ORG-ID

Identification and 14C Dating of Organic Materials in Archaeological Ceramics

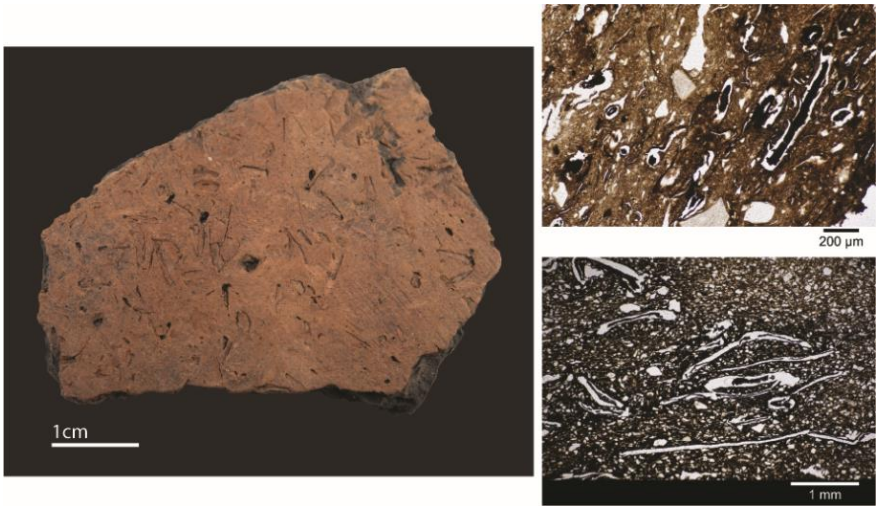
DURATION
01/02/2023 – 01/05/2025

BUDGET
212 729 €

PROJECT DESCRIPTION

Dating archaeological sites is often challenging due to a poor preservation of datable organic materials (bone, plant material, …), especially in the dry and acidic environment of the coversand area in northern Belgium. When organic remains are preserved, their association with the human activities is not always clear: charcoal, for instance, may result from wildfires. In addition, different types of organic materials can be subject to dating problems such as an old wood effect (calcined bone, charcoal) or reservoir effect (human and animal bone, food residue). Pottery is one of the most common finds on archaeological sites and it is the direct outcome of human activities. In Belgium and other parts of NW Europe, from the Neolithic to the Merovingian period (ca. 5000 BC – 800 AD), plant material was often added as temper to pottery clays to enhance the vessels' strength. In many cases, charred remains of these plant additives are preserved inside the pottery and can be used for AMS ^{14}C dating. The possibilities of this dating method are however underexplored.

ORG-ID aims to broaden the dating potential for archaeological sites in Belgium and adjacent areas with the AMS ^{14}C dating of plant temper material preserved in pottery. The first objective is to identify which plant species have been used as temper in Neolithic, Iron Age, Roman and Merovingian pottery from the study area. This is an important first step, as only terrestrial plants provide reliable radiocarbon dates, whereas dates on aquatic plants may be subject to a reservoir effect. The second objective is to set up a protocol for the extraction and chemical pre-treatment of plant temper prior to AMS ^{14}C dating. The third objective is to evaluate the reliability of the obtained dates by comparing them to other dates on (organic) materials from the same archaeological sites.



Archaeological pottery from northern Belgium. Left: Merovingian pottery with imprints of plant material; Right: Thin sections of Neolithic and Roman period pottery containing charred plant remains (© UGent; KIK-IRPA).

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For this project, plant-tempered pottery from 30 to 50 sites from the Neolithic to Merovingian period in Belgium, The Netherlands and northern France will be sampled. We will mainly select pottery from sites with a well-established chronology based on a broad set of parameters (e.g. ^{14}C dates on other organic materials; dendrochronology; coins), to be able to evaluate the reliability of the obtained plant temper dates. However, some pottery from sites with complex chronologies or a lack of other datable material is also included. For the taxonomic identification of the plant material, three complementary analytical techniques are used: thin section analysis, X-ray micro computed tomography (X-ray µCT) and Scanning Electron Microscopy (SEM). These techniques will allow us to assess the degree of preservation of plant material in the pottery and to identify the types of plants present. Pottery with well-preserved remains of terrestrial plants will be selected for further analysis. The charred plant remains will be extracted from the pottery and pre-treated for AMS ^{14}C dating. During this phase of the research, different methods will be tested to develop a protocol for the extraction (maximize sample size) and chemical pre-treatment of plant temper (remove all contaminants while retaining a sufficient sample size for dating purposes). Finally, the obtained plant temper dates will be evaluated by comparing them to the available reference dates for each archaeological site.

ORG-ID will give insight into the types of plants that were used in pottery production from the Neolithic to the Merovingian period in Belgium, The Netherlands and northern France. Based on this information, we will be able to assess the possibilities of plant temper dating for each area and archaeological period involved. At the same time, it will generate dozens of new ^{14}C dates for the sites under study. However, ORG-ID aims to have an impact on a larger scale. Within this project, a full methodological sequence will be developed for the identification, extraction, chemical pre-treatment and AMS ^{14}C dating of organic materials preserved in archaeological ceramics. The methods developed will in turn be transferable and applicable to a wide range of ceramic materials with plant inclusions from all over the world.

CONTACT INFORMATION

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