

A NEW LATE-GLACIAL POLLEN RECORD FROM VALLE DI CASTIGLIONE (ROME)

Federico Di Rita¹, Anna Paola Anzidei² & Donatella Magri¹

¹ Dip. Biologia Ambientale, Sapienza Università di Roma

² Soprintendenza Speciale per i Beni Archeologici di Roma, Roma

Corresponding author: F. Di Rita <federico.dirita@uniroma1.it>

ABSTRACT: Di Rita F., Anzidei A.P. & Magri D., *A new late-glacial pollen record from Valle di Castiglione (Rome)*. (IT ISSN 0394-3356, 2011)

New pollen data from Valle di Castiglione (Rome) highlight the vegetation development of the Roman area between 13,700 and 8000 cal BP. The late-glacial is characterized by a deforested landscape with a scanty presence of woody taxa during the interstadial. The postglacial development of forest vegetation is delayed by the local persistence of chenopods. Evergreen trees are continuously present throughout the pollen record.

RIASSUNTO: Di Rita F., Anzidei A.P. & Magri D., *Una nuova sequenza pollinica tardoglaciale a Valle di Castiglione (Roma)*. (IT ISSN 0394-3356, 2011)

Nuovi dati pollinici da Valle di Castiglione (Roma) delineano lo sviluppo della vegetazione della Campagna Romana tra 13700 e 8000 anni dal presente. Il tardoglaciale è caratterizzato da un paesaggio deforestato, con un modesto aumento di alberi durante la fase interstadiale. La reforestazione postglaciale è posticipata a causa della persistenza, probabilmente locale, di chenopodiacee. La vegetazione sempreverde è sempre presente.

Key words: pollen, late-glacial, central Italy, Mediterranean vegetation

Parole chiave: polline, tardoglaciale, Italia centrale, vegetazione mediterranea

1. INTRODUCTION

This study presents new pollen data from the Valle di Castiglione maar lake, a site that provided one of the longest palynostratigraphical sequences of southern Europe (FOLLIERI *et al.*, 1988). The new pollen record, studied within cooperation between the Laboratory of Palaeobotany of Sapienza University and the Soprintendenza Speciale per i Beni Archeologici di Roma, is supported by six AMS dates and spans the time interval 13,700-8000 cal BP. It shows the vegetation development in the Roman area during the late-glacial and early Holocene. This represents a still poorly known time-period in the vegetation history of the Roman area, because of the scarcity of both pollen data and satisfactorily robust chronological settings in the existing records. The main objectives of the present work are: a) to reconstruct the vegetation responses to the late-glacial climate fluctuations in the Roman area; b) to obtain new data on times and modes of the Holocene reforestation in central Italy; c) to provide insights into the development of the evergreen Mediterranean vegetation during the transition from the late-glacial interstadial to the early Holocene.

2. STUDY AREA

The site of Valle di Castiglione (41°53'30"N; 12°45'35"E) is currently represented by the bed of an ancient lake, artificially dried out, which occupied

an eccentric phreatomagmatic explosion crater of about 1 km in diameter belonging to the Alban Hills volcanic district. It is located at an elevation of 44 m a.s.l. approximately 20 km east of Rome. The area experienced a long history of human frequentation since the Neolithic, which certainly played an important role in the modification of the natural vegetational landscape of the site, whose potential vegetation is a mixed deciduous oak forest rich in Mediterranean elements (BLASI *et al.*, 1995).

3. MATERIALS AND METHODS

The analyzed sediments were collected down to 4 m depth in the central portion of the former Valle di Castiglione maar lake (core VdC09). Subsamples for pollen analysis were taken between 4 m and 1.35 m depth at 4 cm interval along the core. A total of 59 samples were chemically treated and analysed. The pollen sum does not include aquatics, hygrophytes, and spores. In the 20 samples with more than 50% AP (Arboreal Pollen) the mean count was 450 terrestrial pollen grains, while in the 39 samples with more than 50% NAP (Non Arboreal Pollen) an average of 340 terrestrial pollen grains per sample were counted. Pollen preservation was generally good, with an amount of indeterminate (degraded, corroded and broken) grains never exceeding 10%. On the whole, 80 pollen taxa were identified. The results are represented on a summary pollen diagram plotted against the age of the sequence (Fig. 1).

Valle di Castiglione - core VdC09

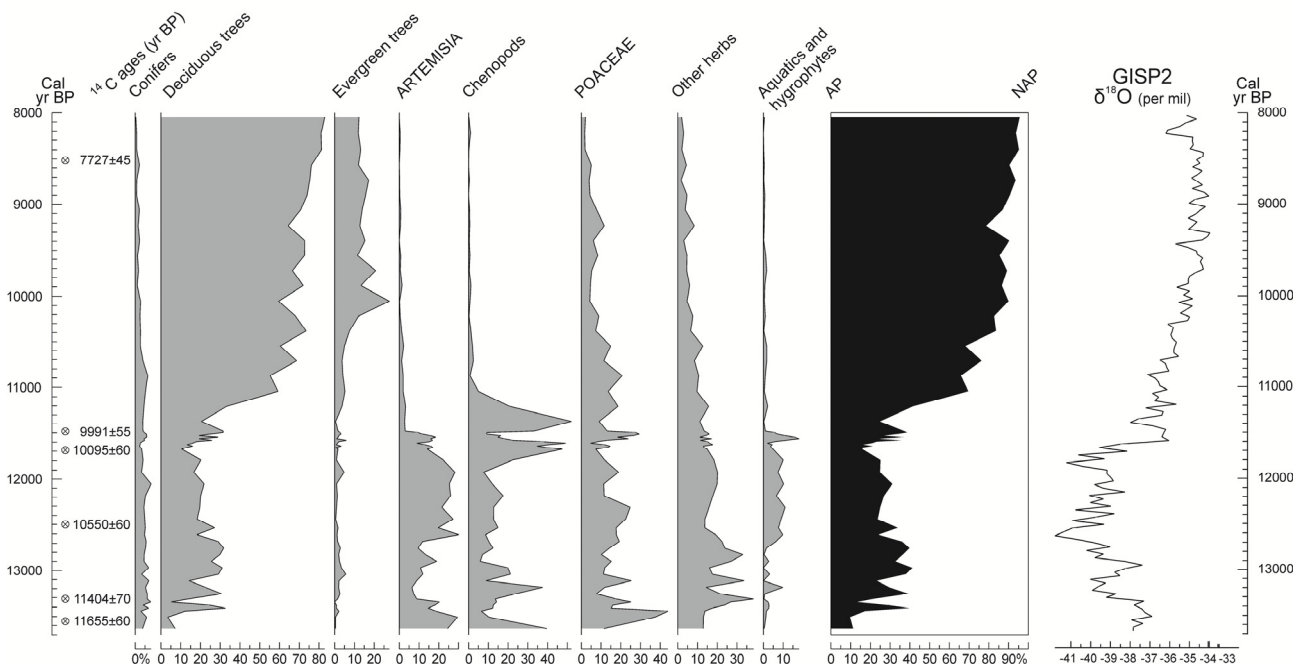


Fig. 1, Summary pollen percentage record from Valle di Castiglione (core VdC09) and the GISP2 $\delta^{18}\text{O}$ record (available from <http://www.ncdc.noaa.gov/paleo/icecore/greenland/summit/document/gispisot.htm>)

Diagramma pollinico percentuale sintetico di Valle di Castiglione (VdC09) e curva GISP2 $\delta^{18}\text{O}$ (da <http://www.ncdc.noaa.gov/paleo/icecore/greenland/summit/document/gispisot.htm>)

The timescale was obtained by linear interpolation of six AMS dates from bulk sediment (Fig. 1), calibrated using the IntCal09 calibration dataset (REIMER *et al.*, 2009).

4. RESULTS AND DISCUSSION

The vegetation development indicates that important changes in the vegetation structure and composition occurred in the landscape between 13,700 and 8000 cal BP, consistently with the main climate fluctuations recorded by the proxy GISP2 $\delta^{18}\text{O}$ curve (Fig. 1).

Late-glacial interstadial - The samples of the Valle di Castiglione diagram between 13,700 and 13,500 cal BP are characterized by high amounts of pollen of herbaceous taxa (NAP 90%) typical of the Pleistocene stadial stages in southern Europe (e.g. *Artemisia*, *Chenopods* and *Poaceae*). This pollen composition may be related to either a landscape almost completely dominated by xerophytes, or overrepresentation of local taxa due to selective pollen preservation. The latter hypothesis is supported by the comparison with other pollen records of the Latium region, where NAP never reach such high values in this time interval (LOWE *et al.*, 1996; MAGRI, 1999; SADORI & MAGRI, 1999). Between 13,500 and 12,700 cal BP there is a significant development of deciduous vegetation (30%) accompanied by a fairly stable presence of conifers

(7%) and a moderate but continuous record of evergreen vegetation (<6%). On the whole, the AP percentages (<40%) point to a mostly open landscape dominated by *Chenopods-Artemisia* steppes, less forested than other sites of the region (LOWE *et al.*, 1996; MAGRI, 1999; SADORI & MAGRI, 1999).

Younger Dryas - The pollen record shows a new important development of xerophytic vegetation, mostly *Artemisia*, paralleling a slight decrease in deciduous and evergreen vegetation. Surprisingly, the diagram does not show a clear increase in conifers, differently from other records in the region (LOWE *et al.*, 1996; MAGRI, 1999; SADORI & MAGRI, 1999). At Valle di Castiglione, during the interval 11,900-11,600 cal BP, conifers decrease, in correspondence with a cold shift in the GISP2 $\delta^{18}\text{O}$ curve. During the Younger Dryas, the lake probably experienced major hydrological changes, as suggested by a marked increase in aquatics.

Early Holocene - Between 11,500 and 11,100 cal BP, the vegetation history is characterized by a remarkable peak of chenopods, possibly related to site-specific vegetation dynamics overshadowing a reforestation process by deciduous taxa. In fact, the regional steppe vegetation dominated by *Artemisia* abruptly decreased at the Younger Dryas/Holocene transition. Clear forest conditions (AP 70%), mostly determined by the development of

deciduous taxa, appear only around 11,100 cal BP. Conifers show a steady decline from 10,900 to 8000 cal BP. Evergreen vegetation experienced a slow increase from 11,300 to 10,200 cal BP, in agreement with the postglacial increase of the GISP2 $\delta^{18}\text{O}$ values. Around 10,200 cal BP an abrupt rise of evergreen trees (20%), followed by fairly stable values (>10%) up to the top of the diagram, suggests that evergreen communities became important elements of the vegetational landscape, approximately at the time when $\delta^{18}\text{O}$ values from GISP2 reached a high and stable level.

5. CONCLUSIONS

The new pollen analysis from Valle di Castiglione indicates that very diversified ecological situations have followed each other in the Roman area between 13,700 and 8000 cal BP:

- The late-glacial interstadial is characterized by a deforested landscape dominated by steppe vegetation (*Artemisia*-Chenopods-Poaceae), with a modest increase of trees compared to the other pollen records of the region.
- Although the prodromes of the Holocene reafforestation started around 11,500 cal BP, a clear forest recovery appeared only at about 11,100 cal BP, probably because of a local marked persistence of herbaceous taxa.
- Evergreen mediterranean trees show a continuous record, suggesting their constant presence in the vegetational landscape even during the late-glacial oscillations. A clear increase of evergreen

trees corresponds to the attainment of high values in the GISP2 $\delta^{18}\text{O}$ curve.

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