INTRODUCTION
The archaeological and archaeobotanical investigations in a cultural context (sanctuary) at Orna (Brindisi, Italy) revealed a lot of botanical remains that allow us to deduce the exploitation of vegetal resources used in the bread process. So the recovery of some fragments of dough has made necessary to set an experimental method to understand which were the raw materials used.

CONTEXT OF STUDY
Orna is one of the most important indigenous site of Messapica placed in the south of Puglia region. The sanctuary of Orna, Monte Pellegrino (VI-III cent. B.C.) is dedicated to Demetra e Pirene. The investigations in the sanctuary have brought to the recovery of a lot of botanical charred remains interpretable as volve of offered.

Besides the numerous charred seeds/fruits (Vicia faba, Hordeum, Triticum) and free fruits (fig trees, pomegranates, grapes, olives) recovered, dough and doughnut have also been brought to the light. Different typologies of doughnut are been recovered, some decorated with grape pips, others with figs or caryopses. These doughnuts are probably linked not only to the feeding but more tightly to the cult of Demetra and Pirene.

ARCHAEOBOTANICAL ANALYSIS
The main shape of dough is like a doughnut, but it is possible distinguish flat bread too.

In order to understand if doughs are used or not an experimental protocol has been set up. The dough and leavened dough were reproduced and after cooking, they were charred at different temperatures. In this way it was possible to individuate a lot of vacuums linked to the process of leavening.

FLOUR ➔ YEST ➔ DOUGH ➔ COOKING ➔ BREAD

CEREALES PULSES GRAPE PIPS DOUGH AND DOUGHNUT

ARCHAEOBOTANICAL ANALYSIS

What did the cereal use to make dough?

It is possible know the taxon thought the study of:
Starch grain
Structure of dough

Experimental design

The experimental design has been conducted on cereals, legumes and free fruits, dough to the purpose of observe the presence of the starch and its transformation in the different phases and to understand if starch grains can be a marker to individuate the seed species used.

A collection of reference of modern raw materials has been created that shows as the starch grains are strongly degraded, and therefore not visible, in the charred material: so we have to find another marker.

Samples of dough were observed through an ESEM (Environmental Scanning Electron Microscope) in order to studying their morphology. Thus it was possible to observe as the outer surface appears compacted and smooth due to the action of rolling. Instead, the inner structure seems particularly rich in vacuums.

RESULTS
The experimental results and the ESEM (environmental scanning electron microscope) analysis performed on the volve offers of Orna suggest choosing a marker such as the morphology of dough in order to understand the raw materials used. The density of vacuum in the microstructure appears coinciding with gluten percentage, as we can see on modern examples. Probably the taxon used to make our doughnut is a cereal with an high percent of gluten, such as a nacked wheat.