Science News

Iberian Peninsula's Earliest Agricultural Systems Were Unsustainable

ScienceDaily (Sep. 17, 2008) — A team of Catalan and Andalusian researchers has proved that the first agricultural systems on the Iberian Peninsula became ever more unsustainable with the passage of time. The study involved the analysis of fossilised grains of wheat and barley from Los Castillejos (Granada), an area of archaeological remains where cereals were cultivated between 4000 and 2500 BCE.

Archaeological site of Los Castillejos, Granada. (Credit: SINC / A. Rovira)

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Mónica Aguilera, an engineer from the Vegetable Physiology Unit at the University of Barcelona (UB) and co-author of the study, told SINC that the natural levels of stable carbon and nitrogen isotopes were measured in order to estimate the yield and nutritional status of the ancient crops. "The size of the grain and levels of the carbon 13 (13C) isotopes allowed us to estimate yield, while the nutritional status of the crop was analysed by measuring levels of the nitrogen 15 (15N) isotopes," the researcher explained.

Figures revealed by the study show a reduction of around 35% in the yield of wheat crops and 30% in barley between the years 4000 and 2500 BCE (end of the Bronze Age). The average weight of the grains of these cereals also fell by 10 miligrammes (33%) and 12 mg (38%) respectively. The research also revealed a 33% reduction in the nitrogen content of the wheat grains and 56% in barley.

"These figures suggest that the agricultural system of the region in the south east of the peninsula became unsustainable over time, and that this was not due to a lack of water," says Aguilera. The scientists have looked into the water available to the cereals by the end of their cultivation period, based upon the carbon isotope component, and have obtained approximately constant values (around 120 mm) for the entire period studied, which makes it seem the decline in yield had no apparent relation to drought events. These estimates, however, contrast with current rain measurements in the area (around 60 mm in April and May).

The researchers have also observed a close relationship between the seasonal variations of the cereals and those of weeds. Barley was most abundant at the same time as wasteland weeds (common in uncultivated land and rubbish tips, such as nettles, mallow, celery, goosefoot and clover), while wheat flourished at the same time as weeds more characteristic of land cultivated with cereals (such as poppies, plantains, knotweeds and various grassy plants).

"This suggests that there was a separate system of cultivation for the two cereals: barley was possibly relegated to marginal areas, while the potentially more fertile fields were reserved for wheat, which was more abundant and very probably the principal crop for human consumption in the primitive agricultural systems of the south east of the peninsula," said Aguilera.

The results of the study show a link between the decline in the status of the crops and a progressive loss in soil fertility, and reinforce the hypothesis that the first agricultural activities in the Mediterranean area had a negative impact on ecological and environmental conditions there.

The scientists chose the Los Castillejos archaeological site because it shows evidence of a continuous period of cereal cultivation over more than 1,500 years, starting in the Neolithic, when agriculture first appears in the region. However, they have contrasted their data with other results from Arkaute (Álava), Guadahortuna (Granada) and various areas in Catalonia and Castilla-La Mancha, as well as with other sites in Syria and the eastern Mediterranean.

Researchers from the University of Barcelona, the University of Lleida and the Archaeology Museum of Catalonia, as well as archaeologists from the University of Granada and the

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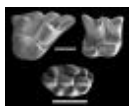

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Andalusian Centre for Iberian Archaeology (University of Jaén), took part in the study, "which uses original means to apply a range of novel methodologies derived from the use of stable carbon and nitrogen isotopes in palaeoclimatic and environmental reconstruction," according to Aguilera.

Adapted from materials provided by Plataforma SINC, via AlphaGalileo.

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