SOUTH CAUCASUS PIPELINE EXPANSION PROJECT

Archaeological programme Azerbaijan SCPX

KP 247 Kerpijlitepe

Final Environmental Remains Report (FERR)

Site: Kerpijlitepe

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Introduction: This report details the results of an archaeobotanical analysing of seven flot samples collected during the excavation of a medieval fort in the Goranboy region of Azerbaijan (Maynard 2020; Nəcəfov 2018). These samples produced a large, carbonised non-wood plant macro assemblages consisting of 5150 carbonised specimens including cultivars, fibre crops, fruit and wild/weed species providing insights into agriculture during this period. The study of agriculture in Late Antique and Islamic Azerbaijan (3rd–16th century) has traditionally received little attention and the use of environmental archaeological techniques to study this dynamic period of Southern Caucasian history is uncommon. Consequently, reconstructions of agriculture and diet rely solely on historical sources and there is a lack of archaeobotanical material for analysis. As a result, little is understood archaeobotanically about the agricultural landscape during the Late Antique and Islamic periods in Azerbaijan and the region is largely absent from current academic debates on agricultural development in Central Asian or Near Eastern archaeology. This represents a major knowledge gap in Southern Caucasus medieval archaeology and its study represents a new frontier for environmental archaeologists. While academic research of the prehistoric periods in Azerbaijan has witnessed an upsurge in the use of modern archaeobotanical techniques, archaeological studies of the Late Antique and Islamic period still operate using traditional approaches. In periods rich in historical literature and with abundant material cultural assemblages, the potential of archaeobotanical research to inform archaeologist about the agricultural economy and daily lives of people in the past has not been realised. This has resulted in a severe lack of archaeobotanical material recovered from excavations targeting this period. Consequently, reconstructions of agriculture and diet during the Late Antique and the Islamic periods rely almost solely on historical sources, supplemented by occasional finds of handpicked materials recovered from a small number of excavations in the 50s, 60s and 70s. This assemblage therefore contributes important information to the knowledge of the period in Azerbaijan and adds to the growing number of assemblages analysed which will allow exciting new research to occur in the future.

Archaeobotanical Analysis: Methodology

Processing of Soil Samples: Bulk soil samples were processed prior to the author's analysis using the flotation method, one of the most important methodological developments in archaeobotanical research worldwide (Wagner 1988; Wright 2005). The aim of using the flotation method is the recovery of seeds, animal bone and other small cultural remains that are overlooked or lost during the normal soil screening processes on archaeological sites. It is a simple, inexpensive procedure, easily implemented and modified to suit specific excavation requirements (Wright 2005, 20).

Extraction and Identification: Flots were 100% analysed using a Leica 9SD stereomicroscope with magnification between x6.3 to x50. The archaeobotanical material extracted were initially classified according to gross morphology (shape and size) and then identified by comparison to reference materials of modern seed diaspores and illustrations and pictures from various seed key publications (Anderberg 1994; Berggren 1981; Cappers and Bekker 2013; Clapham *et al*. 1962; Gale and Cutler 2000; Martin and Barkley 1973; Neef *et al*. 2012). All botanical and common names follow the order and nomenclature in the *Flora of Turkey* (Davies, 1965–1988). Nomenclature for cereals and other cultivars follows Zohary *et al*. (2013). When referring to specific deposits, the term 'c' refers to feature (or context) number. A Leica EC4 camera and attachment were used to photograph seeds used in the report.

Overall Archaeobotanical Results: A large assemblage of 5150 carbonised specimens were recovered from the 7 flots analysed by the author (Table 2). Including economic/cultivated plants, fruits and wild/weed species. Fibre crops overwhelmingly dominated the assemblage, comprising 66%% of the total specimens recovered. Millet species were also numerous (1244 specimens), comprising 24.16% of the assemblage. Cereals grains (7.69%), wild/weed (2.14%) and fruit (0.02%) species were also encountered (Figure 1).

Preservation of material: All material recovered from Kerpijlitepe samples were preserved by carbonisation. Carbonised remains are found on most occupation sites, mainly due to their survival in most types of soil conditions. Carbonisation occurs when plant remains are burned under reducing conditions transforming the plant material from a carbon-based compound to a skeleton of pure carbon, and is related to several factors, such as the temperature, length of exposure, moisture content and type of fuel used (Jacomet 2007: 2387; Turney *et al.*, 2005: 930). Carbonised plant remains can only become preserved through virtue of having been in contact with fire (Fuller *et al.*, 2014: 175–176). Thus, the taphonomic processes experienced by carbonised only plant assemblages differ greatly from those of waterlogged or mineralised assemblages. These taphonomic processes are reasonably well understood and plant material can enter the archaeological record through several different routes (van der Veen 2007: 978). Carbonisation of plant remains usually occurs through three circumstances (van der Veen and Jones 2006: 221–222). The first occurs when by-products of grain processing and cleaning are burned as fuel or waste. Secondly, carbonisation occurs accidentally during food preparation, and finally the accidental burning of stored products. Carbonised assemblages tend to be relatively homogenous with samples mostly comprising of cereal grains, cereal chaff, weed seeds and to a lesser extent pulse, nutshells, and some wild plants (mostly arable weeds) (van der Veen 2007: 977). This bias mainly results from the processing cereals must go through before they are consumed and the differential survival of plant parts during burning (Boardman and Jones 1990; Fuller *et al.*, 2014). Therefore, in a typical charred assemblage, a relatively limited range of plant species is represented.

The carbonisation of plant material depends on several factors including the duration of exposure, temperature, oxidation versus reduction atmosphere (Wright 2005). Carbonised assemblages only represent plants that have been burnt at low temperatures, generally below 400–500 C (Boardman and Jones 1990). As hearths and oven features frequently reach temperatures between 800–1000 C, most plant materials exposed to it will be destroyed (Matthews 2010). The fragility and differential preservation of plant species and their components are highlighted by the fact that proportional losses after burning are great. In experimental firings of hearths between 60% and 80% of cereal grains failed to survive the event, with similar and sometimes greater losses for seeds of wild species recorded (Colledge and Conolly 2014: 194). Therefore, the absence or abundance of a particular component (species or plant parts) may reflect a bias in its ability to carbonise and withstand the thermal exposure. Archaeological samples after burning are therefore likely to comprise species with more resilient seeds, with a low probability that the overall charred assemblage composition bears a direct relationship to the original species proportionality or diversity. Other plants that are likely to be under-represented in the carbonised plant record which may have been of economic importance, include fibre crops, fruits, nuts, legumes, vegetables, herbs, spices, and medicinal plants. As a result, carbonised archaeobotanical assemblages possess an aggregate of about 35% of the range of edible plants documented in waterlogged samples (Colledge and Conolly 2014: 194).

Therefore, the reconstruction of food consumption and environment reconstruction, using only carbonised assemblages, is restricted to a record of the major cereal staples and the arable weed flora, and consequently often only suited for reconstruction of some agricultural practices. Differential carbonisation is also an issue in the formation process of these assemblages. Plant remains can only be identified correctly if they are in a state of good preservation. Presence-absence analysis, crop processing identification and cultivation practices are all based on the identification of the surviving constituents that make up the assemblage. However, not all plant parts or species survive equally well under charring conditions (Boardman and Jones 1990). Therefore, the analysis process needs to take into consideration that bigger more resistant seeds such as cereal grains will occur more frequently in terms of absolute totals than fragile, oily seeds or chaff (Miksicek 1987; Wilcox 2012: 166).

Formation processes: The formation processes of carbonisation are reasonably well understood and charred plant remains to enter the archaeological record through different routes (van der Veen 2007: 978). These accidental or deliberate events can occur on a daily or infrequent timescale and therefore can produce different assemblage compositions. Several activities/actions have been identified as route-ways to carbonisation. Tendencies to assume a direct relationship between contexts and the activities that created the assemblage also need addressing (Fuller *et al*., 2014: 176). Hubbard and Clapham's (1992) three class distinctions categorise different taphonomic processes which lead to the entry of a charred assemblage into the archaeological record, addressing these tendencies (Jacomet 2007: 2394).

- Remains charred within the context from which they were recovered (unambiguous origins).
- Secondary deposits where assemblages from a single burning event have been moved to the context from which they were excavated (single discrete event).
- Assemblages formed from the deposition of many successive charring events, possible representing several different activities (multiple different events).

Archaeobotanical results by sample:

Sample 3A F127: This sample was the richest in terms of species present and also contained the greatest quantity of plant-macro remains including cultivars and wild/weed species. Millets were common with both broomcorn (*Panicum miliaceum*) and foxtail (*Setaria italica*) present. *P. miliaceum* was the dominant millet recovered (537 specimens) with *S. italica* (77 specimens) comprising a smaller proportion of the millets recovered. A large quantity of millets (630) of unidentifiable millet type grains, where the size and shape of the embryo and grain are too distorted through carbonisation to display definitive morphological characteristics, were recorded as 'indeterminant millet' (Panicaceae) in the taxonomic tables. Larger grained cereals were also recovered and included wheat and barley species. Spelt wheat (*Triticum spelta*) was the dominant cereal species (190 specimens) and the only wheat species identified. A further 146 wheat grains were also recovered but were too fragmentary or distorted to identify to species level and were recorded as '*Triticum* sp.' in Table 1. Barley was also recovered in smaller quantities. The majority of barley grains were fragmented but four examples were complete. These grains were all of a hulled variety with straight symmetrical grains and are recorded as two-rowed barley (*Hordeum distichon)*. Wild/weed species were also recovered and comprised of 31 dock tubercules (cf. *Rumex* sp.), 23 goosefoots (*Chenopodium* sp.), and 15 small wild grasses (*Poaceae* sp.) specimens.

Sample 23 (247): A small quantity of carbonised cereal grains were recovered from this sample. Grains while impossible to identify to species level did tend towards those of a wheat type cereal and are recorded as '*Triticum* sp.' in Table 1. Radiocarbon dating of material recovered from this sample returned a date of 1032-1178 AD (93.2%) (Maynard 2022).

Sample 4 (C5): Twenty-six carbonised cereals were recovered from this sample. While they tended towards wheat grains there were no definitive morphological traits that could be used to identify them to species level, and they were recorded as 'Triticum sp.' in Table 1.

Sample 5 (Context 36): Fibre crops overwhelmingly dominated this sample with 999 carbonised cotton (*Gossypium arboretum/herbaceum*) seeds identified. Wild/weed species comprised a minor component of the assemblage with 22 small wild grasses (*Poaceae* sp.), and 13 knotweeds (*Polygonum* ap.) recovered. Three small seeds of a wild/weed species were recovered that could not be identified and are recorded as unknown.

Sample 38 (Pot 5): A large quantity of carbonised specimens was recovered from this sample. Only cotton (*G. arboretum/herbaceum*) was recovered from this sample comprising of 1586 carbonised seeds.

Sample 39 (Pot 13): A small quantity of carbonised material was identified in sample 39. Nine cotton seeds (*G. arboretum/herbaceum*) and a single cereal grain comprised the assemblage. The cereal grain recovered was too poorly preserved to identify to species level and was recorded as 'Cerealia' in Table 1.

Sample 40 (KV IX): A large quantity of carbonised material was recovered in this sample consisting solely of 805 cotton seeds (*G. arboretum/herbaceum*).

Sample 55: A single fragment of a peach stone (*Prunus persicaria*) was the only archaeobotanical material recovered from this sample. Radiocarbon dating of material recovered from this sample returned a date of 1167-1269 (95.4%) (Maynard 2022)

Plant Species at Kerpijlitepe

Cotton (*Gossypium arboretum/herbaceum*): The recovery of large quantities of cotton seeds in samples 5, 38, and 40 is interesting. Cotton belongs to the Malvaceae family and the genus *Gossypium,* and is grown primarily for its seed hairs that can be spun and turned into thread and textiles (Bouchard *et al*., 2019). It can also be pressed for an edible oil once the fibre is removed with the by-product used as a fodder item. Two cotton species are indigenous to the Old-World including tree cotton (*Gossypium arboretum*) and short-staple (*Gossypium herbaceum*). It is listed as one of seventeen key crops that became important in the Islamic world from the 7^{th}–11^{th} centuries in Watsons Green Revolution. While considered an important crop, archaeobotanical evidence of cotton cultivation in Azerbaijan is scant. Historical sources (Istahri, Ibn Haukal, Yakuta Hamavi, and Mukaddasi) cite that the cities of Azerbaijan were the centres of weaving and textiles industries (Muradalieva, 2010). During Late Antiquity cotton had become an important crop in the Araxes River region in Azerbaijan, and cotton was grown in vast areas of Mugan (Decker, 2009; Rustamov, 2014). Different fabrics and yarn were developed from cotton and manufactured goods were sent to the medieval towns of Bardha'a, Beylagan, and Ganja (Mammadov, 1993). Excavations at Mingechevir provided rare archaeological evidence of the cotton industries with the presence of both cottonseed and the discovery of a ball of cotton yarn (Buniyatov, 1968; Mammadov, 1993; Vaidov, 1961). The importance of cotton can also be seen during this period in Turkmenistan, where cotton was also the most ubiquitous species in samples derived from Islamic Merv (Herrmann and Kurbabsakhtav, 1994; Nesbitt, 1994, Simpson, 2014). Ibn Haukal and Istahri also mentioned the linen industry in Azerbaijan with fragments of linen fabric from burials at Mingachevir providing rare evidence of the linen industry in Azerbaijan (Mammadov, 1993). During archaeological excavations at the medieval settlement of Imishli, plant remains were identified which included flax and cotton fibre crops (Rustamov, 2014). Cotton was absent from recent archaeobotanical analyses at both Qaratep and Barda, located southeast of Kerpijlitepe (Stone, 2021) and this find represents the largest assemblage of this species to date in Azerbaijan.

Small-grained cereals (Millets): The term 'Millet' is an umbrella term which includes several genera of small-seeded annual species grown for human and animal consumption including foxtail (*Setaria italica)* and broomcorn (Panicum miliaceum) recovered at Kerpijlitepe. They comprise of small round-shaped cereal seeds varying in size and colour and are highly adaptable and robust with high resistance to pests and diseases, short growing seasons, and are productive under drought conditions (Bray, 1981; Panaud, 2006; Sharma and Niranjan, 2017; Verma *et al*., 2015). Millet is a nutritious food containing proportions of protein, carbohydrates, fat, minerals, and energy per 100g similar to rice and cereal grains (Webber and Fuller, 2008). Grains of broomcorn (*P. miliaceum*) are identified by their ellipsoidal to roundish shape, with roundish hilum. The scutellum is broad, usually oval, and barely reaches half the length of the grain. Foxtail (S. italica) grains are smaller than those of broomcorn, and have a narrow but long hilum, reaching more than half the length of the grain. This difference is very apparent when the grains are viewed abaxially (Cappers and Neef, 2012; Fuller, 2017).

Millets are thermophilic, highly adaptive species that can grow in semiarid and drought-prone regions, and over a range of altitude zones (Baltensperger, 2002; Miller *et al*., 2016; Sharma and Niranjan, 2017; Sharma *et al*., 2017; Shumilovskikh and Poole, 2020; Upadhyaya, 2014: 1; Weber and Fuller, 2008; Weber and Kashyap, 2013). It can grow in less fertile soils than other cereals and is more tolerant of drought, pests, and disease than the larger-grained cereals. It can grow under non-irrigated conditions with as little as 200–500mm of average annual precipitation and are well suited to the lowland region of Bardha'a (Habiyaremye *et al*., 2017). In terms of labour input, millet is considered a much less demanding crop than either wheat or barley, requiring less weeding and manuring. They have a short maturation period (between 60–100 days after sowing) and are usually harvested in the late summer/early autumn (Baltensperger, 2002; Hunt *et al*., 2011; Nesbitt and Summers, 1988; Wilkin, 2020). Its tolerance and adaptability would have allowed it to have been grown in most agricultural zones across medieval Azerbaijan, from marginal lands, cultivated or irrigated fields, to upland pastures during seasonal movements of animal herds, without the requirement of ploughing or major labour-intensive management practices.

The origins of both millets are still debated but are thought to have been domesticated at least 9000 years ago in China (Diao and Guanqing, 2017: 67; Stevens *et al*., 2020; Weisskopf *et al*., 2015). While Soviet-era publications have reported the recovery of broomcorn millet from sites dating to the Neolithic Period in Georgian and Azerbaijani (Lisitsyna, 1984; Lisitsyna and Prischchepenko, 1977; Wasylikowa *et al*., 1991), the inability to critically access these records, and the absence of millet in all subsequent Neolithic excavations, have cast doubt on their accuracy (Hovsepyan and Willcox, 2008;

Hunt *et al*., 2008). Recent analyses of human and domestic animal remains (stable carbon and nitrogen isotopes) indicates that the consumption of C4 plants (most likely millet) occurs much later in the Southern Caucasus than previously thought, during the Middle Bronze Age, with its consumption increasing throughout the Iron Age (Herrscher *et al*., 2018). Millet was reportedly recovered during excavations at Mingachevir in the 50s and 60s dating to the medieval period (Buniyatov, 1964; Vaidov, 1950; 1961), but verification of these accounts is impossible due to the absence of photographs, drawings, or descriptions of the millet type recovered and the loss of the archaeobotanical assemblage. Large quantities of both millets were recovered during excavations in Qaratepe and Barda (2nd-16th century) during the Archaeological Exploration of Barda (AEB) Project conducted between 2015-2018 and appears to have been a ubiquitous part of the agricultural landscape (Stone, 2021).

Large-grained cereals: Cereal species were a minor component of the Kerpijlitepe assemblage comprising just 7.37% of the assemblage. The majority of grains 51.9% could not be identified to species and was recorded either as wheat '*Triticum* sp.' or 'cerealia'. Identified species comprised of just two species, hulled spelt wheat and two-rowed barley. Wheat is endemic to the Southern Caucasus where seventeen domesticated species are known and are usually autumn sown, requiring a period of exposure to cooler temperatures (vernalization) to initiate flowering, but can also be sowed in spring (Beridze, 2019: 921; Fuller and Allaby, 2009: 273). The limited archaeobotanical surveys conducted in the South Caucasus region have demonstrate that cereals were cultivated in the region from the Neolithic period and the crop has a long tradition in the region and would be well adapted to the landscape (Lisitsyna and Prischepenko, 1977). Cereal cultivation was important in the Kura-Araxes economy, and a preference for free threshing wheat, particularly the hexaploid bread wheat (*T. aestivum*-type), and barley (*Hordeum*) is evidenced (Berthon *et al*., 2013; Hovsepyan, 2015; Longford, 2015; Messager *et al*., 2015). While historical sources mention the growing of cereals in medieval Azerbaijan (Valikhanli, 2007), little is understood about the relative importance of these grains in society.

Spelt wheat (Triticum spelta): Spelt wheat was the dominant cereal species identified at Kerpijlitepe comprising 48.1% of the total cereal recovered at the site. Spelt grains are typically identified by their grain morphology with consists of oval grains with parallel sides, bluntly rounded on the upper end of the grain and with a blunt but often relatively pointed lower end. Analysing laterally, the dorsal ridge is symmetrically rounded but very flat, with an almost flat ventral surface. However, the identification of the species using grain alone is considered unreliable with the more definitive glume bases absent from the assemblage here. As a result this identification should be considered tentative. Spelt was recovered during AEB excavations but was recovered in very low quantities and seems to represent either a minor crop or possibly even a weedy type intrusion of other cereal remains (Stone, 2021).

Two-rowed barley (Hordeum distichon): Barley was recovered from a single sample at Kerpijlitepe and represented a minor component of the cereal assemblage. Hulled barley is a hardy species and can grow successfully on less fertile soils than wheat, and is more tolerant of saline soil conditions (Renfrew, 1973: 81). As with spelt, barley cultivation has a long tradition in the Southern Caucasus and was cultivated since the Neolithic period. Barley was an important crop in both Late Antique and Islamic Qaratepe and Barda and was recovered in much higher quantities than at Kerpijlitepe.

Wild/weed species: A small range and quantity of wild/weed species were recovered. These included wild grasses (*Poaceae* sp.), goosefoots (*Chenopodium* sp.), knotweeds (*Polygonum* sp.) and dock (*Rumex* sp.). These species are all quite common and can inhabit a range of ecological niches and could have grown in waste places around the fort or in arable fields, where they entered the site with harvested grain.

Fruit: Fruit species were a minor component of the site, comprised of a half stone of a peach (*Prunus persicaria*). The lack of fruit is likely a result of taphonomy rather than their absence from the diet of the inhabitants of the fort. Fruit, unlike cereals do not need to be processed using fire, and therefore have a low chance of becoming carbonised and surviving in the archaeological record.

Crop husbandry at Kerpijlitepe: The agricultural economy at Kerpijlitepe revolved around the cultivation of broomcorn millet (*Panicum miliaceum*), foxtail (*Setaria italica*), spelt (*Triticum spelta*) and two-rowed barley (*Hordeum distichon*). The recovery of both small-grained millets and larger-grained cereals indicate that the people inhabiting the Kerpijlitepe area during were engaged in a winter/summer agricultural system, growing a variety of crops over multiple seasons. This includes the cultivation of wheat and barley which are either sown in the autumn or spring and millets which are grown over the summer season (van der Veen 1992). The growing of a combination of both autumn/spring (wheat and barley) and summer-sown crops (millet) species represents an intentional diverse cropping strategy across both seasons and a range and ecological niches. As crops yields are inevitably variable the growing of a range of cultivars that can tolerate different environmental conditions and taking advantage of several ecological niches for food production, indicates a cognisant risk-buffering strategy by the inhabitants to mitigate the probability of a disastrously low yield of a single crop (Marston, 2011: 191; Weisskopf *et al*., 2015).

Possible evidence for wetland or irrigation agriculture at Kerpijlitepe is demonstrated by the archaeobotanical evidence. The identification of moisture regimes is often used in archaeobotanical research to identify the intensity of agricultural practice at archaeological sites. Rainfed, naturally irrigated or artificial watering regimes all require differing levels of agricultural input in terms of labour. The use of irrigation can be identified in the archaeobotanical record in two ways. Firstly, the identification of crop species that require irrigation to grow in a given environment and secondly through the identification of wild plants that grow preferentially in wet areas (Marston, 2011). As the average rainfall in the lowlands of the Southern Caucasus is 200–400mm (Mehdiyeva *et al.*, 2017a), rainfed agriculture alone may not be sufficient to sustain arable agriculture reliably or create high yields of crops such as cotton. The importance of a good water supply in cotton cultivation is described by from the first century CE by Strabo for India (Geo. 15.20), or through irrigation devices, as mentioned by several Arab agronomists (Abū l-Ḫayr, Ibn Baṣṣāl, and Ibn Luyūn) (Bouchaud *et al*., 2019). However, cotton has also been found to endure periods of drought and water stress and it may have been possible to grow in non-irrigated areas. In Barda and Qaratepe the cultivation of rice from the 10th century also suggest the possible use of irriogation in agriculutre or the expanision of agriculture into the wetland ragionsof the medieval Azerbaijani lowlands (Stone, 2021). Therefore while the cultivation of cotton and its presence at Kerpijlitepe is interesting, further work to establish how cotton was cultivated in the Late Antique and Islamic Period Azerbaijan is required.

Discussion: While comprising a small number of samples that may not be truly represntative of the larger site, the assemblage from Kerpijlitepe has produced an interesting archaeobiotanical assembladge that contributes to the understanding of crop cultivation in Late Antique and Islamic Azerbaijan. Through the analsys of the seven flots supplied the cultiavtion of a ranage of crops including broomcorn millet (*P. miliaceum*), foxtail (*S.italica*), spelt (*T. spelta*) and two-rowed barley (*H. distichon*) is evidenced.The identification of cotton (*G. arboretum/herbaceum*) at Kerpijlitepe is intriguing and represents a rare example of a modern archaeobotanical recovery of it in Azerbaijan. The assemblage makes a further contribution to the understanding of agricuture in medieval Azerbaijan and adds to the growing body of modern archaeobotnical investigations in the Southern Caucasus.

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Disclaimer: The results, conclusions and recommendations contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data has been collated, the author accepts no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

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Figures:

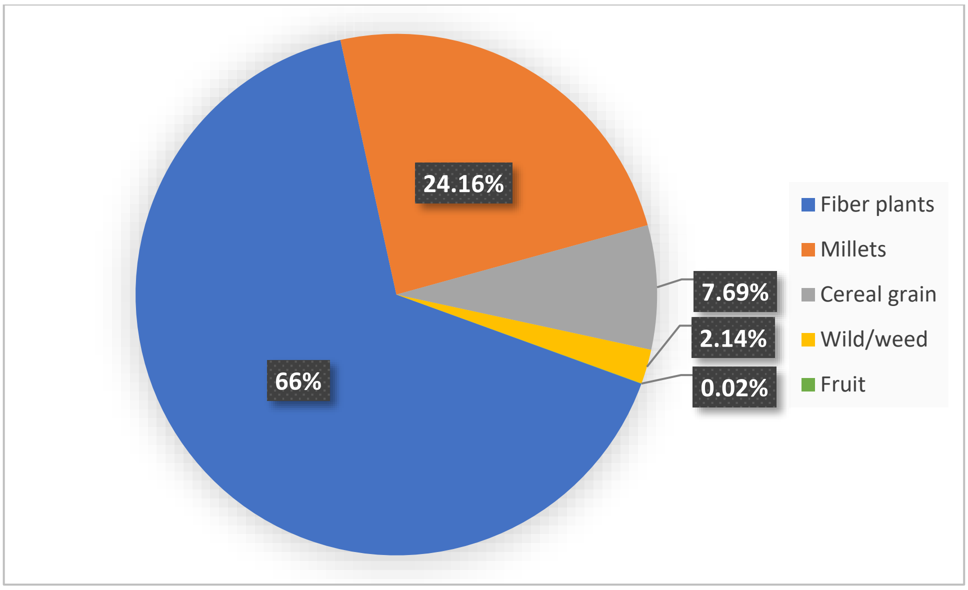

Figure 1: Pie-chart of relative frequency of plant remains at Kerpijlitepe.

Figure 2: Photograph of carbonised cotton seeds (*Gossypium arboretum/herbaceum)* from sample 40.

Figure 3: Broomcorn millet (*Panicum miliaceum*) (R), and Foxtail millet (*Setaria italica*) (L). (2mm square)

Figure 4: Carbonized spelt wheat (cf. *Triticum spelta*) (scale: 2mm square).

Tables:

Table 1: Taxonomic table of identified plant remains from Kerpijlitepe.

		247	**sc6**	**Pot 5**	**Pot 13**	**KV IX**			**c5**	
Latin binomial	**Common name**	**S23**	**S5**	**s38**	**S39**	**s40**	**S55**	**3A F127**	**s4**	**Total**
Large-grained cereals										
Hordeum distichon	Two-rowed barley							4		4
Hordeum sp.	Barley							11		11
Triticum c.f. *spelta*	Spelt							190		190
Triticum sp.	Wheat	18						146	26	190
Cerealia	Indeterminate cereal				1					1
Small-grained cereals										
Panicum miliaceum	Broomcorn millet							537		537
Setaria italica	Foxtail millet							77		77
Panicaceae	Indeterminate millet							630		630
Fibre plants										
Gossypium arboretum/herbaceum	Cotton		999	1586	9	805				3399
Fruit										
Prunus persicaria	Peach						1			1
Wild/weed species										
Poaceae sp.	Wild grass		22					18		40
Polygonum sp.	Knotweeds		13							13
Chenopodium sp.	Goosefoot							23		23
Rumex sp.	Dock (tubercles)							31		31
Unknown			3							3
Total		**18**	**1034**	**1586**	**10**	**805**	**1**	**1667**	**248**	**5372**

Table 2: Kerpijlitepe Radiocarbon Dates (from Maynard 2022)

Beta Sample	Sample No.	Context	Material	Conventional Age	Calibrated calAD IntCal20
489687	23	Unit 30. Same stratigraphy as Sample 58	Seeds	930 +/- 30 BP	1032-1178 (93.2%); 1192-1203 (2.3%)
489693	55	Unit 2a Pit (170). Charred peach stone from pit (170)	Charred	830 +/- 30 BP	1167-1269 (95.4%)