

Reporting Summary

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Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☐ ☒ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- ☒ ☐ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☐ ☒ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☒ ☐ A description of all covariates tested
- ☐ ☒ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☐ ☒ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☐ ☒ For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection No software was used

Data analysis Only the R program was used for carrying out the statistical tests and creation of plots.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

Provide your data availability statement here.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/documents/nr-reporting-summary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This is a quantitative study measuring the stable isotopes of carbon and nitrogen from archaeological crops and wild plants from the Atacama Desert in order to test if they were fertilised or not.
Research sample	The sample are archaeological crops and wild fruits from different sites of the Tarapacá cultural region of northern Chile previously excavated by researchers in the 1960s, 1970s, 1980s and 2000s. Only four samples come from recent excavations carried out by our team. Crops and wild fruits are in excellent preservation conditions so it was possible to sample more than 30 for the Formative (n=86, 1000 BC-AD 900) and Late Intermediate Period (n=90, AD 900-1450). However, there were less samples available for sampling for the Late (n=37, AD 1450-1531) and Colonial Periods (n=13, AD 1531-1800).
Sampling strategy	No sample size calculation was performed in advance, but we targeted archaeological plants including crops and wild fruits when sampling the collections. Some of these collections were never organised/studied after the archaeological excavations, so it was impossible to know the total number of crops/fruits available from each of them. Moreover, in some cases the samples were still in the boxes used during fieldwork in the 1960s and 1970s. There are no inventories or catalogues. So, literally in some cases we sampled what was available for the site. After sampling the collections it was possible to make a general estimate on how many crops/fruits were present in the boxes. However, in our study we intended to sample at least 30 archaeological plants by period to provide robust support for statistical analysis.
Data collection	Samples were collected from museums and universities. Everything was recorded using pen and paper in a project notebook. Samples were collected by the researchers. Gloves, goggles and lab coats were used for collecting the samples. Samples were collected in 10 ml tubes or plastic bags. As mentioned before, some of the boxes where the samples were placed had not been opened for decades, containing dust. For this reason, no laptops were used or brought for sample collection.
Timing	The first set of samples was collected during May 2013 for the doctoral thesis of the first author. The second set of samples was collected during the Postdoctoral FONDECYT project and National Geographic Early Career Grant research carried out by the first author from August 2018 until January 2019.
Data exclusions	We excluded four samples out of the statistical analysis because they were identified as outliers using the Median Absolute Deviation Method.
Non-participation	No participants dropped out/declined participation.
Randomization	Participants were not allocated in experimental groups.

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☐	☒ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Human research participants
☒	☐ Clinical data
☒	☐ Dual use research of concern

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Palaeontology and Archaeology

Specimen provenance	Most of the samples come from museum and university collections, where permission for sampling was formally provided by their directors: Museo Regional de Iquique, Centro Experimental Canchones-Universidad Arturo Prat, Instituto de Investigaciones
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Antropológicas-Universidad de Antofagasta and Departamento de Antropología-Universidad de Chile. Four samples come from archaeological excavations carried out by the researchers at the site of Tiliviche. In order to excavate the site we obtained an excavation permit given by the National Council of Monuments (Chilean Government), the permit number is 3575 and it was issued on the 13th of August 2019. Two permits for sending the samples abroad were provided by the National Council of Monuments (Chilean Government), the first one with number 2077-13 issued on the 12th of June 2013, and the second one with number 42.649-CVE 1757327 and issued on the 7th of May 2020.

Specimen deposition

The collections are available to be studied by other researchers as they are based in museums and universities. In the case of the samples excavated by us, they were deposited at the Departamento de Antropología-Universidad de Chile with free access to other researchers that might be interested in studying them.

Dating methods

A total of 9 samples were obtained for radiocarbon dating. From these 9 samples, 3 came from the excavations carried out by us in Tiliviche, while the other samples come from university/museum collections. They were stored in tubes of 10 ml and sent for radiocarbon dating at the Oxford Radiocarbon Accelerator Unit, University of Oxford. The pre-treatment used followed the protocol published by Brock et al. 2010. The calibration program used was OxCal version 4.3.

☒ Tick this box to confirm that the raw and calibrated dates are available in the paper or in Supplementary Information.

Ethics oversight

This study was approved by the scientific ethical committee (document number 126/2018) of the Universidad de Antofagasta as part of the postdoctoral project of the first author.

Note that full information on the approval of the study protocol must also be provided in the manuscript.