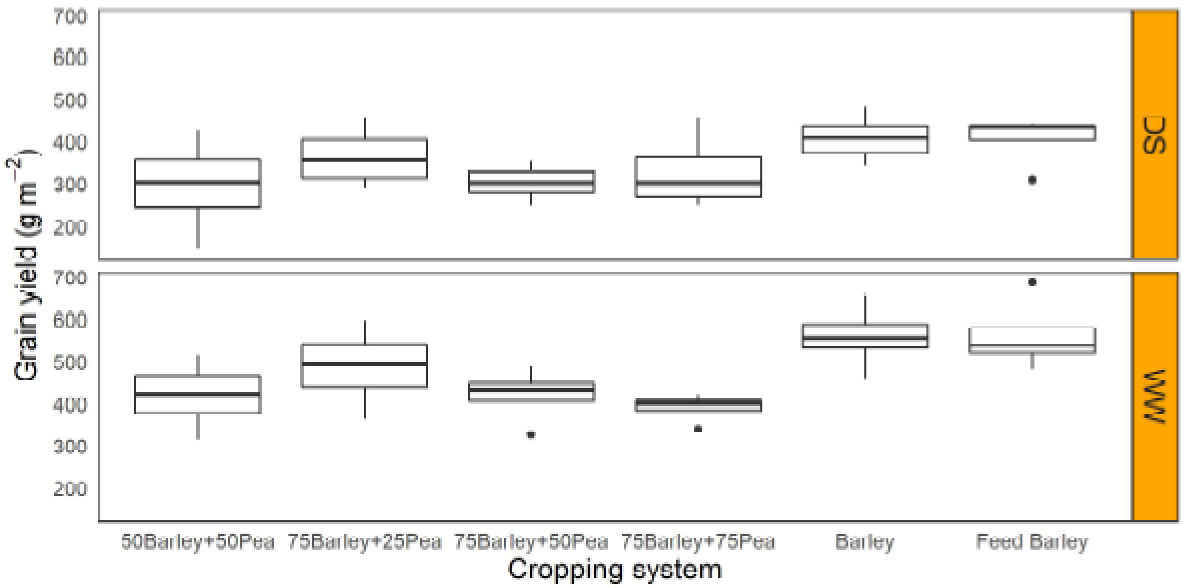


Wheat End-Use Quality in 2022

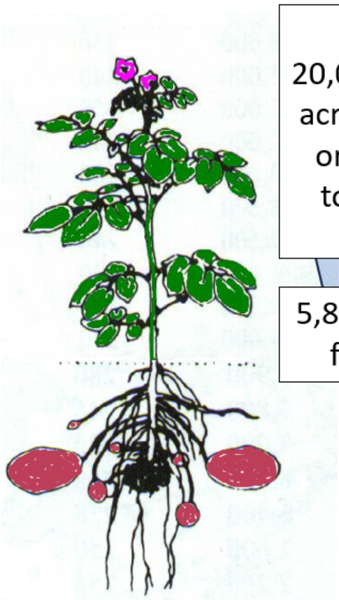
Wheat end-use quality analysis. Wheat grain is milled and sieved to measure flour yield, and the flour is evaluated for flour protein content and baking performance.

	Flour protein (%)	Four yield (%)	Cookie diameter (cm)
Cropping system			
Wheat	8.85	75.1	9.28
75Wheat+75Pea	9.26	74.8	9.14
75Wheat+50Pea	9.09	74.9	9.36
75Wheat+25Pea	8.85	75.2	9.31
50Wheat+50Pea	9.02	75.2	9.14
Water regime			
Drought-stressed	9.47	74.6	9.23
Well-watered	8.55	75.6	9.27
P-value			
Cropping system	0.573	0.671	0.034
Water regime	0.068	0.072	0.219
Cropping system × Water regime	0.654	0.931	0.144

Barley Grain Yield under Drought-Stressed (DS) and Well-Watered (WW) Conditions in 2022



The USDA-Ag Research Service Potato breeding program at Aberdeen



In 2022: 20,013 total seed acres, Aberdeen origin (18% of total US seed acres)

5,860 seed acres for Umatilla

<1 seed acre for Blazer

Umatilla Russet
Ranger Russet
Clearwater Russet
Alturas
Reveille Russet
Teton Russet (R to common scab and dry rot)
Mountain Gem Russet
Western Russet
Alpine Russet
Classic Russet
Pomerelle Russet (PMTV tolerant)
Castle Russet (R to PVY, TRV/Corky Ringspot, dry rot, PMTV tolerant)
GemStar Russet
Highland Russet
La Belle Russet
Huckleberry Gold (R to cyst nematode [golden] and PVX)
Echo Russet
Yukon Gem (R to late blight)
Payette Russet (R to PVY)
Rainier Russet
Defender (R to late blight)
Blazer Russet

Disease trials

Scab, Early blight, dry rot, soft rot, virus resistance, nematode resistance

Focus

Use: fries, fresh pack, specialty

Traits: high yield, tuber greening, protein, vitamin C, tuber quality (cold sweetening resistance), virus resistance (PVY and PMTV)

Size of program

START - 100,000+ single hills (1st year from greenhouse material)

END - 12-15 years to produce a variety - some as early as 8 years.

People

Breeder/Geneticist, Pathologist, Molecular Biologist, 6 Technicians

Spore trap network in southern Idaho

James Woodhall, Phillip Wharton, Kasia Duellman

Monitoring for airborne spores of plant pathogens

Disease forecasting is a fundamental component of integrated disease management. The southern Idaho spore trap network has been in place since 2018 and is led by Dr. James Woodhall, Associate Professor and Plant Pathologist at the UI-Parma Research & Extension Center. The 2023 network consists of nine Burkard multi-vial cyclone samplers placed across southern Idaho. These traps capture airborne spores into small plastic vials. Weekly, vials are collected and sent to Dr. Woodhall's lab where the contents are subjected to molecular assays designed to detect specific pathogens. Email James Woodhall (jwoodhall@uidaho.edu) if you are interested in being added to the weekly updates for the southern Idaho spore trapping network.

Pathogens monitored:

Crop	**Pathogens monitored**
Potato	Late blight pathogen, early blight pathogen
Sugar beet	Powdery mildew pathogen, Cercospora leaf spot pathogen
Onion	Stemphyllium blight pathogen

The presence of late blight spores in conjunction with the Critical Humidity Period (CHP; two consecutive days with relative humidity above 80% for 10 hours) substantially increases risk of late blight developing in southern Idaho, especially when the crop is at row closure and beyond. Preventative foliar fungicide sprays are recommended to protect the crop against late blight, and applications should begin before symptoms are observed because the pathogen can infect, cause symptoms, and produce more infective spores in a matter of days if conditions are right.

Potato late blight management recommendations

Scan the QR code below (by turning on your camera on your cell phone and focusing it on the QR Code) to access an article from 2020 by Phillip Wharton giving scouting and fungicide recommendations for late blight management.

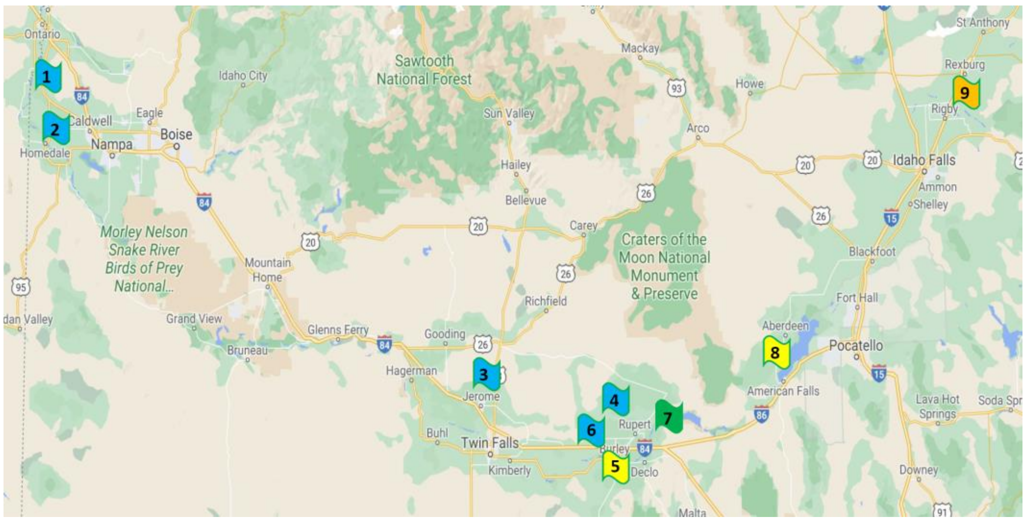
Late Blight Spore Monitoring results for week of July 31, 2023:

Spore Risk Assessment Key		
Color	**Risk**	**Description**
Green	Low	No spores detected this week
Blue	Elevated	No spores detected this week, but have been detected previously in the season
Yellow	Moderate	Spores detected at least one day this week
Orange	High	Spores detected over two consecutive weeks
Red	Severe	Active disease confirmed in the area

Weather Risk Assessment Key		
Color	**Risk**	**Description**
Green	Low	No day with a CHP observed (10 hours at RH 80% or more)
Blue	Elevated	One day with a CHP observed
Yellow	Moderate	Two consecutive days each with CHPs
Orange	High	Two consecutive weeks each with two consecutive CHP days
Red	Severe	Active disease confirmed in the area

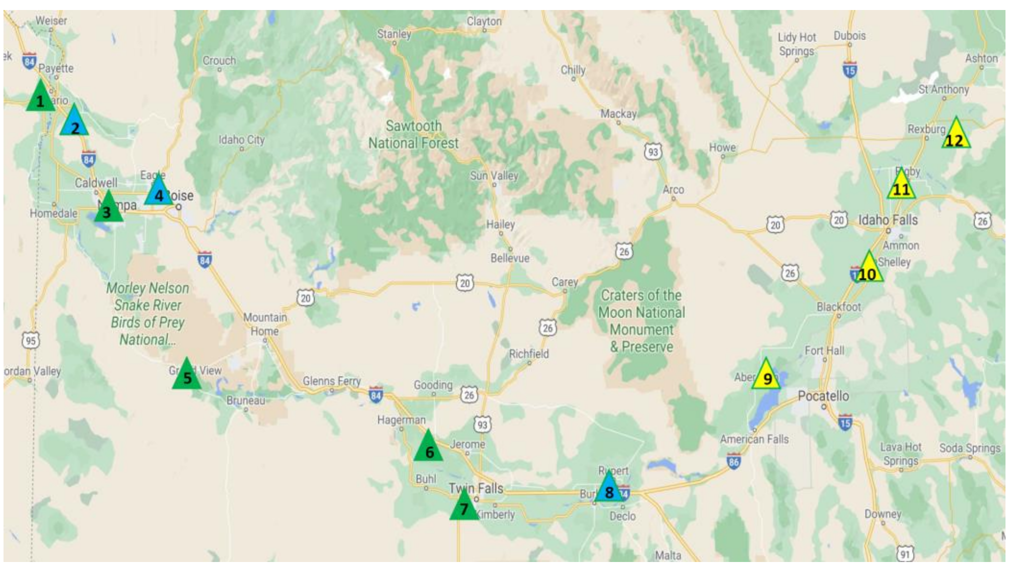
2023 Spore sites

1 Parma REC
2 Wilder
3 Jerome
4 North of Paul
5 South of Paul
6 West of Paul
7 Acequia
8 Aberdeen
9 Rexburg



2023 Weather Stations

1 Ontario – Agrimet
2 Parma REC – Agrimet
3 Nampa – Agrimet
4 Boise – Agrimet
5 Grandview – Agrimet
6 Twin Falls – Agrimet
7 Kimberly – Agrimet
8 Rupert – Agrimet
9 Aberdeen – Agrimet
10 Shelley – Agrimet
11 Rigby – Agrimet
12 Rexburg – Agrimet



Integrated Potato virus Y Management

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

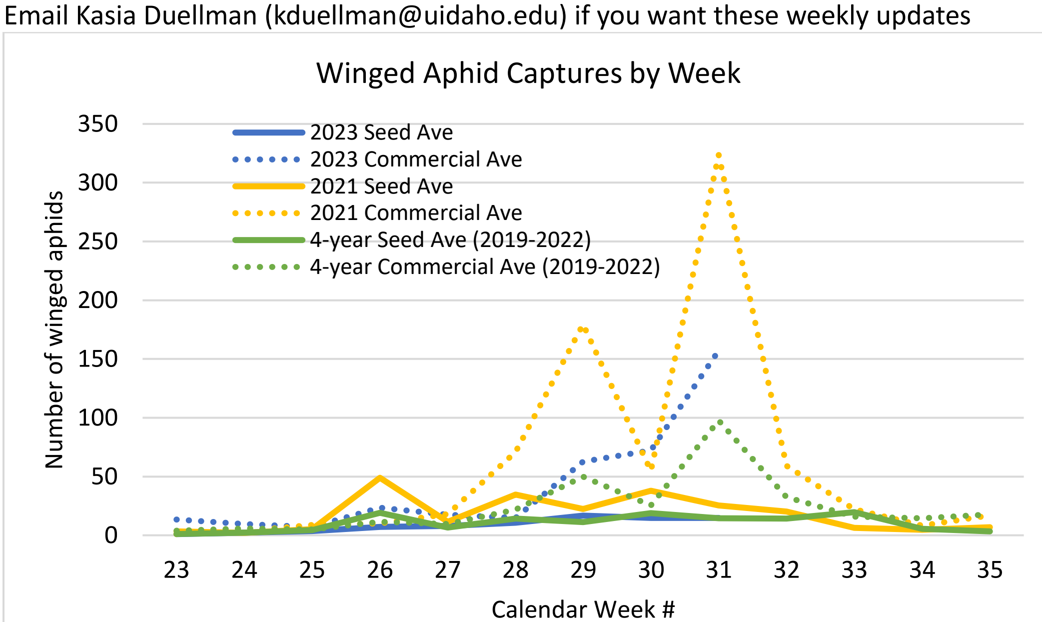
Background: Many species of aphids can vector PVY. Colonizing aphids are most efficient at vectoring PVY. However, the non-colonizing aphids are considered more important in vectoring PVY because these "transient" aphids are moving from potato plant to potato plant as they try to find a suitable host (they don't like potato, so they move around, probing to find a plant they like). Because of how aphids transmit PVY, insecticides alone are not effective: The aphid can pick up the virus on its mouthpart and transmit it within minutes, before an insecticide kills the aphid. (This contrasts with Potato leaf roll virus – PLRV – which can be effectively managed with insecticides alone due to how PLRV is vectored.)

Managing PVY requires a **multi-pronged (integrated)** approach. Recommendations for the seed potato grower include the following:

- Planting seed with less than 1% PVY (as close to zero as possible)
- Rogueing early
- Using some of the newer insect repellant or behavior-altering pesticides or systemic insecticides (like imidacloprid) in conjunction with other practices (don't rely on insecticides alone – you'll be disappointed)
- Implementing a mineral oil regimen (additional research is currently underway at University of Idaho with Erik Wenninger's program at the Kimberly REC)
- Using crop borders (with plants that stay green as long as the potato crop, such as winter wheat planted in spring) (efficacy in Idaho not yet known)
- Planting less susceptible varieties (often not an option due to market demands)
- Killing vines early (however, unpublished research from my program suggests this practice does not reduce PVY in daughter tubers grown in Idaho)
- Use of straw mulch or other types of mulches (efficacy in Idaho not yet known)

Current PVY-related research projects of the Seed Potato Research & Extension Program at UI:

1. **Aphid monitoring network**
   Email Kasia Duellman (kduellman@uidaho.edu) if you want these weekly updates



2. **Attractiveness of different potato varieties to non-colonizing aphids**
Hypothesis: non-colonizing aphids may be attracted to some potato varieties more than others, thus increasing PVY risk for those varieties.

<u>Preliminary experiment in 2023:</u>

- 'Russet Burbank' vs 'Ranger Russet'
- RCBD, four reps; Plot size: two rows, each 100 feet long (12" within-row and 3' between-row spacing)
- Approach: Count number of aphids attracted to each plot, using yellow sticky traps
- FUTURE MODIFICATION: Plots will be square (e.g., 4 rows by 50 feet) rather than rectangular since aphids are not precise fliers and since two-row "islands" of different potato varieties may not be sufficient to differentially attract aphids
- **What varieties should we examine in the future?** Email Kasia Duellman with your suggestions (kduellman@uidaho.edu)

3. **Timing of in-season movement of PVY** ("Row Cover" experiments)

a. Aberdeen – Year 1 (2023)
This is the first year of this experiment to determine late-season risk. Question: Does PVY move into tubers when plants are exposed to the virus (via aphids) in August? Will our data support the **assumption** that late-season aphid flights jeopardize seed crops in terms of increasing risk of PVY in daughter tubers? <u>Stay tuned</u> for future status reports.

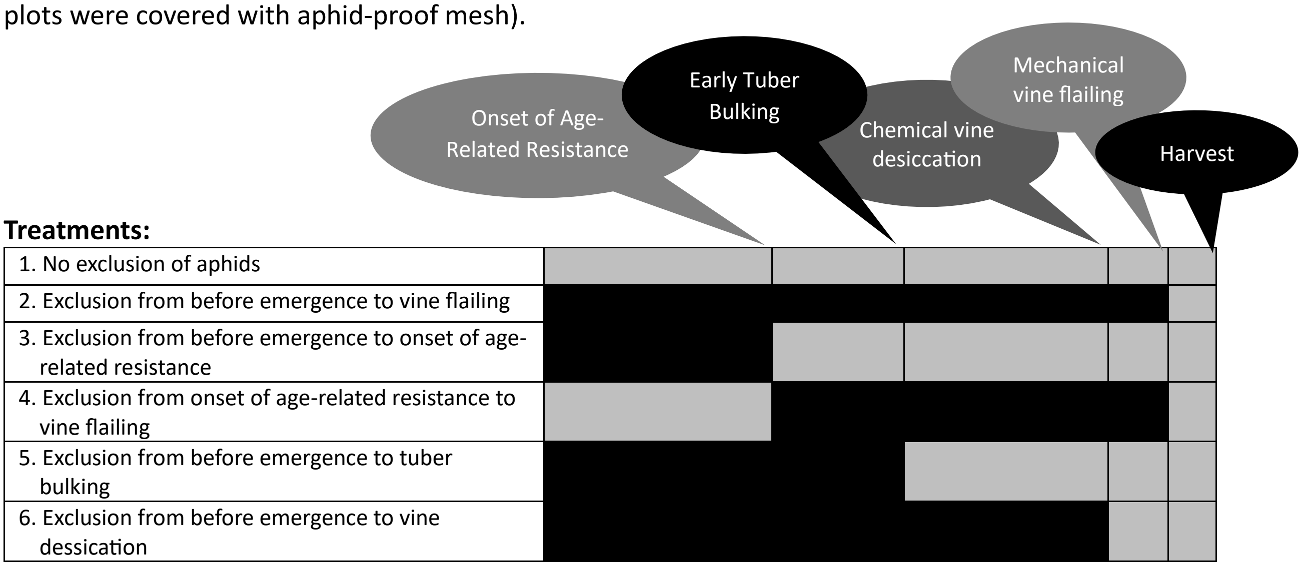
Treatments:	Before emergence to August 1	August 1 to vine-beating
1. No cover all season		
2. Covered all season		
3. Covered through July		
4. No cover through July		

b. Kimberly – Year 3 (2021, 2022 and 2023)
This experiment was established at the Kimberly REC. On the next page, you can view a summary of the 2021 and 2022 seasons. We wanted to know if plants are susceptible to PVY under field conditions when presumed Age-Related Resistance has kicked in, and to garner Insight into when mineral oil applications should begin and end.

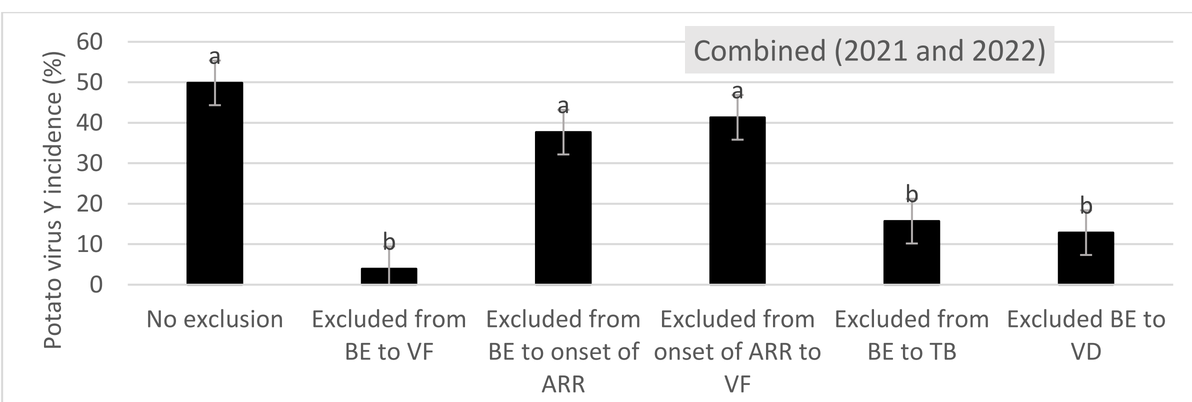
Timing of in-season movement of Potato virus Y – Kimberly, Idaho (2021 and 2022 data)

Kasia Duellman, Seed Potato Specialist and Plant Pathologist
Melinda Lent, Research Specialist
Lindsey McKinney, Research Aide
Cong Liu, Research Aide
Erik Wenninger, Entomologist

For this experiment (established at the Kimberly REC), we used aphid-proof mesh to exclude aphids at different times during the growing season, as shown in the schematic chart below (gray indicates timing when plots were exposed/not covered to naturally-occurring aphids; black corresponds to timing when plots were covered with aphid-proof mesh).



Effects of **aphid exclusion** at different times during the growing season (2021 and 2022) on incidence of post-harvest Potato virus Y in daughter tubers are shown in the Chart below. Columns with the same letter do not differ based on pairwise comparisons (alpha=0.05). We will include 2023 in the analysis once we have the data (2023 will be our third and final year for this experiment).



BE = before emergence; VF = mechanical vine flailing; ARR = age-related resistance; TB = early tuber bulking; VD = chemical vine desiccation. Bars represent the standard error of the least squares means.

Integrated management of Fusarium dry rot (Fusarium seed decay)

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

Fusarium dry rot is also known as Fusarium seed decay when it occurs on seed during seed preparation or after planting. Several different species of fungi in the genus *Fusarium* can cause this disease. The pathogens require wounds, so any integrated Fusarium dry rot management program begins with optimized handling practices that reduce bruise and shatter.

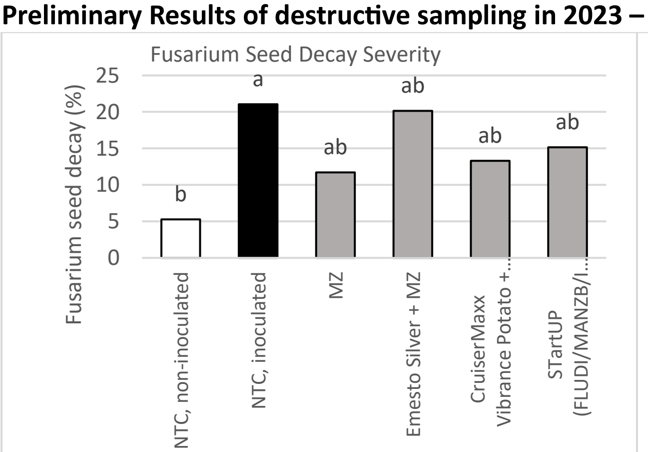
Fusarium management – efficacy of seed treatments

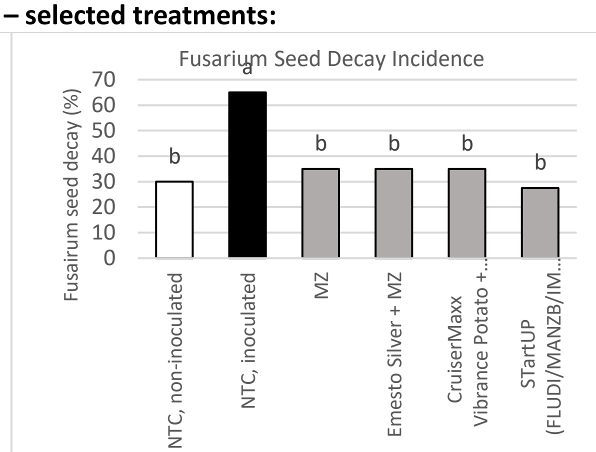
Design: RCBD
Plot size: two 25’ rows (within row spacing: 12”; between-row spacing: 3’)
Total number of treatments: 18
Only the following **6 treatments** are highlighted for today; the remaining 12 treatments represent products not yet labeled for use on potato. **Reps 3 and 4** are available to view.

Seed cutting, treating, inoculation date: May 11
Planting date: May 17
Hilling + systemic insecticide application: June 13
Herbicide (pre-emergence) applied: June 15
Date of full emergence: June 20
Destructive sampling: July 11

Trt No.	Seed Treatment	Rate (applied to cut seed)	Plot Number (by Rep)			
			1	2	3	4
1	Non-treated, non-inoculated control	None	109	204	318	406
2	Non-treated, inoculated control	None	105	210	307	417
3	Mancozeb dust (6%) plus bark	1 lb/cwt	114	217	306	409
6	Emesto Silver Mancozeb dust (6%) plus bark	0.3 fl oz/cwt 1 lb/cwt	113	205	306	401
8	CruiserMaxx Vibrance Potato Mancozeb dust (6%) plus bark	0.5 fl oz/cwt 1 lb/cwt	118	207	317	404
12	STartUP FLUDI + STartUP MANZB + STartUP IMIDA Blank bark	0.08 fl oz/cwt 1.92 fl oz/cwt 0.325 fl oz/cwt 1 lb/cwt	103	212	310	403

Preliminary Results of destructive sampling in 2023 – selected treatments:



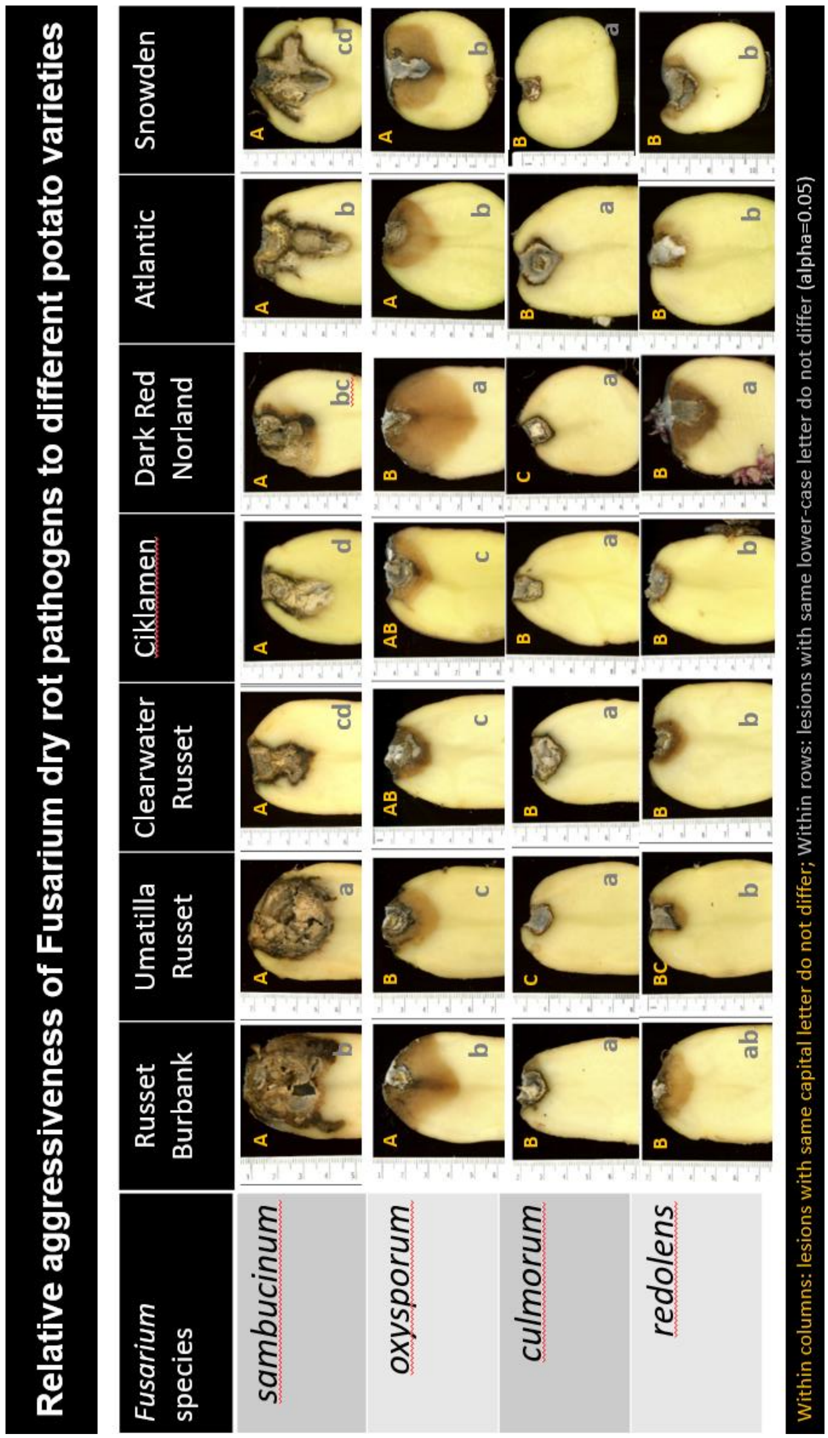


Columns with the same letter do not differ (alpha=0.05). Generally, use of seed piece treatments leads to better stands and improved yields, but year-by-year results can vary.

The role of variety selection and Fusarium dry rot management

Christy Christian (PhD – 2023, UI) and **Kasia Duellman**

Work completed by Christy Christian (Ph.D., UI – 2023) as part of her dissertation suggested that different species of Fusarium dry rot pathogens affect potato varieties differently. If the predominant pathogen species in your operation is known, you may be able to avoid highly susceptible varieties. The chart below summarizes how potato variety and species of pathogen may interact. Note: The most prevalent species in our region are *Fusarium sambucinum* and *Fusarium oxysporum*.



The value of seed treatments to manage Fusarium seed decay – A 10-year view

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

With the long view in mind, seed treatments lead to reduced seed decay and improved yields. Seed type may also be a rational component of an integrated disease management approach for Fusarium seed decay. Over a ten-year study, our data demonstrate the value of using single-drop whole seed to help manage Fusarium seed decay and improve yield. However, the biggest improvement in reducing seed decay and improving yield was from using a fungicide seed treatment, regardless of seed type. The results of this ten-year study were published in the American Journal of Potato Research in 2021.

American Journal of Potato Research (2021) 98:315–327
https://doi.org/10.1007/s12230-021-09845-0

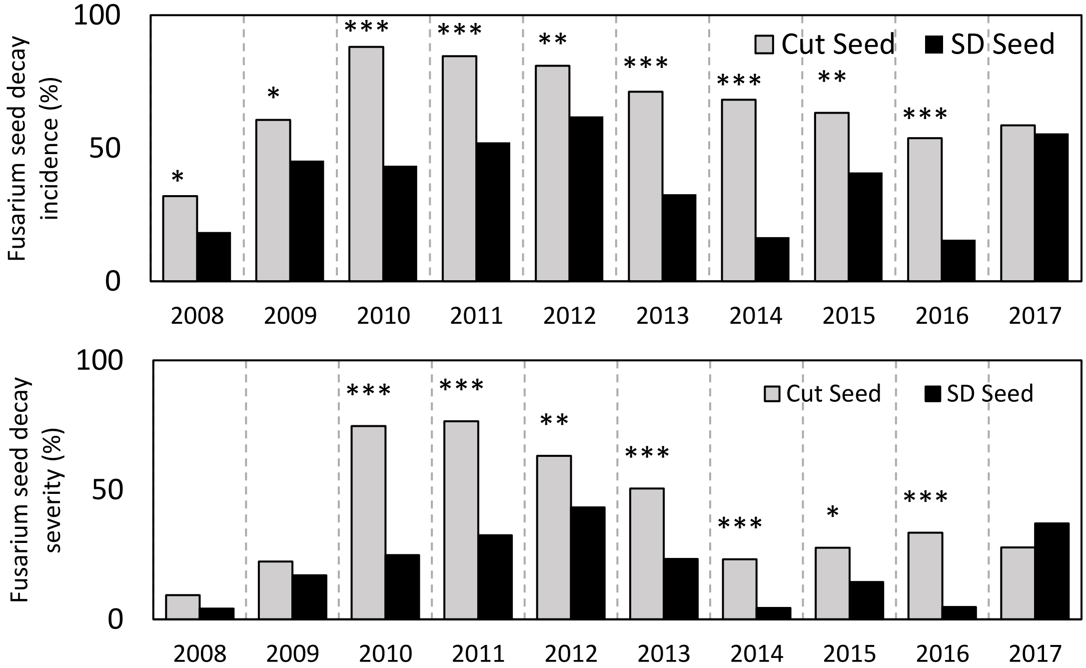
Fungicide Seed Treatment Improves Performance of Single-Drop Whole and Cut Seed Potatoes

Kasia M. Duellman[1] · William J. Price[2] · Melinda A. Lent[1] · Christy L. Christian[1] · Melissa C. Bertram[1] · Phillip Nolte[1]

Accepted: 17 August 2021 / Published online: 16 September 2021

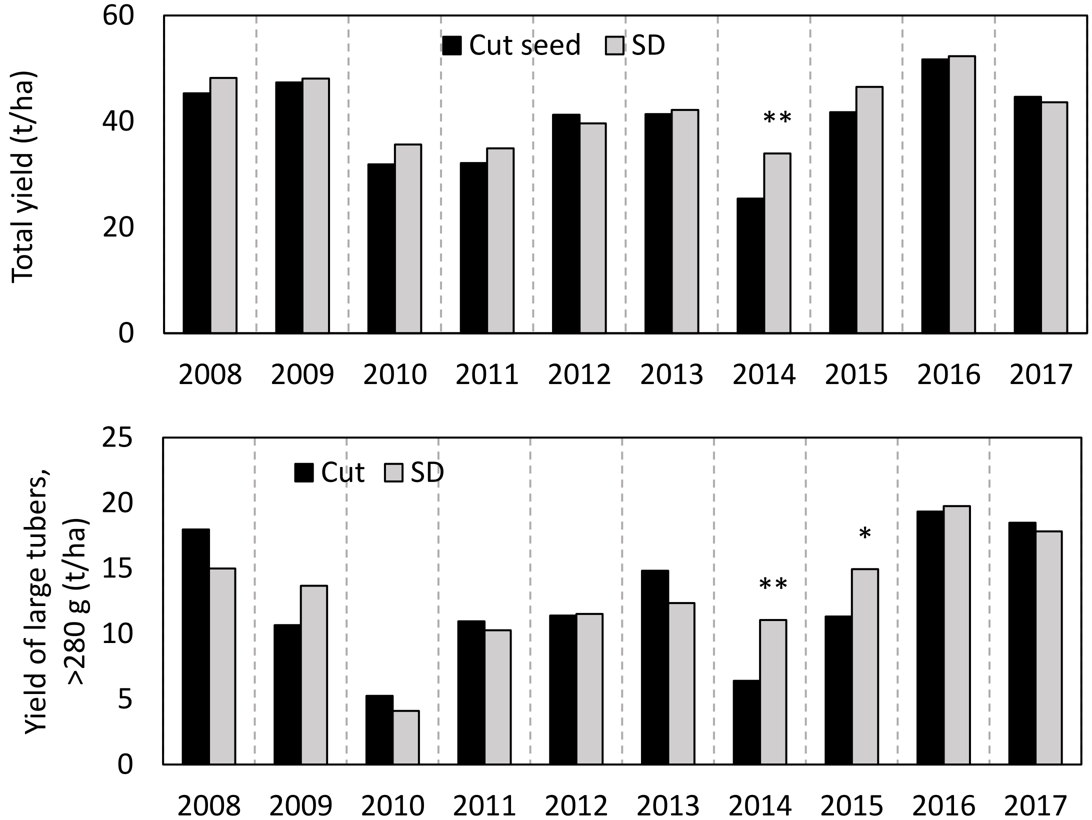
The following charts are adapted from this paper.

Effect of Cut Seed vs. Single Drop (whole) Seed on Fusarium Seed Decay (year x seed type interaction)



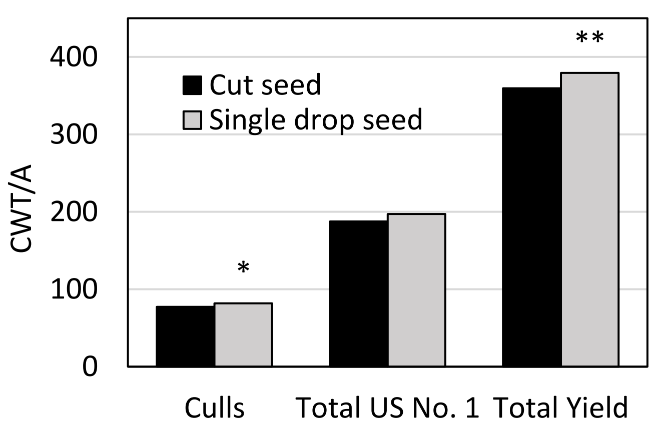
Differences in Fusarium seed decay incidence and severity for single drop (SD) seed (small, whole tubers 50-70g) compared to cut seed in potato cultivar 'Russet Burbank' for the year × seed type interaction (2008-2017).

Effect of Cut Seed vs. Single Drop Seed on yield (t/ha) of large tubers (>10 oz)
(year x seed type interaction; regardless of fungicide treatment)



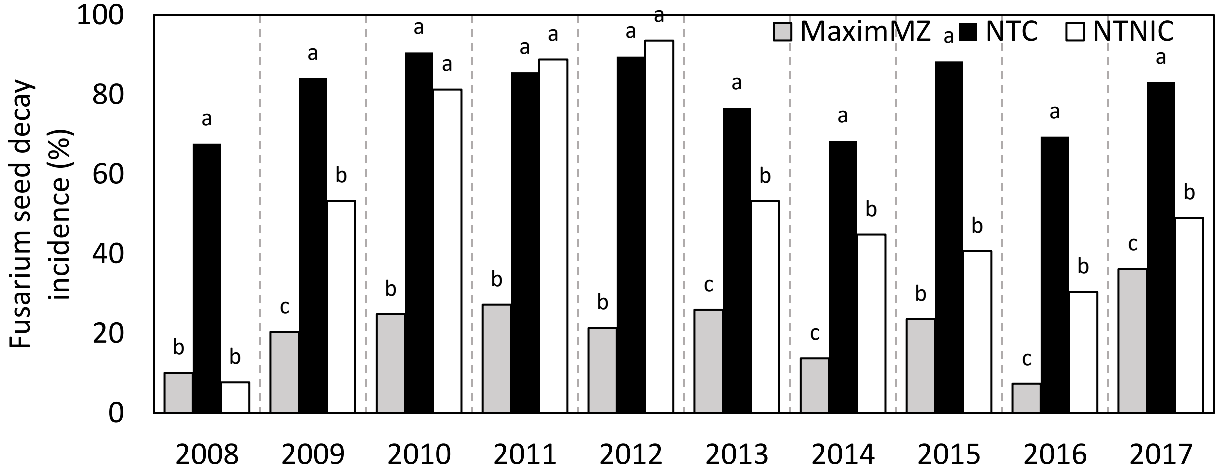
Differences in yield (t/ha) of large tubers (>280) of plants grown from single drop (SD) seed (small whole tubers, 50-70 g) compared to cut seed pieces in potato cultivar 'Russet Burbank' for the year × seed type interaction (2008-2017). **To convert t/ha to cwt/A, multiply by 8.9218.**

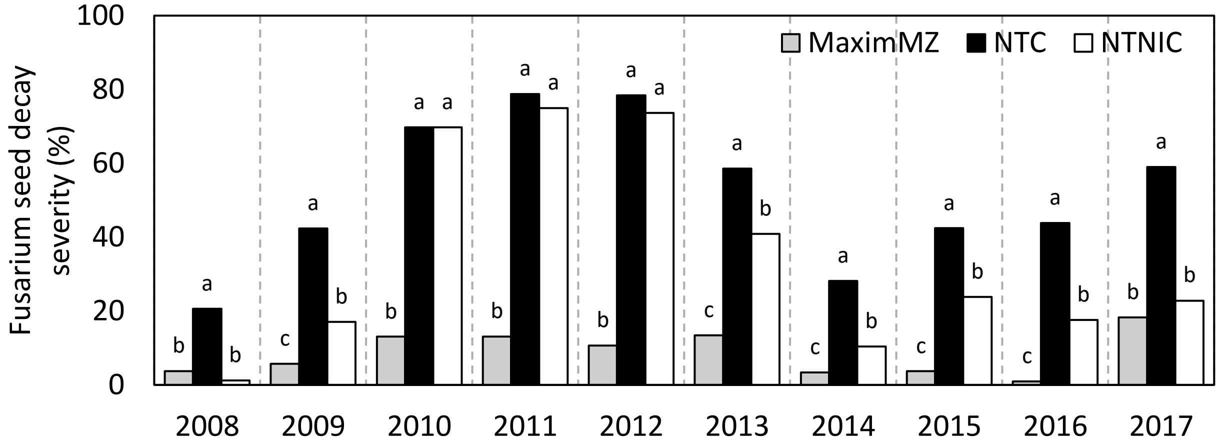
Effect of Cut Seed vs. Single Drop Seed on components of yield
(across all 10 years of the study combined, regardless of fungicide seed treatment)



Within yield category (culls, Total US No. 1, or Total Yield), * and ** indicates the yield of Single Drop treatment is significantly higher than that of Cut Seed (at $P<0.05$ and $P<0.001$, respectively).

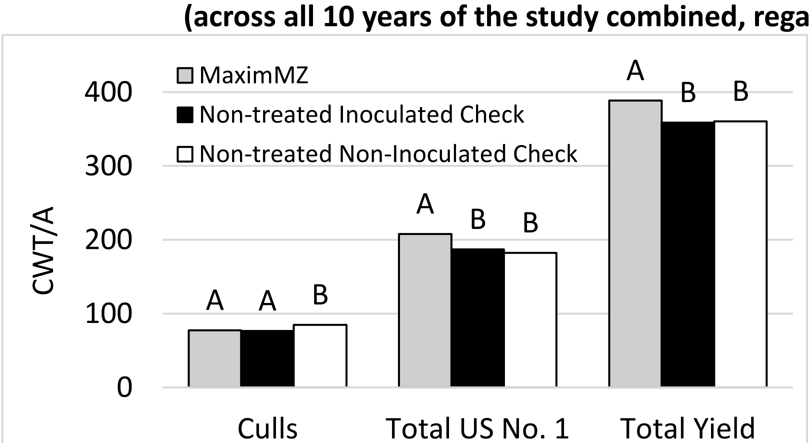
Effect of fungicide seed treatment on Fusarium seed decay (year x seed type interaction)





Differences in Fusarium seed decay incidence and severity in potato cultivar 'Russet Burbank' for the year × seed treatment interaction (2008-2017). NTC = non-treated, inoculated control; NTNIC = non-treated, non-inoculated control. Within years, columns followed by the same letter do not differ (alpha=0.05)

Effect of MaximMZ on components of yield
(across all 10 years of the study combined, regardless of seed type)



Within yield category (culls, Total US No. 1, or Total Yield), columns followed by the same letter do not differ based on pairwise comparisons (alpha=0.05).

In-furrow and foliar biological, fertility, and plant health trial

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

This is our annual NON-INOCULATED trial that allows us to evaluate biological options to manage Rhizoctonia diseases under lower disease pressure compared to our inoculated trial. Since this trial is NON-INOCULATED, it also gives us the opportunity to evaluate "plant health" products and supplemental "fertility" products and their impacts on tuber yield and quality.

Design: RCBD
Plot size: two 25' rows (within row spacing: 12"; between-row spacing: 3')
Total number of treatments: 11 (products not yet available are given coded descriptions)

Seed cutting/treating date: May 9
Plant/In-furrow applications: May 18
Hilling/insecticide: June 13
Pre-emergent herbicides: June 15
Emergence: June 6-26

Trt No.	Treatment	Rate	Application timing	Plot Number (by Rep)			
				1	2	3	4
1	Non-treated control	NA	NA	108	203	308	402
2	Mancozeb (6%)	1 lb/cwt	Seed treatment	104	207	302	408
3	Mancozeb (6%) Quadris	1 lb/cwt 0.80 fl oz/1000' row	Seed treatment In-furrow	106	204	311	403
4	Mancozeb (6%) Minuet	1 lb/cw 24 oz/Acre	Seed treatment In-furrow	105	205	305	407
5	Mancozeb (6%) Biological	1 lb/cwt 10 g/A	Seed treatment In-furrow	101	206	307	410
6	Mancozeb (6%) Plant Health A Plant Health A Plant Health A	1 lb/cwt 250 ml/A 250 ml/A 250 ml/A	Seed treatment July 5 (0-10% bloom) July 19 (2 weeks later) Aug 2 (2 weeks later)	110	211	304	404
7	Mancozeb (6%) Plant Health A Plant Health A	1 lb/cwt 250 ml/A 500 ml/A	Seed treatment July 5 (0-10% bloom) July 19 (2 weeks later)	311	102	310	406
8	Sanitizer P-Vent	(1.0 % v/v) 0.9 lb/A	Seed treatment In-furrow	109	201	309	401
9	Mancozeb (6%) Seed treatment A Seed treatment D Plant Health B Plant Health B	1 lb/cwt 0.25 oz/cwt 3 oz/cwt 1 gal/A 1 gal/A	Seed treatment Seed treatment Seed treatment In-furrow At hilling	102	210	306	405
10	Mancozeb (6%) Seed treatment B Seed treatment D Plant Health C Plant Health C	1 lb/cwt 0.25 oz/cwt 3 oz/cwt 1 gal/A 1 gal/A	Seed treatment Seed treatment Seed treatment In-furrow At hilling	107	209	303	409
11	Mancozeb (6%) Seed treatment C Seed treatment D Plant Health D Fertility A Fertility A	1 lb/cwt 0.25 oz/cwt 3 oz/ cwt 2 gal/A 1 gal/A 1 gal/A	Seed treatment Seed treatment Seed treatment In-furrow At row closure (July 19) Aug 2	103	208	301	411

Rhizoctonia diseases – Efficacy of seed and in-furrow treatments

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

This annual soil-INOCULATED trial evaluates efficacy of seed and in-furrow treatments on reducing Rhizoctonia diseases (Rhizoctonia canker and black scurf).

Design: RCBD
Plot size: two 25' rows (within row spacing: 12"; between-row spacing: 3')
Total number of treatments: 22

Only the following **10 treatments** are highlighted for today; the remaining 12 treatments represent various products not yet labeled for use on potato.

Reps 3 and 4 are available to view.
Seed cutting and treating date: May 10
Planting and soil inoculation date: May 22
Hilling + systemic insecticide application: June 13
Herbicide (pre-emergence) applied: June 15
Date of full emergence: week of June 26
Destructive sampling: July 17-19

Trt No.	Treatment	Rate	Application timing	Plot Number (by Rep)			
				1	2	3	4
1	Non-treated, non-inoculated CHECK	NA	NA	114	203	307	418
2	Non-treated, inoculated CHECK	NA	NA	115	220	310	405
3	Mancozeb dust (6%) plus fir bark Quadris	1 lb/cwt 0.80 fl oz/1000' row	Seed treatment In-furrow	103	211	312	415
5	Emesto Silver Mancozeb dust (6%) plus bark	0.3 fl oz/cwt 1 lb/cwt	Seed treatment Seed treatment	104	206	305	402
7	CruiserMaxx Vibrance Potato Mancozeb dust (6%) plus bark	0.5 fl oz/cwt 1 lb/cwt	Seed treatment Seed treatment	106	212	303	403
11	STartUP FLUDI STartUP MANZB STartUP IMIDA Blank bark	0.08 fl oz/cwt 1.92 fl oz/cwt 0.33 fl oz/cwt 1 lb/cwt	Seed treatment Seed treatment Seed treatment Seed treatment	112	215	316	410
18	Velum Prime	6.50 oz/A	In-furrow	101	214	309	411
20	Elatus 45 WG	6.40 oz/A	In-furrow	110	205	313	407
21	Quadris	0.80 fl oz/1000' row	In-furrow	120	217	320	421
22	Velum Prime Elatus 45 WG	6.50 oz/A 6.40 oz/A	In-furrow In-furrow	122	210	317	422

Aerial stem rot and soft rot management – foliar applications of copper products

Kasia Duellman, Seed Potato Specialist and Plant Pathologist

Design: RCBD (5 reps)
Plot size: two 25' rows (within row spacing: 12"; between-row spacing: 3')
Total number of treatments: 6

Cut and treat seed (Mancozeb 6% plus bark): May 30

Planting date: May 30
Hilling + neonicotinoid: June 13
Pre-emergent herbicides: June 15
Foliar copper application: August 4
Raking: August 4
Inoculation: August 4

Trt No.	Treatment	Rate	Application timing	Plot Number (by Rep)				
				1	2	3	4	5
1	Non-treated, non-raked, non-inoculated – CHECK			106	204	304	406	502
2	Non-treated, non-raked, inoculated – CHECK			101	206	303	401	504
3	Copper (Badge) Raked Inoculated	2.5 pt/A	Foliar	102	202	306	402	506
4	Raked only – CHECK (Non-inoculated)			105	203	301	405	505
5	Raked Inoculated			103	201	305	403	503
6	Copper (Previsto) Raked Inoculated	3 pt/A	Foliar	104	205	302	404	501

Contact Information

Kasia Duellman, Ph.D.

Associate Professor, Seed Potato Specialist and Plant Pathologist, University of Idaho

Email: kduellman@uidaho.edu
Office phone: 208-757-5476
Mobile: 701-793-9456
Office and Lab location/Mailing and Shipping address:
University of Idaho – Idaho Falls Research & Extension Center
1776 Science Center Drive, Suite 205
Idaho Falls, Idaho 83402

Pamela J.S. Hutchinson, Ph.D.

Associate Professor and Potato Cropping Systems Weed Scientist, University of Idaho

Email: phutch@uidaho.edu
Office phone: 208-844-6318
Office/Lab/Mailing/Shipping Address:
Aberdeen Research and Extension Center
University of Idaho
1693 S 2700 W
Aberdeen, ID 83210

Xi Liang, Ph.D.

Associate Professor and Cropping Systems Agronomist, University of Idaho

Email:
Office phone:
Office/Lab/Mailing/Shipping Address:
Aberdeen Research and Extension Center
University of Idaho
1693 S 2700 W
Aberdeen, ID 83210

Rhett Spear, Ph.D.

Assistant Professor and Potato Variety Development Specialist, University of Idaho

Email:
Office phone:
Office/Lab/Mailing/Shipping Address:
Aberdeen Research and Extension Center
University of Idaho
1693 S 2700 W
Aberdeen, ID 83210

Phillip Wharton, Ph.D.

Associate Professor and Potato Pathologist, University of Idaho

Email: pwharton@uidaho.edu
Office phone: 208-844-6317
Office/Lab/Mailing/Shipping Address:
Aberdeen Research and Extension Center
University of Idaho
1693 S 2700 W
Aberdeen, ID 83210

Jonathan Whitworth, Ph.D.

Potato Pathologist, USDA-ARS

Email:
Office phone:
Office/Lab/Mailing/Shipping Address:
Aberdeen Research and Extension Center
University of Idaho
1693 S 2700 W
Aberdeen, ID 83210

How did we do today?

Please take a moment to fill out any evaluations you receive today and leave the filled-out forms with a member of the Seed Potato Team. Alternatively, scan the QR code at the right to fill out an online version. Your feedback helps us improve our programming for you.

Sign up

to receive email alerts from the

Pacific Northwest Pest Alert Network

Scan the QR code below (open your phone camera, point it at the QR Code, and then follow instructions that appear in the viewer screen to access the web link):

Pacific Northwest *Pest* ***Alert*** *Network*

University of Idaho
Extension

Thank you for taking time out of your busy schedules to attend the

Aberdeen Potato IPM Field Day

August 16, 2023