

Rooting plant use: the development of a modern reference collection

Yahaira Núñez-Cortés,
Gwendolyn Fuentes and
Andrea Pérez

Introduction

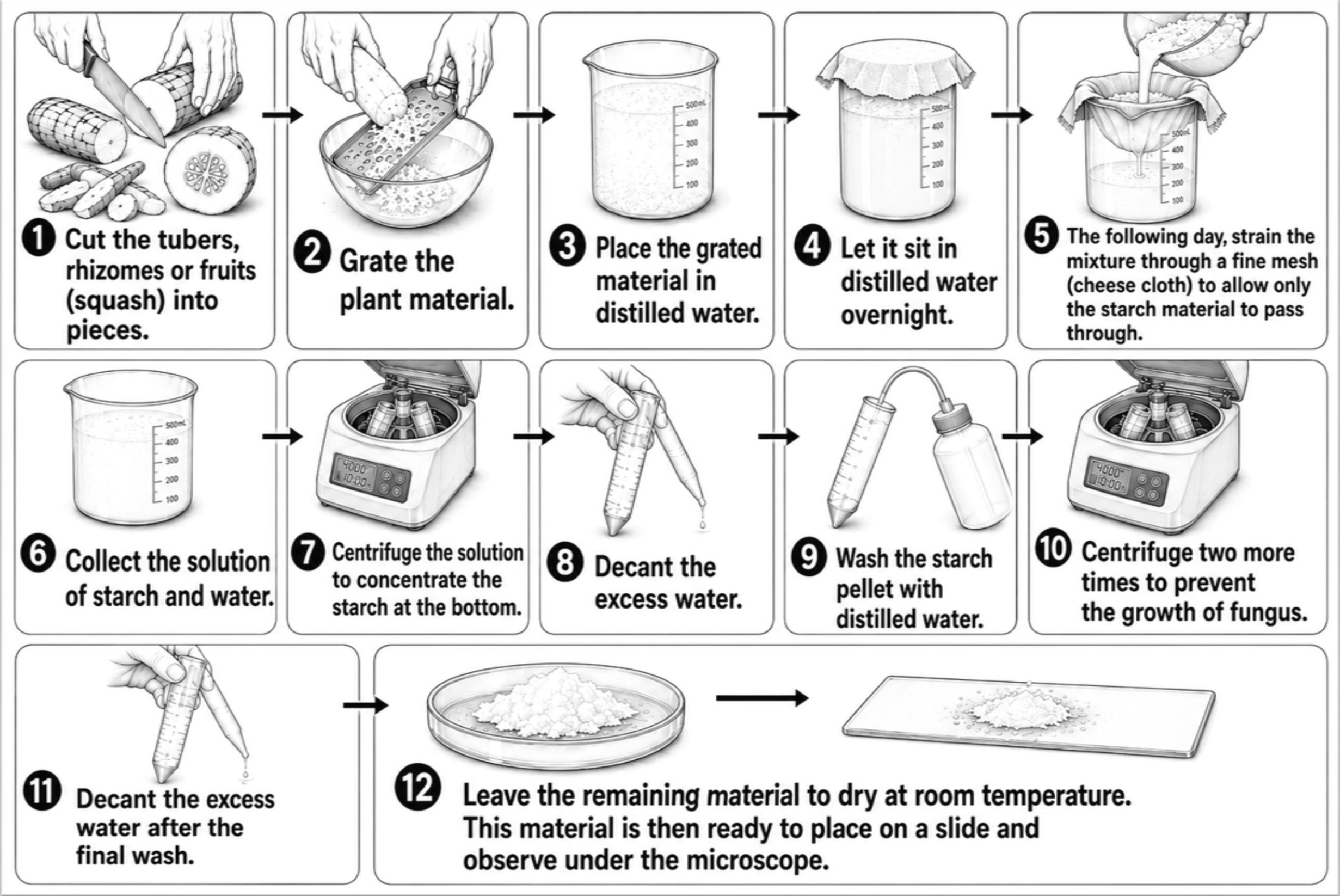
Starch grains are semicrystalline structures that store the energy of plants. They can be found in seeds, fruits, tubers and rhizomes. Their preservation on archaeological tools and dental calculus can provide clues about ancient human diets.

Our objective is to create a comprehensive modern reference collection of starch grains from economically important plants likely used during pre-Columbian times in the tropical Americas to serve as a comparative collection for archaeological samples.

Methodology

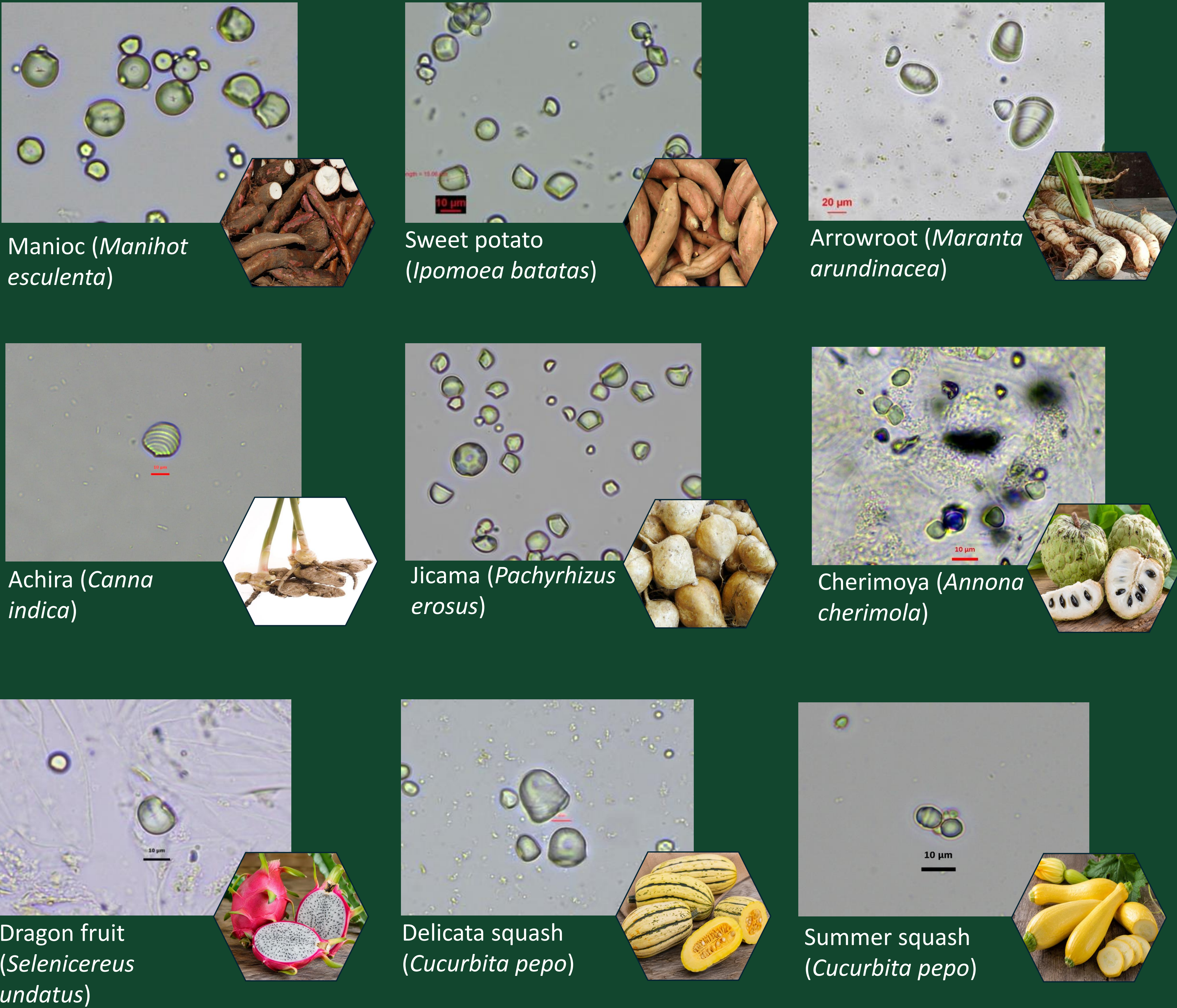
- Plant tissue was obtained from three sources:
- 1) the current living collection at Sacramento State greenhouses
 - 2) the University of Minnesota, CBS Conservatory & Botanical Collection
 - 3) produce purchased from local grocery stores

Plant processing:

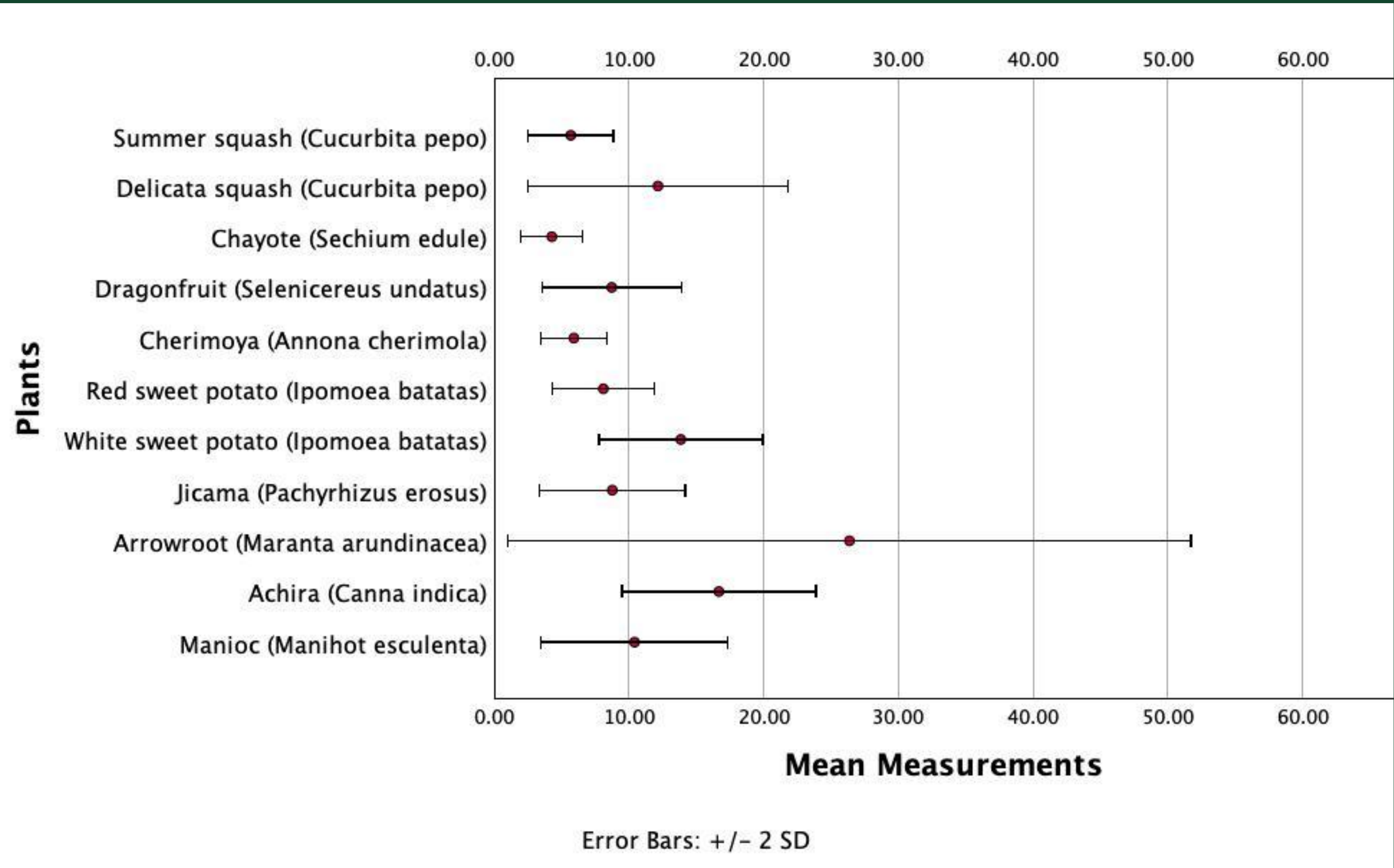


Instrumentation: Nikon Eclipse Ci with a Nikon Digital Sight 100 camera.

Starch grains of analyzed plants



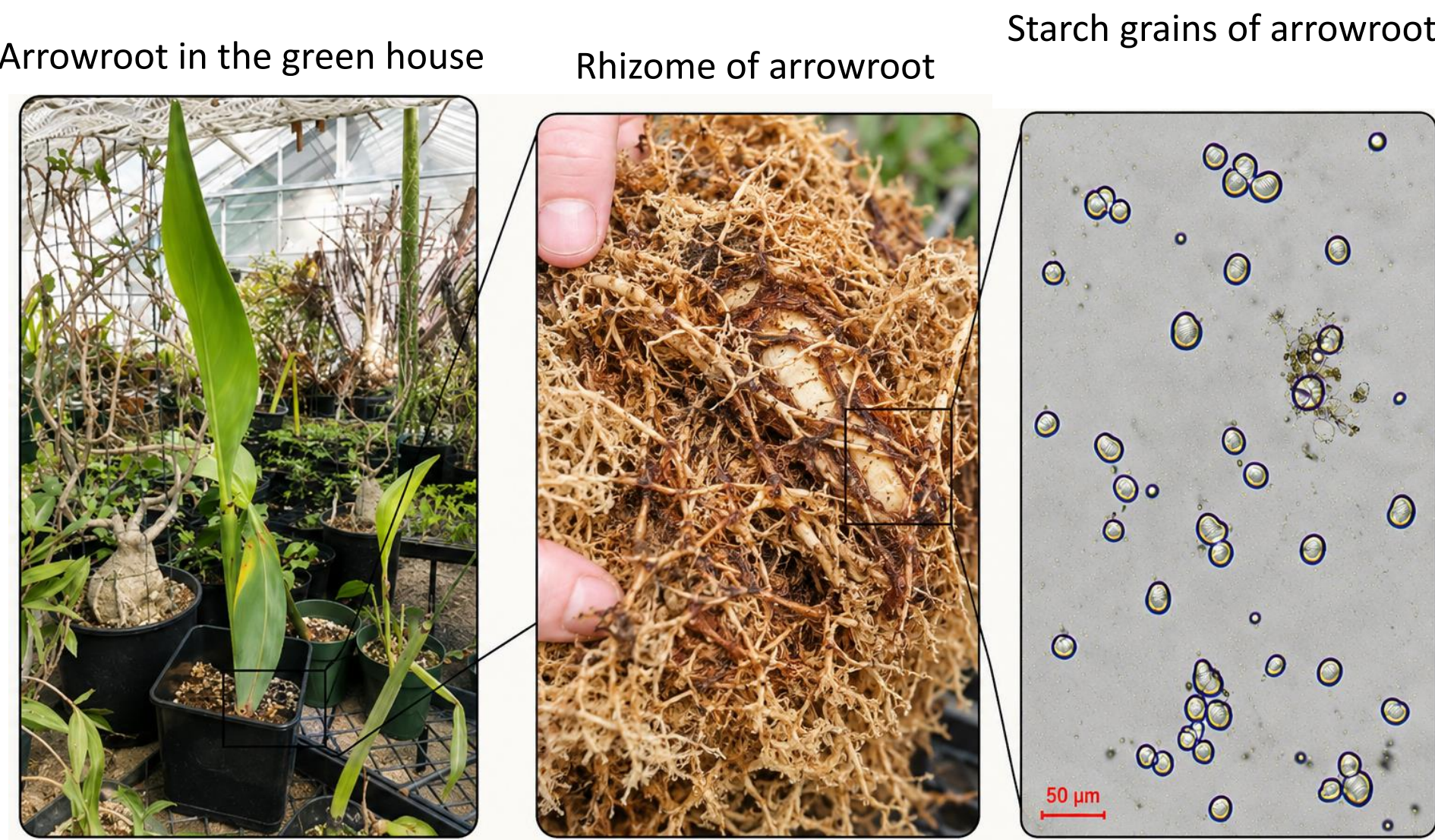
Morphological characteristics of starch grains are a valuable tool for the archaeological record.



Mean and standard deviation of the starches from analyzed plants.

Results

- We have 17 new species as part of the living collection at the Sac State green houses.



- We processed 17 economic plants, described 119 granules, and measured 450 grains.

Common name	Scientific name	Plant material	Starch present	Starches described	Starches measured
Manioc	<i>Manihot esculenta</i>	tuber	Yes (abundant)	9	116
Red sweet potato	<i>Ipomoea batatas</i>	tuber	Yes (abundant)	-	51
White sweet potato	<i>Ipomoea batatas</i>	tuber	Yes (abundant)	6	6
Arrowroot	<i>Maranta arundinacea</i>	rhizome	Yes	5	5
Achira	<i>Canna indica</i>	rhizome	Yes	6	6
Jicama	<i>Pachyrhizus erosus</i>	tuber	Yes (abundant)	13	13
Zamia	<i>Zamia nesophila</i>	roots	No	-	-
Jaracatiá	<i>Jacaratia corumbensis</i>	fruit	No	-	-
Cherimoya	<i>Annona cherimola</i>	fruit	Yes (few)	18	18
Dragon fruit	<i>Selenicereus undatus</i>	fruit	Yes (few)	14	14
Delicata squash	<i>Cucurbita pepo</i>	fruit	Yes (few)	12	49
Summer squash	<i>Cucurbita pepo</i>	fruit	Yes (few)	13	83
Butternut squash	<i>Cucurbita moschata</i>	fruit	Yes (few)	-	-
Chayote	<i>Sechium edule</i>	fruit	Yes (few)	10	82
Pineapple	<i>Ananas comosus</i>	fruit	No	-	-
Serrano pepper	<i>Capsicum annum</i>	fruit	No	-	-
Air potato (old world)	<i>Dioscorea bulbifera</i>	Fruit-like growth	Yes (abundant)	7	7

- Key characteristics to differentiate granules are 3D forms, visibility of lamellae, positioning of the hilum, and size.
- We observed variability in the size and forms within species; more consistent forms are found in arrowroot and achira.

Conclusions and future work

This project established the foundation of a modern reference collection of tropical American plants at Sacramento State.

Future work will expand the reference collection through the analysis of additional modern plant samples and the application of these methods to archaeological materials.