Not just charcoal: Analysis of wood remains from indigenous communal granaries of Gran Canaria (Canary Islands, Spain)

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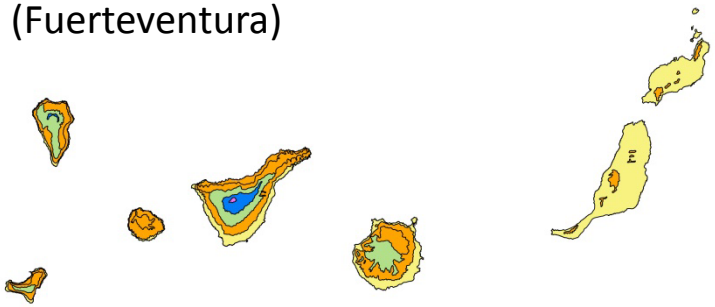
Introduction

Volcanic origin

95 km from Africa at the nearest point (Fuerteventura)



Dry subtropical climate

Presence of 5 bioclimatic belts (infracanarian – orocanarian)

Heterogeneity of landscapes and plant formations

infracanarian termocanarian mesocanarian supracanarian orocanarian

Laurel plant formations

High mountain environment

Mountainous areas

Introduction

North African origin — Isolation during c. 1000 years — Food sources: wild fruits, agriculture, animal herding, fishing — Absence of metals and domestic draught animals — Abundance of sites interpreted as granaries (Gran Canaria island)

Map of amazigh population in North Africa.
Source: http://www.ikuska.com/

Indigenous people of Gran Canaria, as illustrated by Leonardo Torriani (1592).

Introduction

R&I project HAR2017-83205-P (Spanish Government)

Provide new data on the methods and techniques employed in the past for the long-term storage of food plants.

Identify the plant species stored.

Record the pests present in the silos and evaluate the damage of the stores

Determinate the presence of plant pesticides

Assess the origin of charcoal remains

Evaluate the wood use and management by the indigenous groups

Identify wood decay features

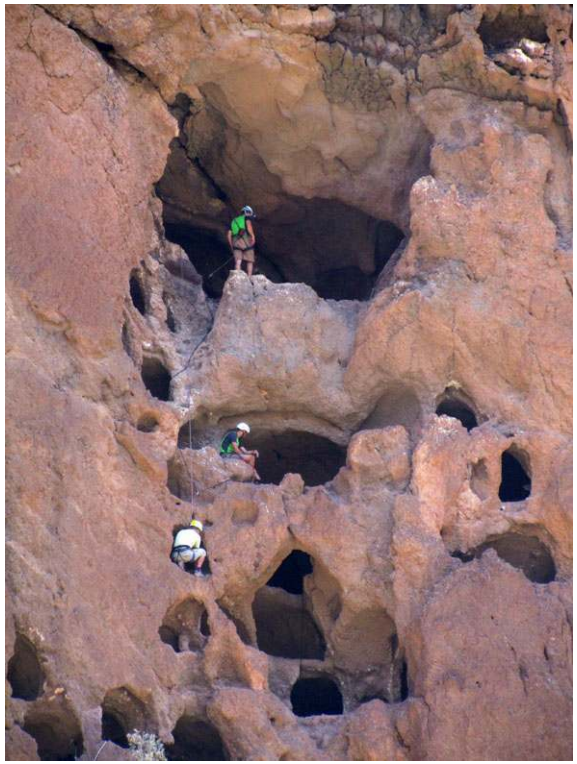
anthracology and xylology

Introduction

Communal granaries — Group of silos carved into the rock — Located at inaccessible places

Granary of Cenobio de Valerón

Granary of Temisas



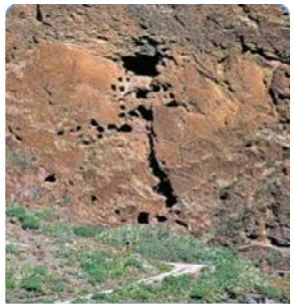
Granary of Cuevas Muchas

Introduction

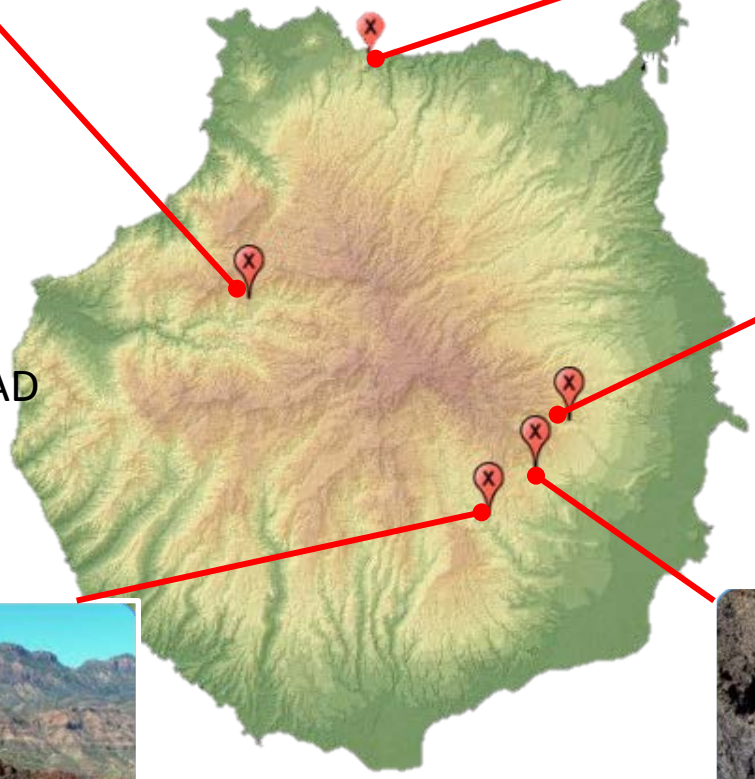
Communal granaries with xylological results mostly 11th – 15th centuries AD

Cenobio de Valerón
Dates: 1040 to 1440 cal AD

El Álamo
Dates: 1030 to 1430 cal AD



Cuevas Muchas
Dates: 1260 to 1430 cal AD



La Fortaleza
Dates: 545 to 1393 cal AD

Temisas
Dates: 1050 to 1440 cal AD

The Canary Islands: an exceptional preservation of the organic matter

STORED FOODS

Cultivated plants

Wheat

Triticum durum

Hordeum vulgare

Barley

· Most common cereal
· Grains, articulated sets of hulls and ears

Lens culinaris

Lentil

Bean

Vicia faba

Ficus carica

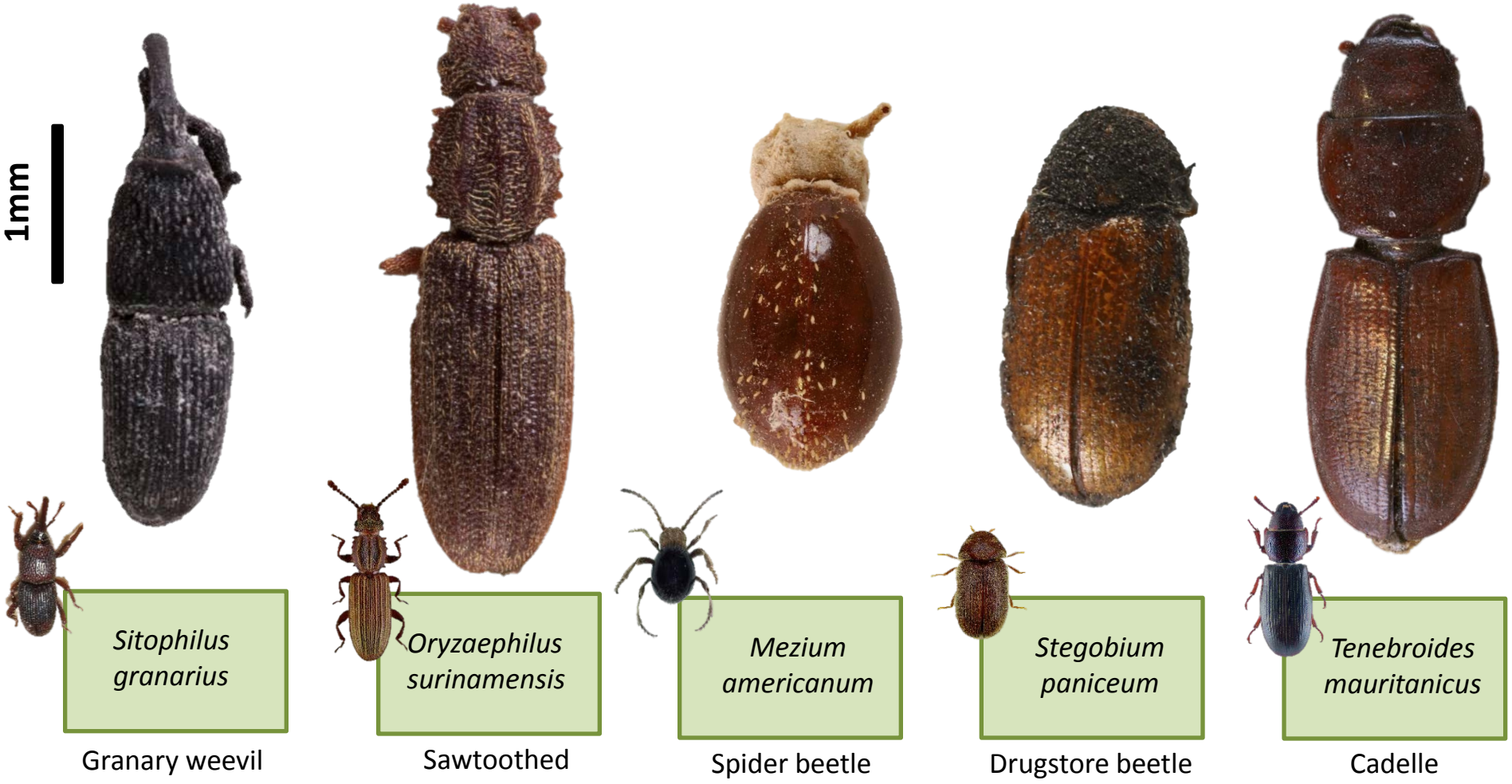
Fig

Most common fruit represented by endocarps, as well as few peduncles, fruit fragments and complete fruits

The Canary Islands: an exceptional preservation of the organic matter

RECORD OF INSECT PESTS

Insects



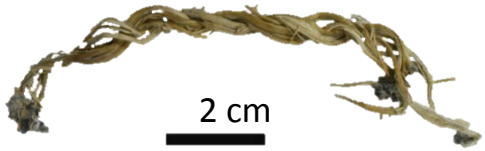
Grains showing insect damage = long-term storage?

The Canary Islands: an exceptional preservation of the organic matter

BASKETRY, ROPES, CONTAINERS

Plant fibres

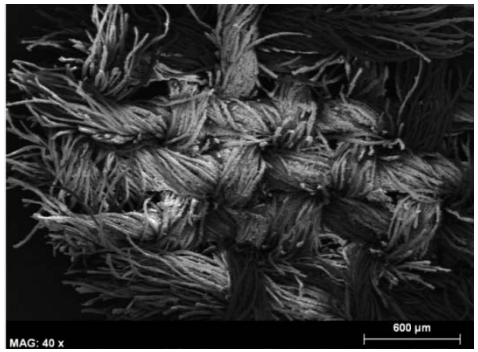
2 cm



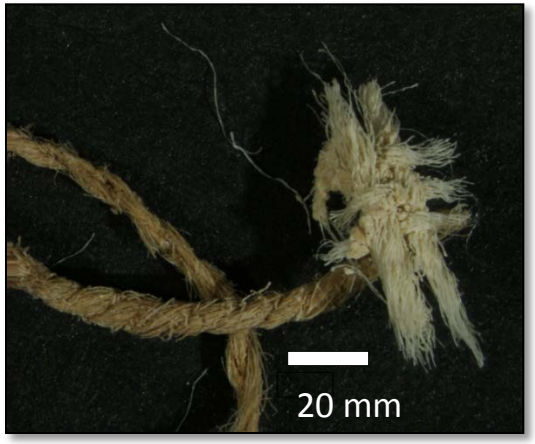
2 cm

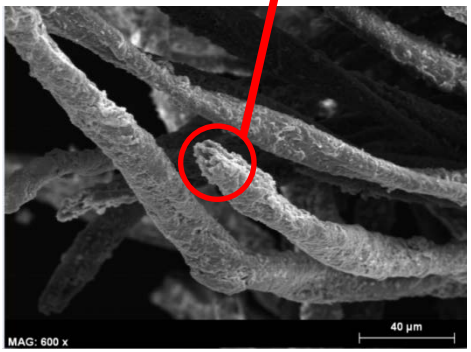
1 cm

Rushes
(*Holoschoenus* sp. / *Scirpus* sp.)



Canarian palm





The Canary Islands: an exceptional preservation of the organic matter

WOOD REMAINS

Desiccated wood

Material & Methods: wood & charcoal

DESICCATED WOOD

Wooden elements for the spatial organization of silos: timber beams, boards or closure elements.

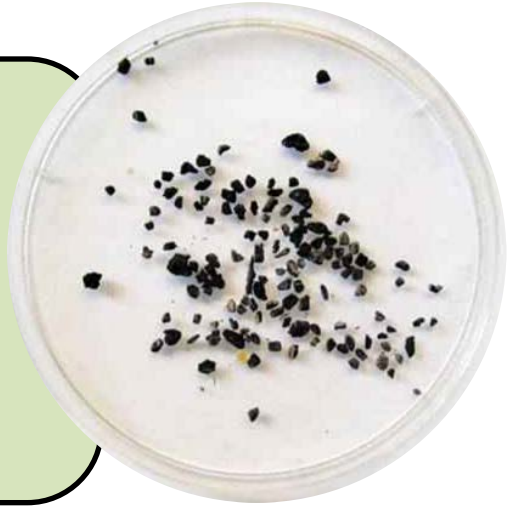
Small fragments (<10 cm): to attach the mortar to the walls.

SMALL CHARCOAL FRAGMENTS

-Charcoal particles from the mortar disintegration (moisture isolation and preservation).

-Other origin not yet identified?

Improbable inside the silos (stored food)

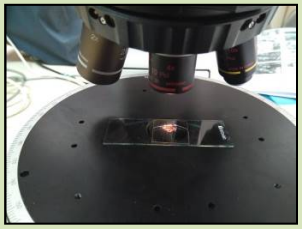


Material & Methods: wood & charcoal

Dry-sieving of sediments using meshes of 2, 1 and 0.5 mm (desiccated plant remains + insects)

Botanical identification
- charcoal
- wood

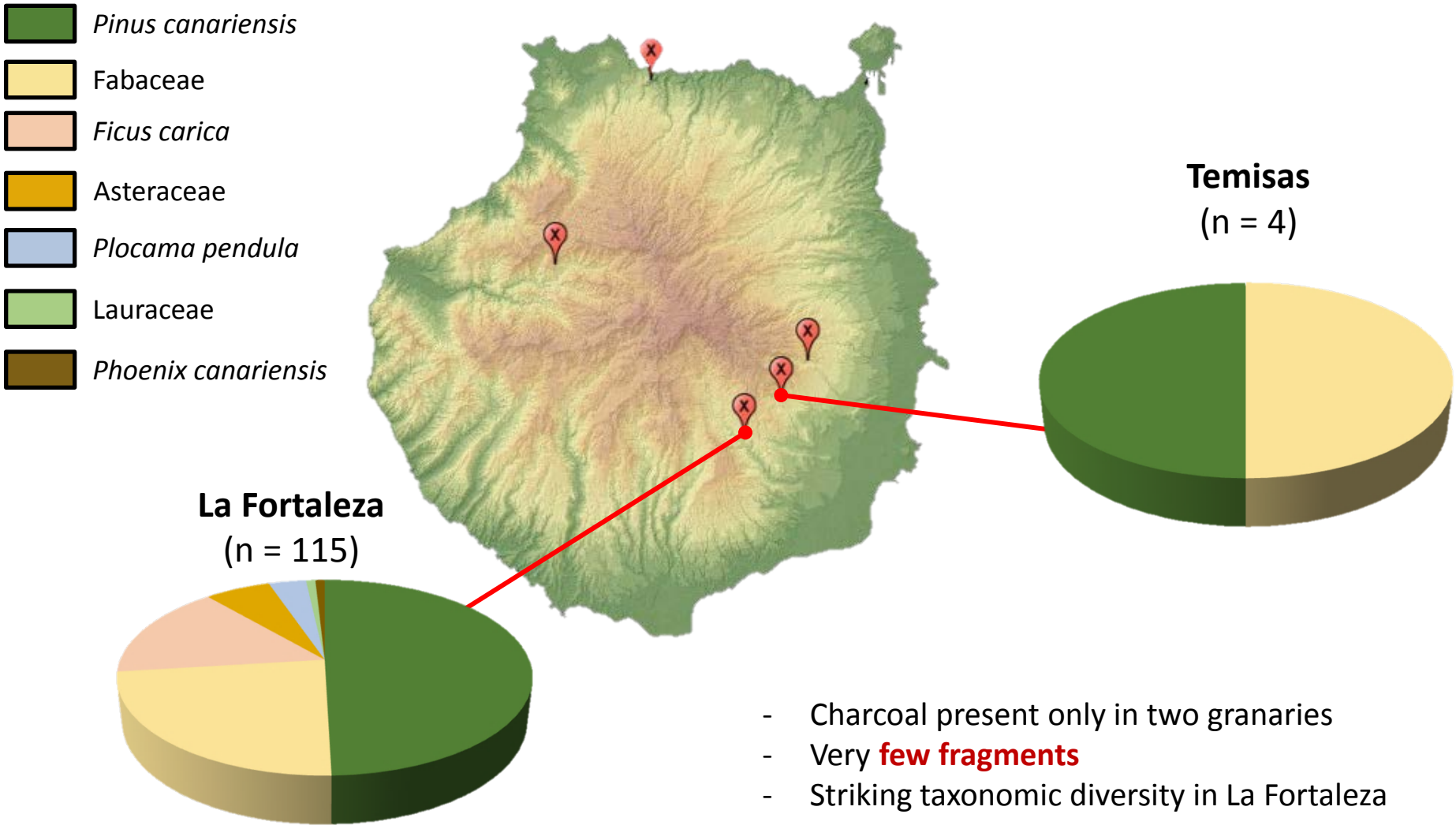
SEM analysis for **wood decay**



Creation of a **reference collection of Canarian woods**

Results & Discussion: anthracological remains (charcoal)

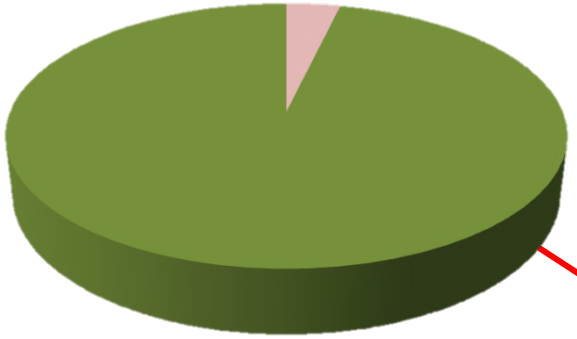
ANTHRACOLOGICAL REMAINS (charcoal) INSIDE THE SILOS



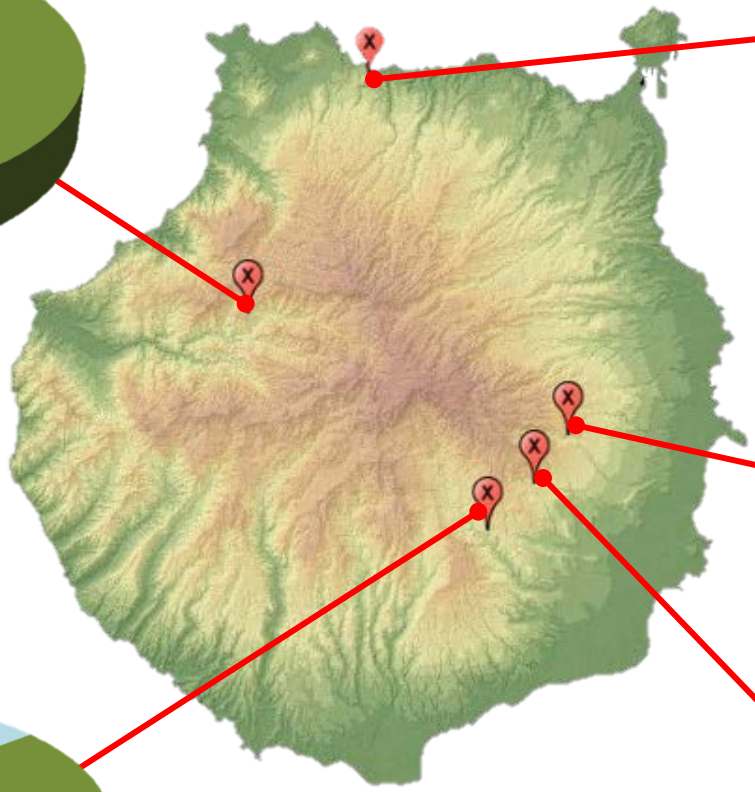
- Charcoal present only in two granaries
- Very **few fragments**
- Striking taxonomic diversity in La Fortaleza

Results & Discussion: xylological remains

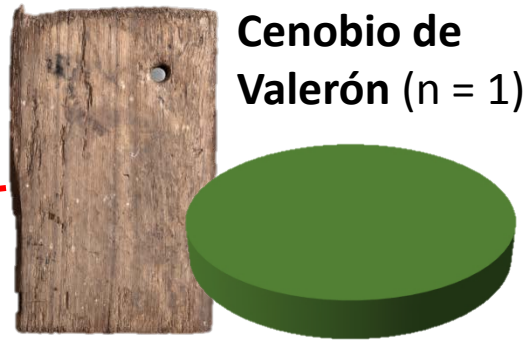
El Álamo
(n = 27)



Pine wood > 70 %
Abundant fig tree wood



Cenobio de Valerón (n = 1)

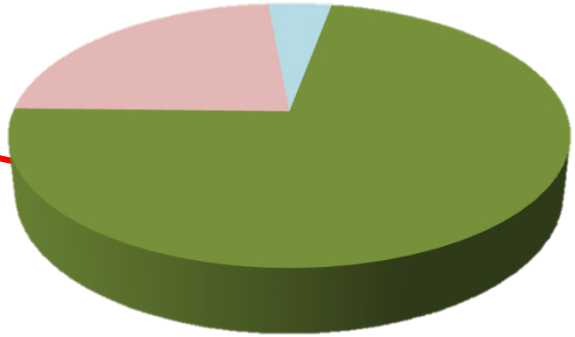


Pinus canariensis

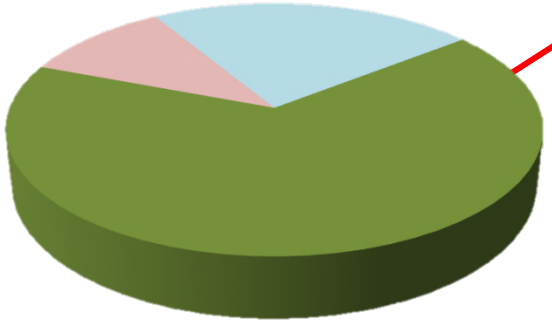
Ficus carica

Varia

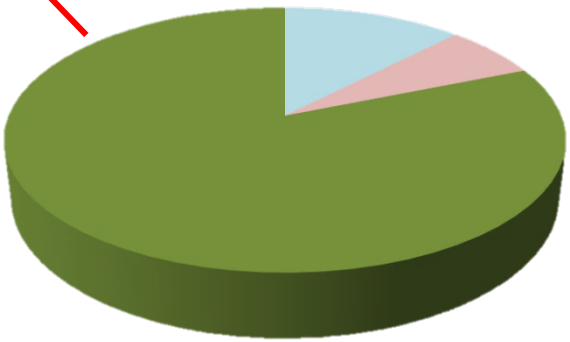
Cuevas Muchas (n = 69)

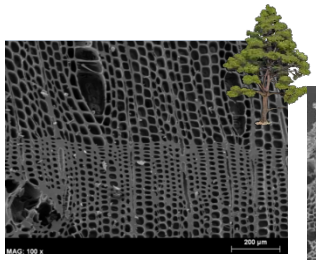


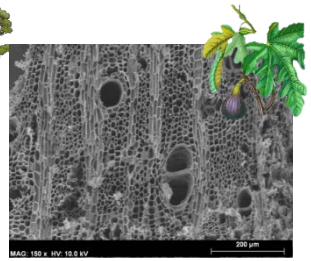
La Fortaleza
(n = 104)



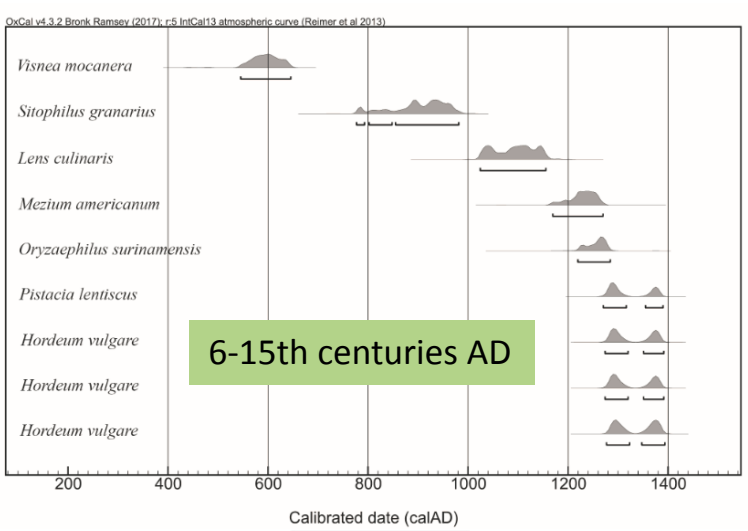
Temisas (n = 122)

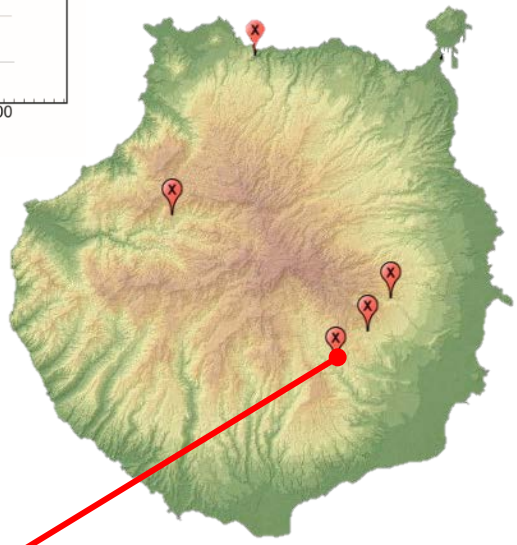




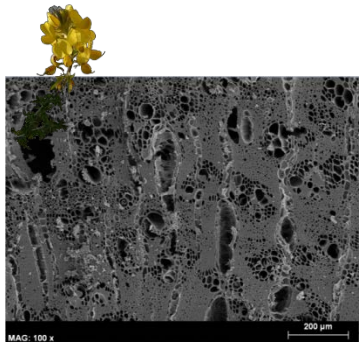


Results & Discussion: wood use in the communal granaries

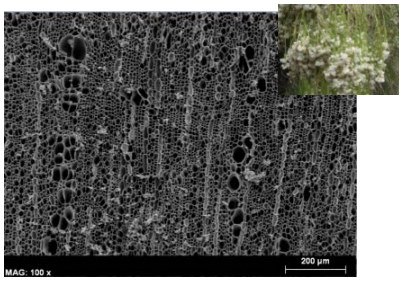




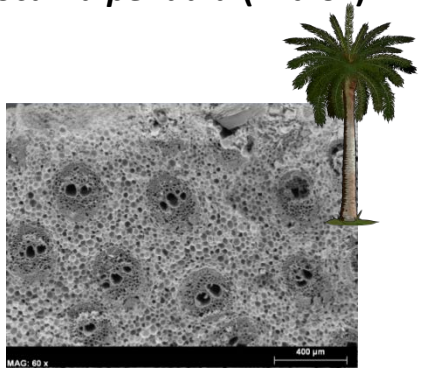
Granary of La Fortaleza



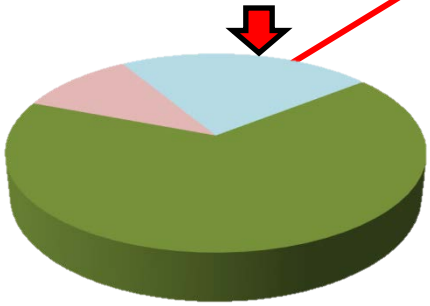
Fabaceae



Plocama pendula **("Balo")**



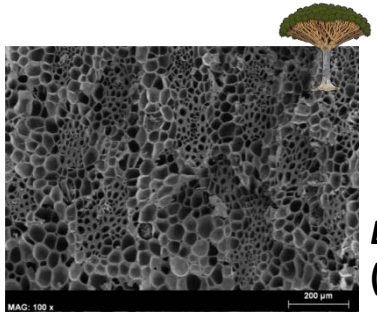
Phoenix canariensis
(Canarian palm)



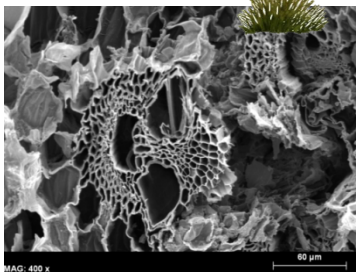
Pinus canariensis

Ficus carica

Varia



Dracaena **sp.**
(Dragon tree)

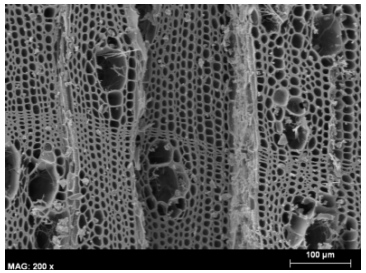


Monocotyledoneae
tp. Poales

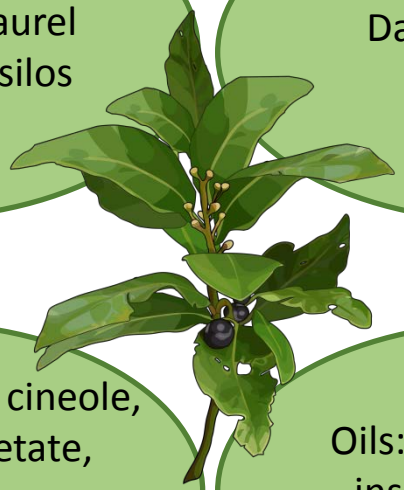
Results & Discussion: wood use in the communal granaries

Use of plant pesticides in the granaries?

Laurus novocanariensis leaf



Lauraceae wood
(cf. *Laurus novocanariensis*)



Presence of laurel leaves in the silos

Dated by C14 to 11-15th AD

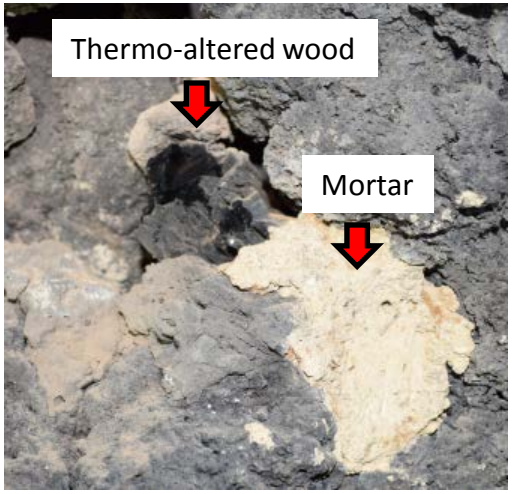
High content of cineole, a-terpinyl acetate, sabinene and limonene (fumigant and repellent properties)

Oils: inhibit growing of insects and strongly antifungal

Green branches (pesticide)

Results & Discussion: wood use in the communal granaries

Some examples of thermo-altered wood fragments



Possible origin of charcoal in addition to mortar disintegration?

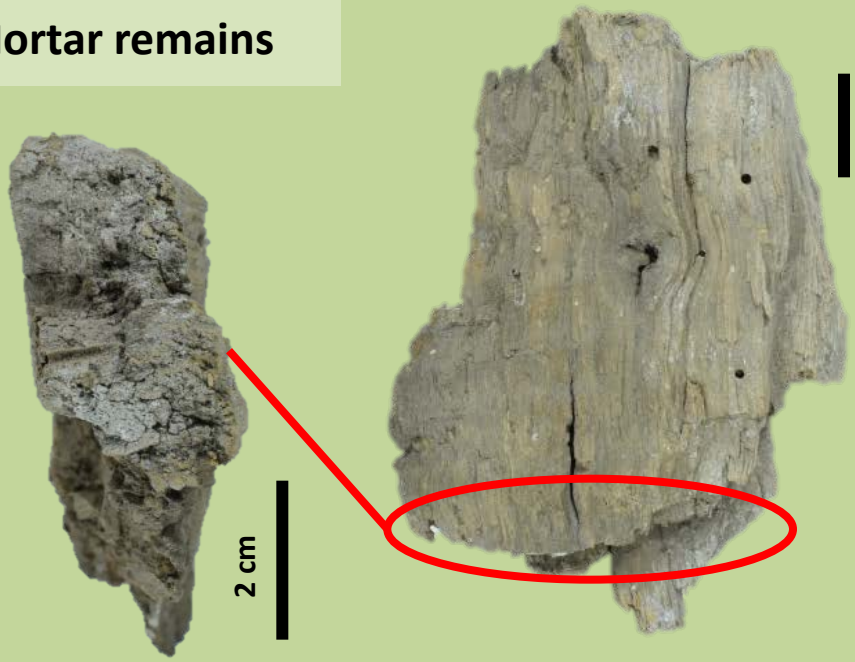
Results & Discussion: wood use in the communal granaries

Wood from fig tree branches

Wood fragments of fig tree cut tangentially; not directly related with the fruits stored

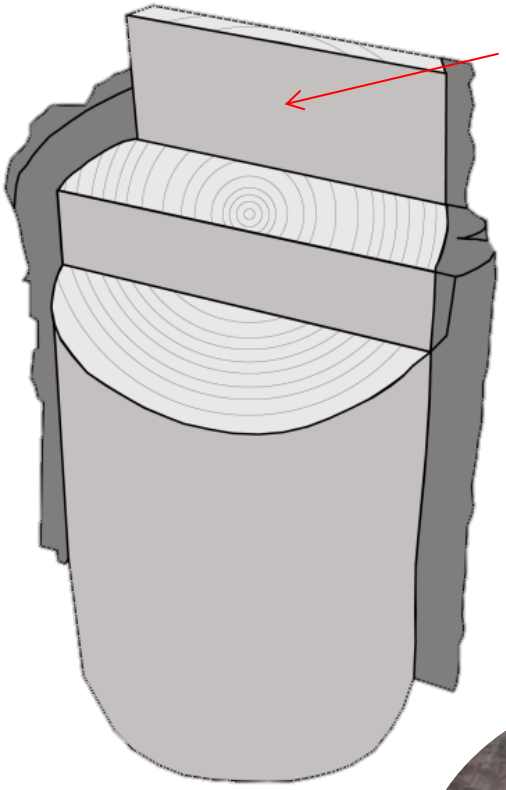
Fig tree pruning and wood use?

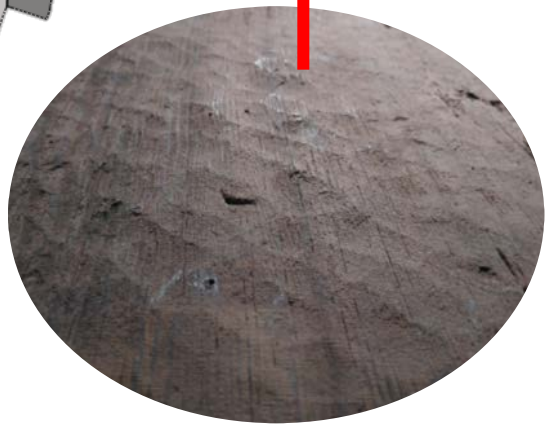
Mortar remains



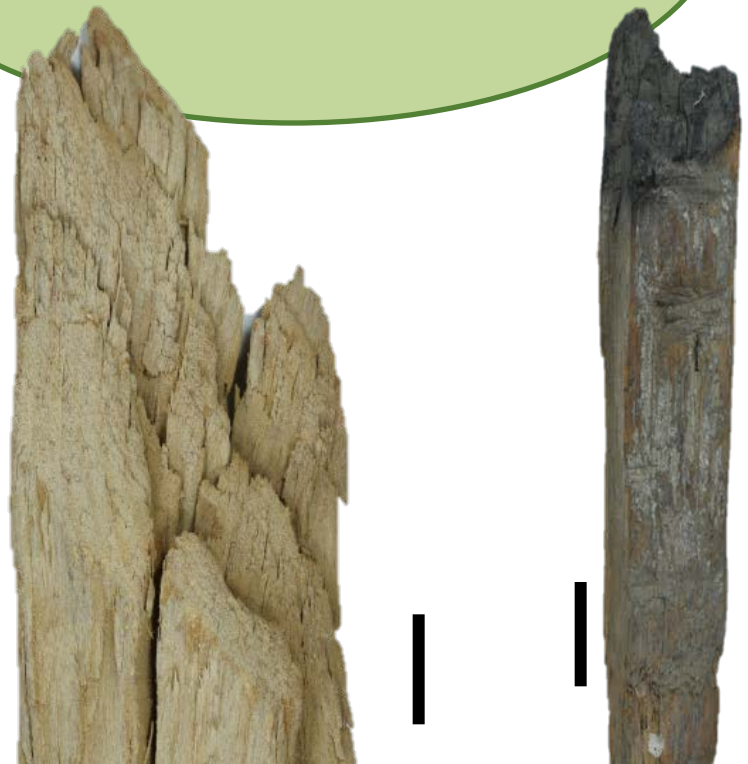
Results & Discussion: wood use in the communal granaries

Scarcity of wooden artifacts (wood reuse)
Some wood remains with worked surfaces





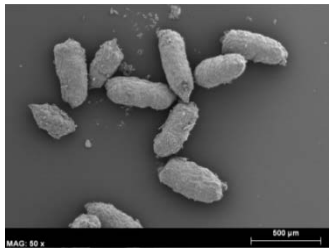
Absence of metallifeous minerals in the Canary Islands:
Wood exploitation strategies

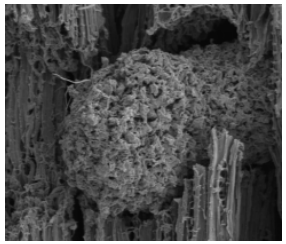


Results & Discussion: wood use in the communal granaries

Wood fragments: a fragile archaeological heritage

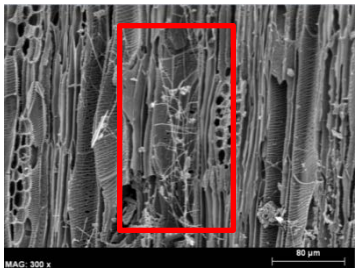
Xylophagous

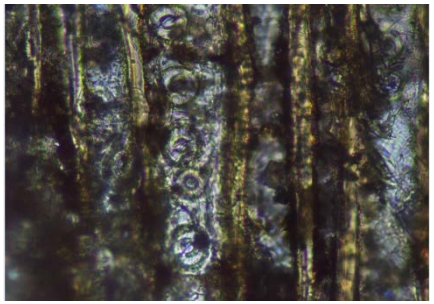


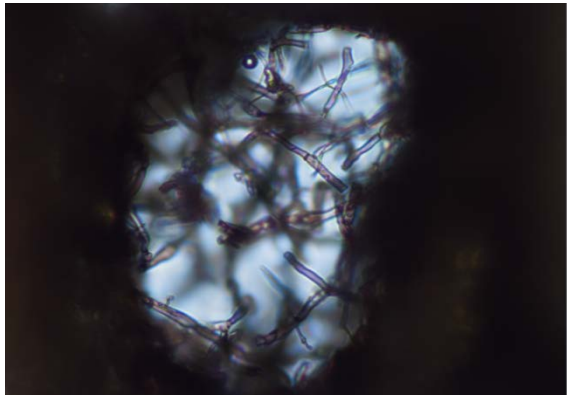


Fecal pellets

Fungi







Results & Discussion: wood use in the communal granaries

Who is eating the wood remains?

Poor preservation of xylophagous insects

Acmaeodera cisti
A wood-boring beetle

Phyllognatus excavatus

Females lay their eggs in rotten wood and the larvae eat degraded wood.

Conclusions and future research directions

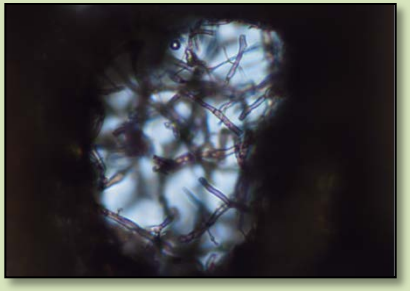
- Great **potential** of xylological studies in the **Canary Islands**
- **Exceptional preservation** of the organic matter (**wood**) from several archaeological contexts (granaries, funerary and domestic contexts).

Current distribution of the Canary Island pine

- *Pinus canariensis*: the most exploited wood.
- *Ficus carica*, *Phoenix canariensis*
- Ethnohistorical written sources (14-15th centuries): existence of “woodcrafters” for Gran Canaria.
- Pine forests more extended in the past

Conclusions and future research directions

- Combination with taphonomical studies (analysis of **microscopic decay features**: fungi, insects) + archaeoentomological studies (**xylophagous insects, coprolites**).
- **Preservation degree** of wood fragments?
- **State of the wood** (healthy – rotten) when it was colonized by insects?



Wooden closure from the Cenobio de Valerón granary

Future research directions:

- Record of tool marks and worked surfaces
- Experimental reproduction of selected wooden artifacts

Better understanding of:

- **Woodworking tools** used
- **Strategies and skills** in woodworking

THANK YOU FOR YOUR ATTENTION !

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