

First evidence of white wine in ancient Egypt from Tutankhamun's tomb

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Abstract

Wine has been considered to be mainly red in ancient Egypt linked with the blood of Osiris, the God of resurrection. No text that refers to white wines from the Dynastic Period (3150–332 BC) exists. The first white wine from ancient Egypt was made near Alexandria during the third century AD. To investigate the presence of white wine in ancient Egypt, dry residue samples from King Tutankhamun's amphorae are studied in this article using the LC/MS/MS method for wine markers. This investigation into the existence of white wines in Tutankhamun's tomb allows us to shed new light on the symbolism of white wine in ancient Egypt.

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1. Introduction

In ancient Egypt, the royal family and the upper classes drank wine, which was also thought to be suitable among the necessities for a good afterlife [12]. Viticulture and wine-making scenes were represented on walls of private tombs from the Old Kingdom Period (2575–2150 BC) and, lately, during the New Kingdom Period (1539–1075 BC), the wine jars included the year of harvest, the ownership, the quality and the name of the wine-maker as well [12]. Wine offerings to Gods performed by the Pharaoh were often shown on the walls of Egyptian temples, recording details of festivals like the Heb-Sed and the New Year's celebration of the flooding of the Nile, as well as coronation ceremonies [16]. Wine had religious significance in offering liturgies, it was offered to the dead for their afterlife, and wine is among the funerary offerings stated in the Pyramid Texts, being the main drink after the king's ascension to heaven [16].

The color of wine was not referred to on the walls of tombs, temples or on New Kingdom inscribed jars. According to Lucas, no literary reference to the color of grapes grown in ancient Egypt can be traced [13].

The grapes on the vines painted on walls of the Egyptian tombs were mainly painted in a dark color. However, they have been considered to range from light green to blackish blue, while the color of the extracted juice varies from a light pink to a dark red which could be related to local conventions or attributed to artistic whim [15]. Red wine symbolized the rebirth of the dead, being compared with the blood of God Osiris, the first who resurrected [7].

The study of archaeological samples from wine amphorae, first based on the identification of the presence of tartaric acid as a grape-wine marker, nowadays can also be focused on the color of the wine through the identification of syringic acid as a red wine marker [9]. Syringic acid is released from the main red grape pigment, malvidin-3-glucoside, through the breaking down of the complex molecule formed over time [14]. The only two amphorae previously studied from Tutankhamun's collection [9,10] have been shown to contain red wine. One was an amphora (numbered *Journal d'Entrée* 62.313 at the

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Egyptian Museum, Cairo) the inscription indicating it contained *irp* (wine), while the other amphora contained *shedeh* (JE 62.315). Both tartaric and syringic acids were identified in the samples from these two amphorae [9,10]. The artistic and textual records suggest that red wine predominated during Pharaonic Egypt [15].

2. White wine in ancient Egypt

It has been a matter of speculation as to whether white wine was ever made in Dynastic Egypt [15]. Originally mentioned in the Pyramid Texts, the *irp* (wine) *abesh* cited in a text found in the tomb of Ukh-Hotep at Meir was suggested as the first evidence of white wine [4], however, it is now considered to have been a type of wine container [15]. The oldest textual evidence of white wines in ancient Egypt dates to the third century AD, when the Greek Athenaeus (170–230 AD) from Naukratis, Egypt, described in the book “Sophists at Dinner” the wine from Mariut as being: “...excellent, white, pleasant, fragrant, easily assimilated, thin, not likely to go to the head, and diuretic” [1]. The wine from Mariut, located in the southwest of Alexandria, was regarded to have been one of the best wines at that time [12]. Earlier, during the first century BC the Latin poet Virgil spoke in praise of the white grapes from Mariut [3,8].

3. Tutankhamun’s amphorae

Twenty-six two-handed amphorae [11] were placed for the burial of King Tutankhamun (1332–1322 BC) in his tomb at the Valley of Kings (KV 62) in Western Thebes. When the archaeologist Howard Carter found them in 1922, some of the amphorae were just fragments of the top of the jars, a few of them were intact sealed amphorae while others had the mud seal broken [11]. The amphorae were mainly located in the small Annexe chamber in no particular order. However, three of them were found inside the Burial chamber [5]. The inscriptions on Tutankhamun’s amphorae show the name of the product, the year, the property and the place of origin, and the name of the vintner in chief but not the color of these wines.

From the 26 amphorae of Tutankhamun’s tomb, 12 amphorae were found intact by Carter but with the mud seal broken or without the entire cap. So that no further damage would be done to the intact sealed amphorae now at the Egyptian Museum in Cairo (Fig. 1), these 12 amphorae were examined and dry residues were found inside six of them. With the permission of the Egyptian Supreme Council of Antiquities and the Egyptian Museum, a small quantity of sample from each one of these six amphorae was collected for analysis.

With the aim of verifying whether the remaining amphorae contained red or white wines, samples of residues from six of the amphorae of Tutankhamun’s collection at the Egyptian Museum in Cairo are studied in this article, by applying the previously published LC/MS/MS wine markers method [9] for archaeological samples.



Fig. 1. Tutankhamun’s amphorae displayed at the Egyptian Museum in Cairo. Photograph: copyright by Maria Rosa Guasch Jané, with permission of the Egyptian Museum, Cairo.

4. Wines in Tutankhamun’s Burial chamber

Three amphorae were found at the Burial chamber of Tutankhamun, which contained the sarcophagus, they were lying on the ground between the wall and the shrine placed on the west (*Journal d’Entrée* 62314), east (JE 62316) and south (JE 62315) walls. They were lacking their mud seals. The inscriptions indicate that two of the amphorae (JE 62314 and JE 62316) contained *irp*, being traditional grape-wine. Nevertheless, the amphora at the south wall (JE 62315) contained very good *shedeh*, a highly appreciated red grape-wine with a more elaborate preparation [10,18]. Ancient Egyptians believed that the universe was not set in order until the dead king had been buried with proper rites to allow him to embark successfully on his eternal life [19]. For this reason, Egyptian Pharaohs were buried at special sacred places such as the Valley of Kings in Western Thebes. During the New Kingdom Period (1543–1078 BC), the Gods Ra and Osiris were considered to give rebirth to the dead. The royal tombs internal features reproduce the underworld, the tomb being a cosmogram [19]. Tutankhamun’s Burial chamber had an east–west orientation in which the wall decoration scenes are being orientated towards the west [17]. One amphora labeled *irp* was placed

beside the east wall, where the picture shows the mummified king. Another *irp* amphora was placed to the west. The scenes there are extracted from the *Amduat*, the book of “What is in the Underworld.” The 12 baboon deities shown represent the 12 h of the night through which the sun, and the king, must travel to their rebirth at dawn [17].

5. The samples

Following the *Journal d'Entrée* (JE) numbers of the Egyptian Museum, the samples from the six amphorae are listed down here. We include the translation into English of the hieratic inscriptions of these amphorae by Černý [6], (see also [2]), the location of the amphorae inside the tomb of Tutankhamun [11], as well as the color of the samples of residues.

- EM1: Amphora no. JE 62301; inscription: “Year 5. Wine of the Estate-of-Aton of the Western River. Chief vintner Pinehas”; found at the Annexe lying on the floor beside the west wall; the color of the residue is yellowish.
- EM2: Amphora no. JE 62302; inscription: “Vizier Pentu”, and charcoal mark on one side; found at the Annexe lying on the floor towards the north; yellowish color residue.
- EM3: Amphora no. JE 62303; inscription: “Year 4. Wine of the Estate-of-Aton, may he live, be prosperous and healthy, of the Western River. Chief vintner Men”; found at the Annexe lying on the floor along the east wall; pale brown color residue.
- EM4: Amphora no. JE 62312; inscription: “Year 5. Sweet wine of the Estate-of-Aton of the Western River. Chief vintner Nakht”, and charcoal mark below the inscription; found at the Annexe lying on the floor; yellowish color residue.
- EM5: Amphora no. JE 62314; inscription: “Year 9. Wine of the Estate-of-Aton of the Western River. Chief vintner Sennufe”, and stamp on handle: “Estate-of-Aton”; found at the Burial chamber beside the west wall; dark-blackish color residue.
- EM6: Amphora no. JE 62316; inscription: “Year 5. Wine of the Estate-of-Tutankhamun-Ruler-of-the-Southern-On in the Western River. Chief vintner Khaa”, and stamp on handle: “Ruler’s Estate”; found at the Burial chamber beside the east wall; pale brown color residue.

6. Results

The previously developed method for the identification of wine markers in archaeology [9], using liquid chromatography coupled to mass spectrometry in tandem mode (LC/MS/MS) technique, was applied to the analysis of the samples. An amount of approximately ~ 2 mg of each one of the samples was extracted with water:methanol containing 0.1% formic acid (80:20, v:v). Alkaline fusion [9] was performed with potassium hydroxide pellets. The extracts were injected in the

LC/MS/MS system in the multiple reaction monitoring (MRM) mode, used as it is the most sensitive MS method.

The first investigation carried out was for tartaric acid, the marker characteristic for grapes. On the MRM chromatograms at the m/z 149 \rightarrow 87 transition for tartaric acid (M_w 150), a peak of tartaric acid with the same retention time of the standard injected in the same conditions was identified in all the samples. The results confirm the samples of residues EM1, EM2, EMS, EM4, EMS and EM6 came from grapes.

Secondly, syringic acid as a red wine marker derived from the main red wine pigment malvidin-3-glucoside was investigated for, before and after performing the alkaline reaction. By using the MRM mode at the m/z 197 \rightarrow 182 transition for syringic acid (M_w 198), a peak of syringic acid at the same retention time of the standard was identified in the EMS sample after the alkaline reaction (Fig. 2). No peak appeared before the alkaline reaction, syringic acid being, therefore released from malvidin-3-glucoside in the complex pigment. These results indicate that red grapes were the source for EM5 sample. No syringic acid was detected before and after the alkaline reaction in the rest of samples: EM1, EM2 (Fig. 3), EMS, EM4 (Fig. 4) and EM6. Due to the different color observed in these samples which was yellow-brownish, in contrast to the EMS sample (dark-blackish) and the two samples previously studied [9,10] in which red wine can be affirmed, and considering that tartaric acid and no syringic acid was found, we propose a white wine, as no marker for a white wine can be established and both the analysis and the hue point to it.

7. Discussion

The results of this work allow us to assure that white wines (EM1, EM2, EMS, EM4 and EM6 samples) together with red wines (EMS sample) were made in ancient Egypt at the end of the 18th Dynasty, bearing the name *irp*.

A detailed study of the inscriptions with respect to the results obtained shows that red wine (EMS sample) and white wine (samples EM1, EMS and EM4) were made at Western Delta in the estates owned by the Aton temple, near modern Alexandria. Moreover, the results indicate that in Tutankhamun’s property in the “Western River” a white wine (EM6 amphora) and a red wine (sample previously reported) [8] were made during the fifth year of Tutankhamun’s reign. Moreover, the results allow us to affirm that the amphora labeled sweet wine (EM4 sample) was a white wine. A white wine was also contained in the amphora (EM2 sample) which was a present given to Tutankhamun by vizier Pentu, who may be present in the funerary procession on the east wall at the Burial chamber [17]. This may indicate that white wine was highly valued in Egypt since only the best products were offered for the afterlife of the Pharaoh.

Interestingly, the results allow us to reveal that a wine jar placed on the west wall of the Burial chamber (EMS sample) contained a red wine, whose inscription states that it was made during the ninth year of Tutankhamun’s reign by the vintner Sennufe in the Estate-of-Aton. In contrast to this, the EM6

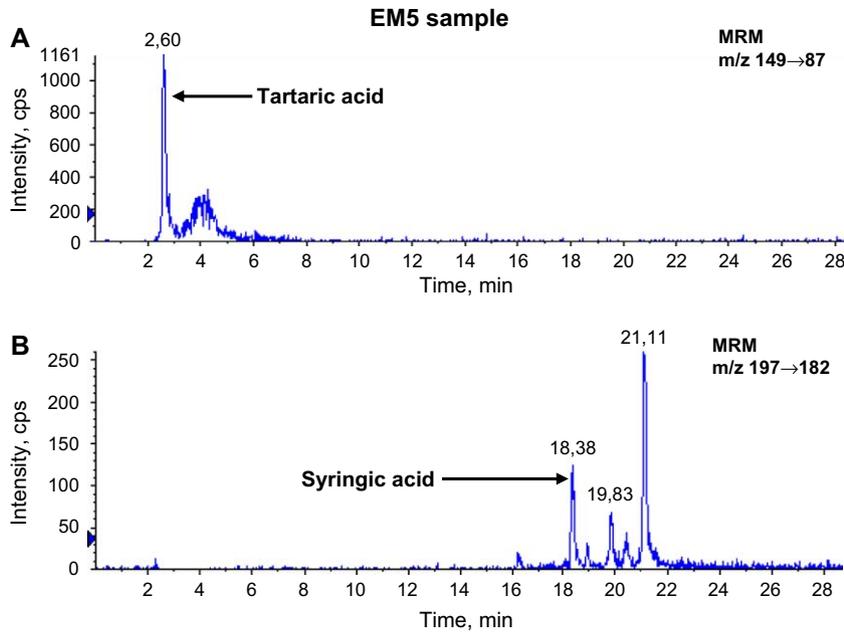


Fig. 2. LC/MS/MS chromatograms in MRM mode for the EMS sample of residue from the amphora JE 62314 found beside the west wall at the Burial chamber. (A) The grape marker tartaric acid is identified in the sample. (B) After performing alkaline fusion to the sample, the red grape marker syringic acid, derived from malvidin-3-glucoside, is also identified.

sample from the amphora placed on the east wall, from the fifth year of the Estate-of-Tutankhamun made by vintner Khaa, was a white wine. Both wines came from the same Western River area.

Importantly, a red and a white wine were strategically placed surrounding Tutankhamun's body in the Burial chamber, together with a *shedeh* amphora, the red wine located on the west and the white wine on the east. In contrast, all the objects found in the Annexe, which was intended as

a store-room for oils, unguents, food and wines, were found in confusion with an overflow of other material belonging to the burial equipment [17]. If we consider that established rituals were performed by the Egyptian priests for the Pharaoh's burial and, according to Poo [16], they organized and established the norms of religious texts and practices, then the real sense of the location of these two wine jars, both being next to the royal body, might have a particular symbolism with respect to rebirth.

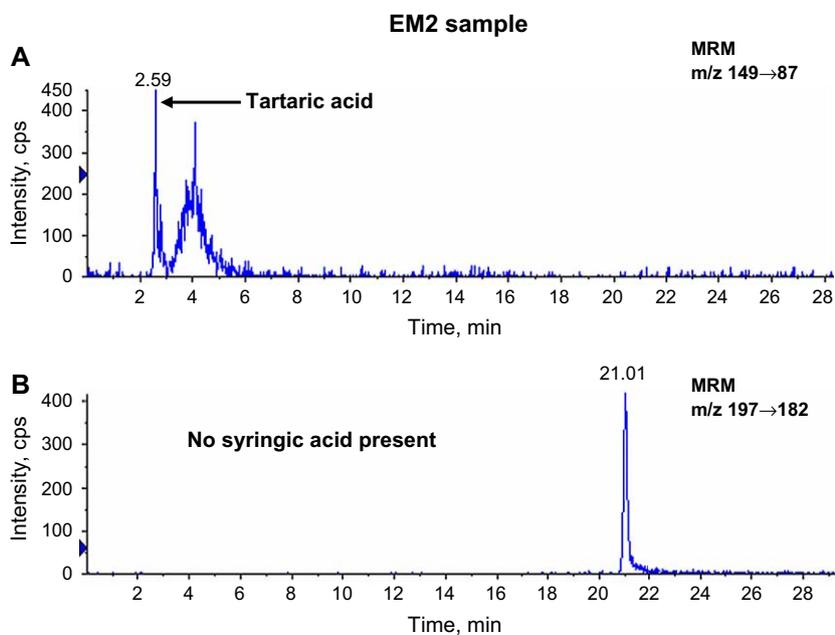


Fig. 3. LC/MS/MS chromatograms in MRM mode for the EM2 sample from the amphora JE 62302 inscribed "Vizier Pentu". (A) The grape marker tartaric acid is identified in the sample. (B) After performing alkaline fusion to the sample, syringic acid derived from malvidin-3-glucoside is not detected.

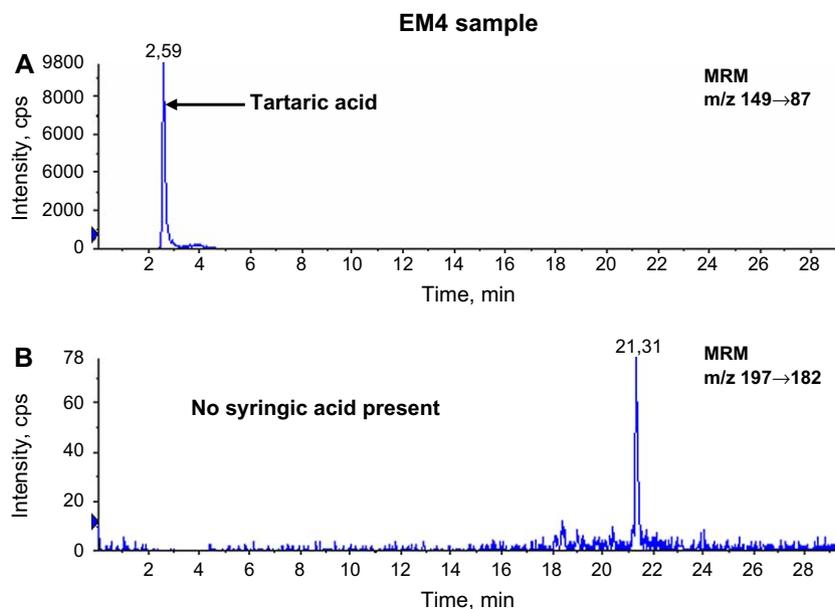


Fig. 4. LC/MS/MS chromatograms in MRM mode for the EM4 sample from the amphora JE 62312 inscribed “sweet wine”. (A) The grape marker tartaric acid is identified in the sample. (B) After performing alkaline fusion to the sample, syringic acid derived from malvidin-3-glucoside is not detected in the sample.

8. Conclusions

The presence of white wine in ancient Egypt is reported here for the first time through the analysis of residue samples from Tutankhamun’s amphorae using the LC/MS/MS method for the identification of wine markers. The results of this research reveal that red and white wines were made at the Western Delta during the New Kingdom Period, on the estates owned by the Aton temple and the king. Moreover, this research reveals that a red and a white wine were placed in Tutankhamun’s Burial chamber, at the west and east sides, respectively. They might have had a special purpose for rebirth which needs investigation in-depth.

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