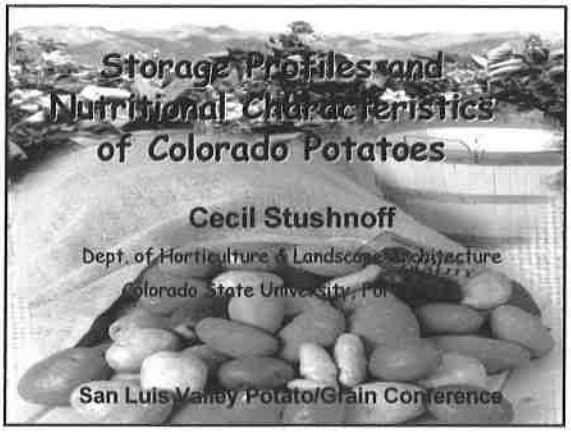
2003



Goals

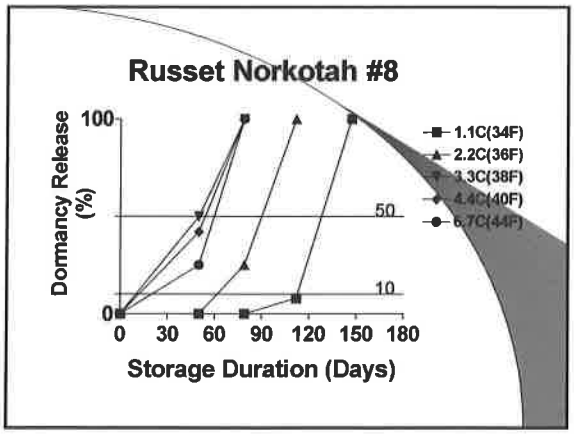
- To assess antioxidant properties of potato cultivars .
- To assist the Colorado potato breeding program to improve nutritional status of CO potatoes.
- To add value to CO grown potatoes

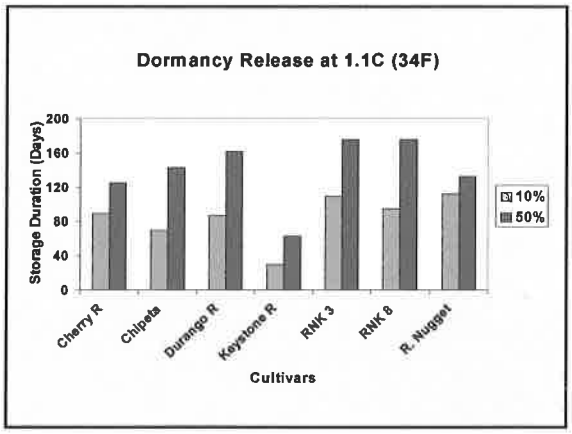
Storage Profiles

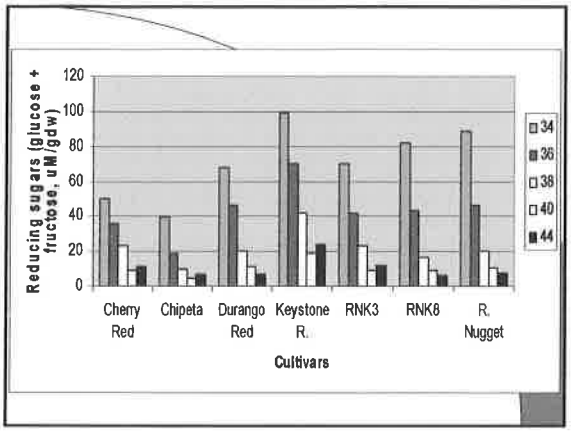
- Storage potential varies among cultivars
- Cultivar storage profiles can help optimize management & marketing
- Impact on processing quality?
- Future of sprout inhibitors?
- Organic marketing requirements?

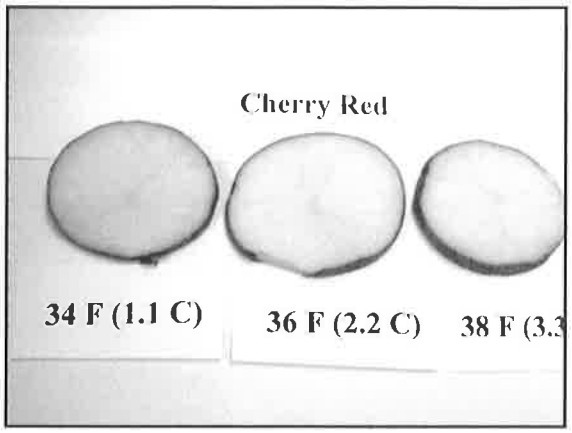
Research Goals

- Determine tuber dormancy without sprout inhibition
- Test storage temps (34, 36, 38 40,40F)
- Examine production of soluble sugars at each temperature
- Determine weight loss









Free Radicals vs Antioxidants

- Antioxidants: compounds that protect against harmful effects of free radicals.
- May protect against cancer & heart diseases by scavenging free radicals.
- Synthetic antioxidants: (BHT) protect packaged foods.
- Biological antioxidants: some enzymes, carotenoids, flavonoids, phenolics, vitamins(C&E).

- Micronutrients such as Se promote antioxidant activity, while Fe and Mn confer pro-oxidant activity e.g. Fenton reaction
- $Fe^{+2} + H_2O_2 \longrightarrow Fe^{+3} + OH^- + OH^{\cdot}$
- Hydroxyl radical ($OH^{\cdot}$) reacts with DNA, proteins, and lipids.

Vegetable	TRAP	FOX	ABTS	Overall Ranking	Total Phenolics
Spinach	7	1	2	1	1
Kumara sweet pot.	1	4	3	2	2
Red Onion	4	3	1	3	3
Broccoli	6	2	5	4	4
Yellow Onion	7	5	4	5	5
Carrot	2	7	6	6	6
Potato	3	6	8	7	7
Tomato	5	8	8	8	8

Wilson et al., (2001)

Potato Antioxidants

- Largely phenolic based compounds
- Sparse data on levels in potato
- Our data show colored flesh cultivars are up to 5xs higher

Assays:

- Total phenolics

(measure blue color as phenolic compounds react with Folin Ciocalteu reagent)

- ABTS

(measure capacity of antioxidants to scavenge a blue-green ABTS• radical cation-activity is compared to Trolox, Vitamin E equivalent).

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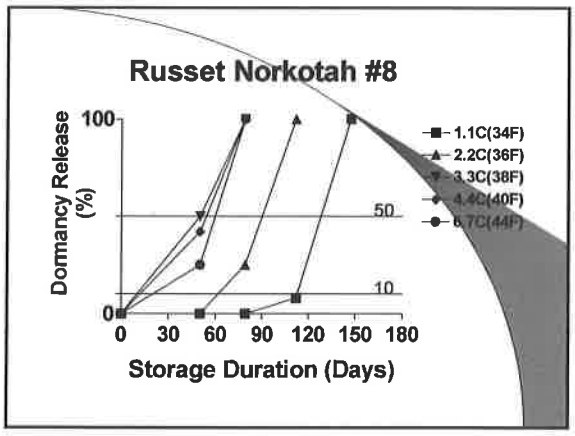

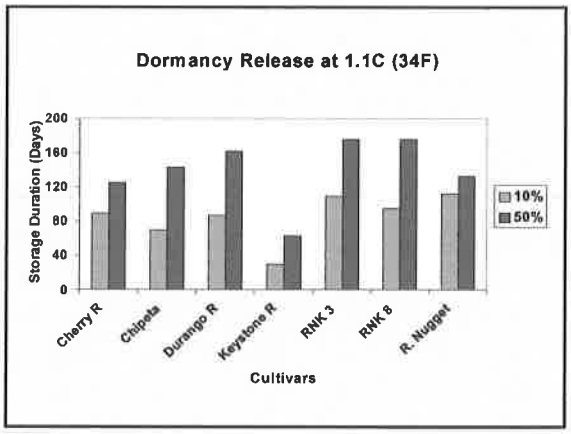

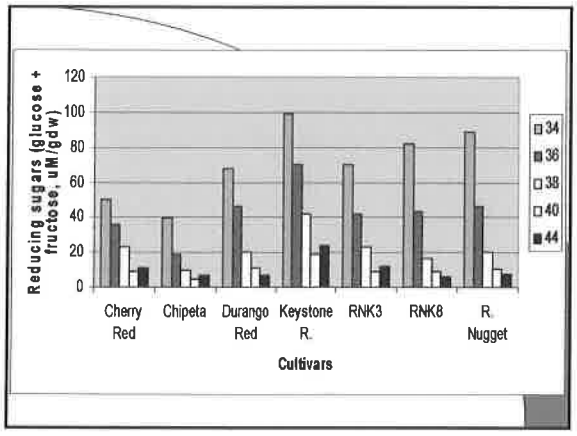

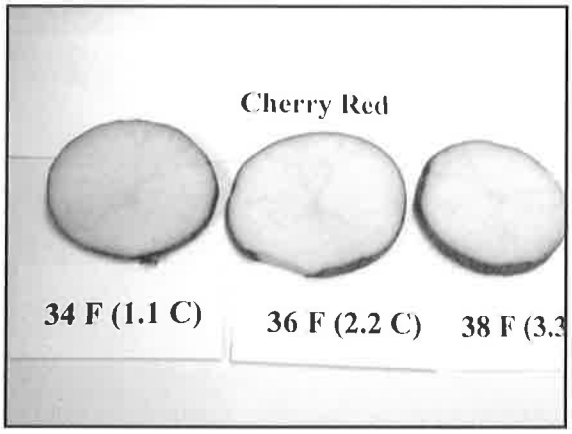

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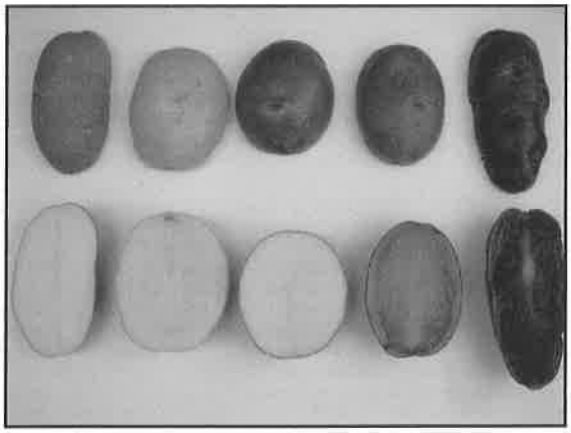

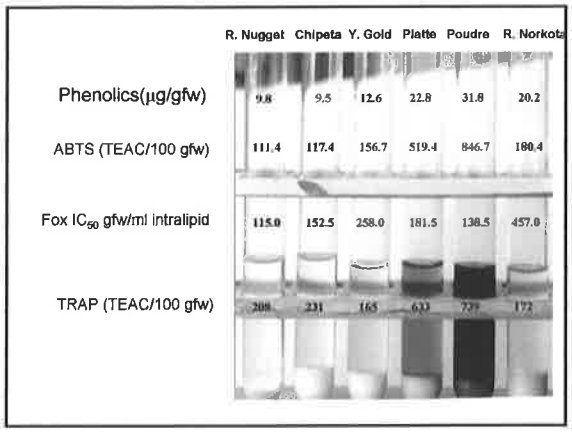

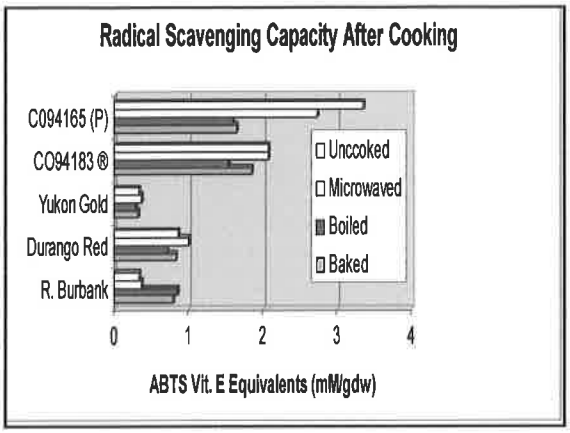

Juma Al-Abaidani's project

1. Examine genotype x environment interaction (7 cultivars & 5 CO locations)
2. Examine the effect of storage temperatures on antioxidant status
3. Examine antioxidant heat stability

Cultivars

- Russet Burbank (russet skin/white flesh)
- Russet Norkotah.
- Russet Nugget.
- Chipeta.
- Yukon Gold.
- CO 94165 (P/P).
- CO 94183 (R/R).

Environmental study

San Luis Valley	Ideal climate
Powder Horn	Short, cool season
Delta.	High plains, hot d/cool n
Weld county	High plains, hot d/cool n
Arkansas valley	Hot days/warm n

Heat Stability

- Cultivars & Selections (72 in 2002/03)
  - Russet/white
  - Red/ Red.
  - Purple/ Purple.
  - Yellow/ Yellow.
- Treatments
  - Fresh (control).
  - Boil (100 ° C/ 30 min.).
  - Bake (177° C/1 hr.).
  - Microwave (5 min.).

Acrylamide Concern!

- Asparagine + glucose + heat = acrlyamide (a probable carcinogen)
- Asparagine is the predominant amino acid in potato
- Glucose forms during cold storage
- Need to know how cultivars vary in content and identify low & high types

Water Soluble Vitamins

- HPLC can be used to characterize:
- Ascorbic acid (vit. C)
- Nicotinic acid
- Thiamine
- Pyridoxine
- Nicotinamide
- Folic acid
- Riboflavin

Acknowledgements

- David Holm, Rob Davidson (SLV)
- Ann McSay (Res. Assist.)
- Mohamed Shahba (Post-doc)
- Juma Al Abaidani (PhD student)
- Emma Locke, Paulina Wisniewska, Scott Berkholtz (work-study students)
- Colorado Potato Administrative Ctte.
- NZ Crop Research Institute