The Ethno-Anthropology of Khubz Samh: An Initial Access to the Forgotten Bread of the Desert and its Rehabilitation in the Southern Badia[1]

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Abstract: *The ethno-anthropology of samh* (سَـمْح, *Mesembryanthemum forsskalei Hochst*) *stands for Arabia's "buried" environmental, healing and food knowledge that needs to be documented, researched and protected like any archaeological heritage. The reconstructed production of the traditional bread of the desert, khubz samh* (خبز سَمْح) *presented here elaborates on an essential rain-dependent, protein-rich and gluten-free food source for the existence of the once-migrating Bedouins in parts of northern Arabia, the southeastern Badia, Wadi Rum, and southern Wadi Araba. The samh harvesting, threshing, seed processing and bread-making exposed the anthropological frameworks discussed here. It led to the urgent issues of safeguarding and rehabilitating ancient Bedouin environmental and food knowledge for the sustainable benefit of modern humans, just in the sense of Applied Ethno-Anthropology.*

Keywords: *samh* (سَـمْح, *Mesembryanthemum forsskalei Hochst*), *southern Badia, ethno-anthropology, replicative study, rehabilitation.*

Introduction

This contribution provides information on the former procurement and use of samh in al-Jafr greater region, including Jabal `Ainab and `Awjah. It is based on the indigenous knowledge of one of the authors (Dalish Salim ad-Dmaniyyah al-Howaitat, hereafter Dalish), which was further enhanced by the memories of Abdul Wahab Zheiman al-Dmaniyyah al-Howeitat (Abu Mahmud) from al-Jafr and Mohammad Harb Andad al-Jazi al-Howaitat (Abu Abdallah) from al-Husseiniyeh (records in June 2011, May and July 2013 and August 2014). The replicative samh study, or the reconstruction of the harvesting, threshing, flour and flatbread making (Fig. 4), was carried out in May and July 2013 when the wild stands of samh were rich in the Jabal `Ainab Area.[2]

The samh study was part of the Eastern Jafr Archaeological Project (Gebel and Wellbrock 2019) directed by one of the authors (H.G.K.G.), which is also devoted to uncovering and safeguarding the remaining environmental, healing and food knowledge of the local Bedouins. The project (succeeded in 2022 by the Eastern Jafr Joint Archaeohydrological Project of Lübeck and Yarmouk Universities) is embedded into the local communities. It follows the general responsibility of archaeology as a cultural discipline to take care of the vanishing remains of the surrounding indigenous heritage.

Samh grows wild in specific locations of Jordan southern Badia east and south of al-Jafr, of Wadi Rum and the southern Wadi Araba, as well as in the Tabarjal, Busaita, Abu `Ajram and al-Sfan regions of al-Jawf Province in northern Saudi Arabia (Fig. 1). It is a halo-succulent/ halophyte (locally called samah/ samh, botanical name: Mesembryanthemum forsskalei Hochst), which provided the nomadic Bedouins with a gluten-free (bread) flour until the 1960s. With the sedentarisation of the Bedouins and the widespread availability of imported bread wheat, this food source and

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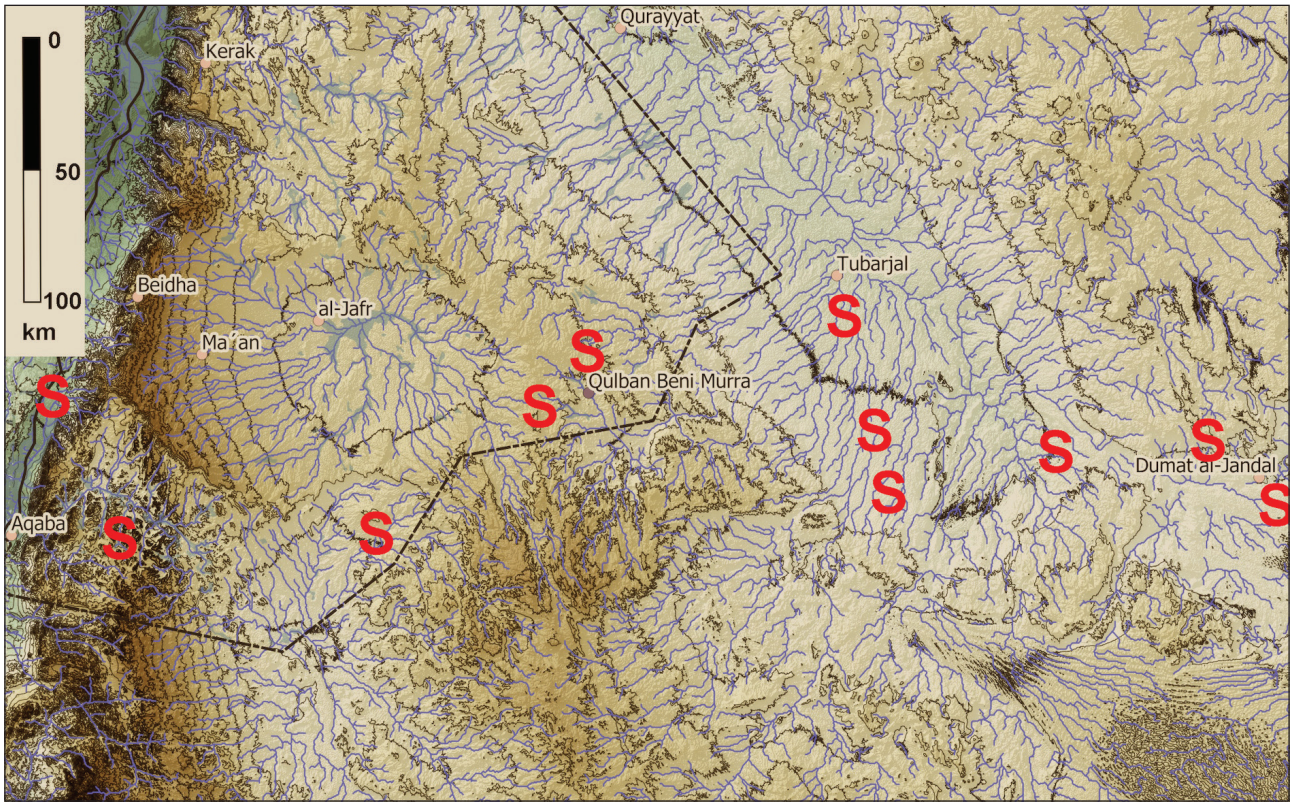

Fig. 1: Geobotanic Distribution of Wild Samh Stands (marked with "S") in Southern Jordan and al-Jawf Province as Known by Today (Locations from W to E: Wadi Araba, Wadi Rum, Mudawarah, `Awjah, Jabal `Ainab, upper Wadi Sahab al Asmar, Taberjal, Buseita, Abu Arjan, Dumat al-Jandal West and Southeast). (Map: Gebel)

the knowledge of its acquisition, exploitation and food processing disappeared from the consciousness of the present-day Bedouin generations. The seed bolls' excellent shelf life and nutritional values made samh an excellent source of protein in mobile lifeways. For two decades, extensive harvesting and use of samh, often considered an "ethno-food" has occurred in northern Saudi Arabia (e.g., al-Sharari 1988, al-Sharari A. 2019). Trends for re-using the samh resources seem to occur recently in Jordan. The natural availability of samh stands depends on rainfall in late winter and spring and can, therefore, vary considerably from year to year. Since the late 1980s, Saudi agro-botanical studies have shown that samh can be cultivated under certain conditions (cf. e.g., al-Sharari S. 1988, al-Sharari A. 2019). The delicious nutty taste of samh can become an alternative gluten-free food source and sustainable land use for suitable areas in Jordan's desert again.

A significant socioeconomic potential is seen in rehabilitating this forgotten wild food resource in Jordan southern Badia, especially if samh is additionally cultivated in its natural habitat. It could address the extreme poverty of local Jordanian Bedouins if a producer-controlled production and distribution of the bolls could be established. It would also help to support the vulnerable Bedouin identity and lifeways (cf. the Conclusions).

Bedouin Environmental and Food Knowledge Documentation Needs and Research Aims[3]

The vulnerable but rich indigenous environmental knowledge, cultural competency and history of the traditional Badia inhabitants are daily vanishing with the remaining bearers

of the culture and knowledge. It became an imperative need to record, conserve and protect this legacy. A multi-disciplinary documentation effort has to safeguard the Bedouin indigenous environmental, hydraulic, food and healing expertise, all part of their highly endangered tangible, intangible and natural heritage package. Safeguarding traditional environmental knowledge can lay the foundation for continued sustainable land use of desert areas, helping to avoid future non-sustainable forms of land exploitation. For thousands of years, the Bedouin type of adaptation and survival in arid environments represented a sustainable management of extreme landscapes.

In general terms, our samh research project can serve as a future paradigm and motor study encouraging more projects[4] to use its experiences and aims, including to cooperate at eye-level with the indigenous expertise/ representatives of the "Bedouin Academy"[5]. In more specific terms, a samh rehabilitation feasibility study, or Samh Development Study, is needed to evaluate the socioeconomic and wider nutritional potentials of samh for the inhabitants of the southern Badia and the organic food markets. The ethno-anthropological contribution of this expertise may help the hardly preserved local Bedouins' competence in foraging and processing the samh. The still-living knowledge bearers have to transfer their experience to the younger generations, supported by geobotanical and nutritional research of national and international specialists like those represented by ICARDA (International Center for Agricultural Research in Dry Areas) or the Badia Research Program.

In detail, our samh research follows several significant aims, as shown below:

1) Reconstruct the exploitation, processing and use of samh by co-authoring indigenous expertise (culturally embedded research using a replicative system's approach).
2) to "Translate" indigenous knowledge into academic/ scientific terms.
3) Raise awareness of local people about lost food knowledge and unused food sources.
4) Prepare the development/ rehabilitation of the socioeconomic potentials of samh exploitation for the local southern Badia population in the wild distribution regions of samh.
5) Investigate the archaeological questions related to the historical use of samh.

Our samh research study is also a plea reminding us of the responsibility of archaeologists as cultural scholars taking care of the documentation and safeguarding efforts of the vanishing indigenous heritage whenever they meet this need in their specialized research environments.

Geo- and Ethnobotany, Nutritional Facts of Samh

Samh (Mesembryanthemum forsskalei Hochst) is a halophyte/ halo-succulent of the Aizoaceae family (Fig. 2a-c; Mandaville 2011: Figs. 1-2) growing in saline water-favoured areas. It is found at the immediate edges of small drainage runnels and their tributaries, both inside wadis and on slopes. Samh grows in smaller and larger carpets in sandy areas or stone pavements on sandy soil, and its color can be identified from a distance. The color in the landscape even indicates if the samh is still green or in the stage of getting dry or becoming harvestable (Figs. 4c and 5)

Samh stands appear denser in areas with more water and remain green for a longer time. Less dense samh covers on slopes having a higher water discharge make samh harvestable

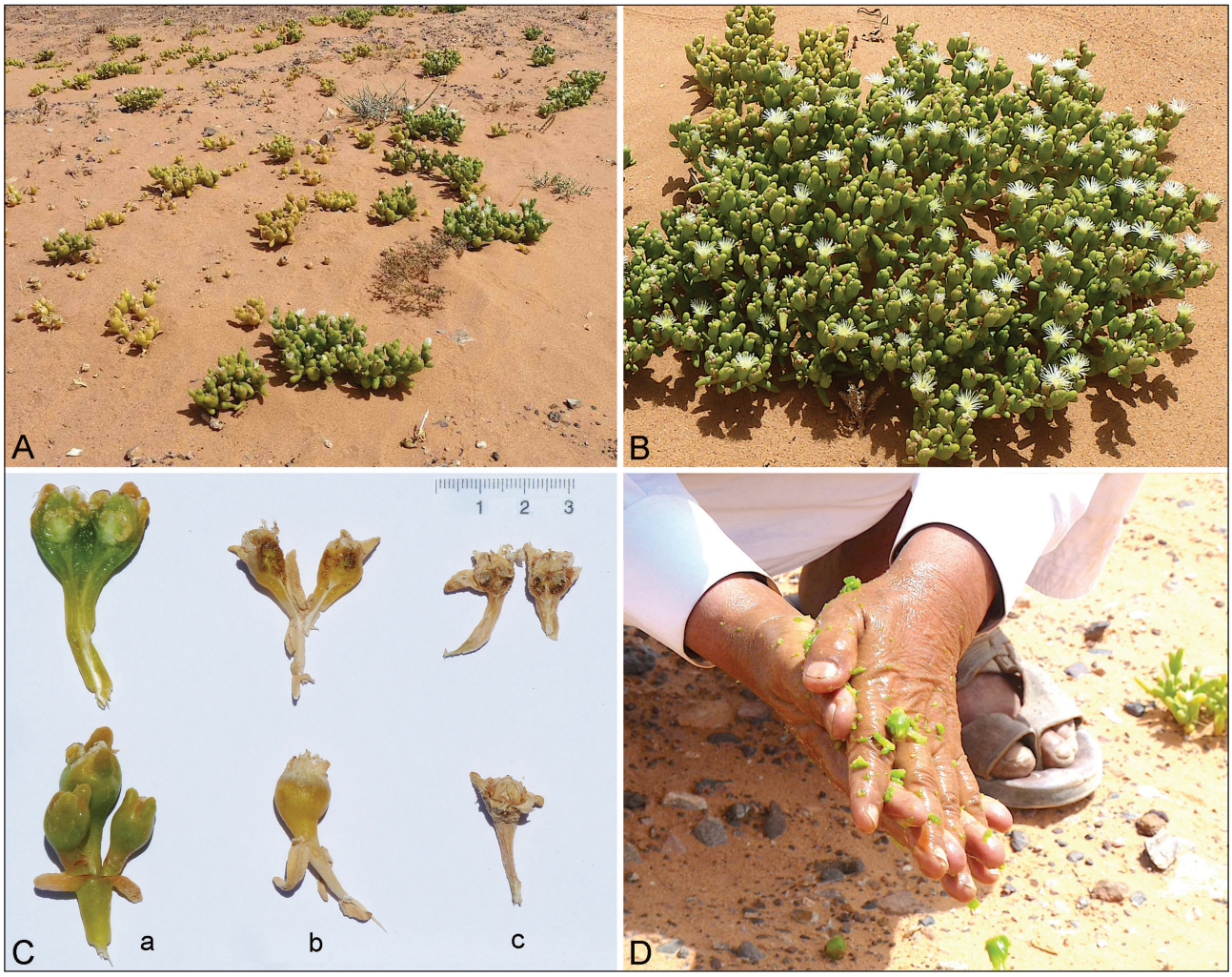

Fig. 2: A-B Green Samh Stands near Jabal `Ainab, East of al-Jafr; C Drying Stages of Samh (not ready to harvest) during May: a Green (Total Moisture) Samh with Flowering Remains, Seeds Still Whitish; b Yellowish–Light Brown Drying Stage of Samh with Seeds Turning Brownish; c Whitish Coloured Boll Almost Dry, Seeds Dark Brown, Branches Break. Upper Row Samh Sections; D Samh is used for Washing Hands, Bodies and can even be Used as a Dandruff Remedy. (Photos: Gebel).

earlier. Much rainfall does not necessarily mean an excellent samh harvest if sandstorms hinder growth. For example, the spread of samh covers near Jabal `Ainab was hit by three sandstorms in the spring 2013, although there was much rainfall; but still 2013 must be considered a good season. Depending on the location, samh grows slowly during January/ February, and after the first rainfall in December/ January. The main growth spurt is in March, followed by flowering in April. It can be harvested when it becomes dry from the beginning of June onwards. If the samh stands aren't harvested, camels, rodents and birds would feed on the dry protein-rich samh.

The geobotanical distribution of samh isn't reliably mapped yet, and in some cases, it is unclear if records exclusively refer to Mesembryanthemum forsskalei Hochst[6]. Our research confirmed wild stands of Mesembryanthemum forsskalei Hochst for the areas of Jabal `Ainab, upper Wadi Sahab al-Asmar, SW and S of Wadi Sahab al-Abyiad, 'Awjah east of Mudawarah in the southern Badia; for spots in the southern Wadi Araba

and Wadi Rumm of the Transjordanian Highlands; and for the areas south of Taberjal, of Buseita, Abu 'Ajram, al-Sfan and areas SE and W of Dumat al-Jandal (Fig. 1). Samh is not found in Bayir, al-Jafr and Jabal Tubaiq Areas. According to local information, samh does not seems to grow in the northern Badia/ Azraq. In general, the samh stands are becoming smaller in recent times due to the lack of rainfall in the southern Badia.

The Saudi samh research has been the most advanced since the 1980s. This research has provided the basis for the botanical, nutritional, biochemical and economic understanding of the plant (e.g., al-Sharari S. 1988; Amr 1991; Jassir et al. 1995a, 1995b; Mustafa et al. 1995; al-Hasan 2001; al-Faris et al., 2011; al-Sharari S.A 2019; al-Qahtani and Maiman n.d.). Gebel et al., forthcoming will discuss our research in more ethno-anthropological detail.

Samh flour was mainly used for making bread (hubz samh) and pekelah (a kind of sweet) (Figs. 8, 9). Unlike wheat bread, samh dough/bread is much less flexible and breaks more easily in its fresh state, mainly due to the missing gluten.

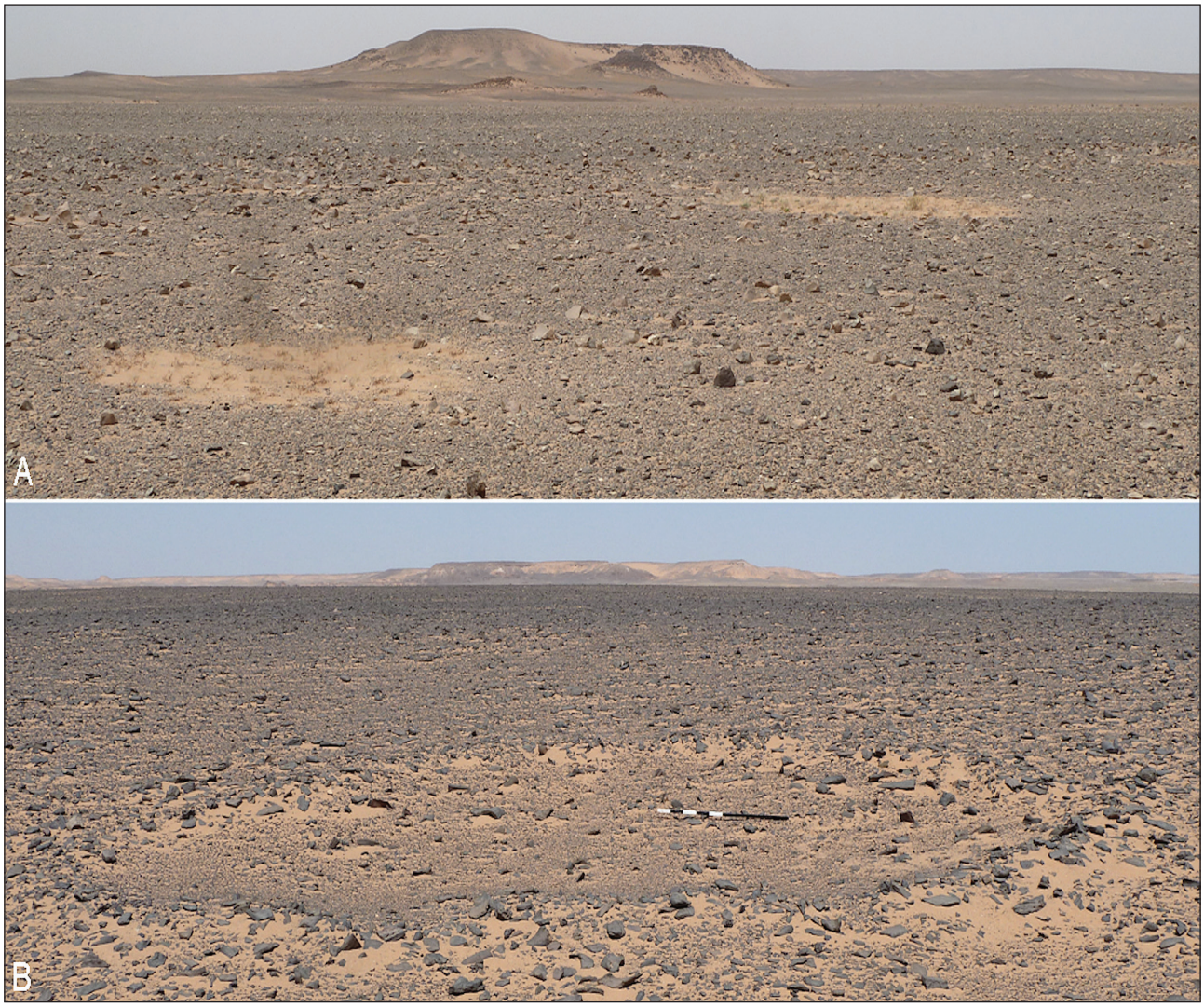

Fig. 3: Subrecent Samh Threshing Places Baidar/ Bayader). A Recent Bayader in the Wadi Sahab al-Asmar Landscape; B Baidar near Jabal `Ainab from the 1960s. (Photos: Gebel).

Table (1) Samh-related Glossary.

English transliteration singular/ plural	Arabic singular/ plural	English meaning/ description
samh	سَمْح	halo-succulent/ halopythe; seeds used to produce flour for flatbread and other dishes.
gamh baladi	قمح بلدي	Triticum durum? (macaroni wheat?).
baidar/ bayader	بيدر /بيادِر	The place where wheat, barley or other grains are stacked after harvesting, and in this case, the place where dry samh is collected and threshed (the name is taken from village areas where threshing places for wheat and barley are called baidar/ bayader).
bahsa/	بحصه	A local name for baidar,Artificial circular surfaces freed from stones near the Samh stands
a‘aqier	عقير	A local name of course samh tibn.
zer/ zrur or („jaras/ jras“) - (al-Jawf-Area: ku‘bur/ ka‘aber)	زِر /زْرور ”جراس/ جرَس“ (كُعبر / كعابر)	Samh bolls (capsules) containing the seeds (Fig. 5).
buthor al-samh (local name: sebeib)	بذور السَمْح صِبيب	Samh seeds.
tibn	تِبن	Chaff (small tibn)
e‘del/ e‘dol	عدْل/عدْول	A sack carried on both sides of the camel back.
thray	ذَراي	Separation of bolls from tibn by using the wind when lifting the heavier bolls and the lighter tibn.
raha	رَحى	Raha (rotating mill)
a‘amud	عَمود	A name of a tent post used to beat/ thresh the samh.
khubz samh	خبز سَمْح	Flatbread made from samh flour (Fig. 8).
khubz mathus		A kind of khubz samh made in the way described in this article.
khubz tabtabyah	خبز طبطابية	A kind of khubz saj (but thicker) made from either gamh baladi (wheat), sha’ir (barley) or samh: characteristic is to shape it circular by pressing the dough on the saj . The name is said to come from the way of shaping the bread circular by pressing the dough on the saj. It is also said that the name is onomatopoetic, imitating the sound of beating the bread to remove the ashes and charcoal after being baked.
khubz nar/ khubz ‘Arbood / khubz farashekh*	خبز نار/ / خبز عربود	“glow bread”, “fire bread” flatbread from gamh baladi or samh baked in the ember of (desert) shrubs (cf. Gebel et al. 1994). ‘Arbood bread is the traditional bread of the Bedouins, unleavened and cooked in ashes.
khubz saj (shrak)	خبز صاج	Very thin flatbread whirled by the hands, traditionally made from gamh baladi dough on a heated iron plate, diameters c. 50 cm; today this bread is made by a mixture of gamah bedladiye and bread wheat).
khubz shrak	خبز شراك	Very thin flatbread reaching diameters of 50 cm.
pekelah (also called pekelah in Wadi Araba	بِيكيله	A sweet dish from roasted samh flour, sugar, hot water, olive oil or pure sheep butter.
makhluta (in al-Jawf Area, makhluta is called pekelah)	مخلوطه	A sweet made from dates, roasted samh flour and pure sheep butter (cf. Fig. 9).
khmy’a (locally also called mjalaleh)	خْميعه (مجلّله)	A cold dish from broken pieces of khubz samh with sheep/ goat/ camel milk, sometimes with pure sheep butter or olive oil.
hejer al-thub	حِجْر الثوب	when a dishdasha is bend or twist to make it a container to bring the collected smah from the field.

Fig. 4: Replicative Studies' Work Steps of Harvesting and Processing the Samh Bolls, and H Preparing the Dough of Khubz Samh. A Preparing the Baidar; B Threshing the Samh; C Separating the Course Tibn; D Soaking the Samh Bolls; E Preparing the Seeds for drying; F dry Samh Seeds Ready for Grinding; G Grinding the Samh Seeds with a Raha. (Photos A-G: Alsouleiman; H: Gebel).

Samh in the Past

The local Bedouins considered samh flour as good as wheat flour (gamh baladi); however, if they had samh flour they would not use wheat flour. Since the grazing period usually coincided with the ready-for-harvesting period for the samh, it was opportune to harvest and thresh the samh. In 1986, a good smah year, while they were out with the camels and goats, the mother of one of the authors (Dalish) harvested samh from `Ainab Area, making 50 kg of flour. The locals harvested the samh until the 1960s; after that, only a few elders continued to harvest it occasionally. The use of samh was not only abandoned because the wild stands shrank and the yield got less over the years, but also because wheat became easily available and its dough was more flexible. On the other hand, samh bread was coarse and felt different; nobody harvested samh after the eighties.

Upon processing the samh bolls in al-Jafr in July 2013, Dalish's neighbors showed great interest in samh. Young people gathered and asked about the plant and the samh bread since having not heard about it yet. The result was that some families from al-Jafr went out to the desert to harvest samh stands near Jabal 'Ainab and Awjah in 2013 and 2014.

Table (2) Steps/ Actions of Harvesting and Processing Samh and Baking Samh Bread (references for the photos in Fig. 4). (Documentation of Steps I- XII by Amer Alsouliman; XIII by H.G.K. Gebel in May and July 2013).

Step	Action	Fig. ref.
I	Surveying for ready-for-harvest samh stands.	
II	Establishing the baidar near the samh stands (بيـدر- بحصـه) the local name for baidar is bahsa.	4A
III	Reaping the dry samh plants.	
IV	Collecting the samh plants in the dishdasha and placing them in the baidar.	
V	Beating/ threshing the samh plants in the baidar by wooden tent posts (dras, دراس).	4B
VI	Removing the course tibn by hand from the bolls, wind-assisted removal of fine tibn (thray ذراي).	4C
VII	Collecting the samh bolls from the baidar into sacks (e'dol, camel sacks, were used to transport the samh bolls).	
VIII	Transporting the samh bolls to water sources (in al-Jafr).	
IXa	Separation of samh seeds from the samh bolls by soaking them in water. (صَويل): pouring the samh bolls (still with small tibn) into a water-filled pot.	4D
IXb	Steering assists opening of samh bolls.	
IXc	Removing the empty bolls and tibn floating on top of water.	
IXd	Pouring out the water from the pot with the help of cloth material.	4E
IXe	Removing remaining tibn and bolls from the pot, assisted by water.	
X	Removing the wet samh seeds from the pot, spreading them on a cloth to dry.	
XI	Sieving the dry seeds, removal of sand, sorting out remaining tibn (here a metal sieve is used, in the past: screened through a cloth fabric).	4F
XII	Making samh flour by filling the seeds into the hole of the raha (rotary hand or rotating mill).	4H
XIIIa	Making the dough of khubz samh (flatbread) or other samh dishes.	

XIIIb	Placing the dough of the khubz samh on the heated saj and pressing it in a circular shape. The use of the saj allows handling the dough more easily since the gluten-free dough is fragile and can break easily. The use of the saj also prevents sand contact with the bread (like it is the case for khubz nar).	
XIIIc	Exposing the unbaked side of the khubz samh on the saj to the heat of the charcoal, to the outer part of bread.	
XIIId	Covering the dough by ashes from desert shrubs.	7
XIIIe	Removing the charcoal from the bread.	
XIIIf	Cleaning the bread surfaces by rubbing off the sand/ ashes.	

Traditional *Samh* Harvesting and Processing (Summary)

In the following, we summarize the individual steps of samh harvesting and processing to produce flour and making flatbread. The detailed study will be published in Gebel et al., forthcoming. All information provided below was provided by one of the authors (Dalish) and his companions from their memory going back to the 1960 - 1980s. The replicative study was also made to control information and to trigger additional details.

Harvest

Samh can be harvested when the samh plants and its bolls (seed capsules; local: singular "zier", plural "zrur" or jaras/ jras, or ku'bur/ ka'aber) by people with contacts to neighboring Saudi territories) are completely dry, also meaning that the boll's junction with the plant became brittle, and so beating/ threshing will separate both; intermediate stages of drying are shown in Fig. 2c. In average years, the samh harvest can start in July, but it in August all samh will be completely dry (Fig. 5). Harvests were usually only for one's own family consumption. The actual period and location chosen to harvest the samh also depended on the family's available workforce and if they could graze the camels out there. The harvesting season is 1-2 weeks, and a small provisions camp with some shadow would be established (no erection of a bait shar). In good years, many families with more than 300 camels would go out for the samh harvest. No samh areas would be reserved for certain families; every family would be collecting in their chosen locations, respecting collecting spots of others.

First, a baidar/ bayader would be established in the direct vicinity of the wild samh stands by removing the stone pavement and sand from a round space of some 2-5 m in diameter. All family members, including the children, would collect the samh by reaping it by hand. The piles of dry samh inside a baidar could be 1m high or more. Then, the reaped plants would gently be beaten by the wooden tent posts, either alone or together and alternately. The beating separates the bolls from the tibn; the bolls would

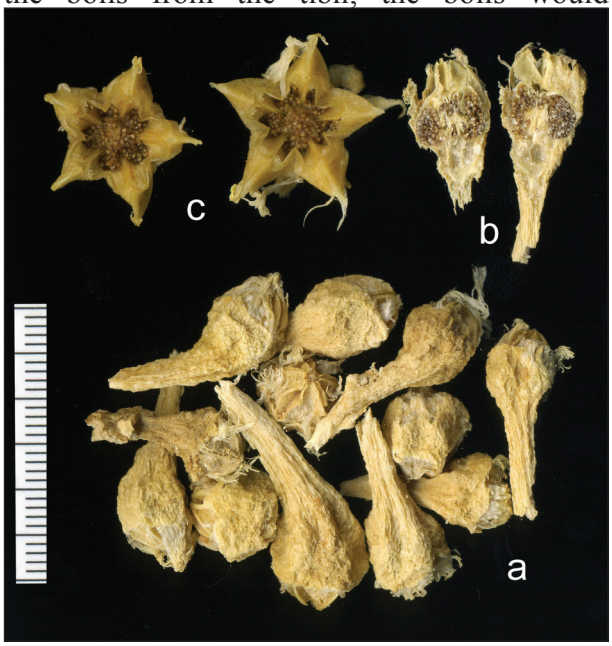

Fig. 5: a Dry Samh Bolls; b cut Samh Boll, Expose the Seeds; c Opened wet Samh Bolls when Discharging the Seeds (after 5 minutes soaking in water). (Photo: Gebel).

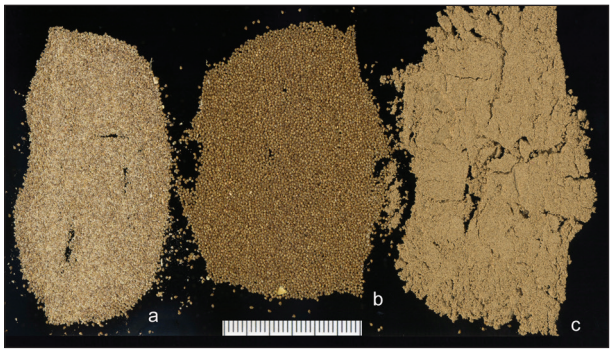

Fig. 6: Samh Seeds and Flour Types; a Flour from Unroasted Roasted Samh Seeds Ground with a Raha (harvest 2013 near Jabal `Ainab); b Dry and Unroasted Samh Seeds as Extracted from the Capsules (harvest 2013 near Jabal `Ainab); c Flour from Roasted Samh Seeds Ground with an Industrial Flour Mill, Harvest 2013 (bought in the souq al-bedu in Tabarjal). (Photos: Gebel).

Fig. 7: Baking of Khubz Samh: Flatbread is on the Heated saj, Covered with the Embers of Scrubs. (Photo: Gebel).

accumulate on the ground of the baidar. During beating/ threshing, the lower samh layers in a pile would repeatedly be moved to the pile's top to exploit all of the collected samh. The beating time would depend on the amount of samh in the baidar; to beating the 0,250 m^3 of samh, it would take 0.15h. After parts of the tibn are removed by hand and even wind, the bolls would be picked up and collected in sacks. The separation of the bolls from tibn (an action called thray), respectively, and the collection of samh bolls from the baidar filled with 0,250 m3 of samh, would produce around 7,13 kg of bolls (Table 2).

Samh harvests are remembered as hard work, especially the threshing. The remaining samh after the harvest would be fed to the camels. In archaeological surveys, such samh collecting and threshing places can be easily identified in deflated stone pavements of the hamad (Fig. 3).

Table (3) Quantitative Information on the Yields Obtained by the Replicative Study.

Material/ action	**harvested Amount of dry *samh* (bolls with plant)**	**Weight of bolls collected from 0,250 m3**	**Weight of dry *samh* seeds obtained from 2 kg of bolls**	**Weight of *samh* flour produced from 2 kg of dry *samh* seeds**
amounts	0,250 m3	7,13 kg	0,770 kg	c. 0,724 kg

Transport and Water-Processing of the Bolls

Water is needed to free the seeds from the samh bolls. Until the 1960s, the samh bolls were transported in sacks from the harvesting areas to al-Jafr for the water available. Before that, the bolls were brought to Melyha near at-Tubaiq mountains since there was water. Every family would produce up to 900 kg of samh bolls from their respective harvesting area. Each camel could carry 300 kg, distributed in two sack-like bags, carrying 150kg on each side of the camel back.

Women and men would share the work of treating the samh bolls; the bolls would soaked in large cooking pots filled with water. In the past, cloth- or plaster-lined basins with contents of up to 1.5 m^3 would be dug in the ground for this purpose (Kraym al-Dmany, al-Jafr, pers.

comm.).

When the samh bolls are soaked in water, they open immediately and free their seeds. It is the only way to gain the seeds. Usually, the bolls were water-processed immediately after harvest or within weeks.(7)

Water processing helps empty bolls to float on the water's surface, and the seeds would sink to the bottom of the vessel. Then, the seeds would be poured out on a cloth to dry under the direct sun. The wet seeds would be mud-like sticky lumps when broken up and have a salty taste(8).

After drying, the samh seeds would be sifted with a 1 mm sieve, stored in sacks, and ground when flour was needed. Otherwise, all seeds would be ground with a raha (rotating mill) at one time, and the flour stored. In the old times, the Bedouin would carry the raha along when migrating. In this region, Bedouin prefer for the raha, the metamorphic rock brought from Jabal at-Tubaiq. All family members would be involved in the processing works of samh.

For the flour yields obtainable during the replicative study from 2 kg of bolls cf. Table (3).

Grinding

The replicative study continued with grinding the sample of 770 g of seeds in a rotated hand quern (raha (rotating mill), which took 20 minutes and provided c. 724 g of samh flour (some lost through the hole of the raha and the cloth used). Grinding massive amounts of samh is exhausting and requires a lot of energy. The raha used in the replicative study would produce a coarse quality of samh flour; a quality useable for making bread. However, it was reported that the samh seeds were sometimes ground twice to produce finer flour.

Fig. 8: Pieces of Khubz Samh Made from Flour of Unroasted Samh Seeds, Ground with a Raha (harvest 2013 near Jabal `Ainab): Glow-Covered upper Side of Khubz Samh Dried through, Partly with Imprints of the (Smouldering) Charcoal and the Baking Bubbles. (Photo: Gebel).

Fig. 9: Pekeleh (Makhluta Version) offered by Abu Fahed in 2013 in al-Jawf. (Photo: Gebel).

Baking Flatbread

Khubz samh is made on the saj (Fig. 7), a roundish and flat-convex iron plate heated with fire from underneath. The dough can be prepared in a metal bowl (Fig. 4H). Water and a bit of salt are added until the flour mixture becomes thick, malleable dough. Unlike wheat dough, samh dough is easily broken and hard to stretch. The dough is made round and flat and applied on the heated saj. Since the samh bread cannot be flipped on the saj due to its fragile

nature, its final baking stage is done by covering the top of the bread with glowing wood. The saj does not only serve as a baking device, it is also a necessary support for the bread, which cannot be moved while baking. After the bread is done, its obverse is cleaned by beating it with a piece of cloth or by the hands (the action is called khubz tabtehba, an onomatopoeic word). The bread is then moved and turned with the gripper (melqat) typically found at Bedouin hearths. The baking process shows some similarity to making khubz nar (called ‘Arbood bread in al-Jafr Area, or khubz tabatabi in Petra Area), but here it is made with flour from durum wheat (gamh baladi (Gebel et al., 1994).

Samh bread tastes more pronounced than wheat bread does, but isn’t easy to describe. It tastes a bit nutty, and the color of the bread is more brownish (Fig. 8). In al-Jawf Area, a modern variety of samh bread is prepared with milk instead of water, making the dough and the bread more flexible and allowing it spread thinner; it can even be prepared in a pan like a pancake.

Selected Other Use of Samh

Animal Fodder: Camels and goats like to eat the green samh since it provides additional water besides its nutritional value. While the salty content of the green plant is tolerable for camels, humans and goats cannot consume the green samh for its salty taste. However, we observe that the camels eating green samh would eat it with other plants, to “balance” the salty fodder. Camels and goats also consume the dry plants.

Samh as a Water Source: Bedouins would use the high-water content of green samh for washing their hands (Fig. 2C), bodies and hairs right at the spot where samh grows. When local squeeze the green samh, water immediately flows out, but Bedouins do not know if the samh water provides special skin protection; they believe it can be used as an anti-dandruff substance. Mothers also would use the watery content to clean babies. Jazy al-Dmany, al-Jar, the brother of Dalish mentioned one day in 1956, when they were moving west of Jabal ‘Ainab with their mother and ran out of water for baking samh bread. Their mother squeezed the water from the green samh, added “white soil” and boiled it on the fire. The white soil “absorbed” the salt from the samh water. After filtering the mixture, she prepared the dough and made bread.

Several dishes are made from samh, and heere we mention pekelah, a sweet made from samh flour, preferably from roasted seeds. The flour is mixed with either sheep butter, olive oil or water, and sugar. This tasty sweet is eaten as compact and sticky dough, leaving a dry taste in the mouth (Fig. 9). In other areas of Jordan, different ingredients are used for pekelah. This pekelah can also be made from gamh flour or green wild pistachio seeds (as al-Amareen do; Talal Hamd al-Amareen and Umm Suleiman, Beidha, personal communication). Makhluta is made from the pulp of dried/ fermented) seedless dates mixed with samh and pure sheep butter (samn ghanam). This sweet would originally be stored in sacks made of animal skin. When kept in the shadow, it last about a year. Khmy‘a (also locally called mjalaleh) is a simple cold dish made of broken old pieces of samh bread and milk; camel, sheep or goat. Pure sheep butter (if available or affordable) is placed in the center of the dish and eaten with milk-soaked samh bread. Khmy’a can also be made with wheat or barley bread.

Samh and Archaeology

So far, to our knowledge, samh still needs to be identified carbonized from archaeological layers. Initial tests by Reinder Neef proved

that the tiny seeds carbonize under certain conditions. The problem is the availability of paleoethnobotanical samples from present-day samh regions and possibly the size of the carbonized seeds.

Samh and its Present-Day Socioeconomic Potential in the Southern Badia

The following remarks are initial ideas and need a feasibility study, including a stakeholder analysis aiming to prepare a local project to rehabilitate the samh exploitation in the southern Badia and make it a source of income for the Bedouins of al-Jafr Area.

When the last actions of the replicative study were continued in al-Jafr (Table (2) Steps IXa- XIIIf), many neighbors came and asked about samh. Older adults commented on the work and joined their memory and knowledge. Six families were encouraged to go out, and harvest samh that year, wondering where the wild stands grow. One neighbor immediately planned to bring the complete dry samh plants to process them in al-Jafr and sell the tibn as animal fodder. This direct interest, created in al-Jafr by our study, shows that local people immediately connect an economic and a heritage interesttheir traditions when being re-informed. The heritage bearer among us authors, Dalish, gained a lot of attention and social prestige from becoming recognized as an expert in these legacy practices and traditions.

The local interest in the reuse of samh is undoubtedly there, and the demand for this organic gluten-free and protein-rich food would certainly be provided by delicatessens in Amman and the national confectionery industry. The problem is the danger of a non-equitable distribution of profits between knowledge holders, harvesters, sellers and buyers. Ideally, such a project would be managed by establishing a local Bedouin cooperative. As the past has shown, such projects are easily maltreated by non-local interests that play local stakeholders off against each other. Direct marketing with buyer transactions would be desirable if food hygiene requirements could be observed in this approach. The investment for harvesting and initial processing of the samh wild stands is comparatively low.

The problem remains, of course, the year-dependent variation in samh supplies, which would be reflected in the dynamics of the prices per kg, as observed in the neighboring al-Jawf Province. The organized samh harvests and samh marketing in al-Jawf Province could become essential advice for establishing a regional Samh Development Project. Saudi Arabia has not only been leading biological-nutritional samh research for a long time, including its cultivation research; but it also has the most advanced experience with samh marketing. Undoubtedly, the early marketing in al-Jawf Province was determined by the fact that samh was considered a healthy ethno-food that gives hosts a special prestige when serving samh dishes.

"This is the Taste of the Old Times". Conclusions

The socioeconomic transformation of Bedouin life (cf. e.g., Lancaster and Lancaster 1999, Baumgarten 2011, Gebel and Baumgarten 2012, Gebel 2014) and the reported climate-triggered reduction of the samh fields in the last decades drove Bedouin to give up samh as a food source.

Aside from the national duty to conserve and protect Bedouin indigenous knowledge and culture, heritage workers and official institutions are responsible for protecting the remaining parts of Bedouin culture. Apart from this overarching commitment, a Samh Development Project can support traditional Bedouin social values

such as solidarity, identity, hospitality and respect, which are endangered values because of the overwhelming social transformations in South Jordan. It may also help to lead families overcome poverty cycles.

This also applies to other projects that should be handled, such as rehabilitating traditional water harvesting in southern Badia. There are enough serious and competent national and international institutions that bring technological and relevant expertise to such projects. Their problem, however, could be that such projects only work if they are embedded in the values of the remaining local Bedouins and if the projects' promotion takes place on an equal footing. The underestimated competence of the "Bedouin Academy" (wording by H.R.H. Hassan bin Talal) requires listening to Bedouins and sometimes a painful commitment to setbacks. At the same time, it must be noted that Bedouin romanticism, activist and humanitarian approaches are insufficient motivations for such engagements. However, such development work for Muslims should have also a sadaqa meaning.

Efforts must start with collecting the geobotanical data on the distribution of wild samh stands to assess the socioeconomic potential of re-exploiting this forgotten food resource.[9] Cultivating samh in its natural habitat needs intense agronomic and other scientific investment and can help to secure future sustainable land use in suitable samh areas in the Badia, helping to avoid the known unsustainable forms of desert land exploitation.

We want to close this contribution with a comment from our late co-author, who, after many years, for the first time ate khubz samh, saying pensively: "This is the taste of the old times".

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ملخّص: لم يأخذ الإرث البيئي والمعرفة البيئية والطب الشعبي وأسلوب الغذاء لمن سكن شبه الجزيرة العربية قديما نصيبه من البحث؛ لذا، فمن الضروري توثيقه ودراسته وحمايته؛ حاله حال الإرث الأثري الملموس. تتناول هذه الورقة دراسة أنثروبولوجة وعرقية لنبات السمح؛ كما تناولت بالتفصيل أسلوب إنتاج خبز البادية التقليدي خبز السمح، المخبوز من طحين السمح (سَمْح Mesembryanthemum forsskalei Hochst). ونبات السمح من النباتات البرية التي تعتمد على مياه الأمطار الموسميه، كما أنه غنيّ بالبروتين، وخالٍ من الجلوتين. كان خبز السمح مصدرًا غذائيًا مهمًا لأهل البادية الذين تنقلوا في مناطق مختلفة في شمالي الجزيرة العربية، والبادية الجنوبية الشرقية الأردنية، ووادي رم، وجنوبي وادي عربة بالأردن. كما أوضح هذا البحث من خلال التفسير الأنثروبولوجي لأسلوب انتاج خبز السمح من حصد البذور وطحنها ومعالجتها حتى تصبح جاهزة لصناعة الخبز منها، عن الحاجة الماسة والطارئة لتوثيق الإرث البيئي، والمعرفة البيئية، وأسلوب إنتاج الطعام، وتوظيف هذه الدراسات والبحوث في إيجاد بيئة خصبة لأبحاث ودراسات تطبيقية مستدامة، تخدم البشرية كتطبيق ملموس لعلوم الأنثروبولوجيا العرقية التطبيقية.

Notes

(1) This article remembers our co-author, late Dalish Salim Lafi al-Dmaniyyah al-Howaitat from al-Jafr, the principal informant of this study; A. Alsouliman chiefly assembled his information in Arabic, before it was jointly transferred into the framework of this article.

(2) The local Arabic words for the terms were assembled in Table 1.

(3) El Mahi 2022 published a contribution in Adumatu with a similar approach, trying to establish a relationship between the collection of esculent wild plants by contemporary pastoralists in Dhofar and prehistory.

(4) Most urgent projects are: Bedouin hydrology and water harvesting; Bedouin medicine including medical herbology; Bedouin social value systems; past migration patterns.

(5) This term was introduced by HRH, Prince el-Hassan, during his opening speech to the ICARDA conference on 21st of May, 2013, referring to the Bedouin experts teaching us their knowledge to be translated by us into academic/ disciplinary and modern social contexts.

(6) This contribution refers only to the Mesembryanthemum forsskalei Hochst species of samh, not with the two other kinds of samh told to be of inferior quality: samh hurr, the red samh, and samh hamar wagif/ wadzif (Mesembryanthemum nodiflorum). (Mandaville 2011).

(7) Ahmad al-Q'ayd, director of Dumat al-Jandal Museum in 2013, mentioned to two authors that samh bolls could be stored for up to 70 years.

(8) Umm Mejele ad-Dmany, al-Jafr, that time c. 70 years old, recommends not to wash the seeds with fresh water in order to keep their salty taste; it helps the seeds' preservation. There was also the advice to add salt to the samh seeds to protect them from insects.

(9) The price of one kilo of samh flour in the souks of al-Jawf Province is currently autumn 2023 (100-120 Saudi Rial).

References

Amr, A.S. 1991. "Characterization and Use of Samh in the Production of Flatbread", **Journal of Cereal Chemistry,** 68: 155-159.

al Faris, Nora A., al Othman, Zeid A., and Ahmad, Dilshad 2011. Effects of Mesembrrybryanthemum forsskalei Hochst Seeds in Lowering Glucose/lipid Pprofile in Streptozotocin- induced Diabetic Rats. **Journal of Food Sciences and Technology**, 48(5): pp. 616-21. doi: 10.1007/s13197-010.

Gebel, Hans G.K. 2014. Site Presentation and Cultural "Heritage Education" in Tribal Environments. In: Z.A. Kafafi and M. Maraqten (ed.), A Pioneer of Arabia:

Studies in the Archaeology and Epigraphy of the Levant and the Arabian Peninsula in Honor of Moawiyah Ibrahim, pp. 45-58. **Studies on the Archaeology of Palestine and Transjordan (ROSAPAT)** 10: Rome: "La Sapienza".

Gebel, Hans G., Hahme, Felix., Hermansen, Dahl B. and Qadi, Nabil 1994. Brotbacken in Basta. **Das Altertum** 39: 301-316.

Gebel, Hans G.K. and Wellbrock, Kai 2019. Hydraulic Cultures and Hydrology under Climatic Change. North Arabian Mid-Holocene Pastoral and Proto-Oasis Land Use. In: E.D. Chiotis (ed.), **Climate Changes in the Holocene: Impacts and Human Adaptation**, pp. 247-269. Handbook published by CRC Press of the Taylor and Francis Group.

Gebel, Hans G.K., Alsouleiman, Amer S.A. and al-Dmaniyyah al-Howaitat, Dalish S. forthc 2024. "Hubz samh. The forgotten bread of Jordan's Desert, and its socioeconomic potentials. Bedouin Legacy", **Occasional Papers**, 1, 2024. Berlin: ex oriente.

al-Hasan, Hamdan E. 2001. The Plant of samh. Environmental Study. (manuscript)

al-Jassir M.S., Nawawy M.A. and Mustafa A.I. 1995."Studies on samh Seeds (Mesembryanthemum forsskalei Hochst) Growing in Saudi Arabia, 1: Anatomy of samh Seed", **Plant Foods for Human Nutrition**, 47(4): 327-331. doi: 10.1007/BF01088270. PMID: 8577650

al-Jassir M.S., Mustafa A.I. and Nawawy M.A.1995."Studies on samh Seeds (Mesembryanthemum forsskalei Hochst) Growing in Saudi Arabia: 2: Chemical Composition and Microflora of samh Seeds", **Plant Foods for Human Nutrition** 48(3): 185-92. doi: 10.1007/BF01088439. PMID: 8833424

Lancaster W. and Lancaster F. 1999. "People, Land and Water in the Arab Middle East: Environments and Landscapes in the Bilad Ash-Sham: Indigenous Systems in the Countryside", **Studies in Environmental Anthropology**. Abingdon.

El Mahi, Ali T. 2022. "Gathering esculent wild plants in Dhofar: Prehistoric practice continued, **Adamatu** 45: 7-16.

Mandaville, James P. 2011. **Bedouin Ethnobotany. Plant Concepts and Uses in a Desert Pastoral World**. Tucson.

Mustafa A.I., al-Jassir M.S and Nawawy M.A. and Ahmed S.E. 1995. "Studies on samh Seeds (Mesembryanthemum forsskalei Hochst) Growing in Saudi Arabia: 3. Utilization of samh seeds in Bakery Products", P**lant Foods for Human Nutrition** 48 (4): 279-86. doi: 10.1007/BF01088487.PMID: 8882366

al-Qahtani M. and Maiman S.A. n.d. Some Nutritional Properties of al-samh (Mesembryanthemum forsskalei Hochst) Seed Products. Manuscript. Buraydah: Food Processing Technology Dept., College of Agricultural Technology.

al-Sharari, Suleiman A. 1988. **Al-Samh**. Riyadh: Alfarazdaq. (First edition) (in Arabic)

al-Sharari A. al-Mezwdi 2019.

واستزراعه استخراجه وطرق السمح عن معلومات, Mesembryanthemum forsskalei Hochst. https://rattibha.com/thread/1193226679155597312 (accessed 25th September 2023)