University of Tehran Prees

Journal of Archaeological Studies

Online ISSN: 2676-4288

https://jarcs.ut.ac.ir/

Archaeobotanical Studies in Feyzabad Site, in Aran-o-Bidgol Town

Narjes Khan Fini ✉[1], **Reza Nouri Shadmahani** [2], **Mohsen Javeri,** [3], **Mostafa Sarlak** [4], **Saman Soortiji** [5]

1. Corresponding Author Graduated from Master's Degree in Archeology of Kashan University, Faculty of Architecture and Art, Kashan, Iran. Email: narjes.khani4811@gmail.com

2. Associate Professor, Department of Archeology, University of Kashan, Faculty of Architecture and Art, Kashan, Iran. Email: javeri@kashanu.ac.ir.

3.Assistant Professor Department of Archeology, University of Kashan, Faculty of Architecture and Art. Kashan, Iran. Email: noorshad@kashanu.ac.ir

4. Graduated from Master's Degree in Archeology of Kashan University, Faculty of Architecture and Art, Kashan, Iran. Email: mostafasarlak7119@gmail.com.

5. Assistant professor and Member of the Cientific Faculty of the Research Institute of Cultural Heritage and Tourism, Tehran, Iran. Email: soortijee_archaeologist@yahoo.com.

Article Ifo

Article Type:
Research Article

Article History:

Received:
13, March, 2023

In Revised form:
4, April, 2023

Accepted:
7, May, 2023

Published online:
21,December, 2023

Abstract

Archaeobotany is one of the interdisciplinary sciences in archaeology. Archaeobotany studies plant remains in archaeological contexts. Based on plant findings, it discusses topics such as people's livelihood, agriculture, vegetation, climate changes, dating, etc. So, this course can reply to many questions archaeologists face about an ancient site and people. In recent years, archaeologists have paid a lot of attention to this field and tried to use experts in excavations. One of the excavations that has paid a lot of attention to archaeobotany, is Feyzabad site. This site has Islamic periods. During the excavation in 2022 in this site, some ovens were found, as well as some samples from them. In this research, we intend to answer questions such as the functioning of the sampled ovens and the identification of plant remains in the ovens. Finally, by combining the information found, we will shed light on the lives of the people of this period. By doing this research, our information about the life of the people belonging to this area, their livelihood and the common types of plant remains used in this area will increase. Also, micro information about climatic conditions will be obtained. After carrying out the necessary investigations and research, it was found that the ovens found in the trench D8 are related to cooking to the inner part of the royal citadel. Besides the more specialized work that is being done, animal husbandry and agriculture are popular. Some climate changes such as warmer weather and less humidity were also identified.

Keywords: Feyzabad, Archaeology, archaeobotany, Plants, Carbonization seeds.

Cite this The Author(s): Khan Fini, N., Nouri Shadmahani, R., Javeri, M., Sarlak, M., Soortiji, S., (2023). Archaeobotanical Studies in Feyzabad Site, in Aran-o-Bidgol City. Journal of Archaeological Studies / No. 2, Vol.15, Serial No. 33 / Summer-Autumn 2023- (43-55). DOI:10.22059/jarcs.2023.356585.143190

Publisheder: University of Tehran Prees.

1. Introduction

Due to the formation of new archaeology in the past few decades, one of the most important branches to which it was linked to is Archaeobotany science. In Iran, due to the lack of attention to it, its name is still unknown to many people (Khan Fini, 2023). In all Islamic, historical and pre-historic periods, archaeobotanical studies are of special importance. Archaeobotanical analysis from Islamic period sites in the last 15 years has been slowly developing, adding much to our understanding of the landscape and diet during the medieval Near East. Yet, certain regions still remain infrequently studied, where excavations of Islamic levels are few and archaeobotanical recovery occurs in an even smaller percentage of those projects (Ramsay and Asa Eger, 2015). The proliferation of such botanical studies in the Islamic/medieval periods is necessary not only on a site-specific or even regional level, but to engage in newly appearing discussions of the intersections of environmental and Islamic studies with crucial archaeological evidence, which can, for example, counter- balance and nuance certain well-worn debated ideas, such as the nature of the Islamic Green "Revolution" (Watson 1974, 1983; Decker 2009; Bulliet 2010; Mikhail 2010). One of the Islamic sites in Iran is Feyzabad site in Aran-o-Bidgol city. This site was excavated by the Department of Archeology of Kashan University from 2012 under the title of educational excavation and continued until 2022 (except 2020). As a result of such excavations, a royal citadel was found in this area, which is located in the northern part of this settlement. This part is related to the privileged position of the city and there were other classes in the urban space part. Architectural evidence shows that the buildings inside the citadel are richer and more distinguished in terms of art and decorations than the buildings outside the citadel. In different years, different parts of this citadel were explored. There is an urban space around it. The space outside the citadel is related to the living space of ordinary people. Some of the worked spaces in the royal citadel had a dome cover. In the Royal citadel, all the buildings were made of clay wall and mudbrick, and only a few brick walls were found. The citadel has two different architectural phases in terms of time precedence. The evidence indicates that the brick building with plaster coating with a rectangular plan was built on the destroyed brick building. The founders of this building filled the empty spaces of the brick building with soil and garbage and made it into a platform and built the new building on a platform. Cladding can be seen in several phases, which shows the importance and continuous use of this building. Considering the lack of any object on the floor and the general poverty of the artifacts, this issue can be considered in connection with the conscious abandonment of this place during the mentioned period, which caused them to collect all the daily life items. Probably, due to environmental changes and worsening climatic conditions, the residents of this area consciously decided to leave this place (Nouri Shadmahani, 2018).

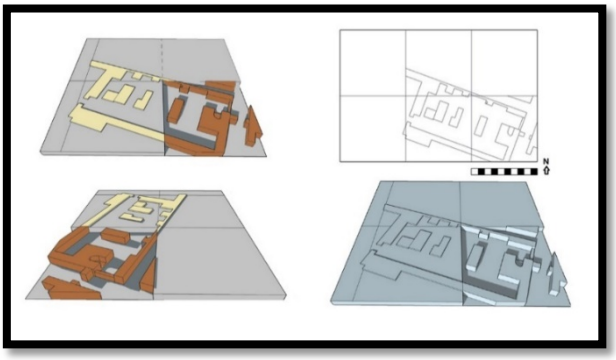

Figure 1: Isometric plan, the excavated part of the royal citadel (Nouri Shadmahani, 2018).

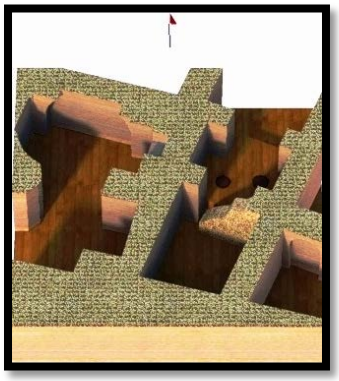

figure2: General plan of the trench The third season of excavation (Nouri Shadmahani, 2018*).*

2.Site Background

One of the largest settlements in the region with remarkable architecture is the Historical site of Feyzabad, which is located 10 kilometers north of Noushabad city and is based on surface findings and data from excavations, including pottery dating from the 13th to the 17th centuries CE. The historical site of Feyzabad is located at 91°, 71°, 24°N and 57°, 71°, 6E, in the northwest of Aran and Bidgol cities in Isfahan province. This area, which in the past (during its prosperity from the Ilkhanid period to the Safavid period) was a village on the way, is now abandoned and with the expansion of the Noushabad region, it has become a function of this city, which is now together with the city of Noushabad in the country divisions of Aran-o-Bidgol and are located in the north of Kashan In terms of climate, the area of Feyzabad, like its surrounding areas, has a hot and dry climate due to its proximity to the desert plain and distance from the Alborz Mountain range. Its annual rainfall is 741 mm on average (Nouri Shadmahani, 2019).

Today, the Vegetation of Feyzabad area mostly consists of Haloxylon and Tamarix shrubs, thorn bushes and pecan plants, which can be seen scattered on almost the entire surface of the area. Tamarix and Haloxylon shrubs have been planted in a large part of the area for desertification. The animal cover of this area mostly includes termites, cockroaches and rats, along with reptiles such as snakes and scorpions. The surface of the area is mostly composed of sand, which has a powdery texture that is easily moved by strong winds, and throughout the history, this wind has caused the burial of the area of Feyzabad. According to the contents of some historical texts, the city of Noushabad was formed in the Sassanid period and was named "Anushabad". With the passage of time, it became simple and easy and became "Nush Abad" (Afshar Sistani, 1392). According to the aforementioned conditions, settlements have been expanded towards the north of Noushabad and life has been going on in them in different Historical periods. There are also many aqueducts in Feyzabad Site (Nouri Shadmahani, 2020).

Four series of aqueducts are located parallel to each other in the northwest part of the area. An important distinction regarding the aqueducts is that the soil on which the aqueducts are placed on is made of soft soil with cracked layers and are covered with salt. This issue can indicate the existence of underground water sources in the past. But these aqueducts are unused and dry today. Unfortunately, in line with security and protection measures, after the completion of each excavation, the trench is filled with soil again. (Other measures: Covering exposed walls and floors using cotton sacks and the use of thatch to protect the walls) For this reason, despite many excavations in this area, it has not yet become a museum site.

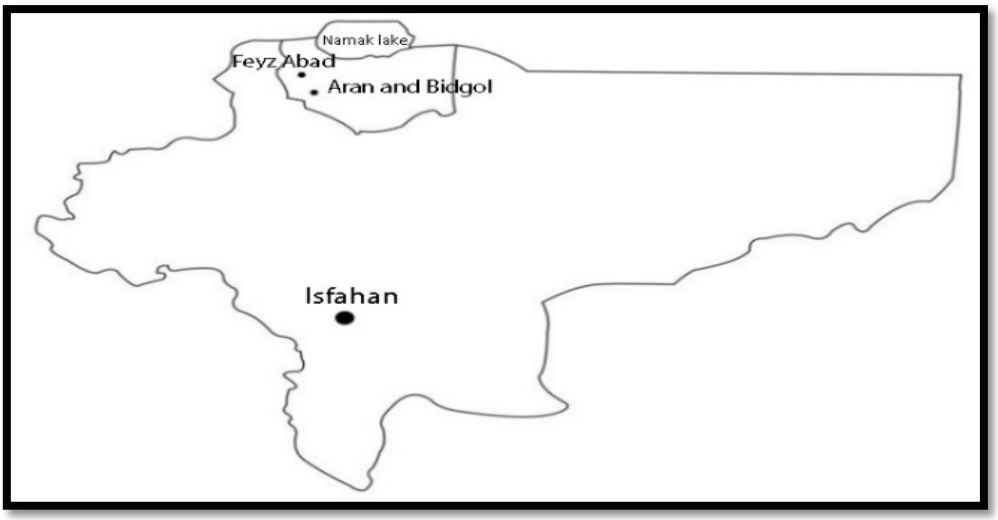

Figure 2: Location of Feyzabad Site (Nouri Shadmahani, Javeri, Sadraei, 2013).

3.Materials and Methods

The excavation of 2022 was carried out in Feyzabad area under the supervision of Dr. Reza Nouri Shadmahani and Dr. Mohsen Javari. In this excavation they worked on a trench with the name D8. This trench was created on the wall separating the royal citadel from the public part of the area, and the part where the ovens were found was related to the inner part of the citadel. All samples belonged to this trench. Soil samples were collected by the excavators in the site for archaeobotanical studies. All of the samples belonged to ovens. In this excavation 11 ovens were found in different parts of the trench, but the excavators only collected soil samples from 6 ovens. All ovens belong to the Islamic period and are named Ilkhani. The collected samples belong to the lower parts of the ovens, where most of the charcoal and ash are seen. All conditions related to sampling were recorded in special forms for archaeobotanical sampling. The most recorded conditions were related to soil type, visible remains, amount of soil sample, locus number and sample depth. Samples collected in site and for flotation were transfered to the Bioarchaeology center in the UK. The next place to be flotted were the Sialk hills where the flotation machine was located. Processing of samples was carried out by a machine flotation with 2 outputs: light fractions, which were found in 1 mm sieve sizes and heavy fractions. In general 207-liter soils were floted. All flotation samples were measured by weight(g) and all of the fractions were sorted under a Stereomicroscope. In the sort process all the seeds, charcoals, bones, snails and… were detached. Because no plant remains were found in the heavy fractions, the heavy fractions were kept separately for other studies. But all light fractions were studied. After flotation and drying of the plant remains at a balanced temperature, they were transferred to the Bioarchaeology Center. Then, identification, classification, photography and design of plant remains were done in the same center. All highly damaged seeds (unrecognizable) and healthy or even almost healthy seeds that could be identified were separated from each other. More plant remains were identified by seeds atlases and modern seed reference collections at the Bioarchaeology center. All the seeds were found in a good condition. All of them were preserved by charring and thats reasonable since they were found in an oven. Broken seeds with high damage were not

studied but they were all kept. Plant samples were identified in each locus with a specific volume of soil. (After completing the study of plant remains, some samples were selected as reference samples of the Islamic era in the Ilkhanid period in the central plateau of Iran).

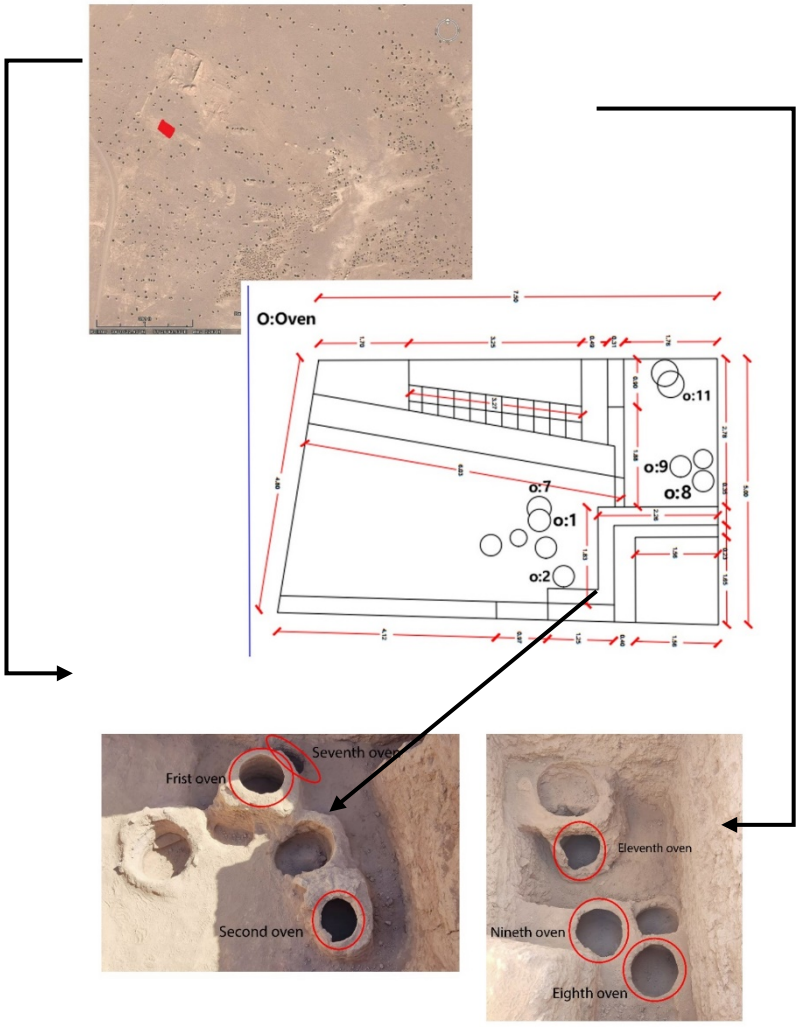

Figure 3: Satellite image of Feyzbad site, Trench plan 2022, ovens found and sampled (auther).

Figure 4: Team of flotation (author).

figure 6: works on seeds (author).

4.Plant Remains from Ilkhani Deposits

All ovens were found in Ilkhanid layers. Each of the 6 ovens selected for archaeobotany samples have carbonization seeds. In other ovens, the upper part debris is visible but in the lower parts ash and burnt soil are visible. To better understand the location and features of the ovens, we will describe each of them.

Loc8032

This locus belongs to the contents of locus 8019. Locus 8019 is the first oven found. In the upper part of this locus (8032) debris and brick were found but in the lower part ash and burnt soil was discovered. Sediment of locus was dry and burnt macro remains are visible with the naked eye. 54-liter soil selection was used for flotation from the lower part. Findings are visible in table 1. After sorting, Plant findings in this locus include 2 grape (V.vinifera) seeds, 1 Galium seed, 13 Barley seeds, 11 wheat seeds, 1 emmer wheat seed, 13 probably Quercus seeds, 1 Fabaceae seed, 18 Hulled Barley seeds, 4 Gramineae seeds, 20 Naked Barley seeds, 17 Bread Wheat seeds and 5 indistinguishable fragment seeds (Due to the severe damage, the seeds are not recognizable).

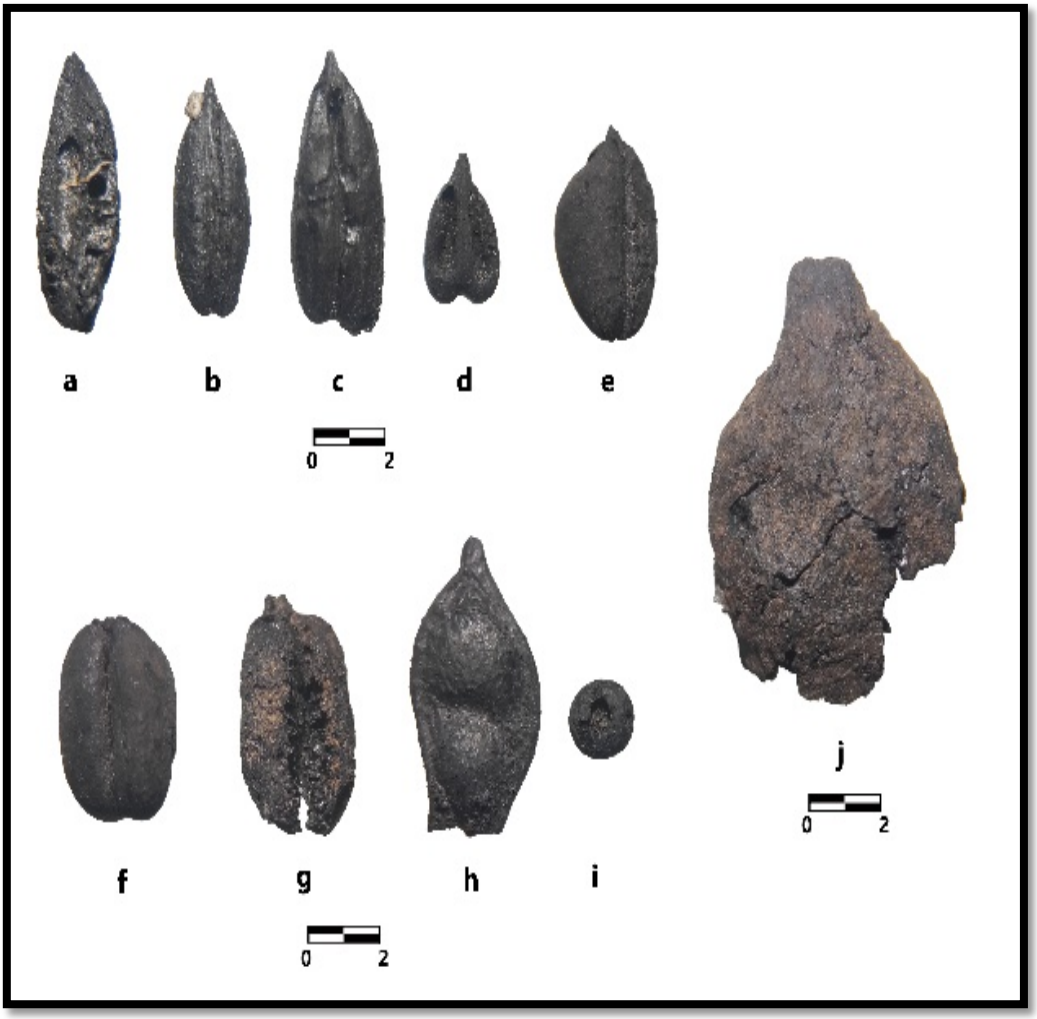

Figure 7: plant findings in locus 8032, a: Barley, b: Hulled Barley, c: Naked Barley, d: Grape (V. vinifera), e: Wheat, f: Bread Wheat, g: Wheat, h: Fabaceae, i: Galium, j: probably Quercus (author).

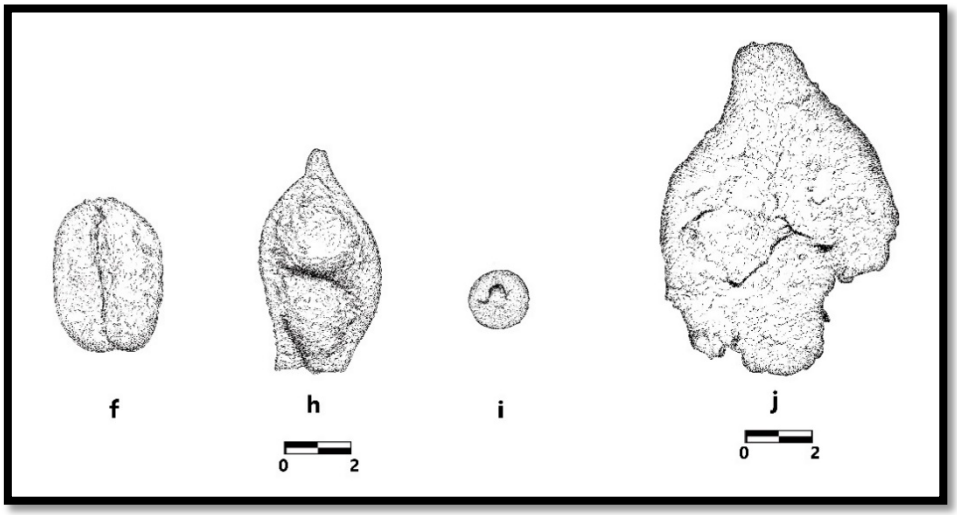

Figure 8: Designing a number of plant findings of Locus 8032, f: Bread Wheat, h: Fabaceae, i: Galium, j: probably Quercus (author).

Loc8033

This locus belongs to the contents of locus 8021. Locus 8021 is the second oven found. In the upper part of this locus (8033) debris and brick were found but in the lower part ash and burnt soil were discovered. The Sediment of locus was dry and burnt macro remains are visible with the naked eye. 57-liter soil selection was used for flotation from the lower part. Findings are visible in table 1. After sorting, Plant findings in locus 8033 included 20 Barley seeds and 1 indistinguishable fragment seed (Due to the severe damage, the seeds are not recognizable).

Loc8043

This locus belongs to the contents of locus 8042. Locus 8042 is the seventh oven found. In the upper part of this locus (8043) a little debris was found but in the lower part soft ash was discovered. The Sediment of the locus was dry and burnt macro remains are visible with the naked eye. 19-liter soil selection was used for flotation from the lower part. Findings are visible in table 1. After sorting, Plant findings in this locus included 1 Bread Wheat seed, 4 Naked Barley seeds and 2 indistinguishable fragment seeds (Due to the severe damage, the seeds are not recognizable).

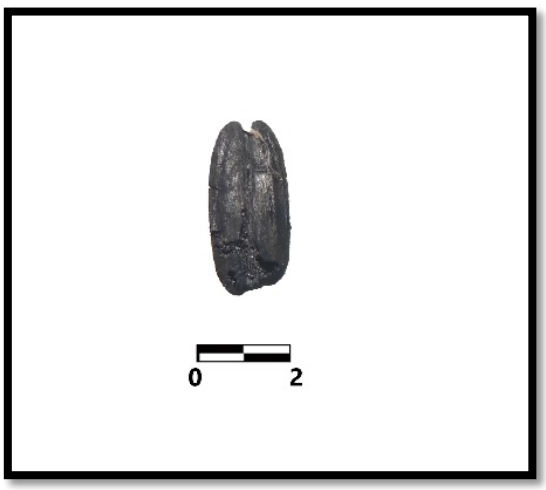

Figure 9: plant finding in locus 8033, Barley (author).

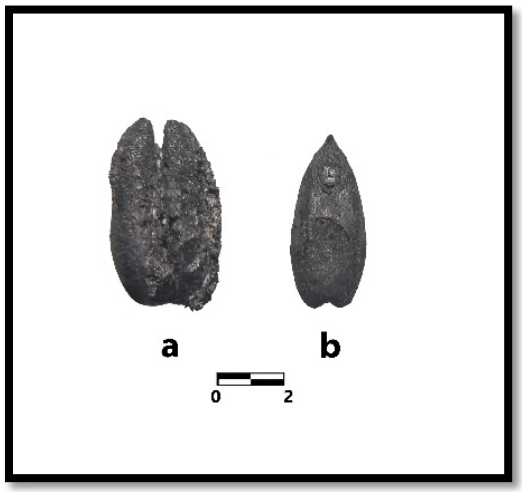

Figure 10: Plant finding in locus 8043, a: Bread Wheat, b: Naked Barley (author).

Loc8047

This locus belongs to the contents of locus 8046. Locus 8046 is the eighth oven found. In the upper part of this locus (8047) a little debris was found but in the lower part ash and burnt soil were discovered. The Sediment of the locus was dry and burnt macro remains are visible with the naked eye. 37-liter soil selection was used for flotation from the lower part. Findings are visible in table 1. After sorting, Plant findings in this locus included 5 Bread Wheat seeds, 7 Barley seeds, 2 Grape (V. vinifera) seeds, 1 Naked Barley seed and 1 Indistinguishable fragment seed (Due to the severe damage, the seeds are not recognizable).

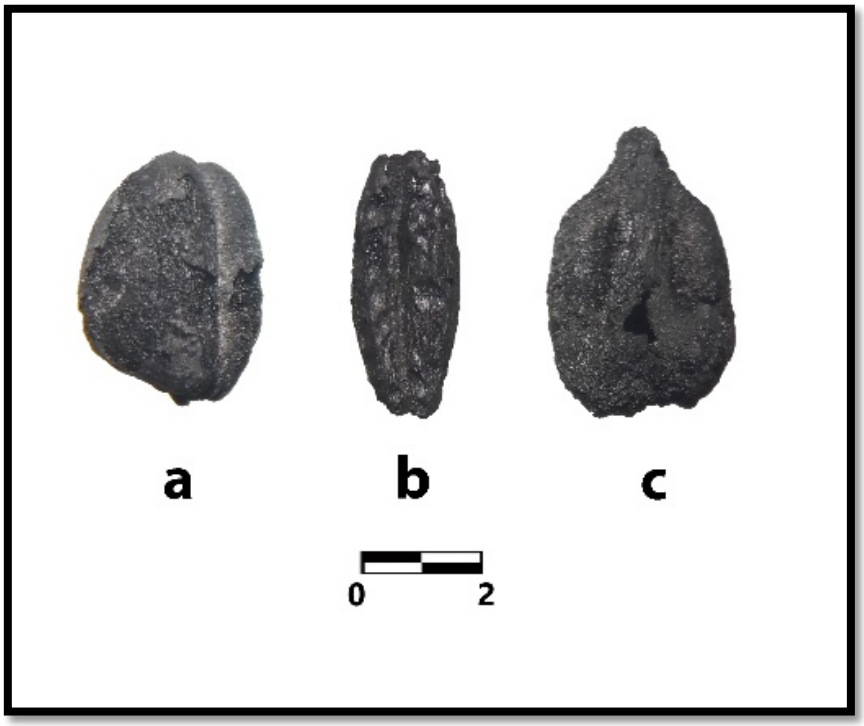

Figure 11: Plant findings in locus 8047, a: Bread Wheat, b: Barley, c: Grape (V. vinifera) (author).

Loc8050

This locus belongs to the contents of locus 8049. Locus 8049 is the nineth oven found. In the upper part of this locus (8050) found a little debris was found but in the lower part ash and burnt soil were discovered . The Sediment of the locus was dry and burnt macro remains are visible with the naked eye . 25-liter soil selection was used for flotation from the lower part . Findings are visible in table 1. After sorting, Plant findings in this locus included 5 Emmer Wheat seeds, 21 Gramineae seeds and 1 indistinguishable fragment seed (Due to the severe damage, the seeds are not recognizable).

Loc8054

This locus belongs to the contents of locus 8053. Locus 8053 is the eleventh oven found. Locus 8054 is full of ash. The Sediment of the locus was dry and burnt macro remains are visible with the naked eye . 15-liter soil selection was used for flotation from the lower part. Findings are visible in table 1. After sorting, Plant findings in this locus included 1 Grape (V. vinifera) seed, 2 Wheat seeds, 1 Pisum Sativum seed and 1 indistinguishable fragment seed (Due to the severe damage, the seeds are not recognizable).

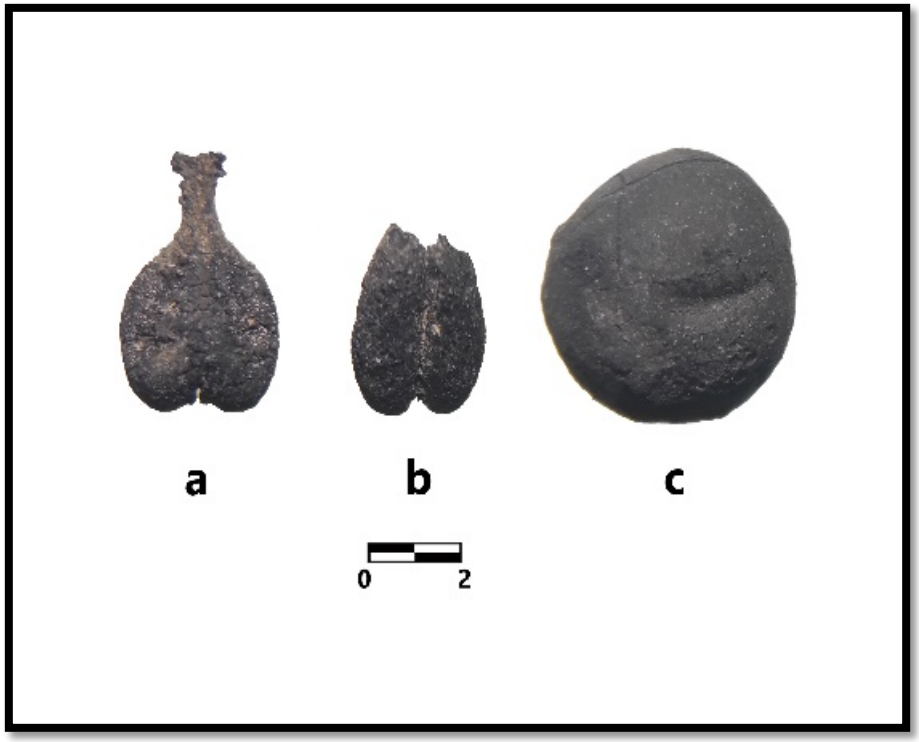

Figure 12: Plant finding in locus 8050, Emmer Wheat (author). *Figure 13: Plant findings in locus 8054, a: Grape (V. vinifera), b: Wheat, c: Pisum Sativum (author).*

Table 1: findings in different locus (author).

Order	Light Floatation	Seeds	Snail	Charcoal	Soil Pack	Bones	Litre Collect
1	TR: D8-Loc8032	✓	×	✓	✓	✓	54 L
2	TR: D8-Loc8033	✓	✓	×	✓	×	57 L
3	TR: D8-Loc8043	✓	×	×	×	×	19 L
4	TR: D8-Loc8047	✓	✓	✓	✓	✓	37 L
5	TR: D8- Loc8050	✓	×	×	✓	×	25 L
6	TRD8-Loc8054	✓	✓	×	✓	×	15 L
							207 L

As you can see in the table above, there are very few animals bone remains in the collected samples. But what was found in all the ovens are the remains of plants. All the remains are kept in the heavy fractions from flotation, and the remains related to charcoals and snails will be studied separately by experts.

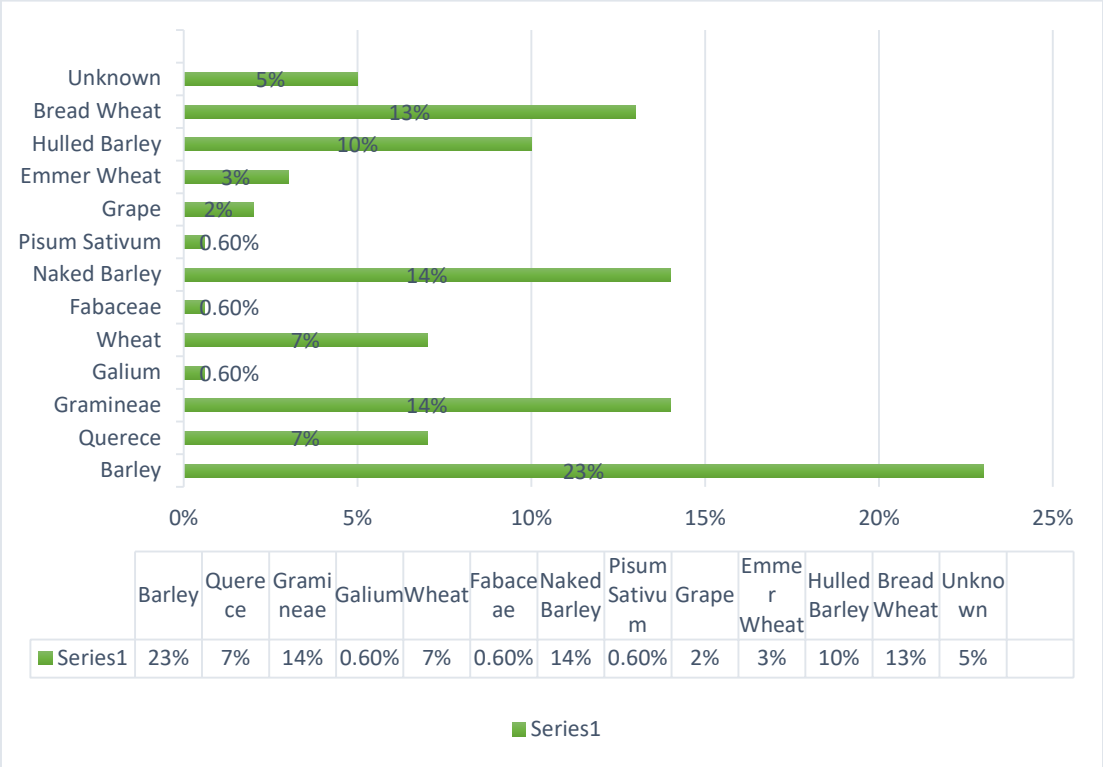

Figure 5: Total percentage of plant findings in Feyzabad area (author).

5.Results and Analysis

Even though only 6 ovens were studied out of the 11 existing ovens, the information obtained also gives us a better understanding of the Cereals, common weeds and other plant species in Feyzabad area during the Islamic era. Agricultural economics is clearly more complex than it is addressed in this study, but other investigations and researches such as Charcoal related studies, geology and studies related to climatic conditions should be done in order to provide more reliable results in this regard.

Before talking about the functionality of the stoves, it should be mentioned that a piece of a crucible was found in the small area where ovens 8, 9, and 11 are located.

Apart from what will be said in the results of this research, maybe in the future, by conducting further investigations, a number of stoves that have not been sampled will be related to metallurgy matters.

Now, based on the studies, we will answer the following questions:

The identified plant species includde Gramineae, Barley, Hulled Barley, Hulled Barley, Wheat, Bread Wheat, Emmer Wheat, Grape (V. vinifera), Quercus, Galium, Fabaceae, Pisum Stivum (Reinder, Cappers and Bekker, 2012).

Based on the high amount of plant finds in the ovens compared to other materials in them, it is possible that the sampled ovens were related to cooking and daily activities. Probably, this space, which is located inside the royal citadel, is related to cooking that adheres to the inside of the citadel. Among the ovens, the 8032 oven has more plant variety than the other ovens. If we consider that the plant remains found in the other ovens are limited to the same identified species (that is, other more diverse species have not been completely destroyed due to reasons such as high heat), then the 8032 ovens probably have more and more daily use than the others.

Based on what you saw, Bread Wheat was found only in two ovens, 8032 and 8043. Therefore, Bread or products consisting of Bread Wheat was probably baked mostly in these two ovens. The presence of the common Galium weed along with the grains in this oven can indicate the use of weeds for fuel supply or the agricultural work in the area itself and the accidental entry of this weed along with the grains in the oven. It is even possible that both assumptions are correct. Also, they probably used oak wood as fuel. Also, in general, Barley is found more than wheat. Regardless of the sampling method, this may indicate climate change. Although wheat is more popular among people, people grow more Barley when the humidity is low and the weather is warmer. Due to Barley's resistance to humidity, this plant is more economical for people. Hulled Barley and Naked Barley were found in close numbers. Therefore, barley in general has both human consumption and animal consumption. And probably animal husbandry has also been popular in this region due to the existence of this type of Barley for animals.

Probably, in the subsistence economy of this period, along with the specialized work of the people, agriculture and animal husbandry are still prevalent.

6.Acknowledgements

First of all, I would like to thank Mr. Alireza Sadeghzadeh and Mrs. Fatemeh Mojibian for their help in the flotation work. Also, I am grateful to Mr. Seyyed Mohammad Hosseini for presenting the trench plan (picture 2) and to Mrs. Mobina Gol Babaei for designing the plant seeds (picture 6).

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مطالعات باستان شناسی در محوطه فیض آباد شهرستان آران و بیدگل

نرجس خان فینی[۱]، رضا نوری شادمهانی [۲]، محسن جاوری، [۳]، مصطفی سرلک [۴]، سامان سورتیجی[۵]

۱. نویسنده مسئول، دانش آموخته کارشناسی ارشد باستان شناسی دانشگاه کاشان، دانشکده معماری و هنر، کاشان، ایران. رایانامه:narjes.khani4811@gmail.com

۲. دانشیار گروه باستان شناسی دانشگاه کاشان، دانشکده معماری و هنر کاشان، ایران. رایانامه: javeri@kashanu.ac.ir

۳. استادیار گروه باستان شناسی دانشگاه کاشان، دانشکده معماری و هنر. کاشان، ایران. رایانامه: nourishadr@gmail.com

۴. دانش آموخته کارشناسی ارشد باستان شناسی دانشگاه کاشان، دانشکده معماری و هنر، کاشان، ایران. رایانامه: mostafasarlak7119@gmail.com

۵. استادیار و عضو هیئت علمی پژوهشگاه میراث فرهنگی و گردشگری، تهران، ایران، رایانامه: Soortijee.archaeologist@gmail.com

چکیده

باستان‌شناسی یکی از علوم میان‌رشته‌ای در باستان‌شناسی است. باستان‌شناسی به مطالعه بقایای گیاهی در بافت‌های باستان‌شناسی می‌پردازد. بر اساس یافته‌های گیاهی، موضوعاتی مانند معیشت مردم، کشاورزی، پوشش گیاهی، تغییرات آب و هوایی، قدمت گذاری و غیره را مورد بحث قرار می‌دهد. بنابراین، این دوره می‌تواند به بسیاری از سؤالات باستان شناسان در مورد یک محوطه باستانی و مردم پاسخ دهد. در سال‌های اخیر باستان شناسان توجه زیادی به این حوزه داشته و سعی در استفاده از افراد متخصص در کاوش‌ها داشته‌اند. یکی از کاوش‌هایی که به باستان‌شناسی توجه دارد، محوطه فیض‌آباد است. این سایت دارای دوره‌های اسلامی است. در حفاری در سال ۲۰۲۲ در این سایت تعدادی تنور پیدا شد که نمونه‌برداری از آنها انجام شد. در این تحقیق قصد داریم به سؤالاتی مانند نحوه عملکرد کوره‌های نمونه‌برداری شده، شناسایی بقایای گیاهی در کوره‌ها پاسخ دهیم. در نهایت با ترکیب اطلاعات به دست آمده، زندگی مردم این دوره را روشن‌تر خواهیم کرد. با انجام این تحقیق اطلاعات ما از زندگی مردم این منطقه، معیشت آنها و انواع بقایای گیاهی رایج مورد استفاده در این منطقه افزایش می‌یابد. همچنین اطلاعات خرد در مورد شرایط اقلیمی به دست خواهد آمد. پس از بررسی‌ها و تحقیقات لازم مشخص شد تنورهای یافت شده در ترانشه D8 مربوط به پخت‌وپز مربوط به قسمت داخلی ارگ سلطنتی است. در کنار کارهای تخصصی‌تری که در حال انجام است، دامداری و کشاورزی رواج دارد. برخی تغییرات آب و هوایی مانند هوای گرم‌تر و رطوبت کمتر نیز شناسایی شدند.

واژه‌های کلیدی: باستان‌شناسی، باستان‌گیاه‌شناسی، فیض‌آباد، گیاهان، دانه‌های کربن شده.