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The option of Roman canal construction by Drusus in the Vecht river area (the Netherlands): a geoarchaeological approach

Supplementary appendix A

Selection method of suitable samples for ¹⁴C dating

The most suitable samples for ¹⁴C dating were selected in three steps in the manner described below. An example of a sample with associated data from one sampled layer of one core is shown in the table.

col no.	aspect	data
Step 1. Field work		
A	Core no.	301
C	Layer no.	17
G	Elevation of top of layer	3.76 m below sea level
H	Elevation of bottom of layer	3.79 m below sea level
I	Texture of layer	Clay, poorly sandy, moderately humourous (Kz1h2)
J	Nature of organic inclusions	Tree leaves, not reworked
K	Remarks / interpretation	Formed on site
Step 2. Botanical analysis		
M	Perform botanical analysis?	Yes
N	General botanical characterisation	Many tree leaves
O	Determination (*species,* nature, condition)	Tree leaves
P	Conclusion	Clay with many remains of tree leaves (possibly locally formed)
Q	Suitability for 14C-dating	Yes
Step 3. 14C-Dating		
S	Perform 14C-dating?	Yes
T	Selection for dating process	Some large fragments of tree leaves
U	Weight	Ca. 100 mg
W	Code Beta Analytic	487321
X	Dating result 2 sigma calibrated	538-645 AD

Example of the methodological approach used to select material for ¹⁴C-dating with reference to a single sample. For data of all samples see supplementary appendix B.

1. From 415 samples, a selection was made of those from which organic remains were expected to be *local*. Selection was estimated on the basis of the lithological soil description (column I), field assessment of organic inclusions (column J) and field interpretation (column K). In particular, those samples whose textural attributes (mostly clay layers) suggested a calm, non-erosive phase of deposition were positively selected.

2. Samples selected in step 1 were then botanically analysed (performed at Biax Consult, Zaandam, the Netherlands). This analysis included an assessment of the nature (seeds, leaves, etc.) and condition of the plant remains and determination of the species in the sample. The reports also contained an evaluation considering whether it concerned *local* or *reworked* materials and whether this could be fully distinguished. For example, when many fragmented remains of plants associated with peat were found in samples, the materials were considered to be reworked and redisposited by the river. The conclusions of the botanical analysis and the suitability for ¹⁴C dating as reported by Biax are recorded in columns P and Q.

3. Based on the results of step 2, 24 samples were selected (by the first author) for ^{14}C dating, which provided a broad distribution of samples over the transects, allowing a robust assessment of river migration. The ^{14}C, ^{13}C-radiocarbon dating was undertaken using Accelerator Mass Spectrometry Analysis (AMS) and performed in the laboratory of Beta Analytic Inc. (Miami, Florida). To avoid deviations in dating results, each sample was pre-treated to remove calcium carbonate and mobile humic acids. The sample was first gently crushed and then dispersed in deionized water. It was then washed with hot HCl acid to eliminate calcium carbonates, followed by an alkali wash (NaOH) to remove secondary organic acids. The alkali wash was followed by a final acid rinse to neutralize the solution before drying. The calibrated age of the dated material is recorded in column X.