Harvest the Past, Feed the Future

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Climate change to hurt wheat, rice crop yields

Maize, rice, wheat: alarm at rising climate risk to vital crops

Speaking of Science

Earth is on its way to the biggest mass extinction since the dinosaurs, scientists warn

By Kristine Phillips July 12

Past extinctions point to a current and future biodiversity crisis

Rapid climate change is a unifying feature of ancient mass extinctions – how bad might it be now?

Arabian Oryx are at risk of extinction becuase of limited habitats and hunting. Evide extinctions suggest many species and not just endangered ones are under threat. Photograph: Karim Sahib/AFP/Getty Images

DAILY NATION

4 JULY 2017

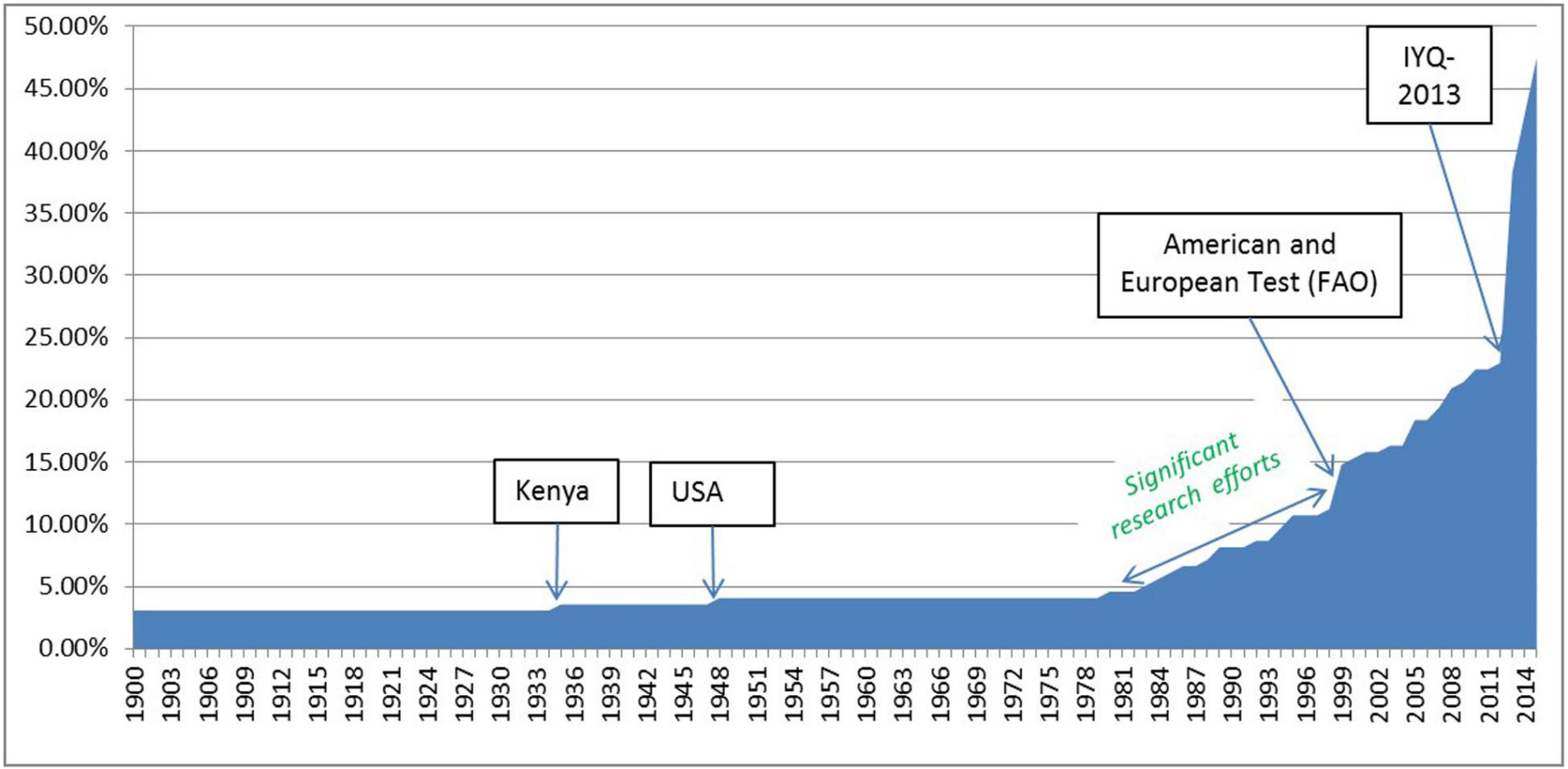
Kenya: Food Crisis to Worsen as Maize Crop Withers

John Boyd, Contributor
Founder & President National Black Farmers Association

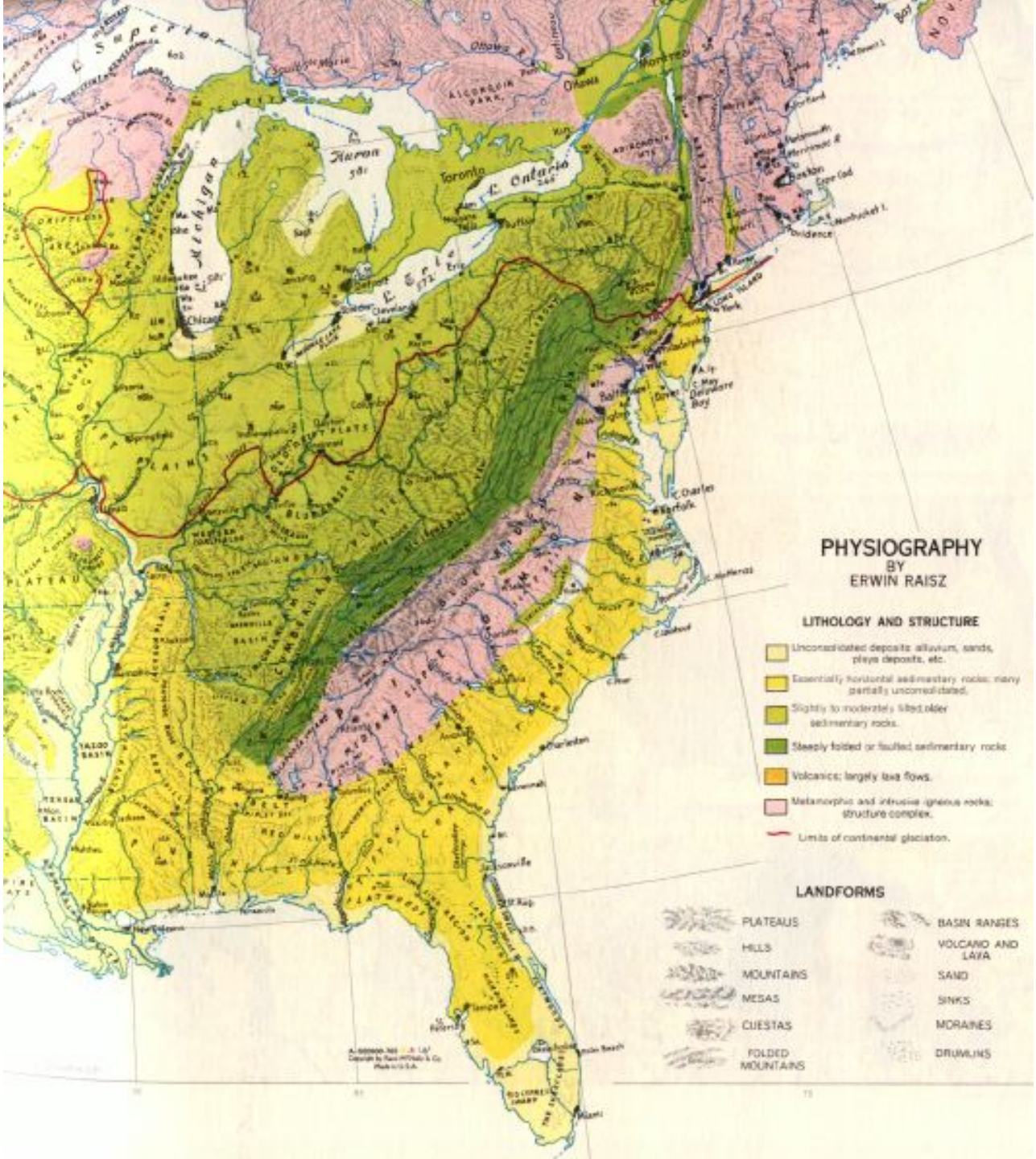
Bayer Monsanto Merger Threatens a Plague for Family Farmers

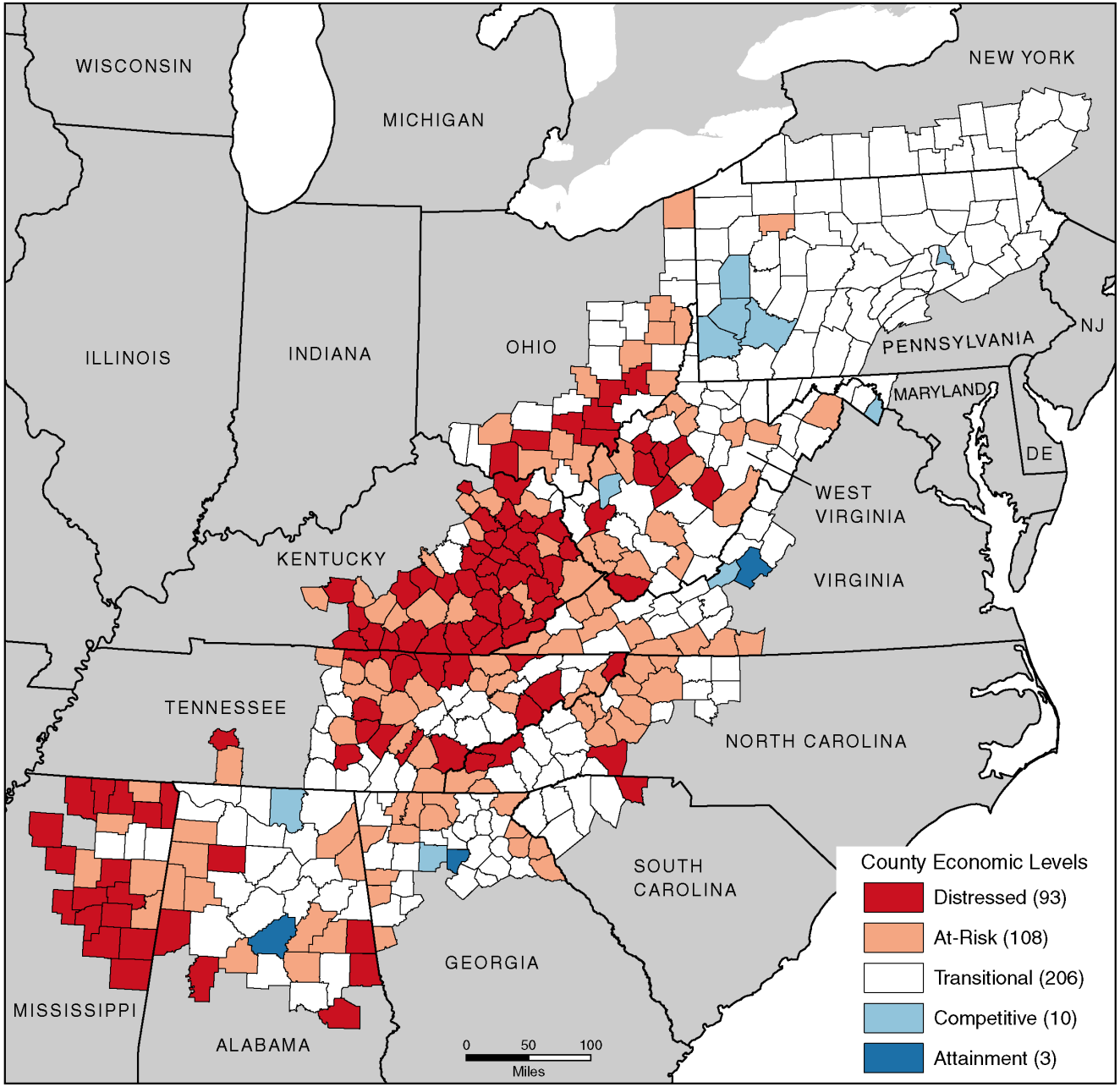
07/10/2017 08:52 pm ET


Quinoa
2013 International Year
A future Sown thousands
of years ago



Percentage of UN countries with quinoa experimentation or cultivation (Bazile et al. 2016)


PHYSIOGRAPHY
BY
ERWIN RAISZ
LITHOLOGY AND STRUCTURE
Unconsolidated deposits: alluvium, sands, playa deposits, etc.
Essentially horizontal sedimentary rocks; many partially unconsolidated.
Slightly to moderately tilted older sedimentary rocks.
Steeply folded or faulted sedimentary rocks
Volcanics; largely lava flows.
Metamorphic and intrusive igneous rocks; structure complex.
Limits of continental glaciation.
LANDFORMS
PLATEAUS
HILLS
MOUNTAINS
MESAS
CUESTAS
FOLDED MOUNTAINS
BASIN RANGES
VOLCANO AND LAVA
SAND
SINKS
MORAINES
DRUMLINS

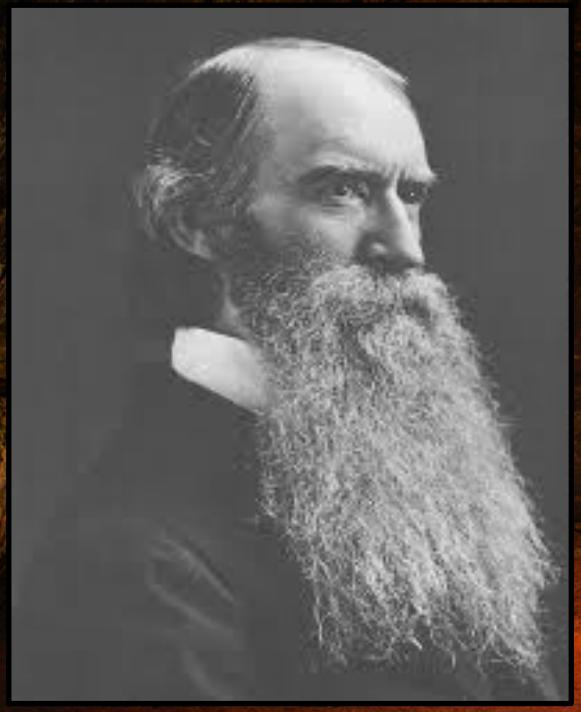


Created by the Appalachian Regional Commission, March 2013
Data Sources:
Unemployment data: U.S. Bureau of Labor Statistics, LAUS, 2009–2011
Income data: U.S. Bureau of Economic Analysis, REIS, 2010
Poverty data: U.S. Census Bureau, American Community Survey, 2007–2011

Effective October 1, 2013
through September 30, 2014


UNITED STATES OF AMERICA
$1

Ash Cave, Ohio



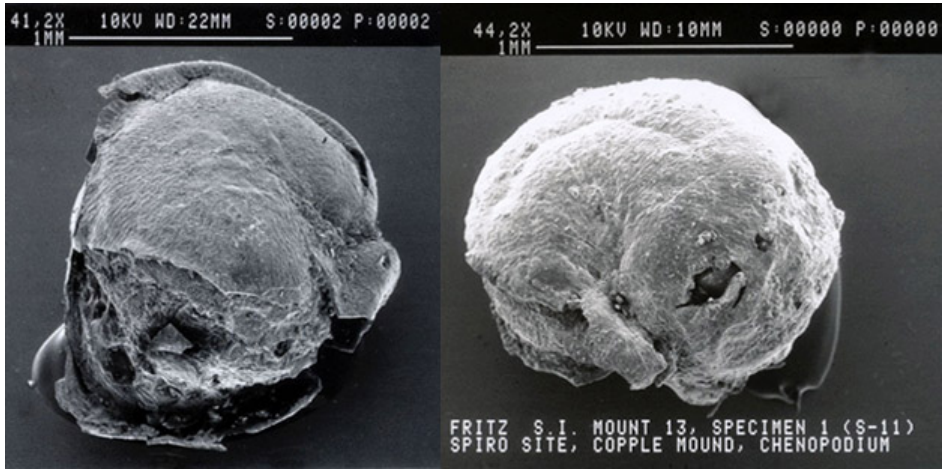


Image from http://pages.wustl.edu/peblabguide/articles/1102

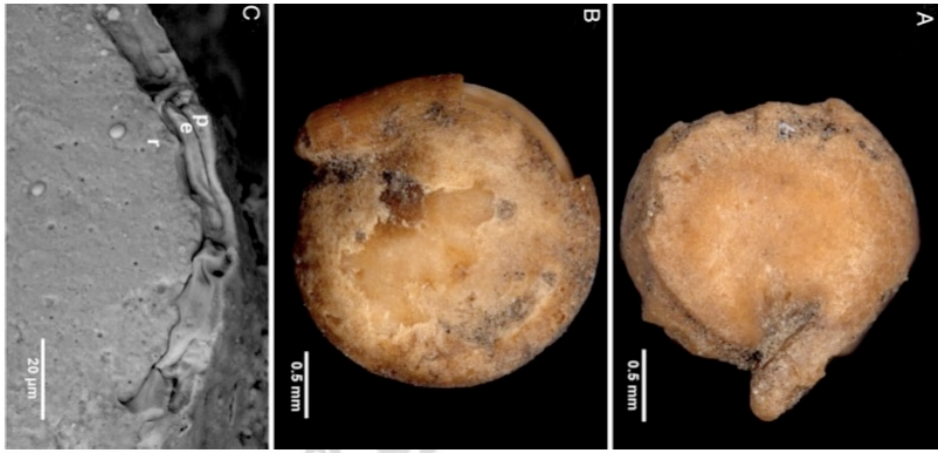
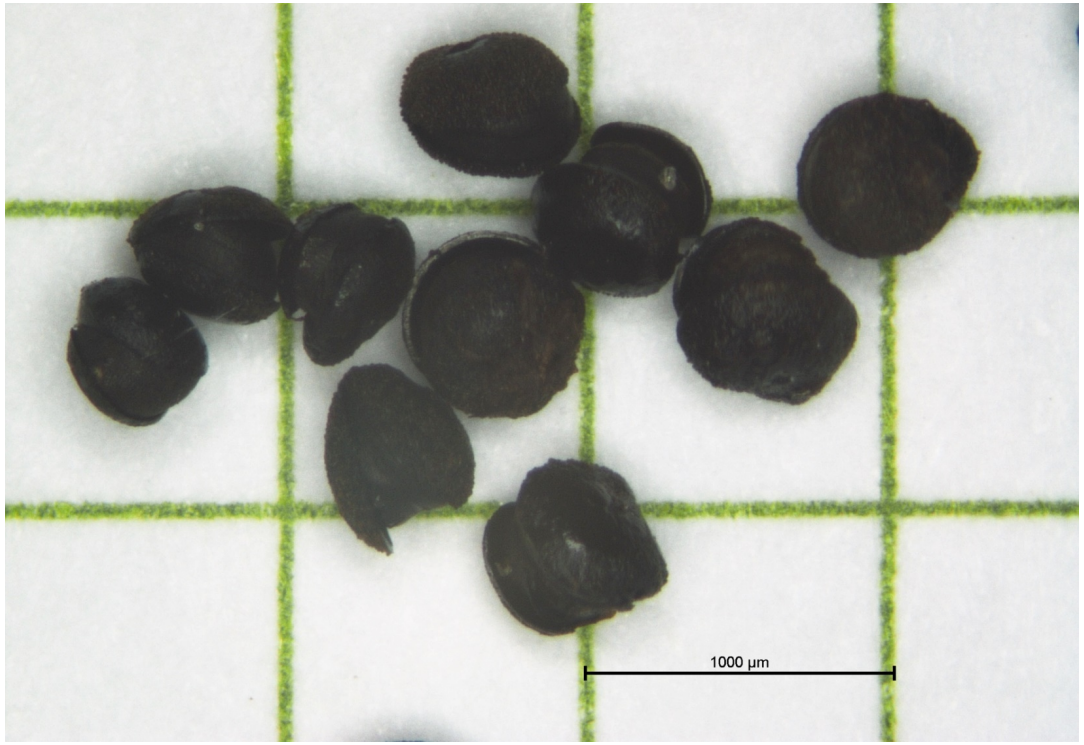


Image from Smith and Yarnell 2009



S. Allen

tmitutorialsblogspot.com

Experimentally carbonized *C. album* (left) and uncarbonized *C. album* (right)

Denmark – Iron Age finds of *C. album* seed caches & bog bodies with *C. album*

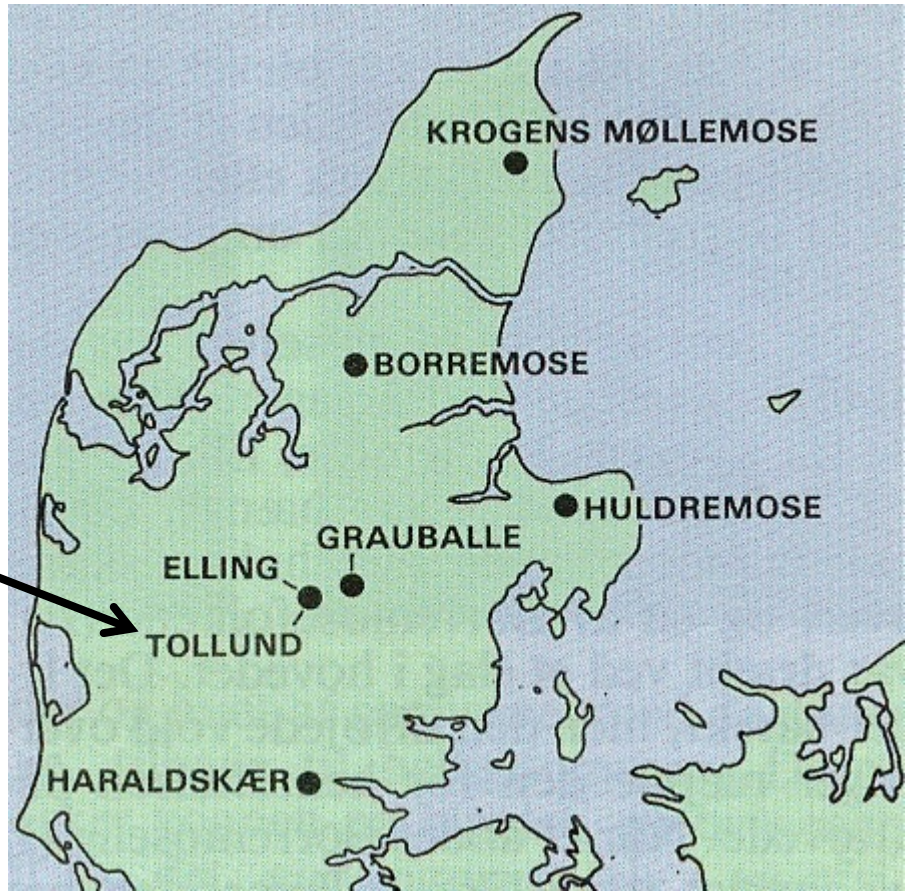


Table 7.3. The Nutritive Value of Seed of Cultigens of the Prehistoric Eastern Woodlands of North America (percent dry basis)

Species	Protein	Fat	Carb.	Fiber	Ash
Starchy-seeded					
Goosefoot[a]					
C. berlandieri	19.12	1.82	47.55	28.01	3.50
Maygrass[b]					
P. caroliniana	23.7	6.4	54.3	3.0	2.14
Knotweed[a]					
P. erectum	16.88	2.41	65.24	13.33	2.34
Oily-seeded					
Sumpweed[c]					
I. annua	32.25	44.47	10.96	1.46	5.80
Sunflower[d]					
H. annuus	24.00	47.30	16.10	3.80	4.00
Tropical crops					
Maize[c]					
Z. mays	8.9	3.9	70.20	2.0	1.2
Squash[c]					
C. pepo	29.0	46.7	13.10	1.9	4.9
Bean[e]					
P. vulgaris	22.0	1.6	60.8	4.3	3.6
Quinoa[f]					
C. quinoa	12.5	6.0	72.5	5.6	3.4

[a]Asch and Asch 1985:361.
[b]Crites and Terry 1984.
[c]Asch and Asch 1978.
[d]Watt and Merrill 1963.
[e]Wu Leung 1961.
[f]White et al. 1955.

Smith, B. 1987 The Economic Potential of C. berlandieri in Prehistoric Eastern North America. Journal of Ethnobiology 7(1):29-54

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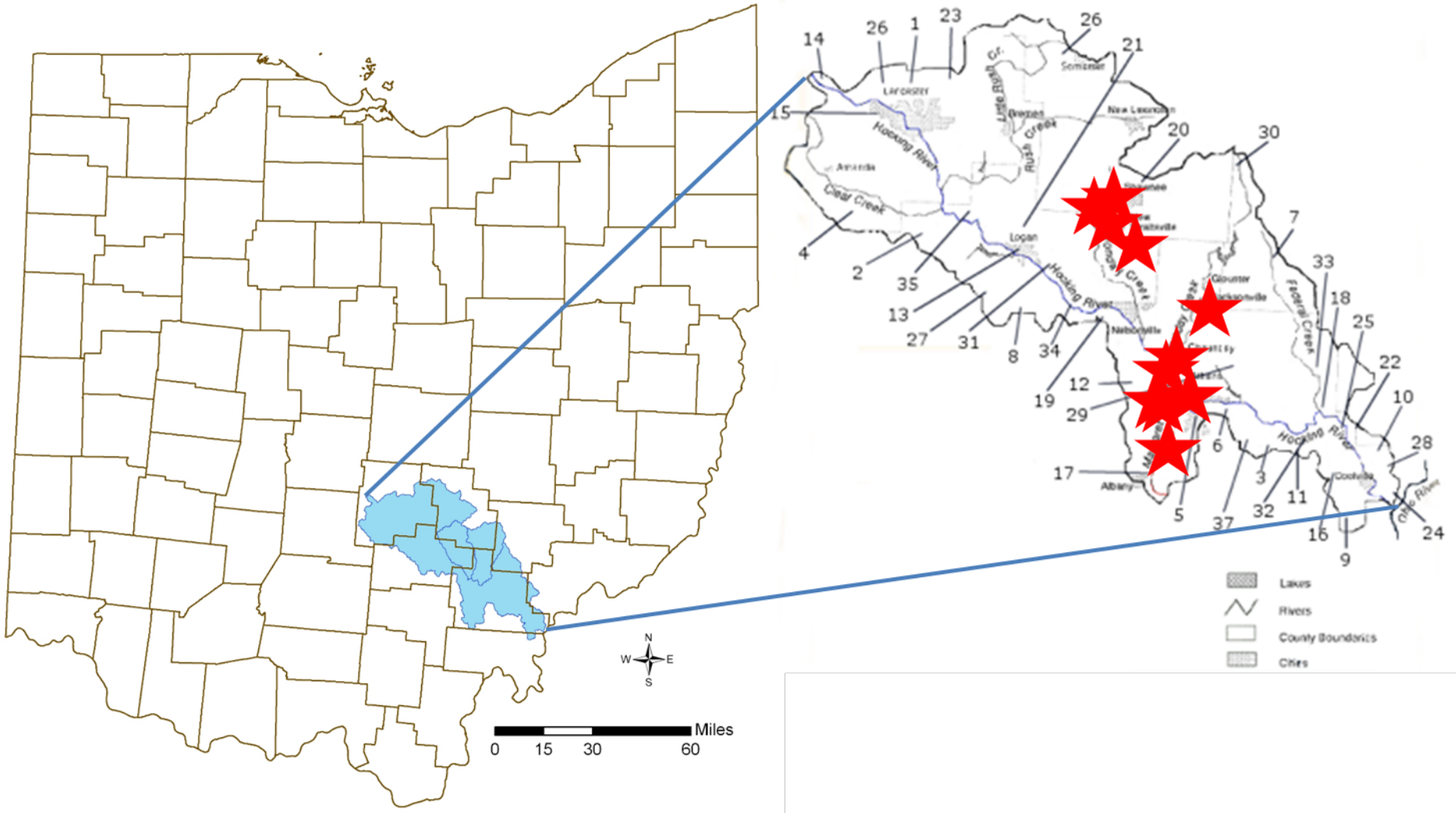
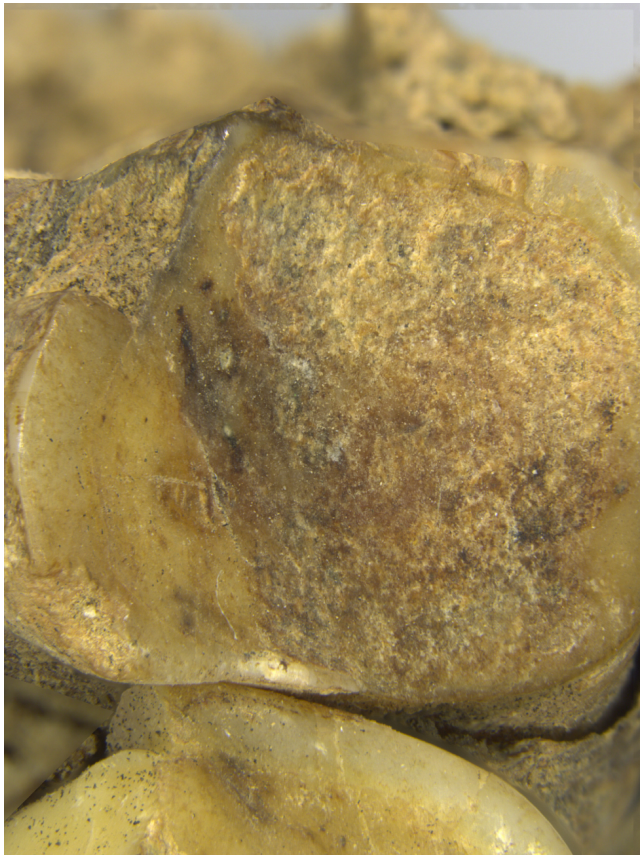
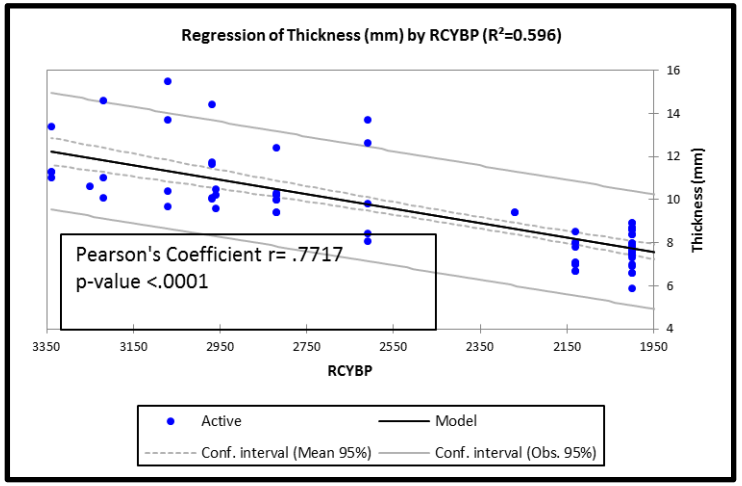
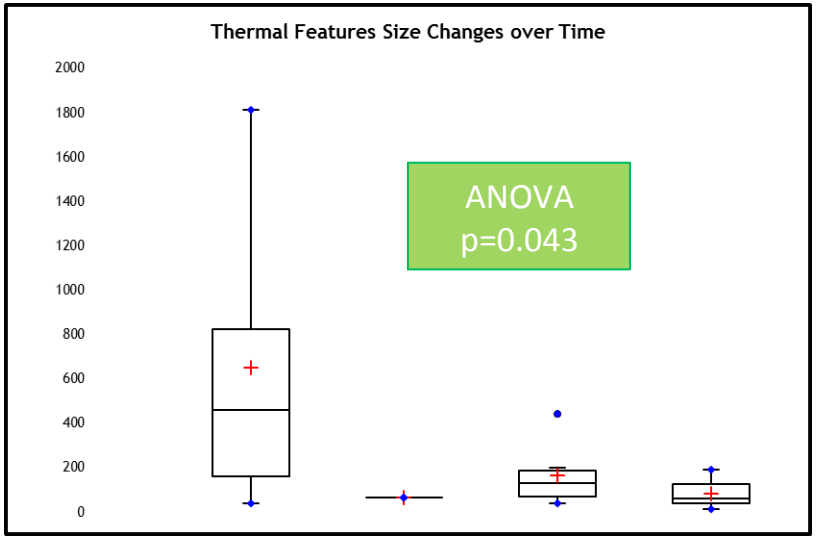
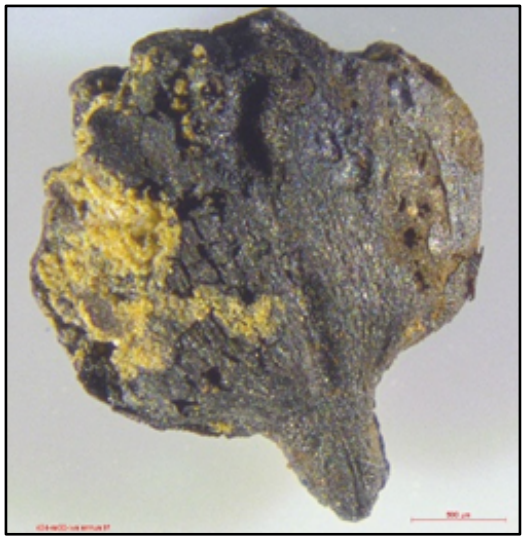
and research excellence

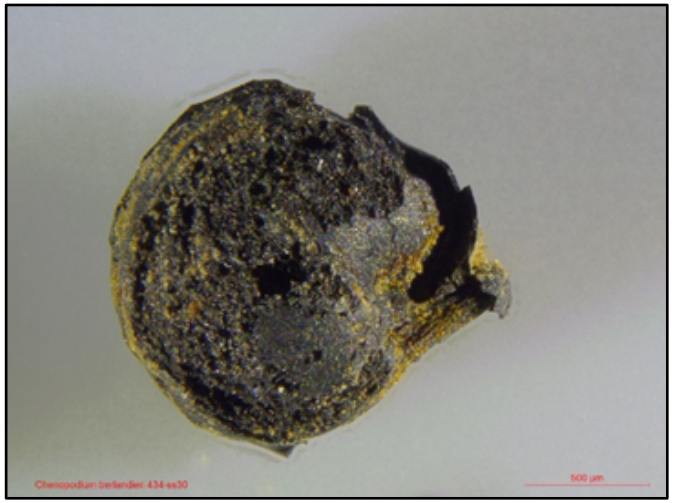

N
W
E
S
0
15
30
60
Miles
Hocking River
Clear Creek
Rush Creek
Little Rush Cr.
Federal Creek
Lancaster
Somerset
New Lexington
Logan
Nelsonville
Albany
Coolville
Ohio River
Lakes
Rivers
County Boundaries
Cities

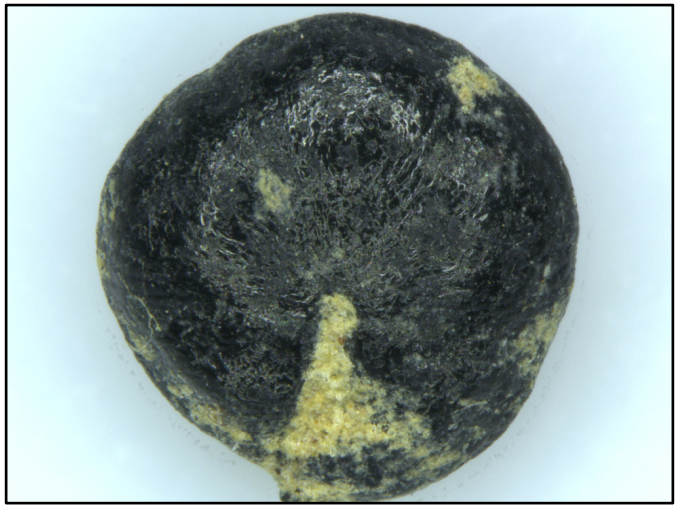



Regression of Thickness (mm) by RCYBP (R^2=0.596)
Pearson's Coefficient r= .7717
p-value <.0001
RCYBP
Thickness (mm)
Active
Model
Conf. interval (Mean 95%)
Conf. interval (Obs. 95%)

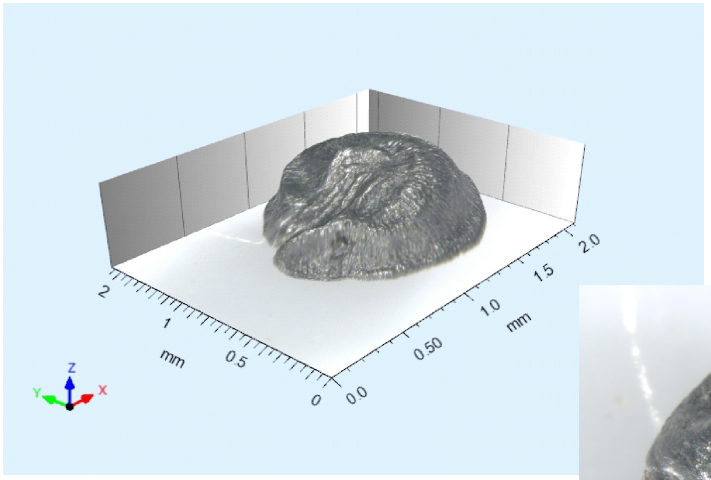

Thermal Features Size Changes over Time
ANOVA
p=0.043

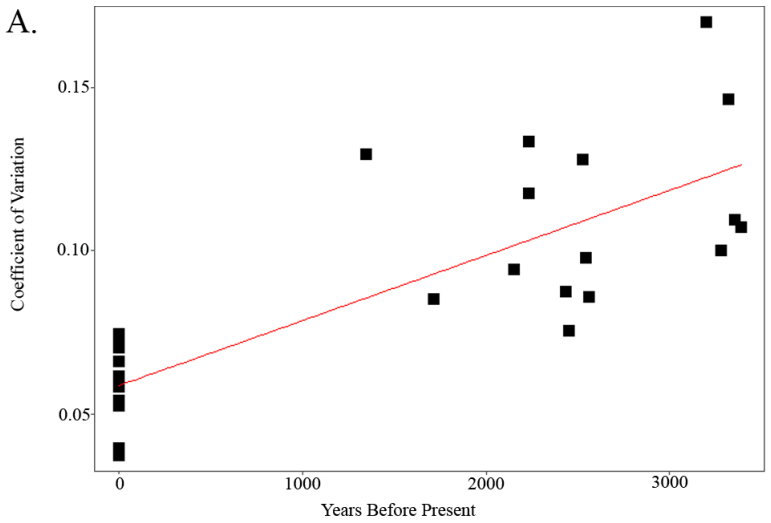


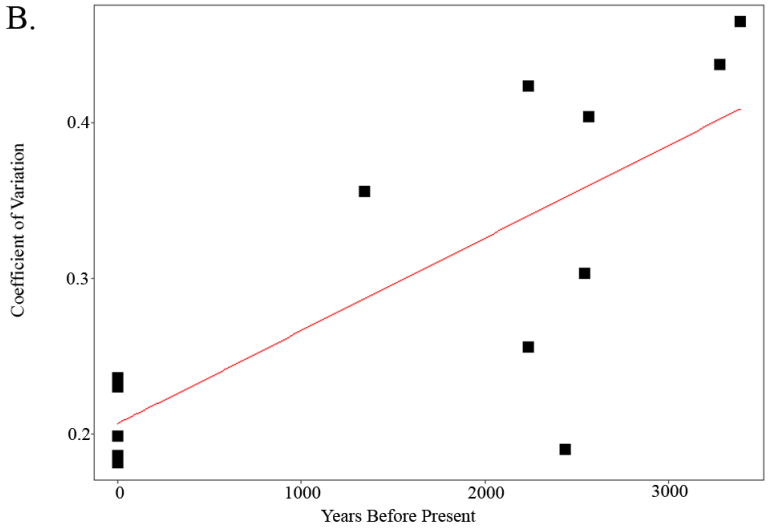


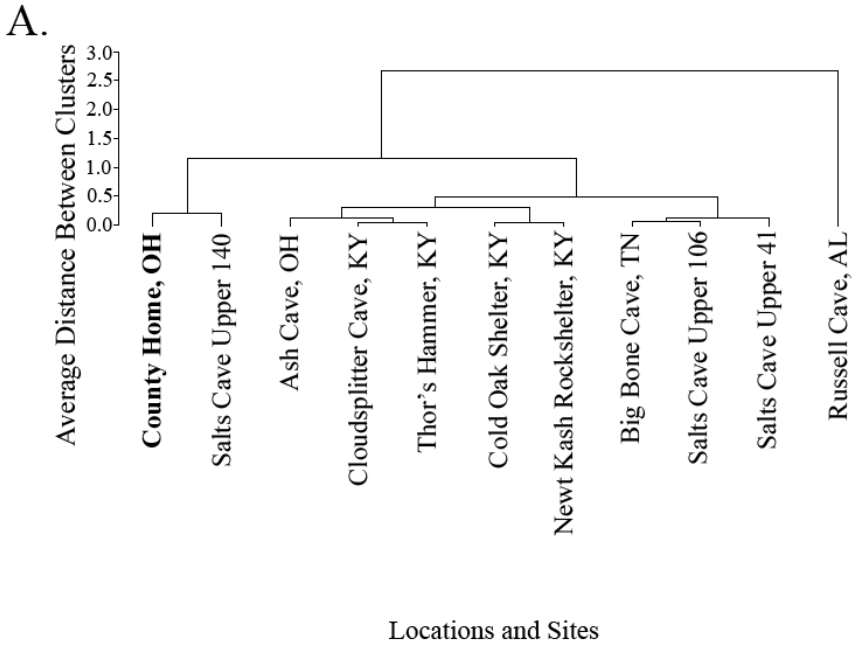


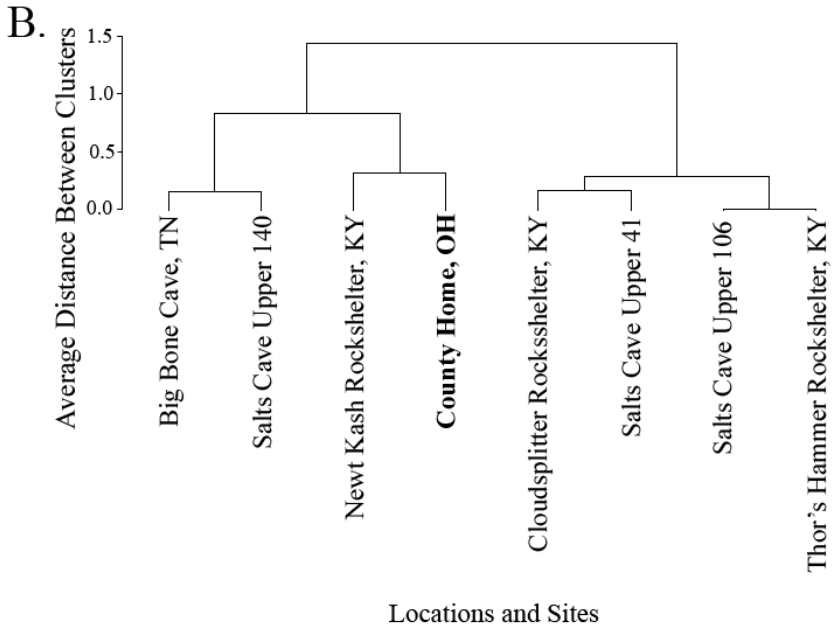
Chenopodium berlandieri ssp. *jonesianum*

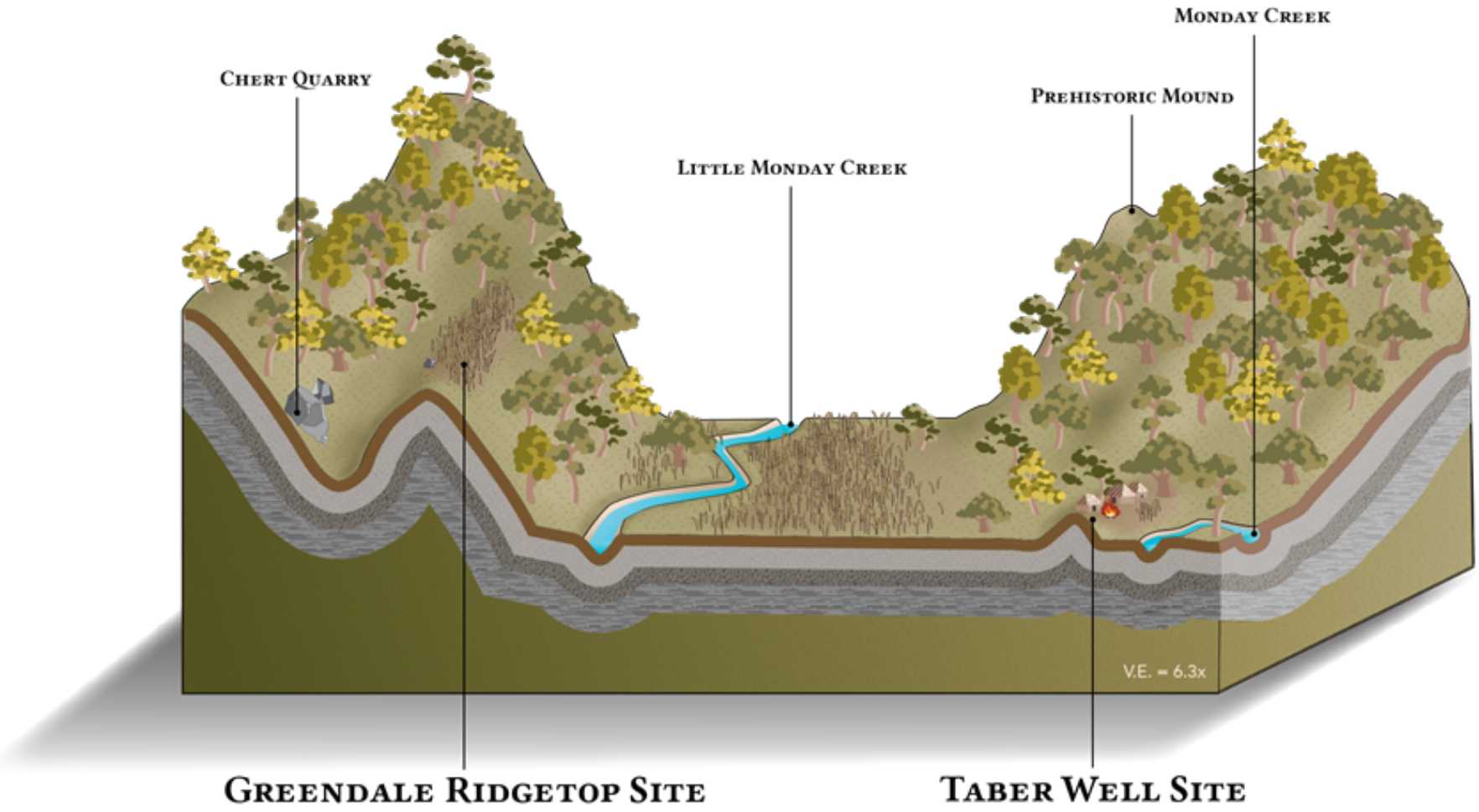



A.
Coefficient of Variation
0.15
0.10
0.05
0
1000
2000
3000
Years Before Present


B.
Coefficient of Variation
0.4
0.3
0.2
0
1000
2000
3000
Years Before Present


A.
Average Distance Between Clusters
3.0
2.5
2.0
1.5
1.0
0.5
0.0
County Home, OH
Salts Cave Upper 140
Ash Cave, OH
Cloudsplitter Cave, KY
Thor's Hammer, KY
Cold Oak Shelter, KY
Newt Kash Rockshelter, KY
Big Bone Cave, TN
Salts Cave Upper 106
Salts Cave Upper 41
Russell Cave, AL
Locations and Sites

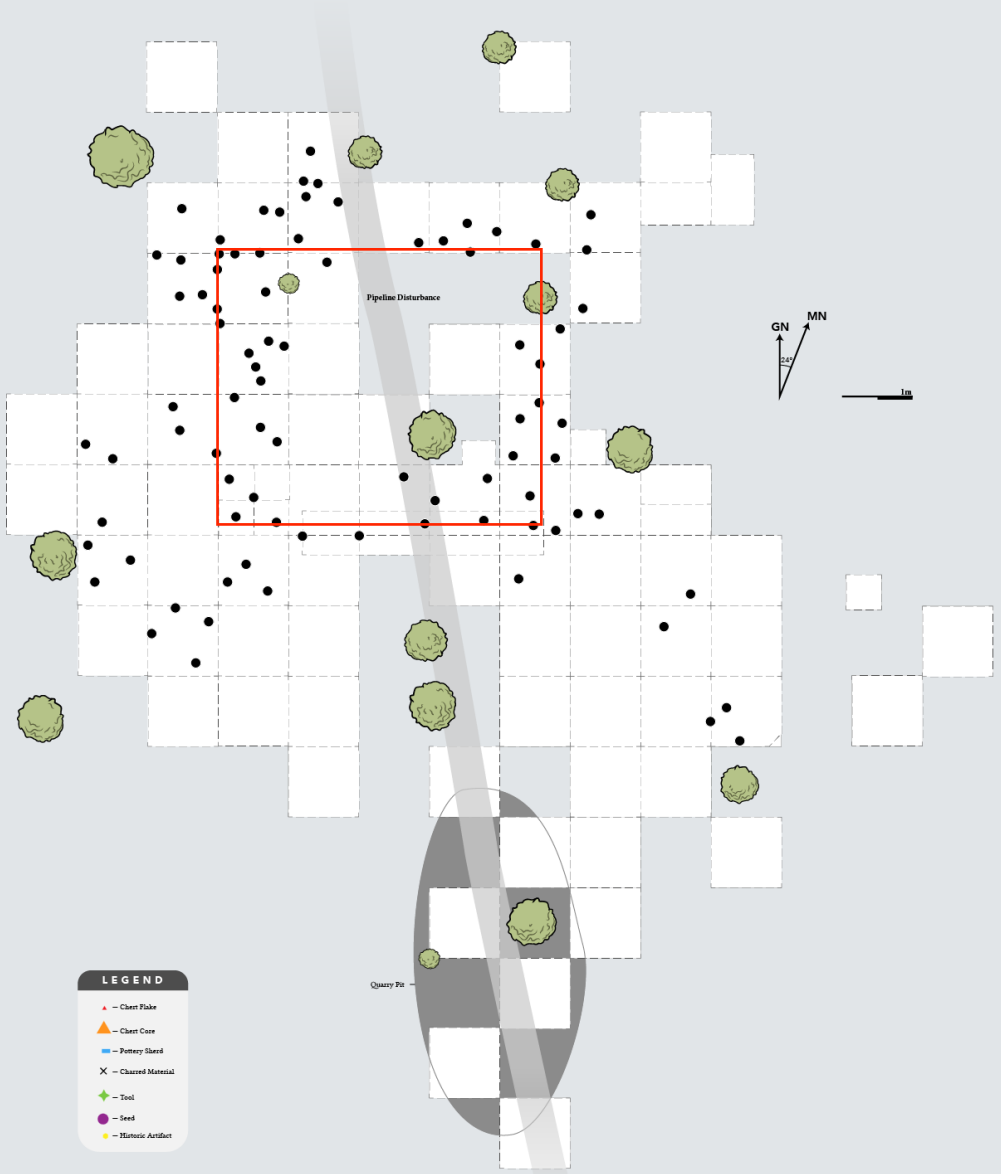

B.
Average Distance Between Clusters
1.5
1.0
0.5
0.0
Big Bone Cave, TN
Salts Cave Upper 140
Newt Kash Rockshelter, KY
County Home, OH
Cloudsplitter Rockshelter, KY
Salts Cave Upper 41
Salts Cave Upper 106
Thor's Hammer Rockshelter, KY
Locations and Sites

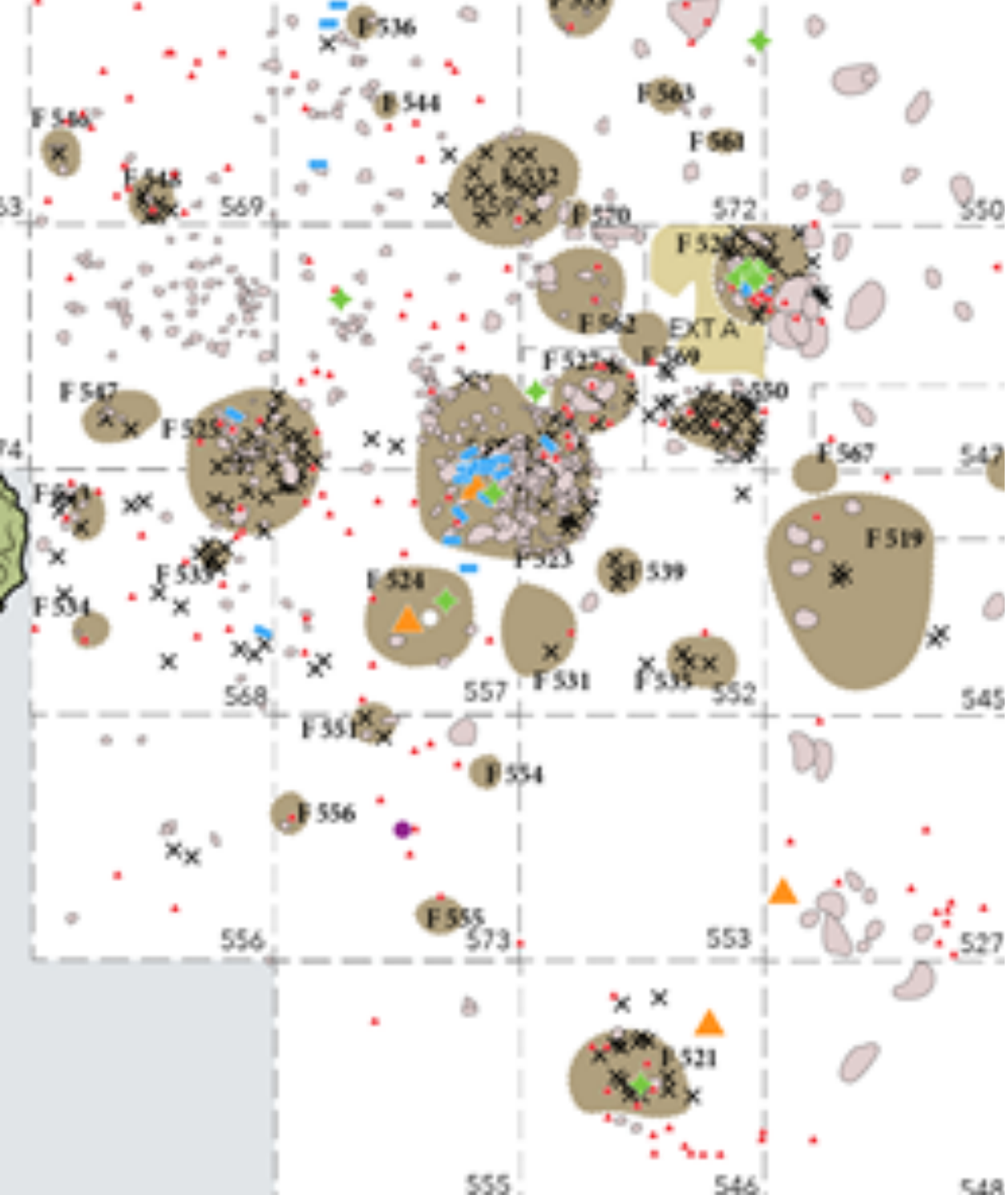

Monday Creek
Chert Quarry
Prehistoric Mound
Little Monday Creek
V.E. = 6.3x
Greendale Ridgetop Site
Taber Well Site

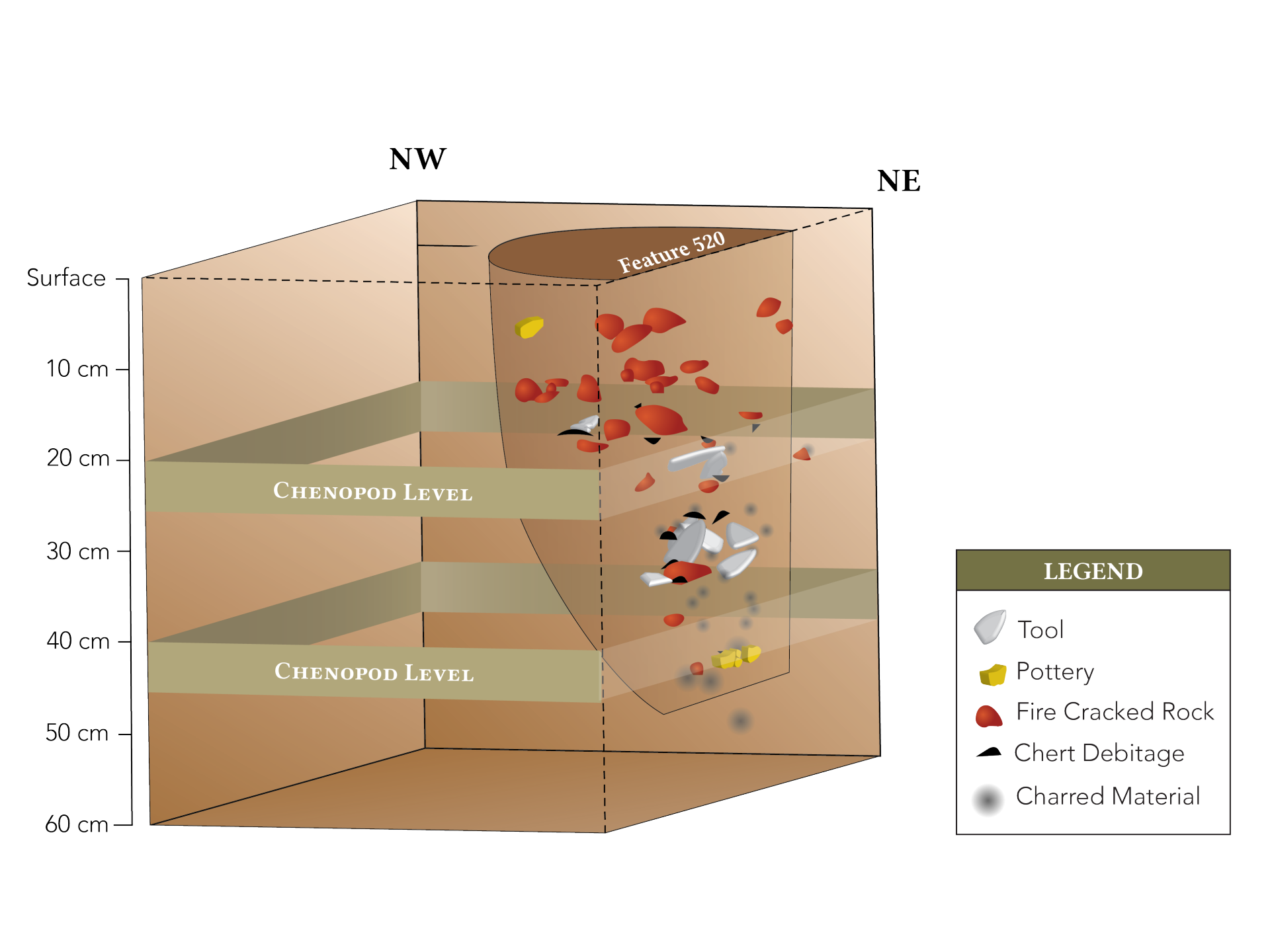

33HO369
GREENDALE RIDGETOP SITE
GN
MN
1m
Pipeline Disturbance
TRENCH 1
EXT A
EXT B
EXT C
DATUM
Quarry Pit
LEGEND
Chert Flake
Chert Core
Pottery Sherd
Charred Material
Tool
Seed
Historic Artifact

33HO369

Greendale Ridgetop Site




F536
F544
F563
F560
F546
F548
F532
F520
F542
EXTA
F569
F525
F547
F550
F567
F519
F523
F539
F524
F534
F531
F535
F551
F554
F556
F555
F521
569
572
568
557
552
545
556
573
553
527
555
546


NW
NE
Surface
10 cm
20 cm
30 cm
40 cm
50 cm
60 cm
Feature 520
Chenopod Level
Chenopod Level
LEGEND
Tool
Pottery
Fire Cracked Rock
Chert Debitage
Charred Material

LEVEL 3
14 cm below surface

LEVEL 4
23 cm below surface

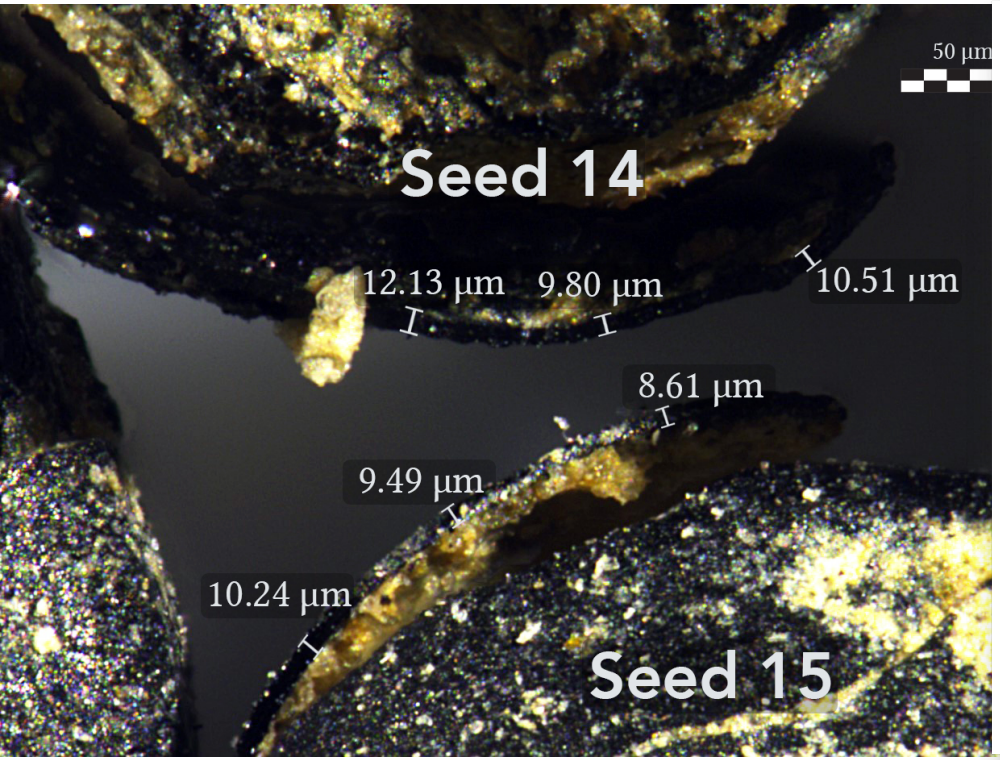
LEVEL 4
25 cm below surface

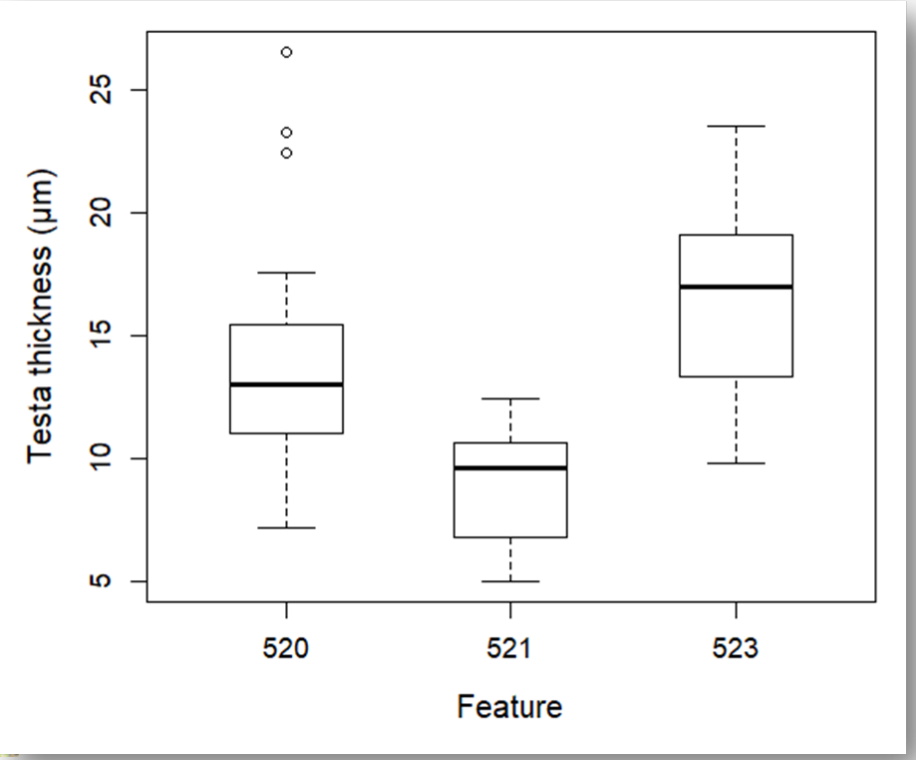
Level 6
32 cm below surface

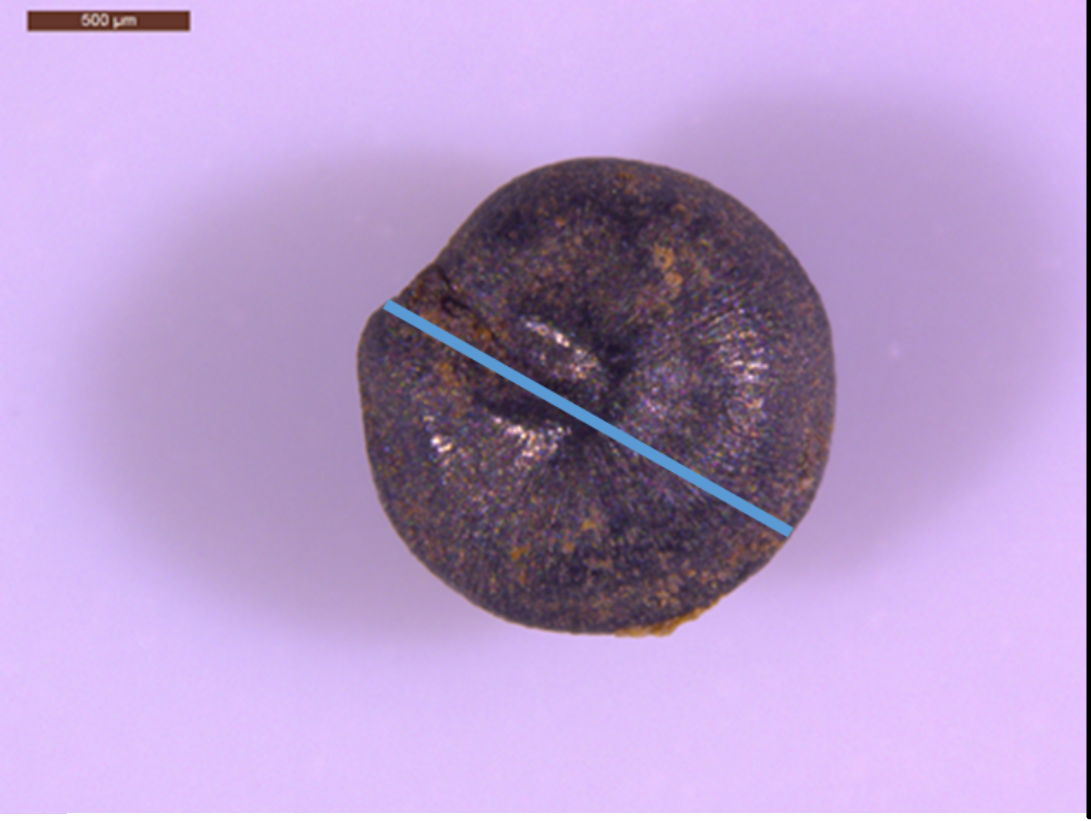
LEVEL 3
East Half - West Wall
5 cm below surface

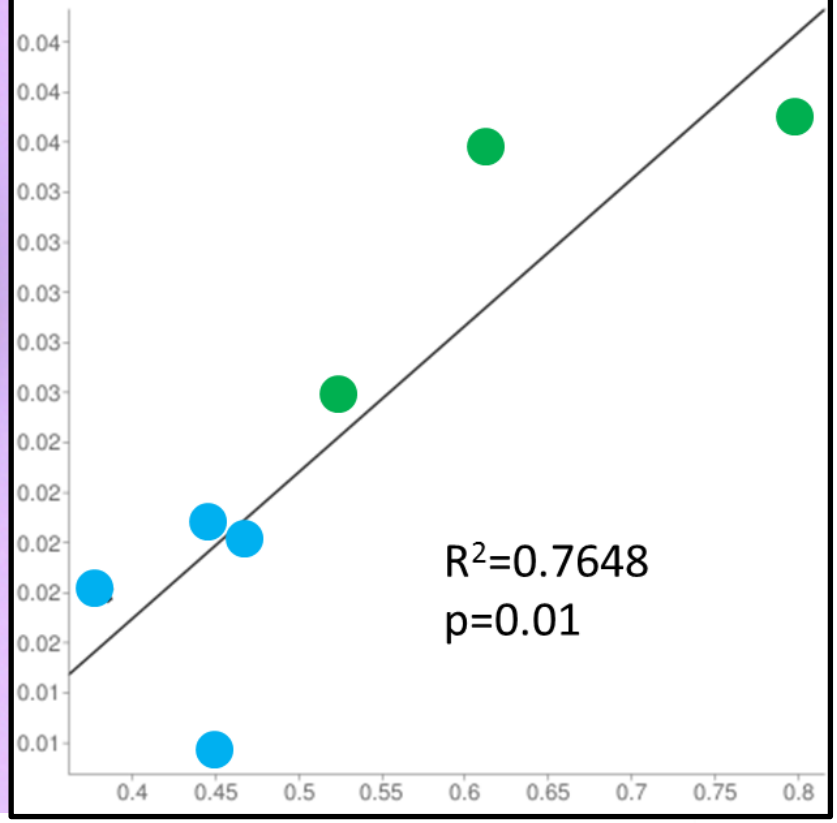
LEVEL 8
East Half
42 cm below surface

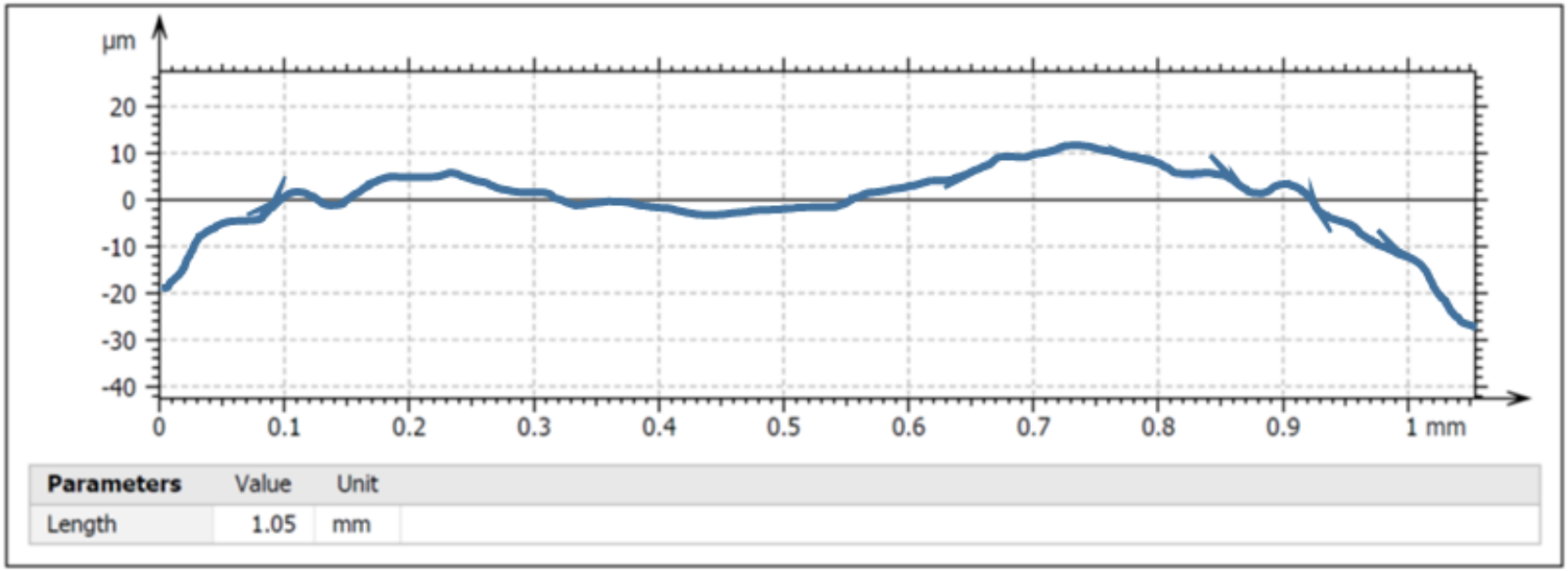
LEVEL8
West Half
42 cm below surface


50 µm
Seed 14
12.13 µm
9.80 µm
10.51 µm
8.61 µm
9.49 µm
10.24 µm
Seed 15


Testa thickness (µm)
5
10
15
20
25
520
521
523
Feature

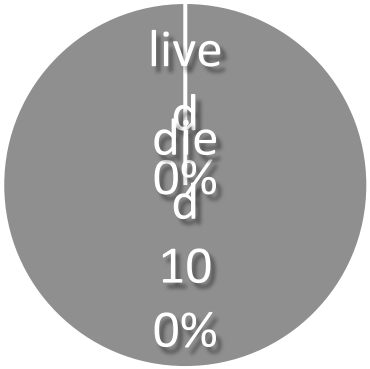


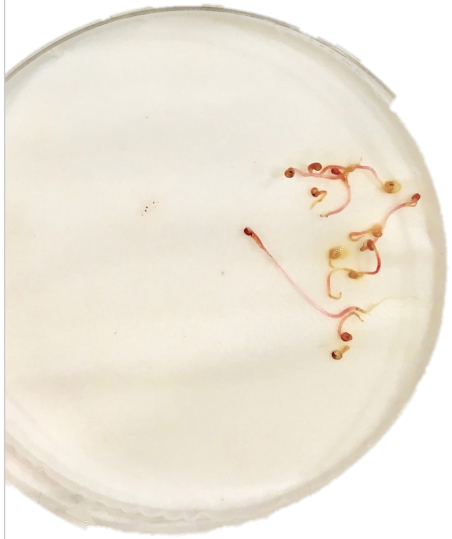




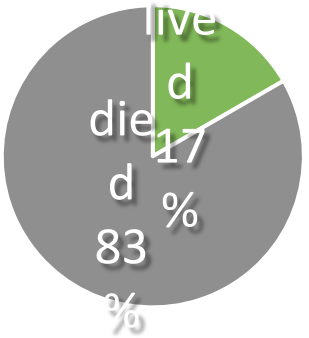
Parameters	Value	Unit
Length	1.05	mm

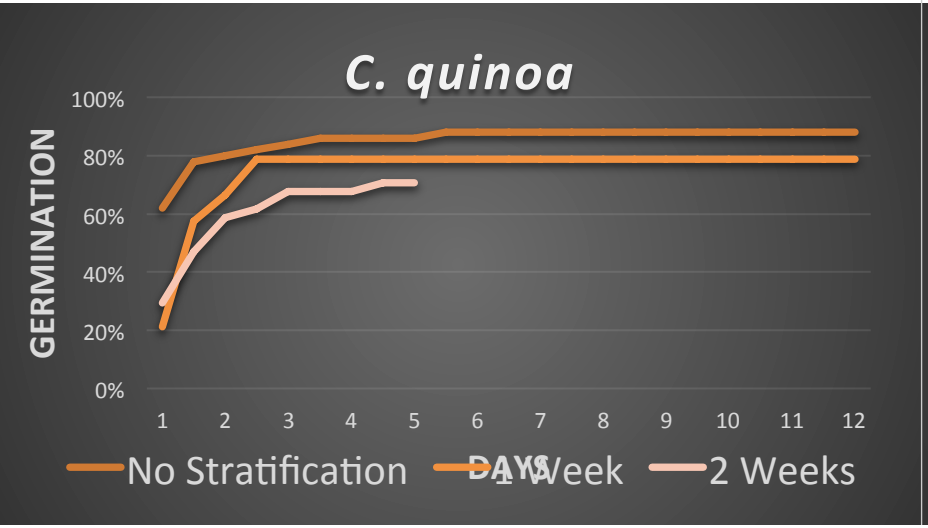
C. quinoa

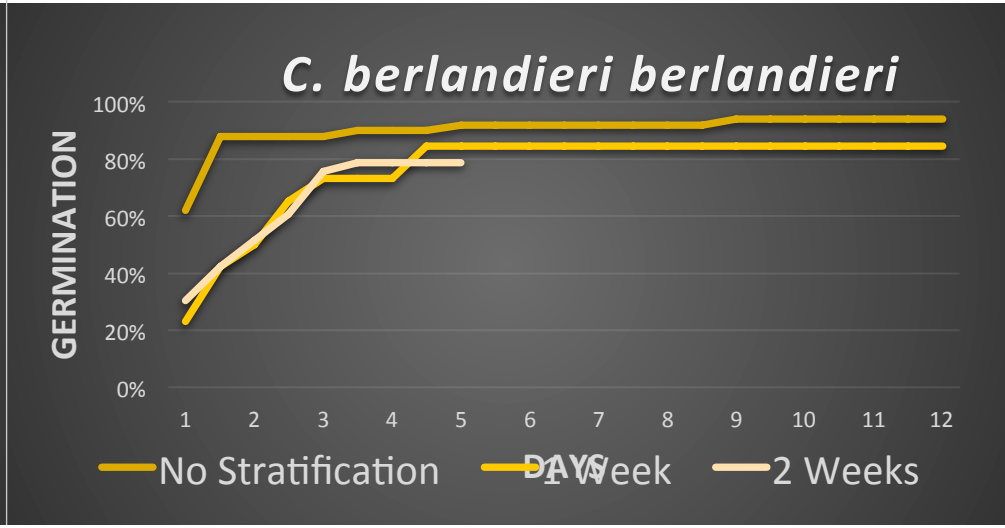


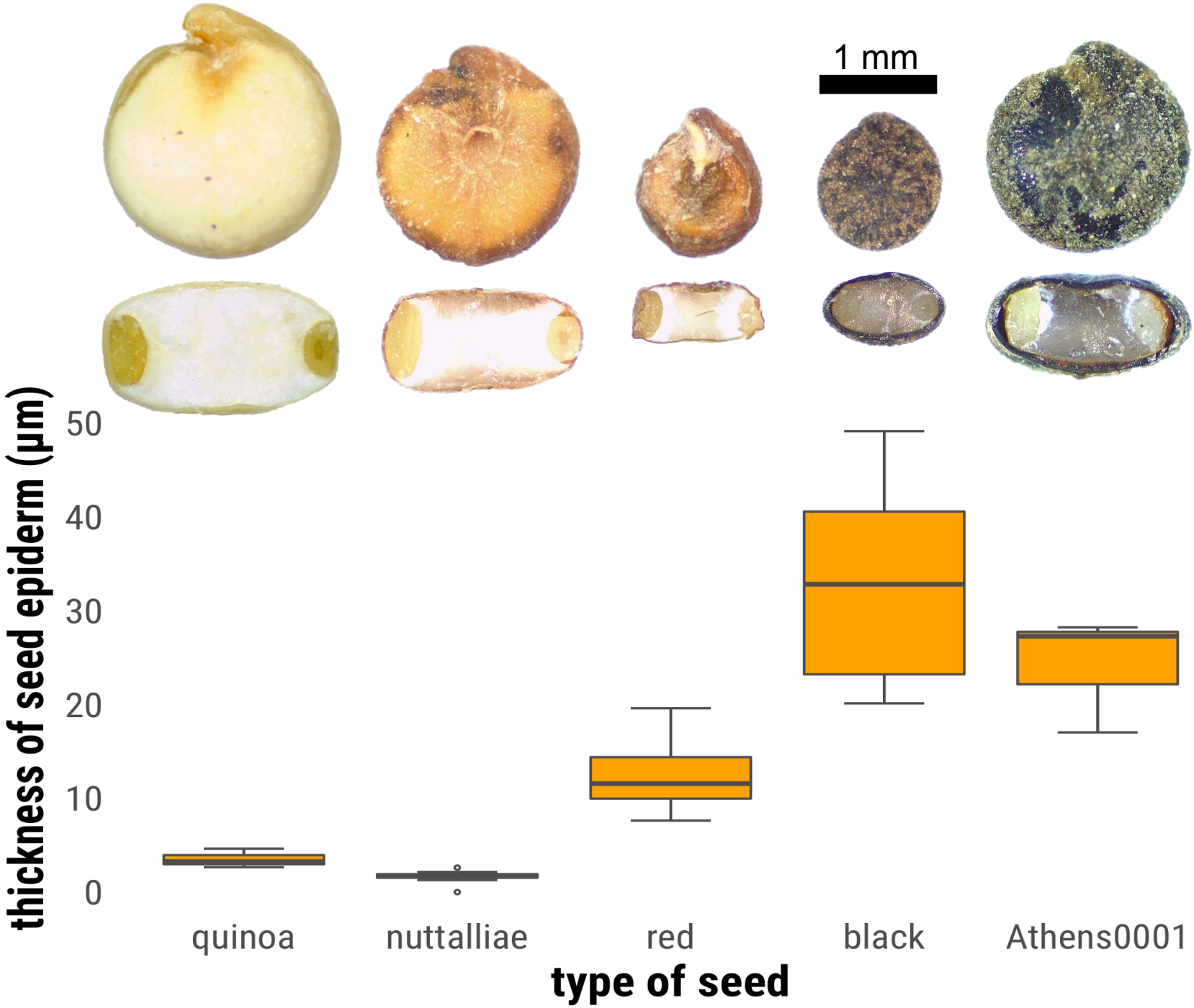


C. berlandieri nuttalliae








1 mm
thickness of seed epiderm (µm)
50
40
30
20
10
0
quinoa
nuttalliae
red
black
Athens0001
type of seed