

Burnt Rice from Four Archaeological Sites in Northern Vietnam

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Abstract: Burnt/charred rice is reported from four archaeological sites. These include: the Den (Vietnamese: *Dền*) citadel in Me Linh district, Hanoi, dated to 3730±50 - 2630±50 years; the brick tomb of the Six-Dynasty period (4th - 6th centuries) at the Ciputra urban area (Tu Liem district, Hanoi); Noi Lam valley (Ninh Binh); and the Xa Tac (Vietnamese: *Xã Tắc*) worshipping esplanade (Dong Da district, Hanoi) dating back to the 10th - 11th centuries. Comparison of the sizes of burnt rice seeds from archaeological sites in Northern Vietnam indicates that rice seeds mainly belong to the round plump (short round) type, which includes summer glutinous rice and field glutinous rice. These findings suggest that rice became a popular crop in the life of ancient Vietnamese as early as 3,000 years ago, and was widely distributed in the North of the country.

Keywords: Burnt rice, archaeology, northern Vietnam.

1. Introduction

From the dawn of history, rice has been regarded as one of the five special grains, which include soybean, wheat, barley and millet. The five grains played an important role in the human story. Rice not only functions as much-needed food, but also is very significant to the spiritual life of the farming population, including those in Vietnam. China is said to be the cradle of ancient rice, especially in its south and southwest and Yangtze River valley, where many samples of ancient rice were discovered [17]. Evidence of ancient rice at the archaeological site of Pengtoushan in

Hunan province aged 9,000 years, and of Hemudu in Zhejiang province aged 7,000 years, indicates that these are the earliest traces of rice in China and the world. Besides these traces, many tools for agricultural production and post-harvest activities have also been found at Hemudu [18].

In Vietnam, the archaeological record shows that the Vietnamese have been practicing rice-growing agriculture since very early times. The most convincing evidence are the finds of several varieties of ordinary rice (long slender grains, medium slender grains), mountain-field glutinous rice (long plump grains), summer glutinous rice (short slender grains), field glutinous rice (short

plump grains), *japonica* (long round grains, short round grains), which were defined to be of the Phung Nguyen culture, and found during the 1984 excavation of the Dong Dau relics in Vinh Phuc province [2] [13] aged $3,050 \pm 80$ years (all dates are uncalibrated years BP unless otherwise stated) [7]. There are also many other sites where rice traces were found aged $1,990 \pm 80$ years (ZK.3) such as Xuan Kieu (Hanoi) with summer glutinous rice (short slender grains), Japonica (short round grains), Dong Tien with Japonica (long round grains), Lang Ca with mountain-field glutinous rice (long plump grains), Lang Vac (Nghe An) with ordinary rice (medium slender grains), summer glutinous rice (short slender grains) [7]. Research into the origin of rice and the history of its cultivation practices have become a significant theme attended to by many researchers.

In recent years, archaeologists have discovered traces of rice in some sites in Vietnam, namely Den Citadel (pronounced “zain”), Vinh Phuc province), Ciputra, Xa Tac worshipping platform/esplanade (Hanoi) and Noi Lam valley (Ninh Binh

province). These recent discoveries can help us draw a picture demonstrating the diversity of rice in the north of Vietnam over the last few millennia.

2. Identifying different types of rice

Visually, all the rice seeds have been burnt black or charred. Some of them still have a trace of the husk, or the husk itself, while others are still attached with their stalk (Photo 6). We, therefore, call these items with a collective name of burnt or charred rice.

2.1. Rice seed recovery method

Sediments samples containing rice were handled with the flotation method using sieves of different sizes ranging from 0.5-0.1mm. The burnt rice was dried in the sun. They were then measured, identified and photographed with stereo microscope lens of 40x.

2.2. Criteria for identifying different types of rice

Table 1: Classification System of Types of Rice in Vietnam [13]

Type of grains	Length (mm)	Types of rice
Long slender grains	>8.8	Southern wild, ordinary rice
Medium slender grains	7.7-8.8	Wild, summer ordinary, winter ordinary rice
Short slender grains	<7.7	Summer glutinous rice
Long plump grains	>8.8	Mountain-field glutinous rice
Short plump grains	<8.8	Field glutinous rice
Long round grains	>7.2	Field glutinous rice, <i>japonica</i>
Short round grains	<7.2	<i>Di</i> (pronounced “zee”), <i>cút</i> (“koot”), <i>japonica</i>

Table 2: Rice Classification Criteria (FAO)

Length (<i>mm</i>)		Shape (based on length/width ratio) (<i>mm</i>)	
Very long	>7	Small	>3
Long	6.0-7.0	Medium	2.4-3.0
Medium or fairly long	5.0-6.9	Plump	2.0-2.39
Short	<5	Round	< 2

The identification of different types of rice based on the length of seeds has been developed by Dao The Tuan from research on rice in the green revolution in Vietnam during the 1980s [13] (Table 1).

In addition, we used the two classification criteria of length and shape based on the length/width ratio of the FAO (the United Nations' Food and Agriculture Organisation) that Te-Tzu Chang applied for milled rice [16] (Table 2).

To measure the shrinkage of rice after being burnt, we used the experimental results of Watabe in 1976. The shrinkage ratio of the rice was 0.6 – 0.7% in length and 1.5% in width [2].

3. Traces of rice at four archaeological sites in Northern Vietnam

3.1. Den citadel archaeological site: It is a crucial archaeological site in the Red River valley and Northern Delta as well as the midland areas, located on a vast area of 24,000m². The average elevation of the sites is approx. 0.8m above the level of the surface of low-lying rice fields in Phu My village, Tu Lap commune, Me Linh district, which is 4km away from Phuc Yen town to the northeast (21°32'09"N, 105°40'26"E). The

Den citadel archaeological site has been very well preserved with 7 excavations so far. Cultural traces and archaeological objects have been identified by archaeologists.

At present, the surface of the archaeological site is used for agricultural cultivation. People here have built a ditch for irrigation which is 1m in width, running in the northwest – southeast direction and dividing the site into two parts.

Rice traces found in the archaeological site of Den citadel

During the excavation of May, 2010, archaeologists and students of the University of Social Science and Humanities, Vietnam National University, Hanoi (USSH – VNU, HN) discovered a number of ceramic pieces, stone and bronze objects. Notably, numerous burnt rice grains were found at sections F4 and F3 (1, 3) of trench H2 and F20, F22, F13, F14 and F15 of trench H3. The total number of measurable grains was 658. In the 1984 excavation many burnt rice traces were found in the ash-containing soil, but no further details are available for these.

By comparing the measurement results in combination with the above criteria (section 1.2), it can be concluded that the varieties of burnt rice in Den citadel are mainly short plump seeds and short round seeds with 54% of the seeds having a length

of <5mm and 50% having the length/width (l/w) ratio of 2-3mm. Medium seeds and long plump seeds (5-7mm long) account for 33%, and long seeds (> 7mm with the l/w ratio from 1 to 2mm) making up 13% in term of length and 39% as regards the l/w

ratio (Table 3). These types of rice may belong to those named *nếp ruộng* (field glutinous), *nếp chiêm*² (summer glutinous), *tẻ chiêm* (summer ordinary), *tẻ mùa*³ (winter ordinary), and those named specifically *di*, *cút*, *dự* (Photos 3-4).

Table 3: Size of Burnt Rice at the Archaeological Site of Den Citadel (Excavated in 2010) (amended based on the FAO’s criteria [16])

Length of seeds (mm)			L/w ratio of seeds (mm)		
Type	Qty of seeds	%	Type	Qty of seeds	%
Short seeds (<5mm)	356	54	Slender seeds (>4mm)	9	1
Medium seeds (5-7mm)	220	33	Medium seeds (3-4mm)	67	10
Long seeds (>7mm)	82	13	Plump/Bold seeds (2-3mm)	325	50
			Round seeds (1-2mm)	257	39
Total	658	100		658	100

In the 1996 and 2010 excavations, archaeologists found some fragments of *Canarium* and other unidentified seeds [10]. *Canarium* is a common seed of mountain-field and mid-land areas in the north of Vietnam, discovered many times in archaeological sites in Hoa Binh province. In the reports of the excavation in 1984, researchers found some traces such as kitchens (fireplaces), red clay compounds coupled with ash and pits filled with black soil. Red clay compounds and ash were scattered with various shapes. The compounds include objects such as ceramic pieces, animal bones and burnt rice.

There were many small pieces of bone shaped almost like beads in a rosary which are round, light, small and incompletely

perforated, and 230 such objects were found in compartment D4 (TD86D4) (11). According to Vu The Long, from the animal bones one can identify animals such as the vertebrae of fish, the toes of pigs (*Sus scrofa L*) or the teeth of buffaloes (*Bubalus bubalis L*). The bones are decayed, maybe because of the strong impacts from human beings or the surrounding environment. For plants, many traces of seeds of *Canarium* and rice husks on the terra-cotta compound were found at that time [11].

3.2. Size of rice in Noi Lam valley, Ninh Binh province

In the 2015 excavation at Noi Lam valley in the Trang An Natural and Cultural Heritage

Site of Ninh Binh province, archaeologists discovered 12 clumps of charred rice on the surface, the dimension of which was 5-12cm, coded as 15TL.ST: 55 (Photo 3). Some clumps were just intact rice grains, while others were de-husked and ground

rice. As the rice grains had been burnt and they had thus formed clumps, it was very difficult to separate them to get detailed measurements. Only 17 seeds were measured to compare with the intact rice in terms of the size (Table 4).

Table 4: Size of Burnt Rice in Noi Lam Valley, Ninh Binh Province (amended based on the FAO's criteria [16])

Length of seeds (mm)			L/w ratio of seeds (mm)		
Type	Qty of grains	%	Type	Qty of grains	%
Short seeds (<5mm)			Very round seeds (>4mm)		
Medium seeds (5-7mm)	8	47.0	Small seeds (3-4mm)	3	17.6
Long seeds (>7mm)	9	53.0	Plump seeds (2-3mm)	13	76.4
			Long seeds (1-2mm)	1	6.0
Total	17	100		17	100

Based on the classification criteria of rice varieties in Vietnam by Dao The Tuan (1986) in Table 2, rice seeds here can be categorized into three main groups: Rice of medium slender seeds and short slender seeds (53% of the seeds have the length of > 7mm and 6% have the l/w ratio of 1-3), which can belong to the varieties of (non-glutinous) winter rice and summer rice, rice of long round seeds (47% of the seeds have the length of 5-7mm and 76.4 % have the l/w ratio of 2-3cm), which can belong to the variety of field glutinous rice; rice of small slender seeds (l/w ratio of 3-4mm), which accounts for 17.6% and can be glutinous rice. The majority of seeds here are ones with short slender seeds and long round seeds, which can belong to the types of summer glutinous rice and field glutinous rice.

3.3. Traces of burnt rice in brick tombs at the Ciputra urban area

In April 2011, while laying sewage pipes in Nhat Tao village, Dong Ngac commune, Tu Liem district, Hanoi, Hanoi Investment and Construction Joint Stock Company No.1 under the Urban Infrastructure Development Investment Corporation (UDIC) discovered an ancient tomb. After that, the Management Board of Hanoi Monuments and Landscapes requested for the company's cessation of construction, and the Vietnam Archaeological Association and the Division of Historic Archaeological Research under the Institute of Archaeology excavated the site.

Two tombs, one larger than the other, situated nearly in parallel, heading northwest-southeast, were discovered. The

first tomb is 4.7m in length, 2.15m in width and 1.9m in height. The second is 3.9m in length, 1.2m in width and 0.95m in height. Both of these tombs were built with a voussoir arch architecture with bricks in the shape of pomelo segments. The inward walls and ceiling of the two tombs were

constituted with uniquely patterned bricks. In addition to valuable objects, a layer of charred plants was seen amidst the mud at the bottom of the tomb. There were similar traces in the two ceramic bowls found in the tombs (Photo 4).

Table 5: Size of Burnt Rice at the Bottom of Tomb 1 at Ciputra Urban Area (amended based on the FAO’s criteria [16])

Length of seeds (mm)			L/w ratio of seeds (mm)		
Type	Qty of seeds	%	Type	Qty of seeds	%
Short seeds (<5mm)	26	46.4	Very round seeds (>4mm)	0	0
Medium seeds (5-7mm)	30	53.6	Small seeds (3-4mm)	1	1.8
Long seeds (>7mm)	0	0	Plump seeds (2-3mm)	47	83.9
			Long seeds (1-2mm)	8	14.3
Total	56	100		56	100

Table 6: Size of Burnt Rice in the Bowl at Ciputra Urban Area (amended based on the FAO’s criteria [16])

Length of seeds (mm)			L/w ratio of seeds (mm)		
Type	Qty of seeds	%	Type	Qty of seeds	%
Short seeds (<5mm)	11	73.3	Very round seeds (>4mm)	0	0
Medium seeds (5-7mm)	4	26.7	Small seeds (3-4mm)	0	0
Long seeds (>7mm)	0		Plump seeds (2-3mm)	12	80.0
			Long seeds (1-2mm)	3	20.0
Total	15	100		15	100

We screened 30cm³ of sediments collected at the bottom of the first tomb and deposit concentrated in a small bowl (HV

16 M1). The result was 56 intact rice seeds and 208 seeds which are partly broken or half-broken, and a large number of crushed

seeds (with the estimated weight to be equivalent to 600 seeds). The number of burnt rice found in a small bowl is 15 intact seeds, 48 seeds which are partly broken or half-broken, and many crushed seeds (estimated by the weight equivalent to 70 seeds) (Photos 5-7).

Intact rice seeds are measured in terms of length, width and length/width ratio (Tables 5-6).

Based on the method of calculating the shrinkage of burnt rice by Nguyen Xuan Hien (1980) and the FAO's classification criteria, rice varieties at the Ciputra urban area (both at the soil at the tomb bottoms and in the bowls) share the same shape and are categorised mainly into the groups of plump seeds and round seeds. Very few rice seeds at the site belong to the long seed group. The length/width ratio of seeds averages from 1.6 to 2.9mm and the length of seeds ranges from 4 to 5.8mm (Tables 5-6). The seeds are field glutinous rice and summer glutinous rice.

3.4. Archaeological site of the Xa Tac worship platform

In the 6 trenches excavated at the Xa Tac worship platform (Hanoi) in 2006, 2 special clusters of objects appeared with 3 vases made of glazed terra-cotta in each. The vases were buried in a straight line with lids broken and mouths facing upward. We examined the vases, studying their types as well as what remained inside.

- Result of sample identification in cluster 1

This cluster includes 3 vases made of glazed terra-cotta, situated between a line of glazed terra-cotta building foundation constructed during the Ly dynasty and

another line of vertically fixed bricks constructed during the Le dynasty, at the elevation of 6.12-5.84m above sea level. The sediments inside the vases, mainly yellow and brown-yellow clay mixed with a little smooth sand and small gravel, are relatively homogeneous.

+ *Vase coded ĐXT06 HIV L₂₋₃EV (3H4)*: The result of screening the sediments inside the vase showed charcoal and ash scattered inside (charcoal from burnt timbers/shrubs). There were few remnants of plants, which include those burnt or vertically half-broken. The two seeds of rice are 5mm in length, the width: 2.3-2.5mm.

+ *Vase coded ĐXT 06HIV L₂₋₃EV (4H4)*: The charcoal inside the vase was concentrated within the upper one-third part of the vase. Remnants of plants found comprise two pieces of burnt rice. The dimensions of the remains of the first piece are: length: 4mm, width: 2mm. The outside of the seeds was rounder than rice seeds in the vase coded 06 ĐXT HIV L₂₋₃EV3H4 (Photo 8). The second piece was very small: length: 2.5mm, width: 2.0mm. There were a few covers of drupe-like fruit seeds, (1/4 or 1/6) of a complex seed with a pomelo segment-like shape and with a triangular cross-section. The dimensions of the seeds are: length: 2mm, width: 1.5mm with unidentified organic materials.

+ *Vase coded ĐXT 06HIV L₂₋₃EV (5H4)*: No traces of plants

- Result of sample identification in the cluster 2

The cluster also included 3 vases with the same shape and burial method as those in cluster 1. The vases were buried in a straight line. Their lids were broken. The middle vase was red and the others were

grey. All 3 vases have mouths of 10 cm in diameter and traces of broken lids. The vase cluster 2 was located near the brick-paved ground of the Ly dynasty at an elevation of 5.62-5.31m above the sea level. The results are presented below:

+ *Vase coded 06 ĐXT H₄L₃₋₄ (1)*: discovered were with 18 seeds of the Compositae family (Photo 14), unidentified seeds, a little amount of ash (very small pieces of charcoal) and roots of contemporary plants.

+ *Vase coded 06 ĐXT H₄L₃₋₄ (2)*: discovered a very small amount of ash and a few vestiges of plants, including a seed of Amaranthaceae family, 7 seeds of the Compositae family and roots of contemporary plants.

+ *Vase coded 06 ĐXT H₄L₃₋₄ (3)*: In vase 3, we discovered 1 seed of burnt rice (*Oryza sativa* L) with a small broken section. The dimensions of the remaining part are: length: 3.5mm, width: 2mm. Notably, we found more than 30 seeds of the Compositae family as in the other two vases, together with a large amount of ash and roots of plants.

We can conclude that all three vases contain seeds of the Compositae family

which indicate that chrysanthemums were used in offering/worshipping rituals.

4. Conclusion

The burnt rice at the Den citadel was mostly short plump and long round seeds (54%). The others were the medium and plump seeds (33%) and long seeds (13%) (Table 3), which could belong to the types of field glutinous rice, summer glutinous rice, summer ordinary rice, winter ordinary rice, *di*, *cút*, and *đr*.

Rice seeds from the Ciputra urban area can be divided into 3 groups in which the majority are plump and medium seeds, compared to a small amount of round seeds and very few long seeds. The seeds are field glutinous rice and summer glutinous rice.

Rice grains found in Noi Lam valley, Ninh Binh province, also belong to three major groups, which are short slender seeds, long round seeds and small slender seeds. The groups of short slender seeds and long round seeds, which account for the highest proportion in the site belong to the types of field glutinous rice and summer glutinous rice.

Table 7: Comparison of Types of Rice Seeds Based on their Length

Type	Den citadel	Noi Lam	Ciputra	Xa Tac worship platform
Short seeds (<5mm)	54%		52.2%	Unavailable because the number of rice seeds is small and all are broken.
Medium seeds (5-7mm)	33%	47%	47,8%	
Long seeds (>7mm)	13%	53%	0	
Total	100%	100%	100%	

Table 8: Comparison of Types of Rice Seeds Based on their Length/Width Ratio

Type	Den citadel	Noi Lam	Ciputra	Xa Tac worship platform
Very round seeds (>4mm)	1%	0	0	Unavailable because the number of rice seeds is small and all are broken.
Small seeds (3-4mm)	10%	17.6%	1.4%	
Plump seeds (2-3mm)	59%	76.4%	83.1%	
Long seeds (1-2mm)	39%	6.0%	15.5%	
Total	100%	100%	100%	

Because almost all of the burnt rice seeds found at Xa Tac worship platform were deformed, it is very difficult to calculate their shrinkage ratio. If based on the formula, burnt rice at Xa Tac worship platform is categorised as plump seeds which can belong to the type of glutinous rice.

The diversity of the rice found in these four archaeological sites is summarised in Tables 7 and 8.

The comparison between the newly discovered rice in these four sites and rice discovered previously in northern Vietnam (Table 9) shows us that the majority of rice seed types are the short round, long round, and short plump ones. These belong to the types of glutinous rice such as summer glutinous rice, field glutinous rice, yellow flower glutinous rice and short glutinous rice. Long slender seeds and medium slender seeds, which belong to the varieties of ordinary rice, account for a lesser ratio.

Table 9: Comparison of Rice Types Discovered in the North of Vietnam [7], [1], [2]

No	Archaeological site	Age	Average size (mm)			Types (varieties)
			Length	Width	L/w ratio	
1	Dong Dau, Vinh Phuc	3,050±80BP (Bln.3711) ÷ 2,830±80BP (Bln.3811)	4.953	2.892	1.818	Long slender grains, medium slender grains, short slender seeds (ordinary rice) at lower layers. Short plump seeds, long round (summer glutinous rice, field glutinous rice and mountain-field glutinous rice) at upper layers.
2	Den citadel, Vinh Phuc	3,730±50BP (Bln.3262) ÷	4.91	0.41	2.1	Short plump seeds (>50%), medium seeds (33%) and long seeds (L/w ratio: 1-2)

		2,630±50BP (Bln.3263)				mm) (39%), which can belong to summer glutinous rice, field glutinous rice, summer ordinary rice, winter ordinary rice, <i>di</i> , <i>cút</i> , <i>dự</i> .
3	Xuan Kieu (Hanoi)	3,500-3,200 BP	-	-	-	Short slender seeds (summer glutinous rice), short round (<i>japonica</i>)
4	Dong Tien	3,000-2,000 BP	-	-	-	Long round (<i>japonica</i>)
5	Ca village (Phu Tho)	2,235±40 BP	-	-	-	Long plump (mountain-field glutinous rice), long round (<i>japonica</i>)
6	Vac village (Nghe An)	1,990±85 BP (ZK.310)	-	-	-	Medium grains (ordinary rice), short seeds (mountain-field rice)
7	Ciputra, Hanoi	Six-Dynasty	4.679	2.14	2.222	Medium seeds (26%), plump seeds (54%), round seeds (20%), which mainly belong to the varieties of glutinous rice.
8	Hoa Lu, Ninh Binh	20 th century	4.612	2.02	2.435	Round seeds (2%), plump seeds (58%), slender seeds (24%) and long seeds (15%).
			5.358	3.104	2.569	
9	Xa Tac worship platform	21 th century	-	-	-	Plump seeds which can be glutinous rice.
10	Noi Lam valley, Ninh Binh	-	7.16	2.61	2.8	Medium slender seeds: summer ordinary rice, winter ordinary rice (18%), long round seeds: field glutinous rice (35%), Short seeds: summer glutinous rice (47%)
11	Xuong Giang, Bac Giang	-	5.276	2.397	2.449	Plump seeds (77%) (almost slender seeds accounts for 56%), slender seeds 22%
12	Ba Dinh, Thanh Hoa	Beginning of 20 th century	5.641	2.561	2.437	Plump seeds (83%), round seeds (6%) and slender (11%)

* Note: (-): information unavailable.

According to Watanabe (1988) the round plump group of rice, similar to *japonica*, was widely grown in Northern countries. *Japonica* rice originated from China's Yunnan plateau and was glutinous as a result of being an intermediate form of ordinary rice and glutinous rice which is a sub-species of *japonica* [18]. In the past, short round rice including ordinary rice such as *di*, *cút*, *lộc*, white ordinary rice, Hai Duong ordinary rice, etc. was widely cultivated in Northern Vietnam [13].

Studying the birthplaces of rice cultivation separately on a widespread area, Te-Tzu Chang commented that rice appeared first in the Ganges River Delta, under the eastern foot of Himalayas, through Upper Burma, the North of Thailand, Upper Laos and the north of Vietnam to the southwest and south of China. Meanwhile, according to Watabe Tadaio (1988), rice had its origins in the area stretching from Assam (India) to Yunnan (China) and the north of Vietnam. Based on the combination of written and archaeological materials, Charles Higham suggested a migration of rice-growing inhabitants from Yangtze river basin to Thailand and Vietnam during the period of 2000-1500 B.C. Another scholar, Bellwood, asserted that the appearance of rice was the result of the migration of people of Austronesia from southern China through the island of Taiwan to Southeast Asian islands in around 2500-2000 B.C. No matter whether the majority of scholars accept the perception that wet rice domestication originated from southern China or not, the most important point is their agreement that "Rice domestication in the Southern China progressed more

rapidly than that in other areas... It does not mean that the whole complex of rice-growing originated from China and then spread to other far areas. In contrast, the domestication of wild rice progresses differently in each area and is separate from that in the North". [1].

From above-mentioned findings, it can be concluded that rice was quite common in life of ancient Vietnamese over 3,000 years ago. In addition, the rice was widely distributed throughout northern Vietnam. The complicated and diverse categorisation of rice is clearly presented in types and varieties such as long, medium, short plump, long plump, short round, and long round grains, and mountain-field glutinous, field glutinous, summer glutinous and summer ordinary rice, etc.

Besides the above-presented proof of rice, the findings of pollen and spore analysis conducted in some archaeological sites such as Den citadel, Dong Dau, Dinh Trang and Dong Son also indicate that a large amount of the pollen of the *Poaceae*, probably including that of *Oryza sativa* rice was usually concentrated in upper layers [5], [6], [8], [3], [4]. A wide range of archaeological objects which were considered directly related to rice cultivation including stone hoes, sickles, bronze or iron rice-harvesting tweezers, and bronze ploughshare were discovered in Go Mun, Go Chua Thong, Dong Son, Tho Vuc, Dinh Trang, etc. [14], [12]. They demonstrate that in the Metal Age, soil-processing techniques and farming methods were already specialised to fit rice cultivation.

The findings of rice grains in the Den citadel archaeological site of the Metal Age, in Noi Lam valley, Ninh Binh province, the brick tombs of Ciputra urban area, which

was thought to date back to the Six-Dynasty period, and Xa Tac worship platform of the 11th century, contributed to proving the long-lasting existence of rice in the life of Vietnamese people. It also suggests the possibility related to the use of cereals and plants in life and ceremonies.

Notes

² *chiêm* – the season of the rice which is harvested in the 5th or 6th lunar month.

³ *mùa* – the season of the rice which is harvested in the 9th or 10th lunar month.

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Photo 1: Round Rice seed in Den Citadel



Photo 2: Short Plump Rice seed in Den Citadel



Photo 3: Burnt Rice Clumps in Noi Lam Valley, Ninh Binh



Photo 4: Rice Seeds in Object 16, M1

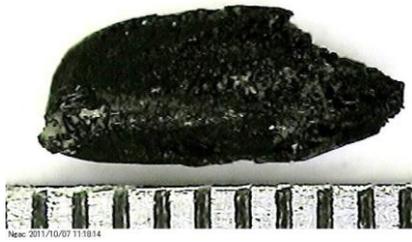


Photo 5: Round Rice Seed



Photo 6: Plump Rice Seed



Photo 7: Medium Rice Seed



Photo 8: Rice Discovered in Xa Tac Worship Platform

(Credit: Nguyen Huu Thiet)