[Supplementary material]

The Beixin Culture: archaeobotanical evidence for a population dispersal of Neolithic hunter-gatherer-cultivators in northern China

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Recovery methods

The flotation samples averaged 10–20 litres in volume, resulting in a total of 373.5 litres of sediments undergoing bucket flotation at the site. Plant remains were collected using a 0.3mm mesh and dried on site. Each sample was weighed, screened through a 1.0mm and a 0.7mm sieve, and sorted under a binocular stereomicroscope. In most samples, the residues smaller than 0.3mm were not sorted, as preliminary evaluation showed no seeds and fruits were found in these fractions. Charred seeds, fruits and other parts of plants were separated from charcoal, then identified and photographed under Nikon SMZ 1500 microscope with reference to modern comparative collections, Chinese seed atlases (The Editorial Committee 1990) and archaeobotany texts (Liu *et al*. 2008).

Table S1. Plant remains from Guanqiaocunnan.

	Scientific name	Number	Percentage (n=4530)	Samples with plant	Ubiquity (n=38)
Cultigens					
Broomcorn millet	*Panicum miliaceum*	2944	64.99	36	94.74
Foxtail millet	*Setaria italica*	1154	25.47	29	76.32
Rice	*Oryza sativa*	42	0.93	17	44.74
Weedy plants					
Aster family	**Asteraceae**				
	Siegesbeckia pubescens	1	0.02	1	2.63
Rough cocklebur	*Xanthium strumarium*	7	0.16	3	7.89
Cannabaceae family	**Cannabaceae**				
	Galium aparine	1	0.02	1	2.63
Caprifoliaceae family	**Caprifoliaceae**				
	Sambucus williamsii	7	0.16	3	7.89
Goosefoot family	**Chenopodiaceae**				
	Kochia scoparia	2	0.04	2	5.26
Bean family	**Fabaceae**				
Soybean	*Glycine soja*	82	1.81	19	50.00
	Lespedeza bicolor	2	0.04	2	5.26
	Melilotus officinalis	4	0.09	1	2.63

	Scientific name	Number	Percentage (n=4530)	Samples with plant	Ubiquity (n=38)
Mint family	**Lamiaceae**				
Perilla	*Perilla frutescens*	21	0.46	10	26.32
Grass family	**Poaceae**				
Crabgrass	*Digitaria* sp.	11	0.24	10	26.32
Barnyard grass	*Echinochloa* sp.	9	0.20	9	23.68
Foxtail	*Setaria viridis*	23	0.51	8	21.05
Knotweed family	**Polygonaceae**				
Pale smartweed	*Polygonum lapathifolium*	1	0.02	1	2.63
Tomato family	**Solanaceae**				
Chinese lantern	*Physalis alkekengi*	5	0.11	2	5.26
Water plants					
Nymphaeaceae family	**Nymphaeaceae**				
Gorgon fruit	*Euryale ferox*	14	0.31	2	5.24
Lythraceae family	**Lythraceae**				
Water chestnut	*Trapa* sp.	7	0.16	1	2.63
Fleshy fruit and nuts					
Betulaceae family	**Betulaceae**				
hazel	*Corylus* sp.	7	0.16	4	10.53

	Scientific name	**Number**	**Percentage (n=4530)**	**Samples with plant**	**Ubiquity (n=38)**
Fagaceae family	**Fagaceae**				
oaks	*Quercus* sp.	91	2.01	10	26.32
Rosaceae family	**Rosaceae**				
prunus	*Cerasus japonica*	25	0.55	3	7.89
Taxodiaceae	**Taxodiaceae**	20	0.44	1	2.63
Vitaceae	**Vitaceae**				
Cayratis	*Cayratia* sp.	1	0.02	1	2.63
Grape	*Vitis* sp.	5	0.11	2	5.26
Fragments of nuts		32	0.71	9	23.68
Unidentifiable		10	0.22	4	10.53
Total seeds		4258			

Table S2. Radiocarbon dates on charred cereal remains from Guanqiaocunnan site (OxCal v4.2.4 (Bronk Ramsey (2013), using the IntCal13 calibration curve (Reimer *et al*. 2013)).

Lab Reference	Material	Unit	Radiocarbon date（BP）	Calibrated date	
				1σ (68.2%)	2σ (95.4%)
BA160669	11 charred broomcorn millet grains	GQCNH3①	5430 ± 25	4334–4317 BC (21.0%) 4298–4263 BC (47.2%)	4340–4247 BC (95.4%)
BA160670	11 charred broomcorn millet grains	GQCNH3②	5400 ± 25	4324–4287 BC (42.6%) 4269–4245 BC (25.6%)	4334–4232 BC (94.2%) 4188–4181 BC (1.2%)
BA160671	One charred rice grain	GQCNH7①	5335 ± 30	4239–4224 BC (8.2%) 4207–4161 BC (27.4%) 4131–4071 BC (32.7%)	4260–4050 BC (95.4%)
BA160672	11 charred foxtail millet grains	GQCNH7②	5290 ± 35	4227–4201 BC (13.9%) 4169–4127 BC (22.6%) 4121–4092 BC (14.0%) 4080–4046 BC (17.7%)	4235–4038 BC (91.3%) 4018–3999 BC (4.1%)

BA160673	11 charred foxtail millet grains	GQCNH7③	5270 ± 30	4225–4205BC (12.0%) 4164–4130 BC (21.6%) 4112–4102 BC (4.7%) 4073–4040 BC (21.6%) 4016–4000 BC (8.3%)	4231–4194 BC (16.0%) 4176–3990 BC (79.4%)
BA160674	Two fragments of charred rice grains	GQCNH5①	5235 ± 25	4046–3990 BC (68.2%)	4224–4207 BC (3.0%) 4161–4131 BC (6.4%) 4071–3971 BC (86.1%)
BA160675	Three fragments of charred rice grains	GQCNH5②	5335 ± 30	4239–4224 BC (8.2%) 4207BC- 416 1BC (27.4%) 4131BC- 4071BC (32.7%)	4260BC-4050 BC (95.4%)
BA160676	Three fragments of charred rice grains	GQCNH5③	5305 ± 25	4227–4200 BC (15.4%) 4169–4148 BC (11.9%) 4135–4090 BC (26.7%) 4081–4056 BC (14.2%)	4233–4048 BC (95.4%)

BA160677	10 charred broomcorn millet grains	QBQH2③	4575 ± 25	3370–3338 BC (56.9%) 3207–3195 BC (8.3%) 3148–3143BC (3.0%)	3493–3468 BC (7.7%) 3375–3329 BC (60.9%) 3216–3180 BC (14.7%) 3159–3123 BC (12.1%)

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