



# Potato Plant Establishment

Mark Pavek

WASHINGTON STATE  
UNIVERSITY



## Plant Establishment

- Goals
  - 100% Ground Cover
    - Quick, uniform emergence
    - Healthy plants
  - Adequate planting depth
  - Proper row width and in-row spacing
  - Proper hill shape and size
  - Prevent/avoid soil compaction

A close-up photograph of several potato tubers, showing their characteristic shape and light brown skin. The tubers are arranged in a way that creates a textured, slightly blurred background.

## You must get it right at planting

- Management
- Quality seed
  - Low rot, minimal disease, vigorous
- Certified seed
- Proper seed size and preparation
- Seed treatments to prevent disease, rot
- Proper soil conditions and temperature

A close-up photograph of several potato tubers, showing their characteristic shape and light brown skin. The tubers are arranged in a way that creates a textured, slightly blurred background.

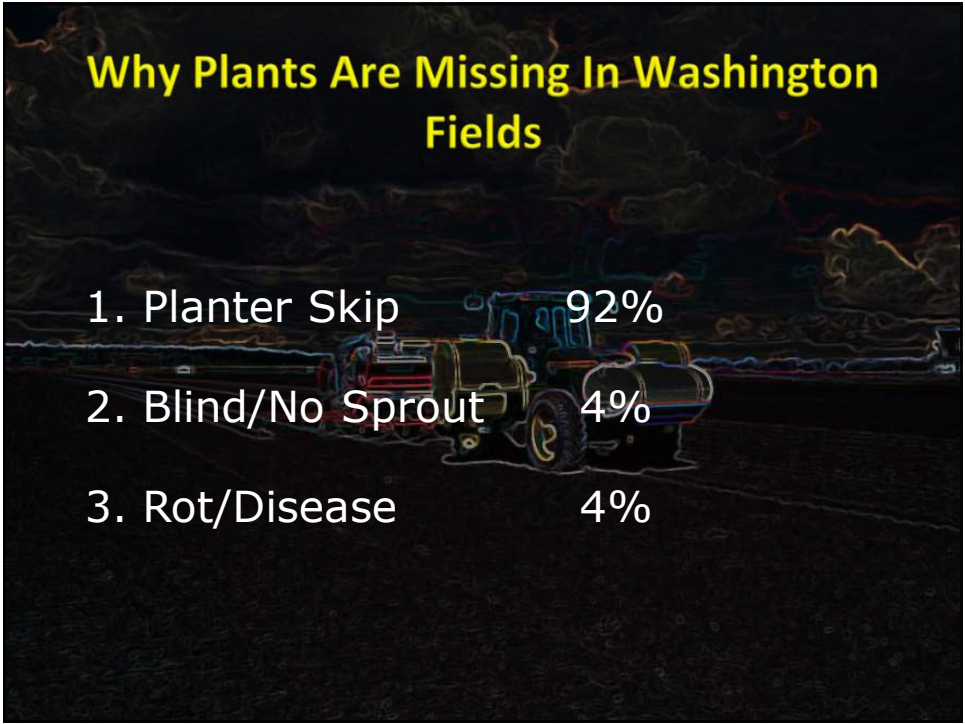
## Common Stand Establishment Issues

- Lack of management
- Planter performance
- Seed shape/size/type
- Seed physiological age
- Seed health
- Planting depth

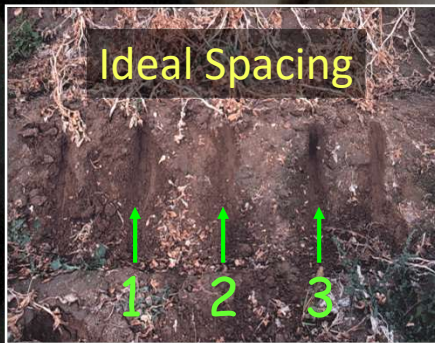




## Why Plants Are Missing In Washington Fields

- 
- |                    |     |
|--------------------|-----|
| 1. Planter Skip    | 92% |
| 2. Blind/No Sprout | 4%  |
| 3. Rot/Disease     | 4%  |

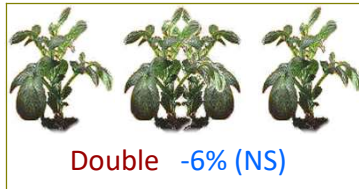
Ideal Spacing



Planter Skip

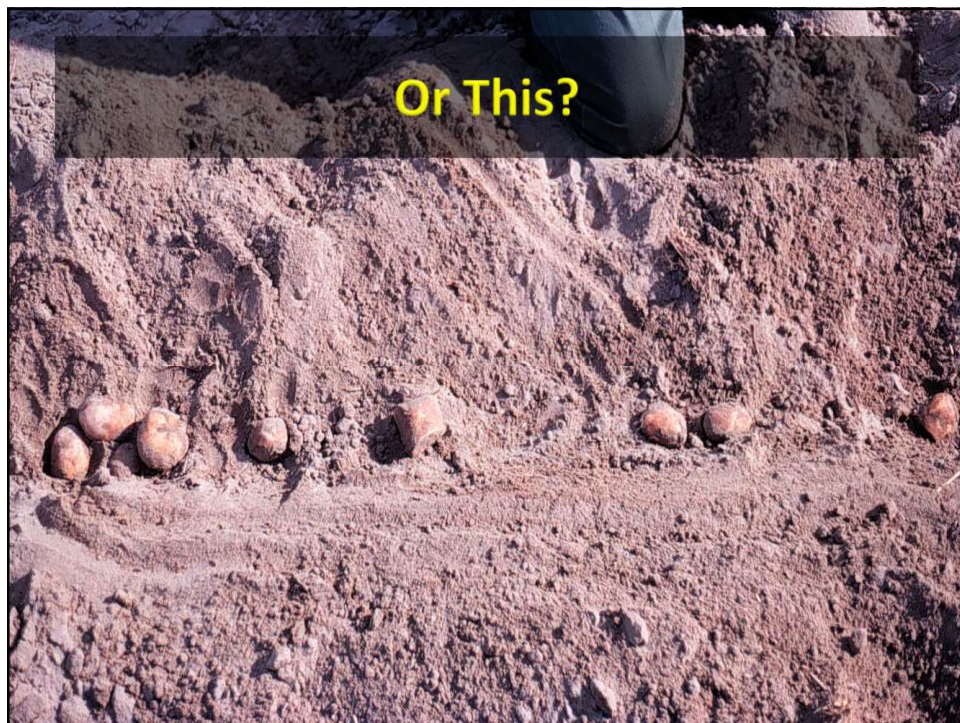


## The Cost of Planter Skips and Double Planted Seed Pieces



Process Income Difference From Optimum Value  
(Russet Burbank)

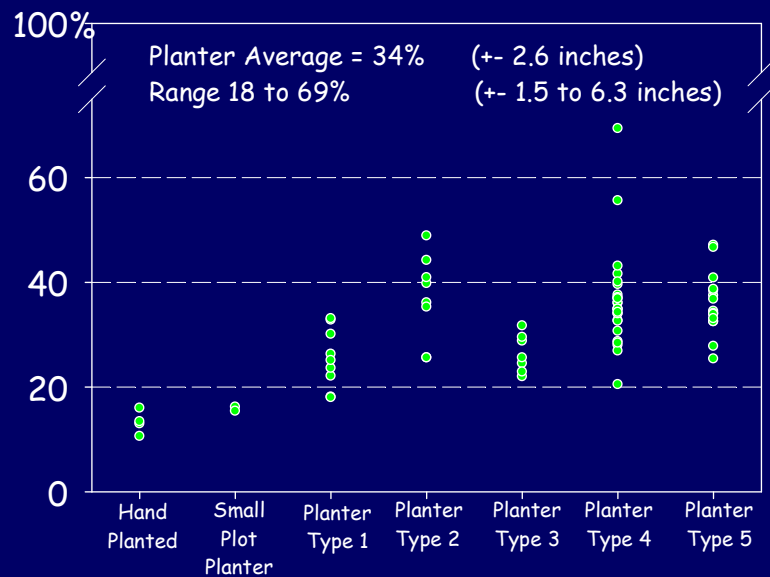


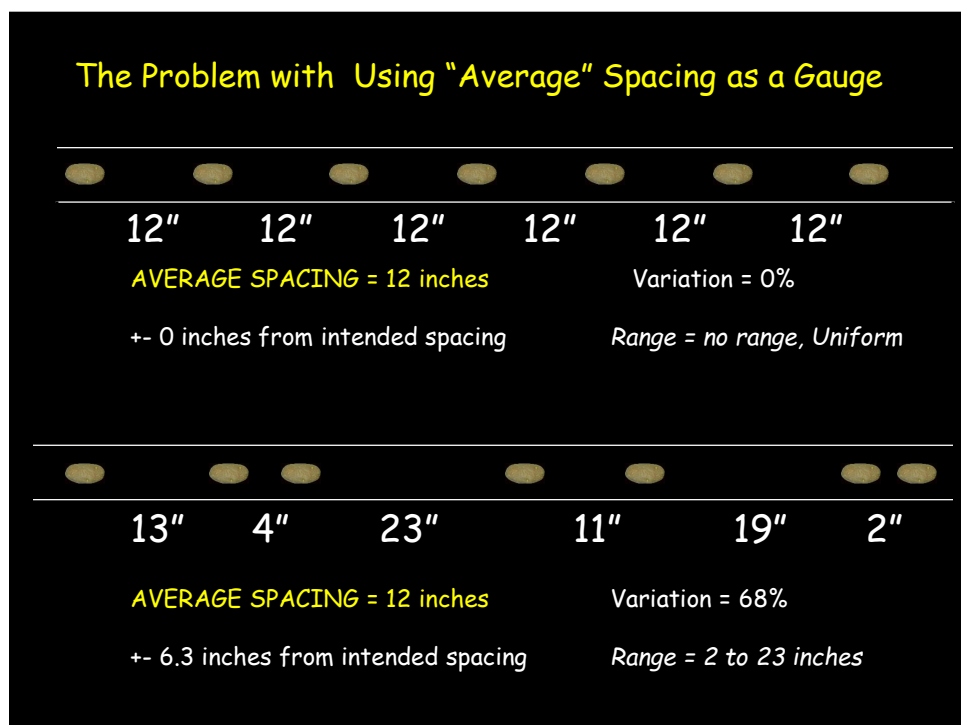


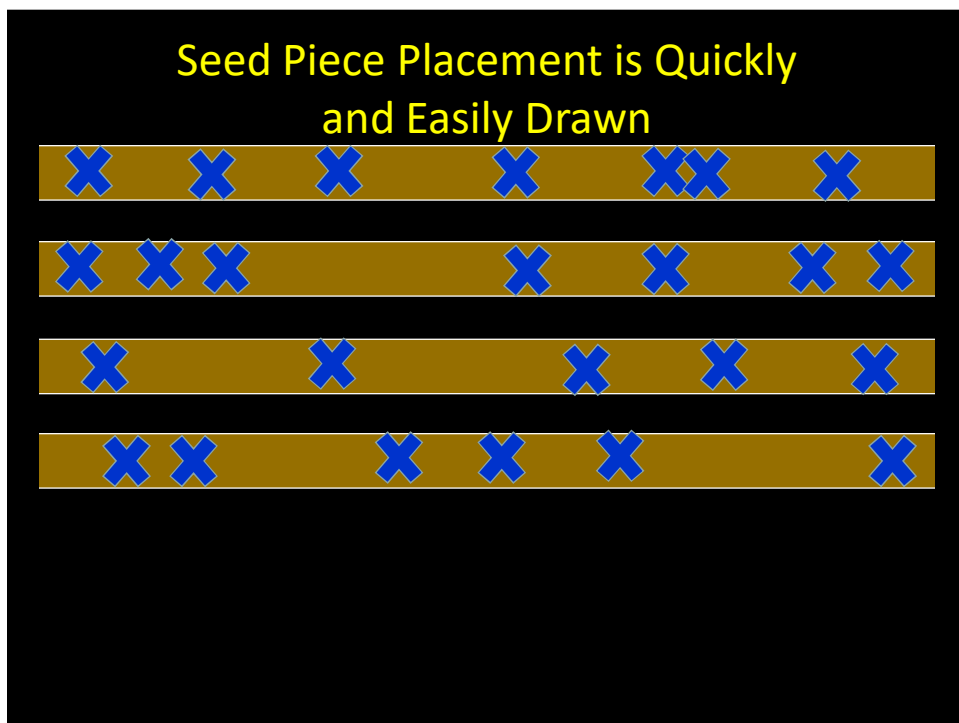
## Poor Seed Piece Placement?



### In-Row Spacing Variability Per Planter Coefficient of Variation for 2001 & 2002







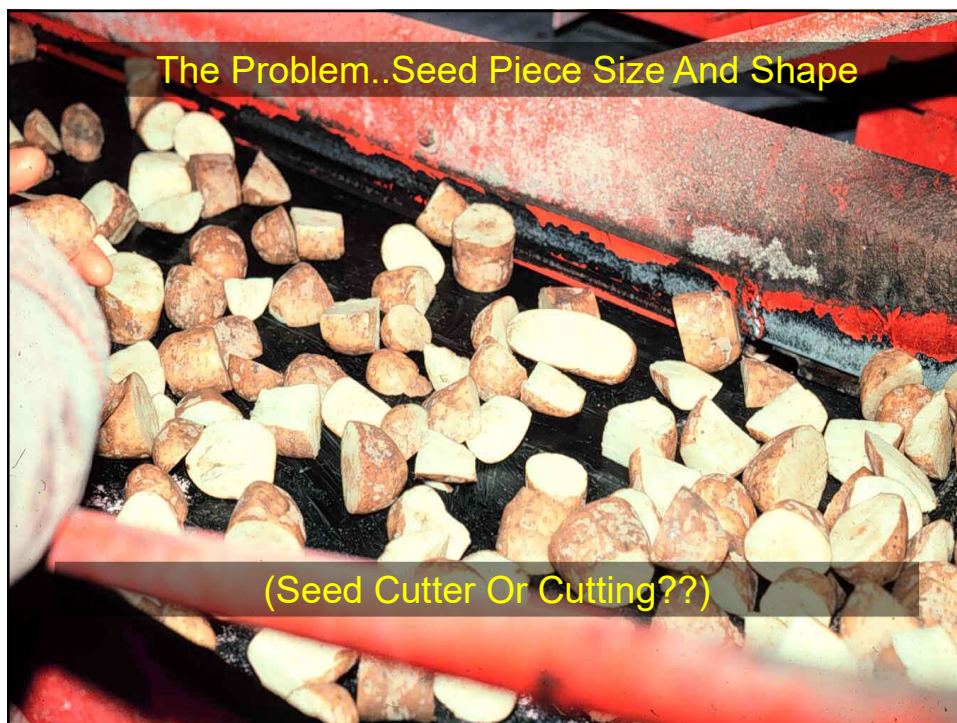


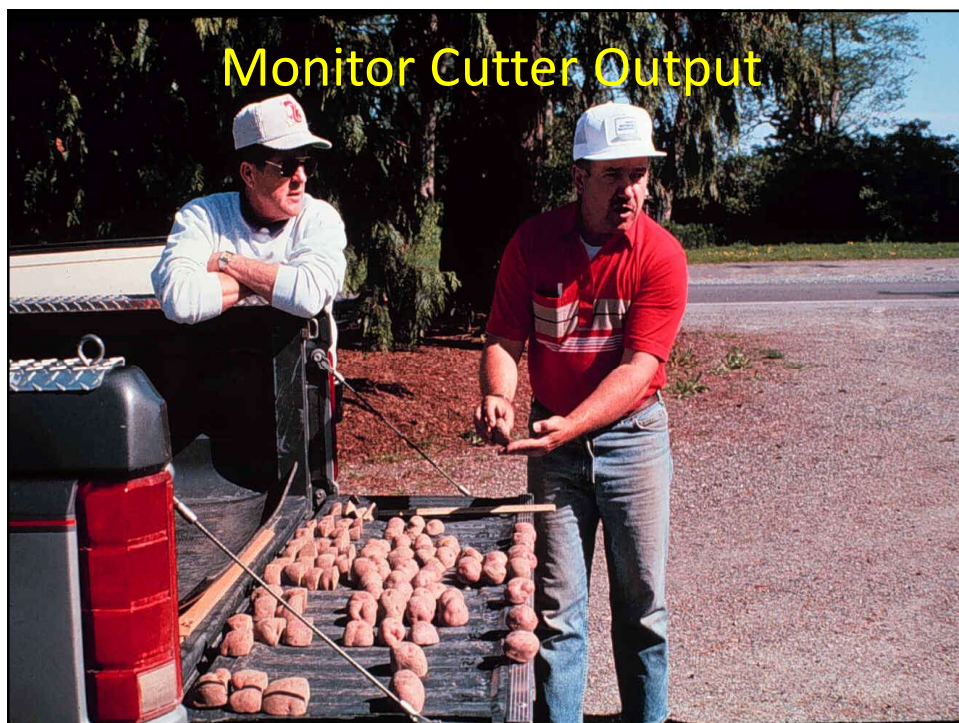
**Importance of Seed Size/Type**  
*Cup Planter – Same Field - Round White*

	Single Drop	1 Cut	2 Cut
Spacing Variation (CV)	23%	26%	32%
Spacing Variation (in)	+2.7	+2.9	+4.0
Blind Seed/A	0	0	1400
Skips/A	470	490	1700
Doubles/A	0	160	330
Weak Plants/A	0	340	2700

\*Based on 4 Reps in Each Seed Type

MJPavek 2019  
Horton 2003







## Cut Seed Piece Size

- ▶ Consider eye number per tuber
- ▶ RB, Economic optimum: 1.6 to 1.9 oz cut seed
  - Schotzko, R.T., Iritani, W.M. & Thornton, R.E. 1984. The Economics of Russet Burbank Seed Size and Spacing
  - American Potato Journal (1984) 61: 57.
- ▶ RB, Physiological optimum, up to 2.5 oz
  - Iritani, W.M. and R.E. Thornton. 1984. Potatoes: Influencing Seed Tuber Behavior. PNW 248. 15 pp.
- ▶ RB and similar, Practical Range: 1.5 to 3.0 oz
  - Eliminate chips
  - Split when too large

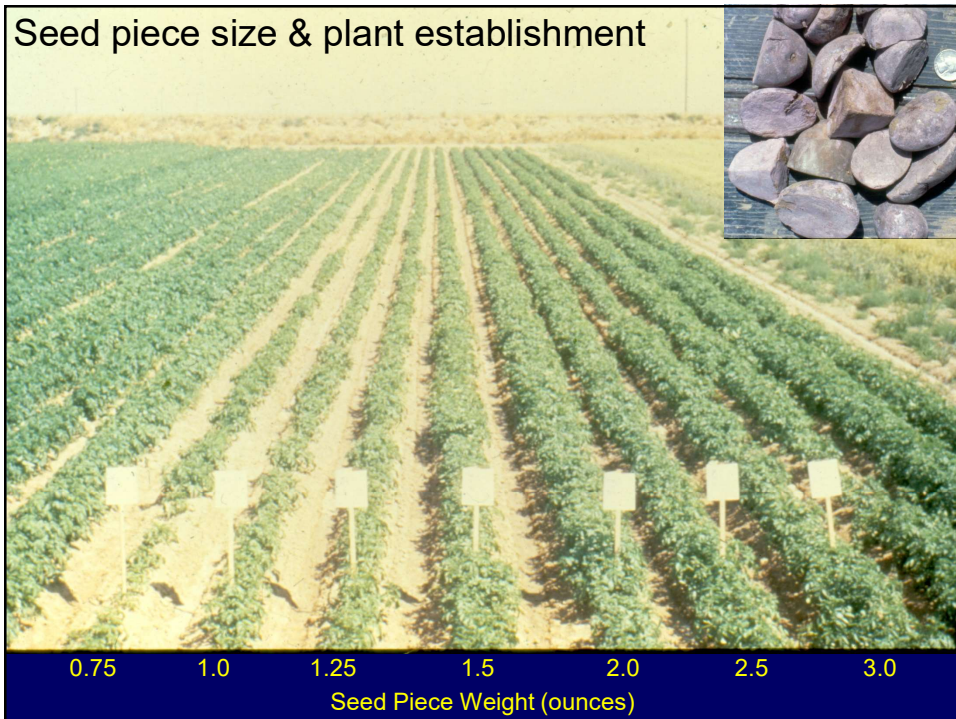
## Cut Seed Size

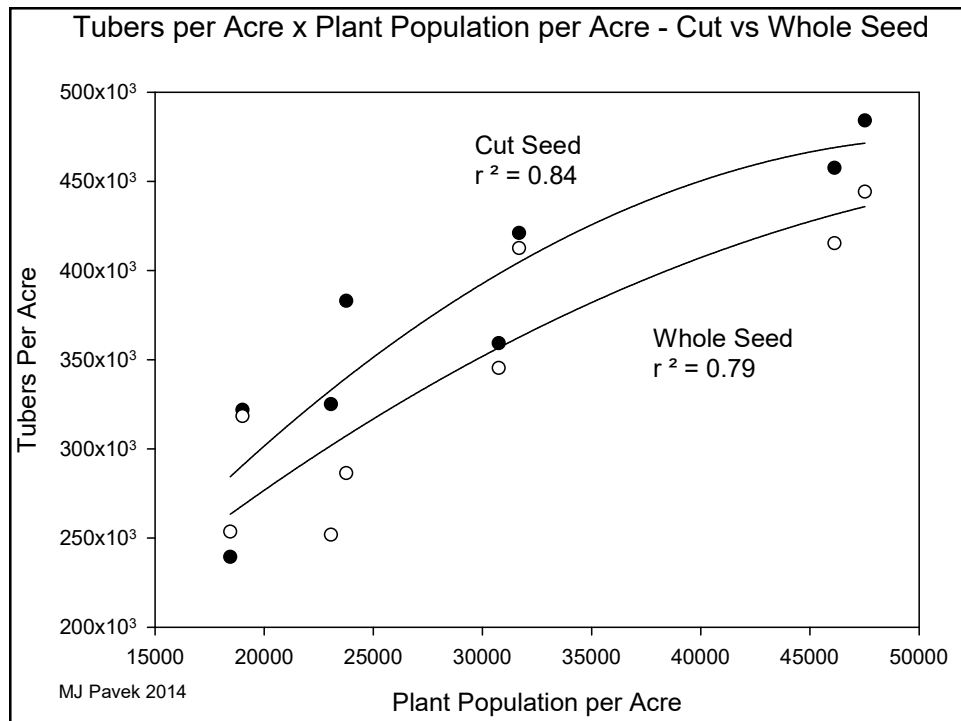
Seed Piece Weight	Total Yield	Ave Tuber No. per Plant	Ave Tuber Wt per Plant	Adjusted Gross Return
oz	cwt		oz	%
2.0	740	8.8	7.9	0
2.5	769	9.3	7.7	-1.5
3.0	754	9.7	7.3	-6.1
Sig. difference	No	Yes	Yes	Yes

Russet Burbank, treated seed cost \$20.00/CWT

## Reasons to Cut Seed Larger

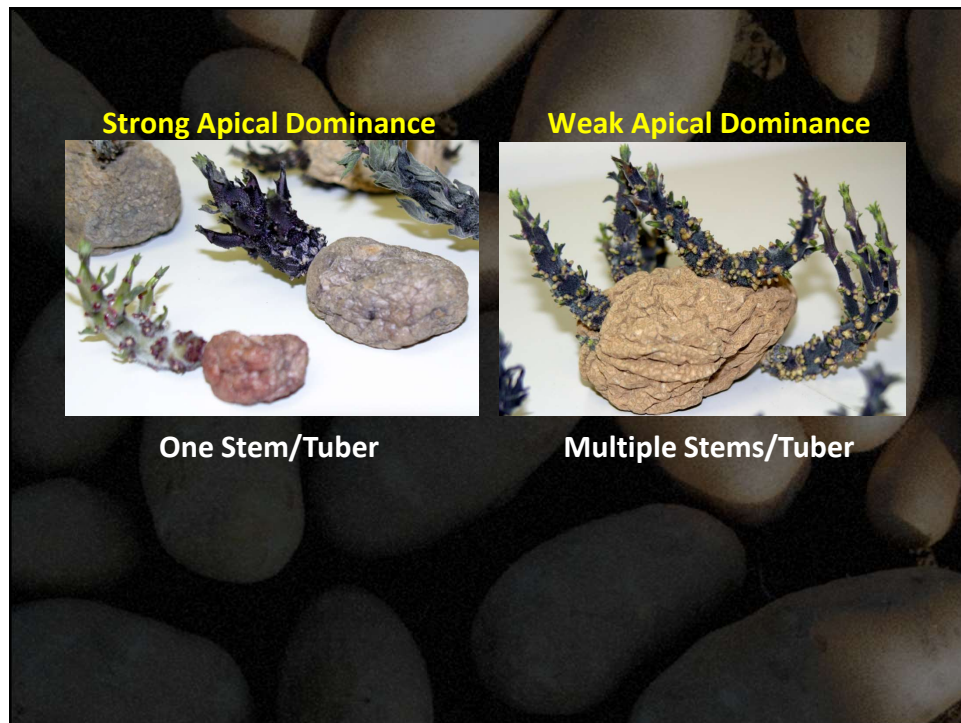
- ▶ Reduce under-sized seed pieces
  - Average weight of 2.5 oz
    - Range of 1.0 to 4.0 oz
- ▶ Prevent blind seed pieces (variety dependent)
- ▶ Planter may perform better with large seed
- ▶ Reduce effects of disease
  - Rhizoc, dry rot
- ▶ Experience and forward thinking management
- ▶ Get it right, typically only get one shot at planting





## Apical Dominance

- ▶ Dominant sprout inhibits the growth/initiation of other sprouts
- ▶ Weakened when seed tubers are cut into pieces
- ▶ Decreases with advancing physiological age
  - Seed with older physiological age = more stems
- ▶ The degree of apical dominance is affected by:
  1. Genotype
  2. Tuber physiological age
  3. Environment
  4. Wounding & Disease
- ▶ Degree of apical dominance dictates
  - Stem number, Tuber number
  - Fewer stems typically = fewer tubers = larger tubers



### Cut vs. Whole Seed 2015, 2016, 2018

	Adjusted Gross	Total Yield	Market Yield > 6 oz	Ave Tuber No. per Plant
	\$/A		%	Oz
Whole	4730	742	74	8.5
Cut	4720	750	71	8.8
Sig. difference	No	No	Yes	Yes

Russet Burbank, gross return adjusted for seed price differences



## Whole vs Cut Seed Dilemma

- ▶ Economics of growing seed: whole vs to cut
  - Seed grower market options for seed too large to plant whole
  - Seed cost to commercial grower
- ▶ Limited supply
  - Certain years/varieties - you get what is available
  - Certification issues
- ▶ Successful track record of cut seed
  - However, some seed related 'train wrecks' are exacerbated by cutting – disease spread, poor soil temps, etc
- ▶ Whole seed may eliminate a lot of issues for commercial growers
  - Disease spread, poor soil temps, excessive moisture, seed cutting management



## Disease Issues

- ▶ Inspect seed prior to cutting or planting
- ▶ Dry rot, soft rot (black leg)
- ▶ Picking rot off the belt helps, but the effort may be futile



## Preventing Missing Plants:

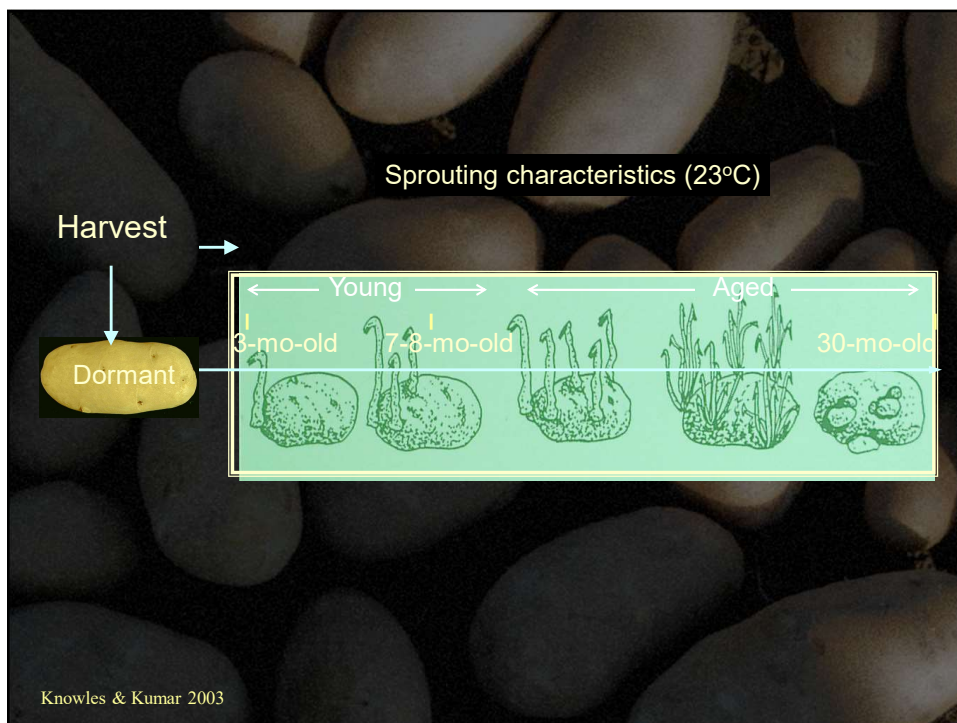
*Use Disease Free Seed*

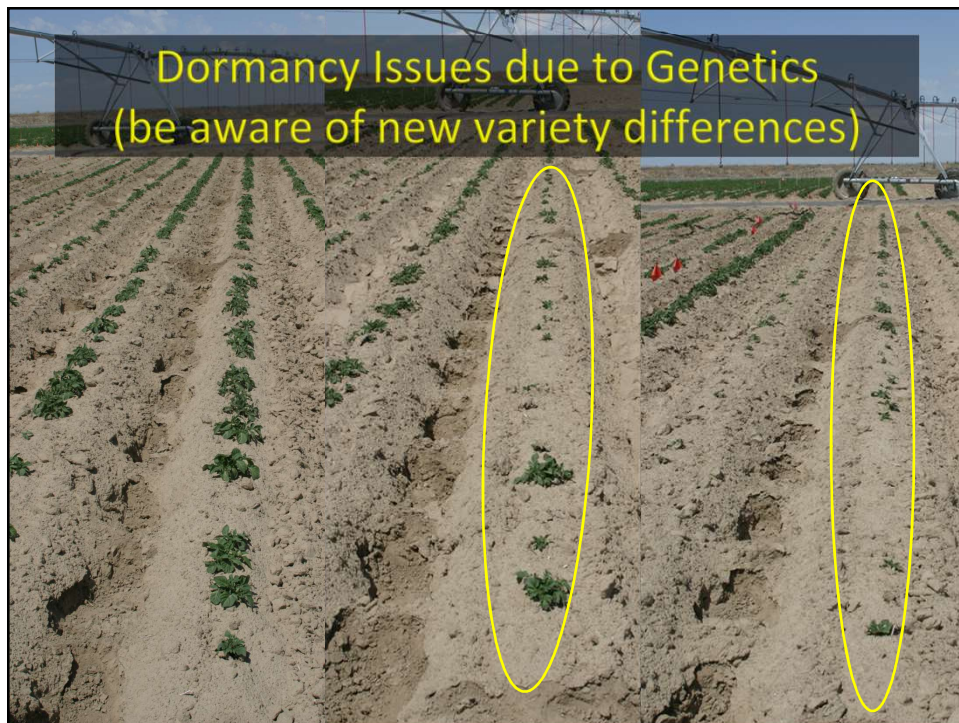
## Blackleg/Dickeya

- Plant only certified Blackleg and Dickeya-free seed potatoes
- Cutting seed will spread Blackleg and Dickeya within a seed lot
- Consider planting uncut seed when possible
- If cutting seed, it's important to ensure that the cut surfaces are suberized prior to planting to avoid new infections
- Sanitize equipment, suberize cut seed

## Tuber Physiological Age

- ▶ Accounts for time and environmental effects to tubers
- ▶ A combination of in-season and post-harvest
  - Stress, temperature, humidity, handling (bruises), storage
  - Chronological time alive
- ▶ Has a significant impact on sprouting
- ▶ Often characterized as the sprouting potential of seed
- ▶ Conditions which increase the rate of respiration can accelerate physiological aging.
- ▶ Apical dominance decreases with advancing physiological age, which results in more stems per plant, increased tuber set and shifts in tuber size distribution toward smaller size tubers.





### Temperature: Seed and Soil

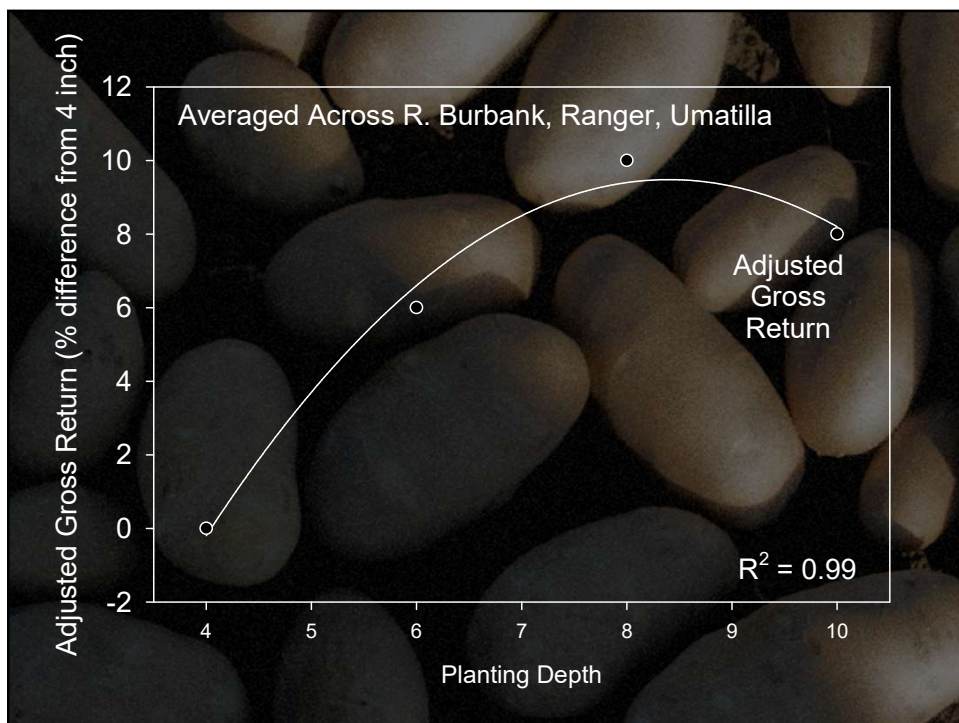
- ▶ > 45 F
- ▶ If seed and soil < 45F
  - Varieties susceptible to soft rot and fusarium = high risk
  - Especially if planted in Feb and March
  - Inspect for rot prior to cutting!
- ▶ Warm seed to at least 45 F if planting into ground ≤ 45 F
  - Warmer seed suberizes faster than cold seed
  - Non-suberized seed sitting in cold ground without much sprout growth = high risk





### Ideal Planting Depth

- Partially dictated by days of growth
  - Region, early harvest
  - Longer season, larger yields, deeper depth
- Central WA, S. Idaho – 8 inches Deep
  - Top of seed piece to the top of the final hill
  - Flatten out the hill - 4 inches below level ground
- UK, perhaps PEI - ~ 6 inches Deep
  - full season crop
- Smaller the seed, shallower the depth
- Avoid the extremes







## You must get it right at planting!

- Management
- Quality seed
  - Low rot, minimal disease, vigorous
- Certified seed
- Proper seed size and preparation
- Seed treatments to prevent disease, rot
- Proper soil conditions and temperature



## Commercial Producers must Produce Potatoes for a Specific Market

AS OPPOSED TO

## Producing Potatoes and Putting them on the Market

Commercial Producers require Seed  
with Specific Qualities

Seed Producers will have to  
produce seed that aids commercial  
Producers to meet market goals

Which Stand Would You Choose?

