

Starchy food residue on a potsherd from a late Holocene hunter-gatherer site in Argentine Patagonia: towards the visibility of wild underground storage organs

Vegetation History and Archaeobotany

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ESM Table 1 Starch grain features described in the bibliography for other starchy *taxa* which might be present in pottery sherd residues of ancient Patagonia. Abbreviations: dom=domesticated, s/d=sine data

<i>Taxa</i>	<i>Oxalis</i> spp. L. (wild)	<i>Arjona tuberosa</i> Cav. (wild)	<i>Araucaria araucana</i> (Molina) K. Koch (wild)	<i>Prosopis</i> spp. L. (wild)	<i>Zea mays</i> L. (dom.)	Convolvulaceae (dom.)	<i>Ephedra</i> spp. L. (wild)	<i>Chenopodium</i> spp. L. (wild/dom.)	<i>Bromus catharticus</i> Vahl. (wild)	<i>Panicum urvilleanum</i> Kunth. (wild)	<i>Sporobolus rigens</i> (Trin.) E. Desv. (wild)
Source	Medina et al. 2018	Lema et al. 2012	Conforti and Lupano 2007	Giovannetti et al 2008	Reichert 1913, Cortella and Pochettino 1994, Babot 2003	Reichert 1913	Carlquist 1989	Cortella and Pochettino 1994, Babot 2003	Musaubach et al. 2013	Musaubach et al. 2013	Musaubach et al. 2013
Shape	Asymmetrical shapes, Elliptical, conical and elongated	Spherical	Spherical to slightly oval	Regular (spherical, ovoid, polyhedral) and irregular (multifaceted with protuberances)	Oval, polyhedral with sharp edges	Spherical, rarely oval, triangular,	Spherical to slightly ovoid, rarely irregular outline	Oval compound grains, polyhedral units	Spherical, ellipsoid, irregular, ovoid flattened	Spherical	Every component granule is irregular
Mode (X) (µm)	s/d	6.7	8.4	s/d	s/d	s/d	s/d	s/d	6 (4.9)	3.2 (4.3)	s/d
Range (µm)	10-50	1.9-10.8	4.4-12.4	2.5-28	12-30	17 (simple) -40 (compound grains)	2-4	1 (unit)- 50 (whole compound grains)	1-10	1.2-7	2-10
Aggregation	s/d	Simple	Simple grains	Simple	Simple and compound of 2 to 6	Simple and compound of 2 to 10 equal components	Simple	Compound of indefinite number	Simple	Simple	Compound
Hilum	Eccentric	s/d	Central	Central, eccentric, spherical, elongated	Central, radial fissures	Central, eccentric	s/d	Not visible	Centric, elongated	Centric; deep depression	s/d
Cracks/fissures	absent	s/d	s/d	s/d	s/d	s/d	s/d	s/d	Absent	Radial	s/d
Extinction cross	High birefringence, broken arms crossing at more than one point	Fair birefringence	High birefringence, straight arms	High birefringence, straight arms	s/d	s/d	s/d	Not visible	s/d	s/d	s/d
Lamellae	Not visible	s/d	s/d	Not visible	Delicate lamellae	s/d	s/d	s/d	Visible	Not visible	s/d

ESM Table 2 Comparative features of the starch grains from Monte Loayza Site 3 potsherd and from *Alstroemeria aurea*, *Tropaeolum porifolium* and *Diposis patagonica* tubers

<i>Taxa</i>	Monte Loayza Site 3 potsherd	<i>Alstroemeria aurea</i>	<i>Tropaeolum porifolium</i>	<i>Diposis patagonica</i>
Length (µm) 1st Mode	Cat. 2/3 (2.50 to 6.49)	Cat. 9 to 12 (16.50 to 24.49)	Cat. 9 (16.50 to 18.49)	Cat. 2 (2.50 to 4.49)
Length (µm) 2nd, 3rd Mode	Cat. 7/8 (12.50 to 16.49)	-	Cat. 1/2 and 6/7 (0.50 to 4.9)(10.50 to 14.49)	Cat. 7 (12.50 to 14.49)
X	11.28	21.11	15.62	12.51
range	3.50- 33.75	3.65 – 43.90	2.50 – 38.75	2.50 – 50.00
STD	9.07	7.96	8.25	8.70
n	44	300	300	200
Aggregation	Simple and much less frequently compounds of two	Simple and compound, usually of two or three	Simple and much less frequently compounds of two	Simple and frequently compounds of two, three, four and five
Shape	Spherical, hemispherical, ovoid, pyriform, ellipsoid, conical	Spherical, ovoid (some dome shaped or truncate)	Spherical, hemispherical, ovoid (some dome shaped or truncate), pyriform, ellipsoid, conical	Spherical, hemispherical, ovoid, ellipsoid, conical, polyhedral, quadrangular
Hilum	Distinct, indistinct; spherical, elongated (bifurcated at one end)	Distinct, indistinct; spherical (commonly with fissures); central, eccentric	Distinct; spherical (commonly with radial fissures); elongated (fissured at one or both ends); central, eccentric	Distinct; spherical (commonly with radial fissures); central
Cracks/Fissures	Branching, radial/stellate in the hilum	Longitudinal or transverse fissures, or two fissures crossing one another, usually in the hilum	Longitudinal; branching; transverse; radial/stellate in the hilum	Radial/stellate in the hilum
Extinction cross	Distinct; centric and eccentric; lines straight/curved; high birefringence in some grains and fair or no birefringence in others	Distinct but not clear-cut; centric and eccentric; symmetric and asymmetric; lines straight/curved; high birefringence	Distinct; centric and eccentric; fairly well defined; lines; straight and/or irregular and jagged; high birefringence	Distinct; central; symmetric; sharply defined; lines straight/curved; high birefringence
Lamellae	Indistinct	Lamellae fairly well seen; Concentric	Indistinct	Indistinct

ESM Table 3 Comparative morpho-anatomy of *Alstroemeria aurea*, *Tropaeolum porifolium* and *Diposis patagonica* tubers

<i>Taxon</i>	<i>Alstroemeria aurea</i>	<i>Tropaeolum porifolium</i>	<i>Diposis patagonica</i>
Type of organ	Root tuber	Stem tuber	Stem tuber
Diameter (cm)	0.9	2	1.5
Length (cm)	8.5	2	1.5
Rhizo/periderm	Rhizodermis of 2/3 layers, abundant starch grains	Periderm of multi-layered (5/6) compressed cells followed by very thick-walled sclerenchyma cells, abundant starch grains	Periderm of multi-layered (10/12) compressed cells, oleo resin cells, starch grains
Cortex (cortical parenchyma)	Several layers of thin-walled parenchyma cells, abundant starch grains	Few layers (4/5) of parenchyma cells, abundant starch grains	Several layers of thin-walled cells, abundant starch grains
Parenchyma rays	absent	Incipient secondary growth, parenchyma rays of thin-walled cells, abundant starch grains	absent
Endodermis	present	absent	absent
Pericycle	Visible (1 layer)	Not visible	Not visible
Vascular tissues	Primary, Polyarch central stele, Mx, Px, Phlo	Regularly distributed secondary xylem -with solitary vessels - alternating with the parenchyma rays	Irregularly distributed vascular bundles
Pit (medullar parenchyma)	Present, thin-walled parenchyma cells, abundant starch grains	Present, thin-walled parenchyma cells, abundant starch grains	Absent

ESM Table 4 Starch grain features described in the bibliography for other species of the studied *genera*. Abbreviations: dom.= domesticated; s/d =sine data

<i>Taxa</i>	<i>Tropaeolum tuberosum</i> ssp. <i>silvestre</i> (wild)	<i>T. tuberosum</i> ssp. <i>tuberosum</i> (dom.)	<i>Alstroemeria brasiliensis</i> (wild)	<i>A. ligtu</i> (wild)	<i>A. hookeri</i> ssp. <i>Hookeri</i> (wild)
Source	Bulacio and Ponessa (2012)	Melchiorre (1985), Cortella and Pochettino (1995)	Reichert (1913)	Reichert (1913)	Correa et al. (2013)
Shape	Spherical to ovoid, and oval to elliptical.	Spherical to ovoid, and oval to elliptical, dome-shaped.	Spherical to ovoid, and oval to elliptical, no pressure facets in simple grains	Spherical to ovoid, some with pressure facets (the latter dome-shaped and hemispherical)	Elongated, round, irregular, all with irregularities on the surface
Mode (µm)	s/d	23 8.9	30	30	25
Range	10-15	0.5-50, those less than 7 spherical and not diagnostic	10-48	8-70	14.16-79.62
Aggregation	Simple	Simple and compounds of two or three	Usually simple, very few compound	Simple and frequently compounds of two, three or more	Simple and compound
Hilum	s/d	Punctate, eccentric	Punctate, usually fissured; centric to eccentric	Punctate, usually fissured; centric to eccentric	s/d
Cracks/ Fissures	s/d	s/d	Longitudinal, transverse, usually ragged in the hilum	Longitudinal, transverse, usually ragged in the hilum	s/d
Extinction cross	s/d	High birefringence	Distinct; very eccentric; not as high birefringence as <i>A. ligtu</i> ; double and multiple figures rare	Distinct; eccentric; high birefringence; double and multiple figures occasionally seen	s/d
Lamellae	s/d	visible	Not very distinct	Not very distinct	s/d

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