**[Supplementary material]**

# Prehistoric agricultural decision making in the western Himalayas: ecological and social variables

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## Contents



## OSM1: a heterogeneous ecological landscape

Western Tibet (Ngari Prefecture) represents one of the harshest places that humans have ever permanently settled long-term, putting strong selective forces on humans, herd animals, and crops. The landscape is mostly located above 5000m asl and has only a few river basins and

lake terraces. The whole prefecture is fundamentally a cold orographic desert, with an annual average temperature between −4.0 and 3.1℃; the average low temperatures can reach −36.6℃ (source from China Meteorological Administration 1981–2010). The annual average temperature varies across the different counties; Pulan, in the southern part, is the warmest county (3.5℃), followed by Ritu (0–1℃) and Gaer (0.2℃), the rest of the counties are all under 0℃ (Gaize −0.2℃; Zhada −1.5℃; Geji −1.9℃; Cuoqin −4℃). Annual precipitation is also highly variable, the western (66.4mm from Shiquanhe observation station) and northern areas receive much less rainfalls than the southern and eastern counties (162.9mm from Gaize station), owing to the gradual weakening of the Indian Summer Monsoon moving westward (d'Alpoim Guedes & Aldenderfer 2019).

The differing ecologies shape diverse subsistence strategies. Pulan County, in the southern part, is the richest agricultural zone in the region today, followed by several counties (Gaer, Zhada and Ritu) in the western part, which currently foster a herd-based agropastoral economy. People in the eastern portion (Geji, Gaize and Cuoqin) predominantly practice nomadic pastoralism. In these extreme cold environments, even cold-tolerant naked barley is often at high risk for failure. A survey conducted in the year 2000 noted that approximately 94.27 per cent of arable land in Ngari was cultivated with naked barley, followed by potato (*Solanum tuberosum*, 2.06 per cent), rape (*Brassica napus*, 1.6 per cent), wheat (1.35 per cent), and buckwheat (0.72 per cent). Other crops of minor significance in the local agricultural system, without exact statistical data, include hulled barley and millets. Peas (*Pisum sativum*) are also cultivated as food in some counties, but they traditionally were harvested before reaching maturity and then used for animal fodder (Local History Compilation Committee in Tibet 2009).

**OSM2: results of wild plants**

For wild herbaceous remains, Chenopodioideae (*n* = 840), Fabaceae (*n* = 563), and Cyperaceae (*n* = 568) were the most abundant plants, accounting for 37.92 per cent, 25.64 per cent, and 25.42 per cent of the identifiable wild seeds (Table S2). Chenopodioideae was the most dominated plant at serval sites, especially at the site of Dingdong (20.3 seeds/l). Unfortunately, this might not indicate the importance of Chenopodioideae because of the extremely large generation sizes in this clade; a single *Chenopodium* sp. plant can yield 50 000–70 000 seeds in optimal environments (Mandal 1990). Given the small size, primarily <1.0mm in diameter, we do not believe these wild seeds are from *Chenopodium* sp. proper, but may represent one of the many arid-land adapted wild relatives that are prominent across

the mountains of Central Asia, such as *Suaeda* sp. or *Bienertia* sp. Seeds from small herbaceous wild Fabaceae were identified, and appear to represent multiple species (Figure S2a–c.); most of them morphologically resemble *Medicago* sp. and may have functioned as wild forage for herds. However, identifying small herbaceous Fabaceae to species or even genus is challenging, given that our comparative collection of local wild species is still limited and there are hundreds of species recorded for the Himalaya (Chen *et al.* 2020). Different types of Cyperaceae were recovered, mostly resembling *Carex* sp. Similar sedges have been reported from several sites in Tibet, and other scholars have claimed that they were used to feed animals (d'Alpoim Guedes *et al*. 2014; Song *et al*. 2017). Other wild plants from Rosaceae, Brassicaceae, Poaceae, Polygonaceae, and Solanaceae were also identified, but only account for a minor proportion of the assemblages.

**OSM3: social differences between sites**

Despite the environmental constraints, abundant archaeological remains have been recovered through surveys and excavations over the past 30 years. Scientific excavations and interdisciplinary research at several Tibetan sites have enabled researchers to explore social differences among these sites. Here, we roughly categorise these sites into small and large-scale, based on their size and the quantity of elite status artefacts.

*Small-scale sites*

The first systematic archaeological excavation in western Tibet was carried out at the site of Piyangdongga (4030–4200m asl) from 1992–2001 (Sichuan University & Cultural Heritage Bureau of Tibet Autonomous Region 2008). Twenty-six tombs were excavated from three locations with diverse burial features, dating between around 500 BC and AD 1000. The artefacts include abundant pottery in a diverse array of forms, lithics, wooden vessels, bones, and a few iron tools, bronze objects, beads, and bamboo containers. The excavators suggested that a bronze sword recovered from the site shows similarity to finds from southwestern China (Sichuan University & Cultural Heritage Bureau of Tibet Autonomous Region 2008: 258–59).

*Large-scale sites*

The large-scale settlement of Kaerdong (4300m asl) is located on a mesa, about 100m higher than the surrounding valley. Ten radiocarbon dates show that the site was occupied for about 600 years, from AD 220–880 (d'Alpoim Guedes *et al.* 2014; Song *et al.* 2017). Remarkable

stone structures were exposed on the surface, covering an area of 130 000m$^2$. The site was first discovered in 2004, at which time four units (A–D) were identified by Huo (2005), most artefacts were surface-collected from the biggest unit (A), and consist of ceramic sherds, grinding stones, iron objects, beads, as well as a pre-Buddhist bronze statue. Huo pointed out that Kaerdong likely served military, residential, and religious functions (Huo 2005, 2013). Scholars often speculate that the site was the capital of Zhangzhung polity because of its immense size, multiple functions, and the possible overlap with locations mentioned in ancient texts (Aldenderfer & Moyes 2005; Huo 2005, 2013). However, more research is required to support this claim. About 1l of desiccated sediment was collected in 2004 for archaeobotanical research; to get a comprehensive understanding of subsistence strategies, in 2013, approximately 60l of additional sediments were collected from six clear stratigraphic layers in the earliest unit (B). In addition to 144 barley, seven wheat, two Tartary buckwheat, five foxtail millet (palea and lemma only), and one rice grain, 61 barley rachises and nine rice spikelet bases were recovered; animal remains were also identified, including sheep, goat, horse, and yak (d'Alpoim Guedes *et al.* 2014; Song *et al*. 2017).

Another large-scale settlement, Zeben, sits on a wide terrace, only 3km from Kaerdong. The total surface area of Zeben is estimated at roughly 600 000m$^2$, as designated by the stone structures visible on the surface. Large-scale buildings with hearths are located at the centre of the site and are surrounded by several smaller structures, all in a symmetrical arrangement (Huo 2005). Test excavations have not been published and there is essentially no understanding of subsistence strategies, but carbonised rice grains were identified by Song *et al*. (2017); they indicate that the site is contemporaneous with Kaerdong.

Furthermore, elite cemeteries have provided considerable insight into the life of higher status individuals. Eleven burials at the Gurujia site (4300m asl) were excavated and dated to AD 95–235. The dense burial group may be tied to the contemporaneous settlement of Kaerdong (Tong *et al*. 2014). A considerable wealth of artefacts, such as bronze and iron horse harnesses, weaponry, vessels, and silver ornaments, clearly reveal the higher social ranking of the interred. The scale of social stratification is particularly evident from the discovery of a golden mask, which is similar to gold masks recorded from Quta, also in western Tibet, as well as Samdzong in Nepal and Malari in India (Lu 2015). A luxury silken textile was also recovered, woven with the Chinese characters "王侯" (King and Marquis) in the same brocade style that has been reported from burials in southern Xinjiang, which are usually recognised as gifts from the Han Dynasty (Tong *et al*. 2014). In addition, long-distance

commodity exchange existed, which included tea and wooden (*Cephalotaxus* sp.) coffins (Tong *et al*. 2014; Lu *et al*. 2016).

Another high-status cemetery, Quta (3710m asl), dating to 50 BC–AD 200 was also excavated by Tong *et al.* (2015). Two golden masks and rich bronze and iron adornments, weaponry, and bridle bits were recovered, these impressive artefacts attest to an elite ranking. A large amount of naked barley grains was also collected from 2014M4. Four Job's tears fruits were identified in one tomb (2014M3), which normally grows in wet-warm ecological settings below 2000m. Additionally, horse, sheep/goat, cattle, and dog sacrifices were practiced at the sites, as cited above; similar customs were widespread throughout Central Asia and have been associated with a mobile lifestyle.

In summary, the existence of social hierarchies has been established in western Tibet by at least 2000 years ago. Elite burials and large-scale settlements are usually associated with valuable artefacts. Notably, 21 bronze and 41 iron artefacts were recovered from eight tombs at Quta, and 12 bronze, 20 iron, and eight silver artefacts were found from 11 burials at Gurujia. Furthermore, abundant symbolic artefacts that have been interpreted as elite signifiers were interred, such as golden masks, silk, as well as the presence of goods that have been transported over long distances, like rice, tea, plum yew wood coffins, and Job's tears. However, at smaller village settlements and their associated cemeteries, ceramics were the more prominent artefact type, few luxury items were recovered even from the slightly larger tombs in these cemeteries, and architecture was less well-pronounced. Only 13 bronze and one iron object were recovered from 26 burials at Piyangdongga, of which eight are small adornments. In addition, the long-distance-trade items were limited to bamboo objects, and possibly bronze weapons and beads. Accordingly, a growing body of archaeological evidence indicating that occupants at the larger-scale sites owned more wealth than commoners and benefited more from long-distance trade.

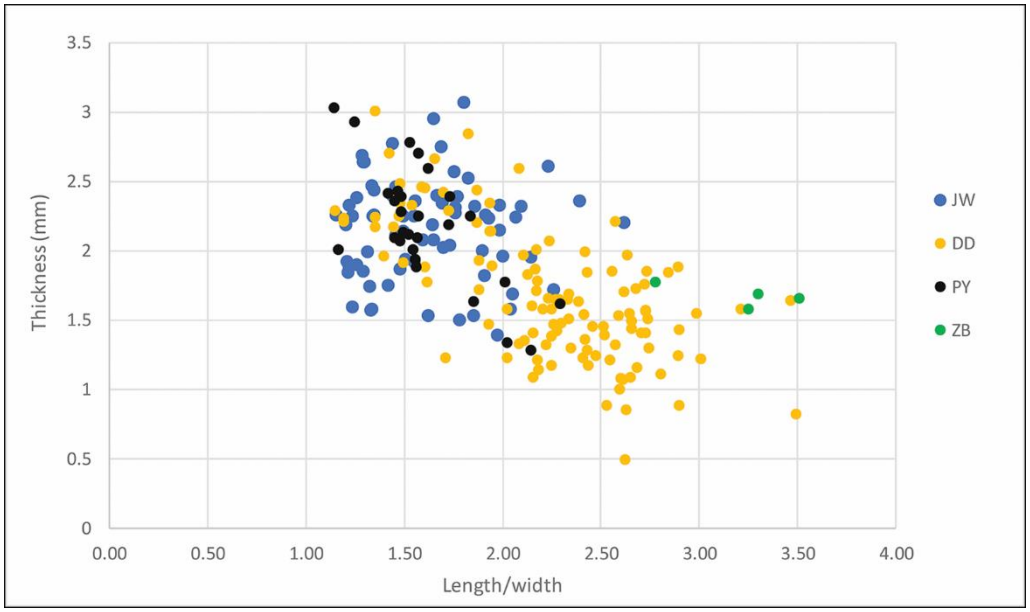


*Figure S1. The scatterplot shows size variation in barley grains within and between sites (figure by Li Tang).*

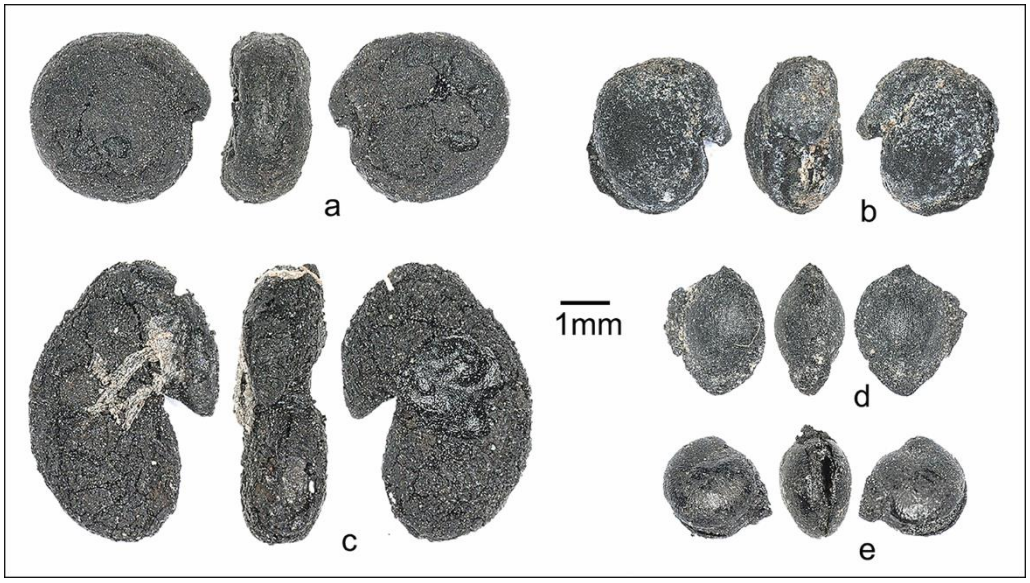


*Figure S2. Major wild remains from these sites (figure by Li Tang).*

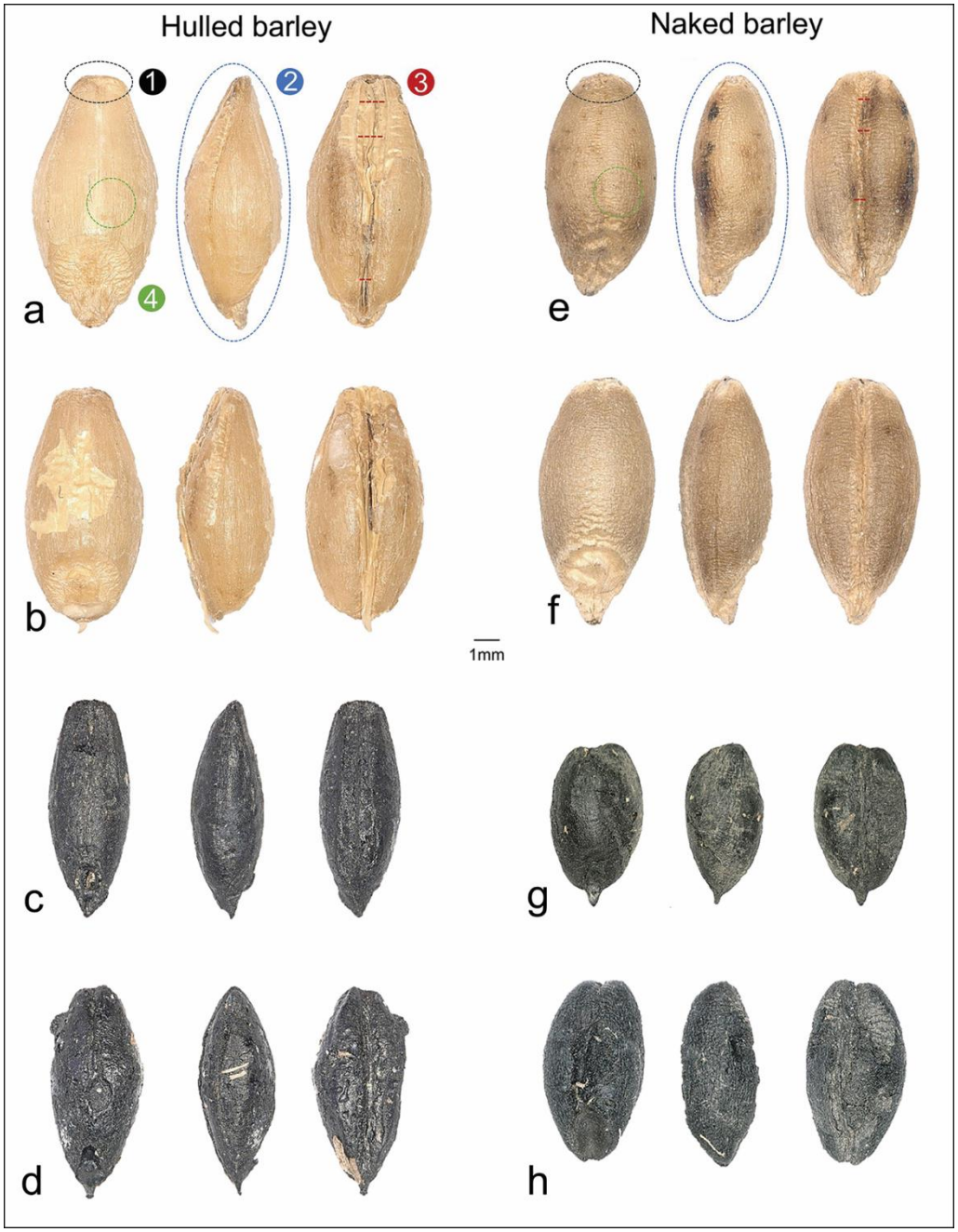


*Figure S3. The characteristics of naked and hulled barley grains (Jacomet 2006; Motuzaite Matuzeviciute* et al. *2021) (figure by Li Tang).*

**Table S1. Summary of new archaeological data.**

| **Western Tibet** | | | | Grain Parts (*not in totals) | | | | Domesticated grains | | | Amaranthaceae | | Brassicaceae | Cyperaceae | Fabaceae | Poaceae | | | Polygonaceae | Rosaceae | Solanaceae | Unidentified | Unidentifiable | Totals |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site name | Context number | Date | Volume of soil floated (litres) | Barley rachis | Cerealia rachis | Cerealia | Culm nodes | *Hordeum vulgare* var. *nudum* | *Hordeum vulgare* | *Hordeum vulgare* var. *vulgare* | *Chenopodium/Atriplex* | Amaranthaceae | *Capsella type* | Cyperaceae | Fabaceae | *Bromus* | Poaceae | Pooid | Polygonaceae | *Potentilla/Fragaria* | Solanaceae | Unidentified seeds | Unidentifiable seed fragments | Totals without unidentifiable fragments |
| Jiweng | 2019 JWT02 ① | | 3.2 | | | 1 | | | | | | | | | | | | | | | | | | 0 |
| | 2019 JWT02 ② | | 4.5 | | | | | | | | | | | | | | | | | | | | | 0 |
| | 2019 JWT04 ② | | 8 | 7 | | 16 | 6 | 4 | 4 | | 4 | | | 5 | 0 | 1 | 5 | 2 | | 1 | | 1 | 32 | 27 |
| | 2019 JWT04 HT1 | 391–208 cal BC | 14.6 | 54 | | 170 | 44 | 88 | 80 | 3 | 22 | | | 87 | 7 | | 23 | 7 | 4 | 1 | | 30 | 53 | 352 |
| | 2019 JWT05 ② | | 5.2 | | 1 | | | | | | | | | | | | | | | | | | | 0 |
| **Jiweng** | **5** | | **35.5** | **61** | **1** | **187** | **50** | **92** | **84** | **3** | **26** | | | **92** | **7** | **1** | **28** | **9** | **4** | **2** | | **31** | **85** | **379** |
| Ding dong | 2019 DD | | 5.5 | 34 | | 978 | 8 | 403 | 317 | 62 | 8 | | | 16 | | 1 | 2 | | | | | 2 | 266 | 811 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F4HD1 | | | | | | | | | | | | | | | | | | | | | | | |
| | 2019 DD F1R3 HT1 | cal AD 428–541 | 4.5 | 2 | | 23 | | 10 | 13 | | 195 | 3 | 2 | 106 | 21 | | 2 | | 4 | 32 | | 14 | 48 | 402 |
| **Dingdong** | **2** | | **10** | **36** | **0** | **1001** | **8** | **413** | **330** | **62** | **203** | **3** | **2** | **122** | **21** | **1** | **4** | **0** | **4** | **32** | | **16** | **314** | **1213** |
| Piyang | 2019 PY1 | | 0.25 | | | | | | | | 11 | | 1 | 24 | 1 | | 1 | | 1 | 2 | | 3 | 28 | 44 |
| | 2019 PY2 | | 1 | 5 | | 25 | | 5 | 3 | 1 | 43 | | | 173 | 127 | | | 3 | | 25 | 1 | 25 | 38 | 406 |
| | 2019 PY3① | | 1.4 | | | | | | | | | | | 2 | | | | | | | | | 9 | 2 |
| | 2019 PY3② | 396–212 cal BC | 3.6 | 80 | 2 | 96 | 5 | 20 | 7 | | 48 | | 3 | 36 | 28 | | 2 | | | | | 7 | 52 | 151 |
| **Piyang** | **4** | | **6.25** | **85** | **2** | **121** | **5** | **25** | **10** | **1** | **102** | **0** | **4** | **235** | **156** | **0** | **3** | **3** | **1** | **27** | **1** | **35** | **127** | **603** |
| Zhabu | 2019 ZPZTG1 ④ | | 10.5 | 3 | | 11 | | 6 | 4 | | 2 | | | | 60 | 1 | | | | | | 2 | 10 | 75 |
| | 2019 ZPZTG1（27） | | 7.5 | | | 7 | | | | | 9 | | | 13 | 29 | | 3 | | | | | 3 | 26 | 57 |
| | 2019 ZPZTG1（28） | cal AD 408–537 | 10.8 | 1 | | 4 | | | | | 15 | 1 | | 28 | 107 | | 1 | | | 4 | | 0 | 54 | 156 |
| | 2019 ZPZTG1（29） | | 10.5 | 1 | | 4 | | | | | 28 | 1 | | 26 | 15 | | 3 | | | 2 | | 2 | 38 | 77 |
| **Zhabu** | **4** | | **39.3** | **5** | **0** | **26** | **0** | **6** | **4** | **0** | **54** | **2** | | **67** | **211** | **1** | **7** | | | **6** | | **7** | **128** | **365** |
| Jiamengxiong | 2019 JMX ② | | 4.7 | | | | | | | | 6 | | 2 | 33 | 3 | | 1 | | | 10 | | 2 | 6 | 57 |
| | 2019 JMX ④ | | 1 | | | | | | | | | | | 4 | | | | | | | | 2 | | 6 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 JMX ⑤ | | 2.5 | | | | | | | | | | | | 6 | | | | | | | | | 6 |
| | 2019 JMX ⑥ | | 7.6 | | | | | | | | | | 23 | | 60 | | | | | | | 1 | 1 | 84 |
| | 2019 JMX ⑦ | cal AD 363–539 | 3 | | | | | | | | 12 | | 5 | 1 | 4 | | 1 | | | 1 | | 0 | 4 | 24 |
| | 2019 JMX 0.75–0.97m | | 2 | | | | | | | | 153 | | 28 | 7 | 53 | | 4 | | | | | 3 | 27 | 248 |
| | 2019 JMX 0.97–1.06m | | 1 | | | | | | | | 43 | | | 3 | 7 | | 3 | | | | | 0 | 10 | 56 |
| | 2019 JMX 1.06–1.20m | | 1.4 | | | | | | | | 110 | | 7 | 3 | 25 | | 1 | | | 4 | | 2 | 19 | 152 |
| | 2019 JMX 1.20–1.35m | | 1.5 | | | | | | | | 84 | | 3 | | 8 | | | | | | | 12 | 11 | 107 |
| | 2019 JMX 1.35–1.39m | | 1 | | | | | | | | 36 | | 2 | 1 | 2 | | | | | | | 1 | 8 | 42 |
| | 2019 JMX 1.60–1.66m | | 0.4 | | | | | | | | 7 | | 1 | | | | | 1 | | | | 1 | | 10 |
| | 2019 JMX > 1.66m | | 1.3 | | | | | | | | 4 | | 2 | | | | | | | | | 0 | | 6 |
| **Jiamengxiong** | **12** | | **27.4** | **0** | | **0** | **0** | **0** | **0** | **0** | **455** | | **73** | **52** | **168** | | **10** | **1** | | **15** | | **24** | **86** | **798** |
| **In total** | | | **118.45** | **187** | **3** | **1335** | **63** | **536** | **428** | **66** | **840** | **5** | **79** | **568** | **563** | **3** | **52** | **13** | **9** | **82** | **1** | **113** | **740** | **3358** |

**Table S2. Measurements of barley grains.**

| Site name | Context number | L (mm) | W (mm) | T (mm) |
|---|---|---|---|---|
| Jiweng | JWT04② | 6.16 | 3.1 | 2.33 |
| Jiweng | JWT04② | 6.39 | 2.98 | 1.95 |
| Jiweng | JWT04② | 5 | 3 | 2.4 |
| Jiweng | JWT04② | 3.57 | 2.72 | 1.99 |
| Jiweng | JWT04② | 4.44 | 2.25 | 1.39 |
| Jiweng | JWT04② | 5.07 | 2.47 | 1.69 |
| Jiweng | JWT04② | 3.54 | 2.65 | 1.58 |
| Jiweng | JWT04HT1 | 6.22 | 2.97 | 2.32 |
| Jiweng | JWT04HT1 | 5.93 | 3.72 | 2.08 |
| Jiweng | JWT04HT1 | 5.89 | 3.32 | 2.39 |
| Jiweng | JWT04HT1 | 5.24 | 2.32 | 1.72 |
| Jiweng | JWT04HT1 | 5.5 | 3.55 | 2.25 |
| Jiweng | JWT04HT1 | 5.38 | 3.27 | 2.19 |
| Jiweng | JWT04HT1 | 5.53 | 3.26 | 2.34 |
| Jiweng | JWT04HT1 | 5.48 | 2.95 | 2.32 |
| Jiweng | JWT04HT1 | 7.19 | 3.99 | 3.07 |
| Jiweng | JWT04HT1 | 4.35 | 2.28 | 1.82 |
| Jiweng | JWT04HT1 | 4.36 | 3.25 | 2.25 |
| Jiweng | JWT04HT1 | 4.62 | 2.49 | 1.53 |
| Jiweng | JWT04HT1 | 5.31 | 2.6 | 1.58 |
| Jiweng | JWT04HT1 | 5.16 | 2.6 | 2.15 |
| Jiweng | JWT04HT1 | 5.14 | 2.71 | 2 |
| Jiweng | JWT04HT1 | 5.23 | 3.08 | 2.02 |
| Jiweng | JWT04HT1 | 5.69 | 3.23 | 2.31 |
| Jiweng | JWT04HT1 | 5.07 | 3.12 | 1.53 |
| Jiweng | JWT04HT1 | 5.51 | 3.34 | 2.95 |
| Jiweng | JWT04HT1 | 4.37 | 2.65 | 2.08 |
| Jiweng | JWT04HT1 | 3.75 | 3.25 | 2.26 |
| Jiweng | JWT04HT1 | 4.61 | 2.97 | 1.92 |
| Jiweng | JWT04HT1 | 3.98 | 2.73 | 2.11 |
| Jiweng | JWT04HT1 | 3.45 | 2.79 | 1.59 |
| Jiweng | JWT04HT1 | 4.24 | 3.42 | 2.25 |
| Jiweng | JWT04HT1 | 3.98 | 3.26 | 2.33 |
| Jiweng | JWT04HT1 | 3.6 | 2.79 | 1.85 |
| Jiweng | JWT04HT1 | 4.04 | 2.27 | 1.5 |
| Jiweng | JWT04HT1 | 5.22 | 3.87 | 2.44 |
| Jiweng | JWT04HT1 | 5.3 | 3.54 | 2.14 |
| Jiweng | JWT04HT1 | 6.21 | 3.68 | 2.75 |
| Jiweng | JWT04HT1 | 4.18 | 2.95 | 1.75 |
| Jiweng | JWT04HT1 | 6.12 | 3.2 | 2.26 |
| Jiweng | JWT04HT1 | 5.44 | 3.5 | 2.36 |
| Jiweng | JWT04HT1 | 5.5 | 3.12 | 2.27 |
| Jiweng | JWT04HT1 | 5.65 | 3.26 | 2.04 |
| Jiweng | JWT04HT1 | 4.53 | 3.36 | 2.26 |
| Jiweng | JWT04HT1 | 3.42 | 2.72 | 1.9 |

| | | | | |
|---|---|---|---|---|
| Jiweng | JWT04HT1 | 3.81 | 3.13 | 1.84 |
| Jiweng | JWT04HT1 | 3.39 | 2.78 | 1.88 |
| Jiweng | JWT04HT1 | 4.03 | 3.35 | 2.19 |
| Jiweng | JWT04HT1 | 4.02 | 3.02 | 1.57 |
| Jiweng | JWT04HT1 | 4.16 | 3.44 | 1.92 |
| Jiweng | JWT04HT1 | 4.8 | 3.73 | 2.69 |
| Jiweng | JWT04HT1 | 4.81 | 3.3 | 2.46 |
| Jiweng | JWT04HT1 | 3.81 | 2.57 | 1.87 |
| Jiweng | JWT04HT1 | 4.5 | 3.47 | 2.64 |
| Jiweng | JWT04HT1 | 4.28 | 3.4 | 2.38 |
| Jiweng | JWT04HT1 | 3.71 | 2.46 | 1.94 |
| Jiweng | JWT04HT1 | 3.74 | 2.82 | 1.74 |
| Jiweng | JWT04HT1 | 4.92 | 3.29 | 2.25 |
| Jiweng | JWT04HT1 | 5.2 | 4.02 | 2.64 |
| Jiweng | JWT04HT1 | 4.88 | 3.38 | 2.77 |
| Jiweng | JWT04HT1 | 5.39 | 2.95 | 2.52 |
| Jiweng | JWT04HT1 | 5 | 2.99 | 2.4 |
| Jiweng | JWT04HT1 | 4.42 | 3.07 | 2.4 |
| Jiweng | JWT04HT1 | 5.56 | 3.17 | 2.57 |
| Jiweng | JWT04HT1 | 4.82 | 3.6 | 2.47 |
| Jiweng | JWT04HT1 | 6.16 | 3.19 | 2.23 |
| Jiweng | JWT04HT1 | 6.96 | 2.91 | 2.36 |
| Jiweng | JWT04HT1 | 5.69 | 2.75 | 2.24 |
| Jiweng | JWT04HT1 | 6.48 | 2.9 | 2.61 |
| Jiweng | JWT04HT1 | 4.95 | 2.47 | 1.96 |
| Jiweng | JWT04HT1 | 6.5 | 2.48 | 2.2 |
| Dingdong | DDF4HD1 | 4.21 | 3.67 | 2.29 |
| Dingdong | DDF4HD1 | 4.38 | 2.84 | 2.33 |
| Dingdong | DDF4HD1 | 3.67 | 3.08 | 2.23 |
| Dingdong | DDF4HD1 | 4.43 | 3.28 | 2.24 |
| Dingdong | DDF4HD1 | 5.89 | 3.15 | 2.44 |
| Dingdong | DDF4HD1 | 6.06 | 3.13 | 2.34 |
| Dingdong | DDF4HD1 | 5.39 | 2.95 | 2.84 |
| Dingdong | DDF4HD1 | 5.7 | 3.3 | 2.29 |
| Dingdong | DDF4HD1 | 5.51 | 2.83 | 1.89 |
| Dingdong | DDF4HD1 | 5.27 | 3.18 | 2.66 |
| Dingdong | DDF4HD1 | 5.03 | 3.16 | 2.46 |
| Dingdong | DDF4HD1 | 5.21 | 2.69 | 2.14 |
| Dingdong | DDF4HD1 | 6.12 | 3.81 | 2.45 |
| Dingdong | DDF4HD1 | 6.28 | 3.01 | 2.59 |
| Dingdong | DDF4HD1 | 6.72 | 2.51 | 1.73 |
| Dingdong | DDF4HD1 | 6.18 | 2.27 | 1.76 |
| Dingdong | DDF4HD1 | 7.01 | 2.66 | 1.97 |
| Dingdong | DDF4HD1 | 6.43 | 2.42 | 1.49 |
| Dingdong | DDF4HD1 | 5.62 | 2.99 | 1.72 |
| Dingdong | DDF4HD1 | 5.85 | 2.27 | 2.21 |
| Dingdong | DDF4HD1 | 6.59 | 2.41 | 1.85 |

| | | | | |
|---|---|---|---|---|
| Dingdong | DDF4HD1 | 5.63 | 2.99 | 1.93 |
| Dingdong | DDF4HD1 | 6.17 | 3.18 | 2.14 |
| Dingdong | DDF4HD1 | 6.43 | 2.67 | 1.23 |
| Dingdong | DDF4HD1 | 5.9 | 2.8 | 1.97 |
| Dingdong | DDF4HD1 | 6.63 | 2.43 | 1.57 |
| Dingdong | DDF4HD1 | 6.5 | 2.51 | 1.53 |
| Dingdong | DDF4HD1 | 6.09 | 2.8 | 1.71 |
| Dingdong | DDF4HD1 | 5.17 | 2.31 | 2.07 |
| Dingdong | DDF4HD1 | 5.42 | 2.51 | 1.41 |
| Dingdong | DDF4HD1 | 5.5 | 2.1 | 1.7 |
| Dingdong | DDF4HD1 | 5.63 | 2.36 | 1.63 |
| Dingdong | DDF4HD1 | 5.96 | 2.06 | 1.24 |
| Dingdong | DDF4HD1 | 5.05 | 2.29 | 1.58 |
| Dingdong | DDF4HD1 | 5.82 | 2.49 | 1.69 |
| Dingdong | DDF4HD1 | 6.15 | 2.44 | 1.39 |
| Dingdong | DDF4HD1 | 5.86 | 2.41 | 1.28 |
| Dingdong | DDF4HD1 | 5.35 | 2.51 | 1.83 |
| Dingdong | DDF4HD1 | 5.6 | 2.58 | 2.01 |
| Dingdong | DDF4HD1 | 5.45 | 2.33 | 1.51 |
| Dingdong | DDF4HD1 | 6.39 | 2.33 | 1.51 |
| Dingdong | DDF4HD1 | 5.42 | 2.41 | 1.58 |
| Dingdong | DDF4HD1 | 7 | 2.42 | 1.88 |
| Dingdong | DDF4HD1 | 6 | 1.73 | 1.64 |
| Dingdong | DDF4HD1 | 5.79 | 2.38 | 1.84 |
| Dingdong | DDF4HD1 | 5.24 | 2.8 | 2.2 |
| Dingdong | DDF4HD1 | 6.09 | 2.69 | 1.47 |
| Dingdong | DDF4HD1 | 5.06 | 2.2 | 1.48 |
| Dingdong | DDF4HD1 | 5.69 | 2.44 | 1.65 |
| Dingdong | DDF4HD1 | 5.11 | 2.29 | 1.66 |
| Dingdong | DDF4HD1 | 5.16 | 2.27 | 1.65 |
| Dingdong | DDF4HD1 | 5.1 | 2.23 | 1.65 |
| Dingdong | DDF4HD1 | 5.19 | 2.38 | 1.21 |
| Dingdong | DDF4HD1 | 5.86 | 2.06 | 1.84 |
| Dingdong | DDF4HD1 | 5.19 | 1.9 | 1.56 |
| Dingdong | DDF4HD1 | 5.74 | 2.23 | 1.32 |
| Dingdong | DDF4HD1 | 4.91 | 2.54 | 1.47 |
| Dingdong | DDF4HD1 | 5.76 | 2.38 | 1.99 |
| Dingdong | DDF4HD1 | 7.01 | 2.9 | 1.54 |
| Dingdong | DDF4HD1 | 5.47 | 2.51 | 1.78 |
| Dingdong | DDF4HD1 | 5.21 | 1.62 | 1.58 |
| Dingdong | DDF4HD1 | 5.38 | 2.48 | 1.87 |
| Dingdong | DDF4HD1 | 5.48 | 2.07 | 1.55 |
| Dingdong | DDF4HD1 | 5.55 | 2.05 | 1.41 |
| Dingdong | DDF4HD1 | 4.58 | 1.88 | 1.17 |
| Dingdong | DDF4HD1 | 4.87 | 1.68 | 1.43 |
| Dingdong | DDF4HD1 | 4.52 | 2.01 | 1.17 |
| Dingdong | DDF4HD1 | 5.59 | 1.87 | 1.55 |

| | | | | |
|---|---|---|---|---|
| Dingdong | DDF4HD1 | 4.53 | 1.93 | 1.3 |
| Dingdong | DDF4HD1 | 4.76 | 1.82 | 1.07 |
| Dingdong | DDF4HD1 | 4.72 | 2.1 | 1.38 |
| Dingdong | DDF4HD1 | 4.07 | 1.83 | 1.32 |
| Dingdong | DDF4HD1 | 4.85 | 1.83 | 1.09 |
| Dingdong | DDF4HD1 | 4.56 | 1.84 | 1.24 |
| Dingdong | DDF4HD1 | 3.9 | 1.81 | 1.09 |
| Dingdong | DDF4HD1 | 3.64 | 1.8 | 1.23 |
| Dingdong | DDF4HD1 | 3.68 | 2.15 | 1.23 |
| Dingdong | DDF4HD1 | 4.65 | 2.04 | 1.42 |
| Dingdong | DDF4HD1 | 3.83 | 1.46 | 0.49 |
| Dingdong | DDF4HD1 | 4.67 | 2.14 | 1.14 |
| Dingdong | DDF4HD1 | 5 | 1.88 | 1.44 |
| Dingdong | DDF4HD1 | 4.34 | 1.58 | 1.3 |
| Dingdong | DDF4HD1 | 5.78 | 1.92 | 1.22 |
| Dingdong | DDF4HD1 | 4.4 | 1.69 | 1.08 |
| Dingdong | DDF4HD1 | 4.27 | 2.05 | 1.33 |
| Dingdong | DDF4HD1 | 3.85 | 1.9 | 1.58 |
| Dingdong | DDF4HD1 | 4.81 | 1.9 | 0.88 |
| Dingdong | DDF4HD1 | 4.23 | 1.63 | 1 |
| Dingdong | DDF4HD1 | 4.43 | 2.06 | 1.6 |
| Dingdong | DDF4HD1 | 4 | 1.38 | 0.88 |
| Dingdong | DDF4HD1 | 4.97 | 1.82 | 1.41 |
| Dingdong | DDF4HD1 | 4.55 | 1.62 | 1.11 |
| Dingdong | DDF4HD1 | 4.54 | 1.69 | 1.16 |
| Dingdong | DDF4HD1 | 4.68 | 1.86 | 1.45 |
| Dingdong | DDF4HD1 | 5.03 | 1.44 | 0.82 |
| Dingdong | DDF4HD1 | 5.31 | 2.02 | 0.85 |
| Dingdong | DDF4HD1 | 4.53 | 1.84 | 1.45 |
| Dingdong | DDF4HD1 | 4.33 | 2.05 | 1.35 |
| Dingdong | DDF4HD1 | 4.21 | 1.74 | 1.36 |
| Dingdong | DDF4HD1 | 4.64 | 1.82 | 1.21 |
| Dingdong | DDF1R3 | 5.06 | 3.74 | 3.01 |
| Dingdong | DDF1R3 | 4.88 | 3.49 | 1.96 |
| Dingdong | DDF1R3 | 4.7 | 3.48 | 2.17 |
| Dingdong | DDF1R3 | 4.28 | 2.96 | 2.17 |
| Dingdong | DDF1R3 | 4.73 | 3.32 | 2.7 |
| Dingdong | DDF1R3 | 5.26 | 3.09 | 2.42 |
| Dingdong | DDF1R3 | 4.81 | 3.31 | 2.38 |
| Dingdong | DDF1R3 | 5.68 | 3.84 | 2.48 |
| Dingdong | DDF1R3 | 4.6 | 3.07 | 1.91 |
| Dingdong | DDF1R3 | 4.17 | 3.5 | 2.21 |
| Dingdong | DDF1R3 | 5.7 | 2.23 | 1.85 |
| Dingdong | DDF1R3 | 4.88 | 3.04 | 1.88 |
| Dingdong | DDF1R3 | 4.39 | 2.98 | 2.25 |
| Dingdong | DDF1R3 | 4.45 | 2.75 | 1.77 |
| Dingdong | DDF1R3 | 4.78 | 3.23 | 2.34 |

| | | | | |
|---|---|---|---|---|
| Piyang | PY2 | 6.16 | 3.79 | 2.59 |
| Piyang | PY2 | 4.42 | 2.98 | 2.28 |
| Piyang | PY2 | 3.91 | 2.69 | 2.09 |
| Piyang | PY2 | 5.04 | 3.2 | 2.25 |
| Piyang | PY2 | 4.83 | 2.4 | 1.77 |
| Piyang | PY2 | 5.57 | 3.03 | 2.25 |
| Piyang | PY2 | 4.76 | 2.22 | 1.28 |
| Piyang | PY3② | 4.22 | 2.82 | 2.13 |
| Piyang | PY3② | 4.75 | 3.05 | 1.94 |
| Piyang | PY3② | 4.29 | 2.74 | 2.09 |
| Piyang | PY3② | 4.27 | 2.76 | 2.01 |
| Piyang | PY3② | 4.26 | 2.88 | 2.07 |
| Piyang | PY3② | 5.4 | 3.55 | 2.12 |
| Piyang | PY3② | 5.11 | 3.6 | 2.41 |
| Piyang | PY3② | 4.95 | 3.17 | 1.88 |
| Piyang | PY3② | 4.39 | 2.54 | 2.19 |
| Piyang | PY3② | 5.05 | 2.72 | 1.63 |
| Piyang | PY3② | 4.1 | 2.76 | 2.39 |
| Piyang | PY3② | 3.2 | 2.75 | 2.01 |
| Piyang | PY3② | 5.69 | 2.48 | 1.62 |
| Piyang | PY3② | 4.94 | 3.96 | 2.93 |
| Piyang | PY3② | 4.17 | 2.87 | 2.36 |
| Piyang | PY3② | 6.11 | 3.53 | 2.39 |
| Piyang | PY3② | 4.73 | 3.09 | 2.78 |
| Piyang | PY3② | 4.03 | 3.52 | 3.03 |
| Piyang | PY3② | 4.49 | 2.22 | 1.34 |
| Piyang | PY3② | 4.9 | 3.33 | 2.43 |
| Piyang | PY3② | 5.53 | 3.52 | 2.7 |
| Zhabu | ZB④ | 5.13 | 3.25 | 2.46 |
| Zhabu | ZB④ | 4.94 | 2.78 | 2.7 |
| Zhabu | ZB④ | 5.58 | 3.3 | 2.15 |
| Zhabu | ZB④ | 5.8 | 3.51 | 3 |

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