Yucca Research

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Purpose

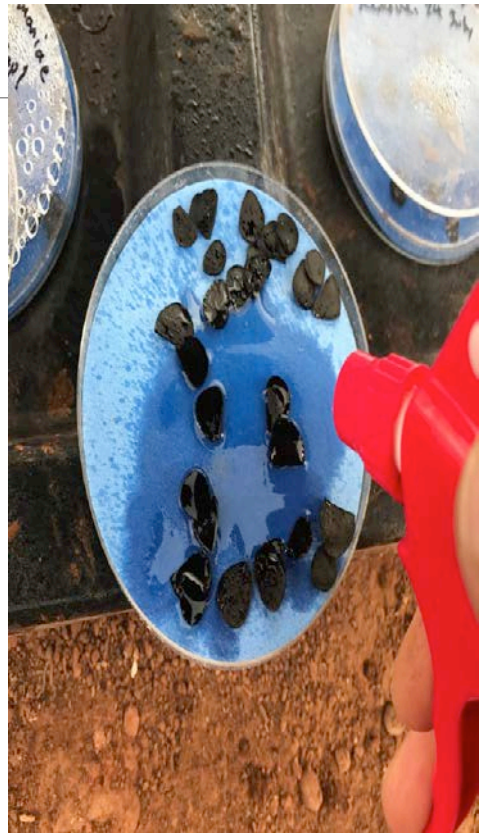
Diné food and fiber crop: characterization of the nutritional and fiber properties of Yucca species native to the Navajo Nation

Objective 1: Students at Diné College, in collaboration with students at and NMSU BYU, will determine the protocols of how to most efficiently germinate seeds of several culturally important Yucca Species: (Y.Angustissima, Y. Baccata, Y. Baileyi, Y. Glauca and Y. Harrimaniae).

Objective 2: We plan to characterize the nutritional and fiber properties of multiple accessions of Yucca species native to the Navajo Nation. In terms of analyzing Yucaa species for their potential as food crops, we will focus upon content analysis of sugars, nutrients, lipids, saponins, and other metabolically important compounds.

Cold Stratification

Actual Experiment					
Group	Baccata	Baileyi	Harrimaniae	Glauca	Total
Control	90	90	90	90	360
Week 1	90	90	90	90	360
Week 2	90	90	90	90	360
Week 3	90	90	90	90	360
Week 4	90	90	90	90	360
Week 6	90	90	90	90	360
Week 8	90	90	90	90	360
	630	630	630	630	2520



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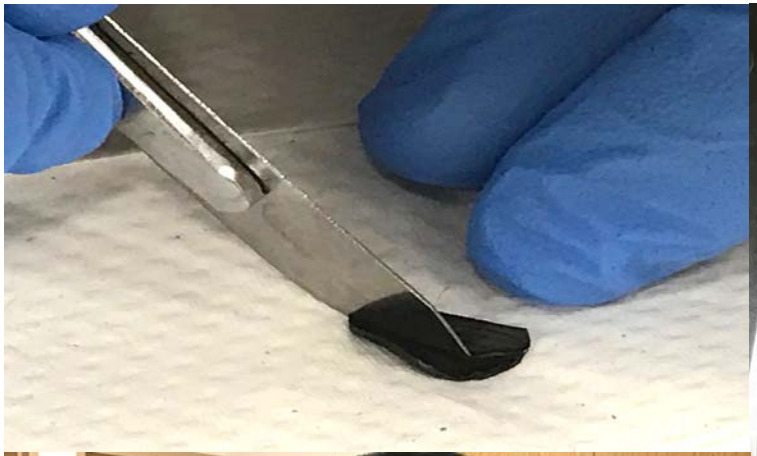
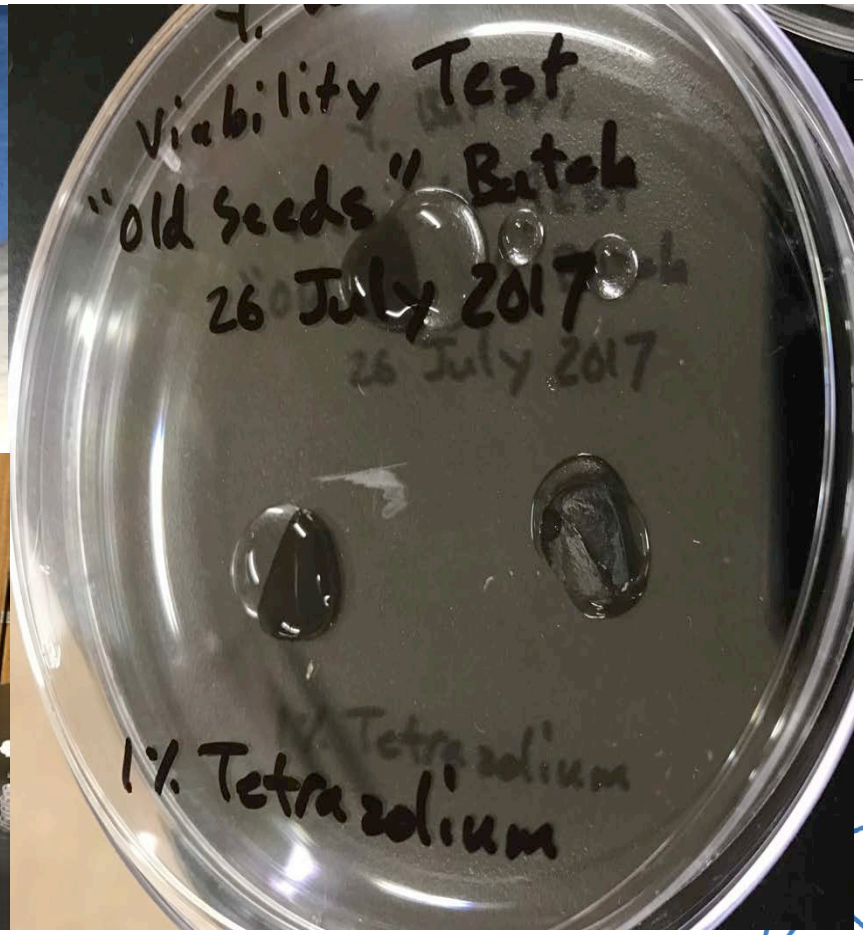
Tetrazolium – Seed Viability



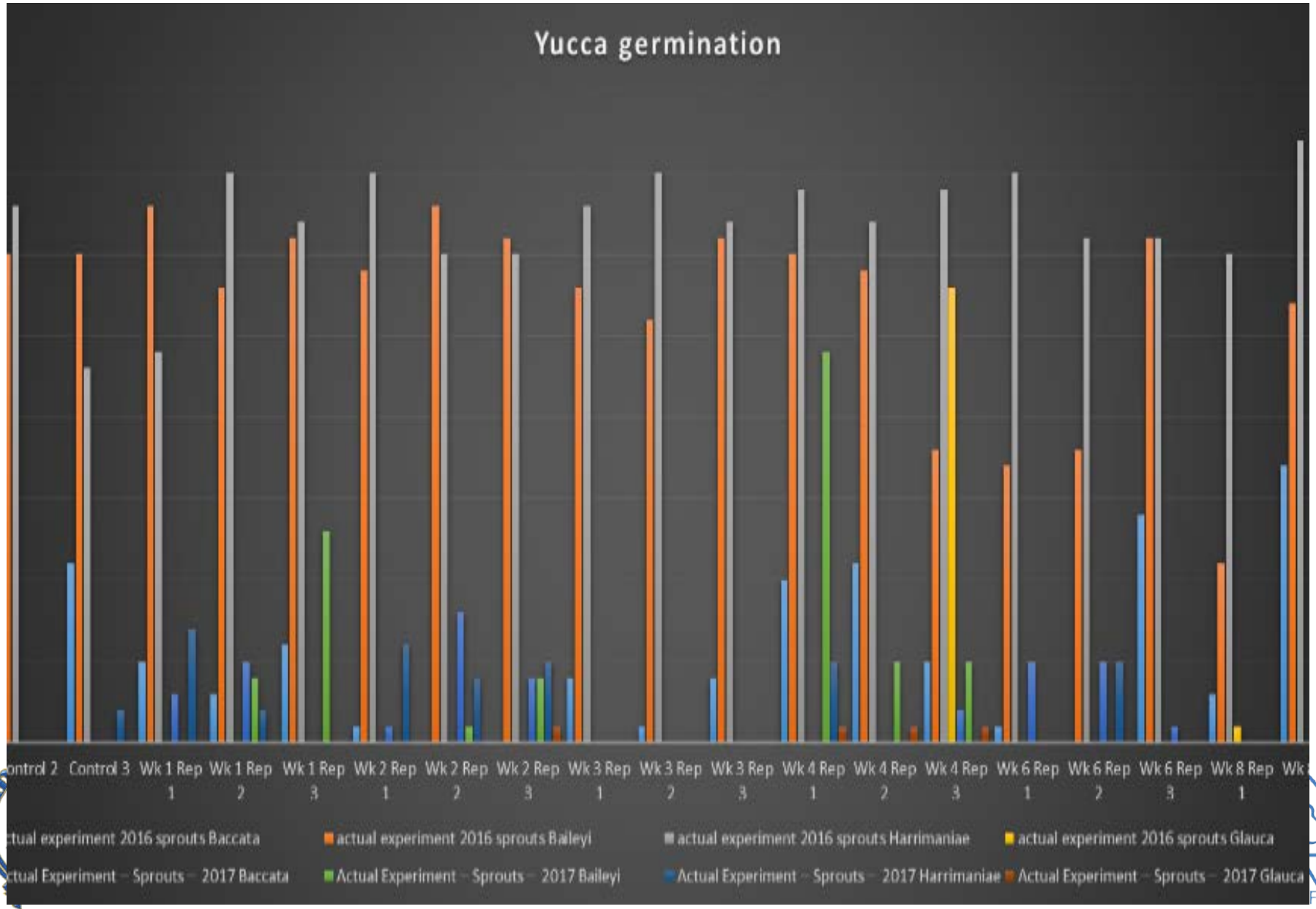


Students Participation

- Plant Biology/ Plant Taxonomy
- 21 students.
- Four students assisted with the project. Tetrazolium test.

BYU – Moisture (Forced draft oven), Ash (Muffle furance) & Fat (Goldfisch Condenser)

Fiber, Saponins (soap), Lipids (fat) & Nutrients (Sugar)


Yucca germination
ontrol 2
Control 3
Wk 1 Rep 1
Wk 1 Rep 2
Wk 1 Rep 3
Wk 2 Rep 1
Wk 2 Rep 2
Wk 2 Rep 3
Wk 3 Rep 1
Wk 3 Rep 2
Wk 3 Rep 3
Wk 4 Rep 1
Wk 4 Rep 2
Wk 4 Rep 3
Wk 6 Rep 1
Wk 6 Rep 2
Wk 6 Rep 3
Wk 8 Rep 1
tual experiment 2016 sprouts Baccata
actual experiment 2016 sprouts Baileyi
actual experiment 2016 sprouts Harrimaniae
actual experiment 2016 sprouts Glauca
tual Experiment – Sprouts – 2017 Baccata
Actual Experiment – Sprouts – 2017 Baileyi
Actual Experiment – Sprouts – 2017 Harrimaniae
Actual Experiment – Sprouts – 2017 Glauca

Yucca Baccata Fruit

Results for Y. Baccata and Angustissima

	Yucca Angustissima						*Yucca Baccata*						Kiwi, Fruit	Orange, Mandarin
Nutrient (per 100 g)	**Sample 1**	**Sample 2**	**Mean**	**S.D.**	**RDI or DRV**	**%RDI**	**Sample 1**	**Sample 2**	**Mean**	**S.D.**	**RDI or DRV**	**%RDI**	**Sample**	**Sample**
Moisture (g)	87.5	85.4	86.5	1.5	NA		82.76	77.75	80.255	3.5	NA			
Carbohydrates (g)	10.9	12	11.5	0.8	275		16.2	21.3	18.75	3.6	275		14.86	19.47
Protein (g)	<0.78	1.03			50		<0.78	<0.78			50		1.35	0.88
Fat (g)	0.7	0.7	0.7	0.0	78		0.6	0.5	0.55	0.1	78		0.68	0
Ash (g)	0.91	0.925	0.9	0.0	NA		0.426	0.409	0.4175	0.0	NA		0.352	0.181
Calories	50	58	54.0	5.7	NA		70	90	80	14.1	NA		61	80
Vitamin C (mg)	111	35.6	73.3	53.3	90	81.4	148	89.8	118.9	41.2	90	132.1	88.2	29.6
Vitamin A (beta-arotene) (µg RAE)	13.8	9.52	11.7	3.0	900	1.3	13.9	16	14.95	1.5	900	1.7	64	438
Vitamin E (synthetic IU)	2.15	1.32	1.7	0.6	15	11.6	0.219	1.04	0.6295	0.6	15	4.2		
Vitamin B1 (mg)	0.21	0.18	0.2	0.0	1.2	16.3	0.26	0.18	0.22	0.1	1.2	18.3		
Vitamin B2 (mg)	<0.03	<0.03			1.3		<0.03	<0.03			1.3			
Niacin	0.54	0.588	0.6	0.0	16	3.5	0.393	0.607	0.5	0.2	16	3.1		
Vitamin B6 (mg)	0.172	0.168	0.2	0.0	1.7	10.0	0.084	0.066	0.075	0.0	1.7	4.4		
Folic Acid (µg)	237	14.5	125.8	157.3	400	31.4	36.5	17.7	27.1	13.3	400	6.8		
Calcium (mg)	77.4	142	109.7	45.7	1300	8.4	41	32.7	36.85	5.9	1300	2.8	41	35
Iron (mg)	<1.00	<1.00			18		<1.00	<1.00			18		0.23	0
Sodium (mg)	<3.00	<3.00			2300		<3.00	<3.00			2300		0	4
Phosphorus (mg)	29.1	38.6	33.9	6.7	1250	2.7	33.5	33.5	33.5	0.0	1250	2.7		
Copper (mg)	<1.00	<1.00			0.9		<1.00	<1.00			0.9			
Potassium (mg)	415	373	394.0	29.7	4700	8.4	238	210	224	19.8	4700	4.8	311	142
Magnesium (mg)	10.2	35	22.6	17.5	420	5.4	13.2	14.3	13.75	0.8	420	3.3		
Manganese (mg)	<1.00	<1.00			2.3		<1.00	<1.00			2.3			
Zinc (mg)	<1.00	<1.00			11		<1.00	<1.00			11			

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Results

- Yucca Glauca is difficult to grow.
- Yucca Baccata, Baileyi, and Harrimaniae are the earlier to grow.
- So we hypothesis that Yucca species are a regional crop.
- Fiber, Saponins (soap), Lipids (fat) in testing.

Acknowledgements

Diné College Land Grant Office

- Daniel Allen, Tiko Tsinnijinnie, and Aylissa Morris.

BYU partners – Dr. Ryan Stewart, Claire Poore, Stephanie Bedford, Megan McGie. Dr. Oscar Pike.

NMSU partner – Dr. Rolston St. Hilaire