Textile tools and textile production – studies of selected Bronze Age sites: introduction

Andersson Strand, Eva ; Nosch, Marie Louise Bech; Cutler, Joanne

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We dedicate this book to Betchen Barber,
the pioneer of the study of Aegean Bronze Age textiles.

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Front cover: clockwise: MM II Quartier Mu, Malia, Crete, map (after Poursat 1996, pl. 81), spindle whorls from Phaistos, Crete (courtesy of P. Militello), Khania, Crete, Late Bronze Age ribbon, reconstructed loom weights in TTTC experiments.
Back cover: Splicing (drawing: Annika Jeppsson)

Contents

Chapter 6.1

Textile tools and textile production – studies of selected Bronze Age sites: introduction

Eva Andersson Strand, Marie-Louise Nosch and Joanne Cutler

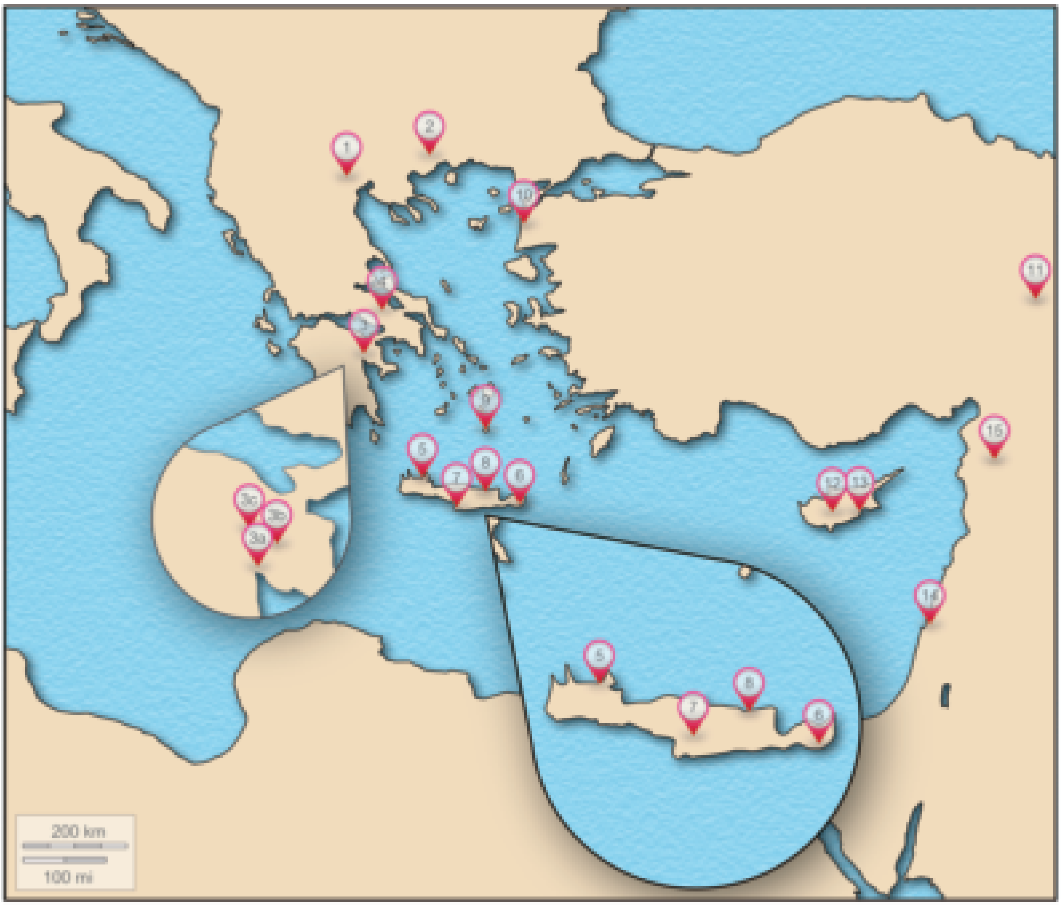
This chapter will focus on the evidence for the nature of textile production at 15 selected Bronze Age sites (Fig. 6.1.1). As written in the introduction to the database (chapter 5.1), many of the tools have been recovered from mixed contexts or do not have a secure date. In other cases the tools have been dated very widely; for example, to the Early, Middle or Late Bronze Age. Furthermore, in several cases a period or a context is only represented by a few tools. The case studies discussed in this chapter are sites with one or more securely dated contexts represented by several tools.[1]

The aim is to give good examples of how textile tools can be used to discuss textile production during a particular period or within a particular building at a specific site. In each case the chronological system adopted by the collaborators has been used (for a general chronological chart please see the introduction). Each case study is based on the technical textile tools report (chapter 5.1) and incorporates the results of the analyses of the textile tool assemblage from the individual site, together with a context description, in collaboration with the collaborators for the site.

In order to provide a wide range of examples, the various studies presented have various perspectives and slightly different approaches, all relating to the site in question. The results of the tool analyses are presented in a similar way in each case, however. The different textile tools from a particular site are presented in tables (chapter 5.1). The weight and diameter of spindle whorls with a recordable weight and diameter (that is, with both a complete or estimated original weight and a preserved diameter) and the weight and thickness of loom weights with a recordable weight and thickness (that is, with both a complete or estimated original weight and a preserved thickness) are presented in graphs. In some cases, the markers in a graph can represent more than one spindle whorl or loom weight, if two or more spindle whorls or loom weights have the same weight and diameter/thickness. Where this is the case, it has been noted in the caption. The fact that some markers represent more than a single tool does not alter the visible clusters, since the extra tools lie within the visible groupings.

The spinning experiments with suspended spindles conducted in the TTTC research programme have confirmed that the quality of fibres, the spinner and the weight of the spindle whorl affect the finished product, *i.e.* the spun yarn, with the weight of the whorl having a significant effect (chapter 4.1). However, as it is not possible to determine exactly what types of yarn were produced with a specific spindle whorl, the thread range will only be referred to in general categories: 'very thin', 'thin', 'medium', 'thick' or 'very thick' (Fig. 6.1.2). Furthermore,

Figure 6.1.1. Map showing the location of the sites discussed in the case studies (map: Christian Schmidt).



Northern Greece
1: Sitagroi
2: Archontiko

Mainland Greece
3a: Tiryns
3b: Midea
3d: Mycenae
4: Thebes

Crete
5: Khania
6: Ayia Triada
7: Phaistos
8: Malia

Aegean Islands
9: Akrotiri

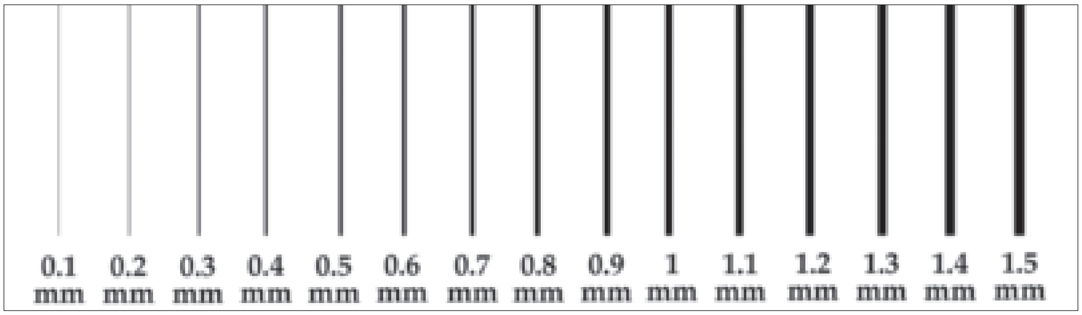
Western Anatolia
10: Troia

Central and Eastern Anatolia
11: Arslantepe

Cyprus
12: Apliki
13: Kition

Levant
14: Tell Kabri
15: Ebla

Figure 6.1.2. Range of threads, from very thin to very thick (0.1 mm to 1.5 mm): very thin c. *0.1 (and below)–0.2 mm; thin* c. *0.2–0.4 mm; medium* c. *0.4–0.8 mm; thick* c. *0.8–1.1 mm; very thick* c. *1.1–1.5 mm. NB. This is a visual approximation only of what is a very thin, thin to very thick thread.*



when discussing yarn produced with a specific spindle whorl it is important to bear in mind that there will always be a range and that it is not possible to suggest a particular thread diameter (chapter 4.5). Since so few textiles have been preserved in the area under study, the categories of thread thickness used are largely based on wider analyses of ancient textiles from other regions and time periods (for example, the preserved textiles from Egypt; see Barber 1991; Kemp and Vogelsang-Eastwood 2001) and on the possibilities and limitations of the range of thread that could be spun with different whorls in the experimental tests. If a large corpus of textiles was available, it would be possible to establish firmer categories regarding what a 'very thin', or 'very thick', *etc.* thread looked like.

In order to visualise the range of fabrics that could have been produced with a specific loom weight and/or cluster of loom weights, calculations have been made based on the TTTC loom weight tests (chapter 4). However, it should be noted that while it is possible to estimate the number of warp threads, the number of weft threads can only be guessed at (chapter 4.5). Evidence of tabby weaving exists from the area and period under study and since tabby weaving is considered to be the most common weaving technique during the Bronze Age (chapter 3), the analyses were carried out for this type of fabric. Twill weaving cannot be excluded (see chapters 3 and 4) and the loom weights could also be used to make twill fabric.

The calculations are based on the weight and the thickness of the loom weights and the different parameters, such as there being no less than 10 threads and no more than 30 threads on a loom weight, defined in the loom weight tests (chapters 4.1 and 4.5). It is also important to note that what is presented will always be a range of possible fabrics, since all loom weights can be used with different types of thread needing different tension. For example, if a loom weight weighs 300 g the weaver can attach 10 threads needing 30 g tension or 30 threads needing 10 g tension (chapter 4.5).

Thread tensions of 5 g, 10 g, 15 g and further 5 g intervals up to 70 g tension, were used when evaluating an individual loom weight's suitability for use with threads needing different tensions. Occasionally, 7.5 g and 12.5 g thread tensions have also been included in order to demonstrate the functional range of a particular loom weight group. It is important to note that these tensions have been chosen in order to give a general spread, since the tension needed could also be 6 g, 11 g, 16 g, *etc.* In general, a thicker thread needs more tension than a thinner thread; however, the tension required is also related to the weight of the thread (see chapter 4.5).

Thread needing *c.* 10 g tension or below is in this chapter described as 'very thin'; *c.* 15 g to *c.* 20 g tension thread is described as 'thin'; *c.* 25 g to *c.* 35 g tension thread is 'medium'; *c.* 40 g to *c.* 50 g tension thread is 'thick; *c.* 55 g to *c.* 70 g tension thread is 'very thick'. However, harder spun thread will also need more tension than thread that is not so hard spun (see chapter 4.5).

As concluded in the TTTC experiments, thread that needs slightly different tension can be used in the same loom setup; for example, thread needing 40 g tension could be used together with thread that requires 45 g tension. Furthermore, the exact number of warp threads per centimetre can of course vary within the same fabric. If a fabric is dense, *i.e.* the warp threads are close together, whether they are thin or thick threads, there is not much room for the threads to move, meaning that the number of threads per centimetre will be more consistent. However, if the fabric is more open, there is a greater possibility that the threads can move, and the warp thread count

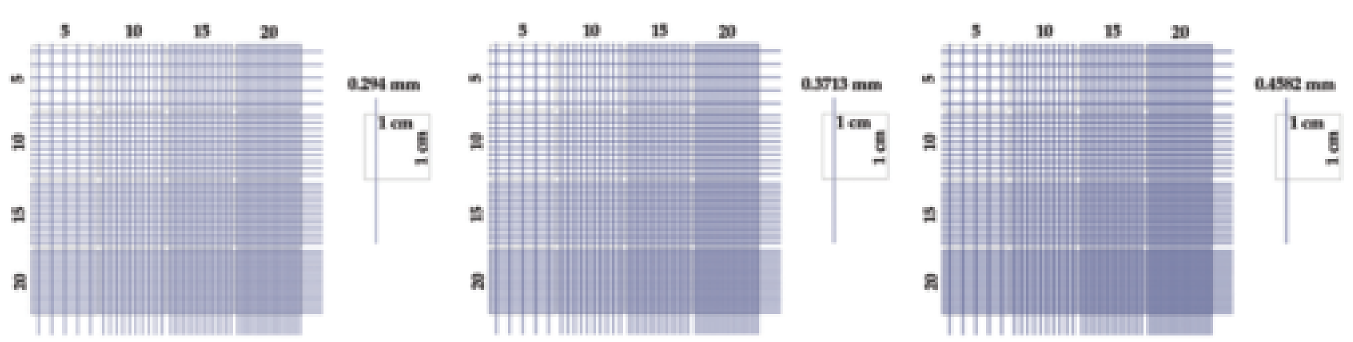


Figure 6.1.3. Different types of tabby fabrics illustrated with different numbers of threads per centimetre. The thread thickness is based on the average of the wool thread spun with spindle whorls of different weights in the TTTC experiments (chapter 4), (left) 4 g spindle (needing 13 g tension per warp thread), (middle) 8 g spindle (needing 18 g tension per warp thread), (right) 18 g spindle (needing 25–30 g tension per warp thread).

can therefore vary more (see also chapter 4.5). For example, at one point in the fabric there could be 5 threads per centimetre, but 7 threads per centimetre at another point. In general, the warp threads in a tabby are more moveable than in a twill fabric. According to analyses of archaeological textiles, tabby fabrics often vary by 1–3 threads in a centimetre, and sometimes more. Moreover, the thread count in a textile when it is on the loom can alter when it is cut down, and when it has been finished (see chapter 4.5). The visual appearance of a fabric will vary according to the thickness of the thread and the number of threads in the warp and the weft (Fig. 6.1.3). A fabric can be balanced, with approximately the same number and type of threads in both the warp and the weft (Figs. 6.1.4–5). A fabric can also be unbalanced; in a weft faced fabric there are more and/or thicker weft threads than warp threads per centimetre[2] (Fig. 6.1.6), while in a warp faced fabric there are more and/or thicker warp threads than weft threads per centimetre[2]. For a 2/1 twill using three rows of loom weights the thread count would be approximately 1.5 times the estimated thread count given for tabby fabrics, while for a

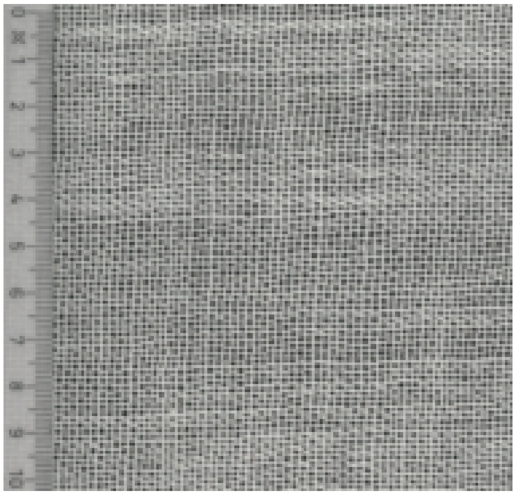
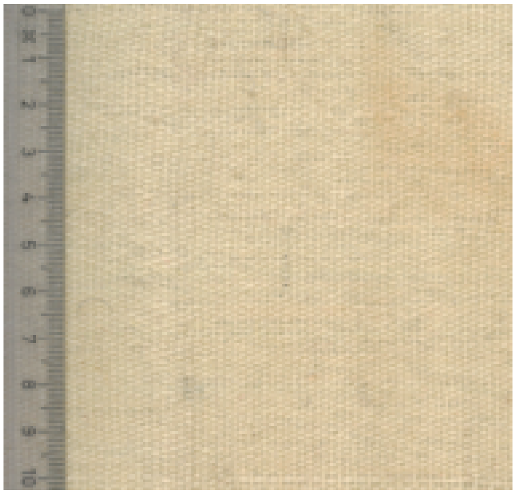


Figure 6.1.4. Balanced open tabby, with an average of 6.1 warp threads and 7.4 weft threads per cm (wool fabric) (photo: CTR).



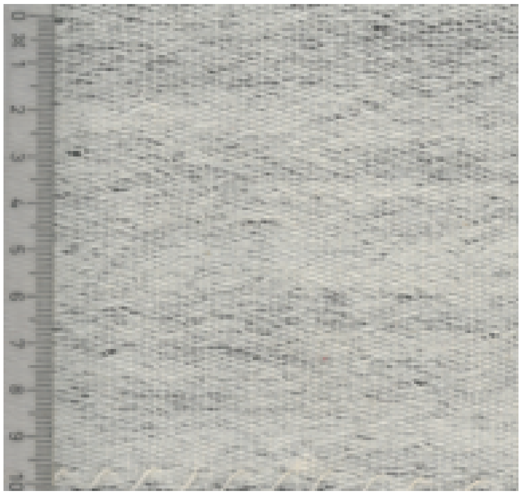


Figure 6.1.5. (left) Balanced tabby, 14 warp and 14 weft threads per cm (linen fabric) (photo: CTR).

Figure 6.1.6. (right) Weft faced tabby, with an average of 5.8 warp threads and 14.8 weft threads per cm (wool fabric) (photo: CTR).

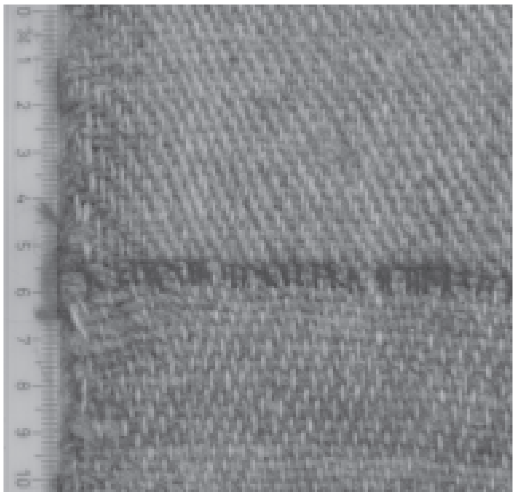


Figure 6.1.7. (left) 2/1 twill, with an average of 6 warp threads and 4 weft threads per cm. The top half shows the twill structure, while the lower half shows the reverse side with the tabby structure (photo: CTR).

Figure 6.1.8. (right) 2/2 twill, with an average of 14.6 warp threads and 14.6 weft threads per cm (photo: CTR).

Warp thr/cm	5 g, N=0	7.5 g, N=0	10 g, N=0	12.5 g, N=13	15 g, N=35	20 g, N=35	25 g, N=35	30 g, N=35	35 g, N=35	40 g, N=22	45 g, N=0	50 g, N=0	55 g, N=0	60 g, N=0	65 g, N=0	70 g, N=0
1 thr																
2 thr																
3 thr																
4 thr																
5 thr									3	9						
6 thr								3	21	6						
7 thr							3	21	11	7						
8 thr							15	4								
9 thr						3	10	7								
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14 thr				3	9											
15 thr					10											
16 thr				6												
17 thr																
18 thr					7											
19 thr				4												
20 thr																

Figure 6.1.9. The number of warp threads per cm in relation to thread tension. N= the number of loom weights from the specific group (in this case 35 loom weights) that could be used with thread needing the given tension.

2/2 twill using four rows of loom weights the thread count would be approximately double (Figs. 6.1.7–8).

The N number (used in the figures throughout chapter 6 that show the number of warp threads per centimetre in relation to thread tension) refers to the number of loom weights from the specific group that could be used with thread needing the given tension; for example, 30 g, N=35 indicates that 35 of the loom weights from this specific group would function well with a thread needing 30 g tension (see Fig. 6.1.9). With these loom weights and 30 g warp tension, it would be possible to weave fabrics with 6–9 warp threads per cm. Most of them (21) would be suitable for producing a fabric with 7 warp threads per cm.

The sites analysed cover a wide time span and geographical area, with some areas and periods within the Bronze Age being much better represented in the database than others (see chapter 5.1). Therefore, of course, the results of the analyses cannot provide a wholly representative picture of textile production in this region during the Bronze Age. Instead, the different sites will give information on how textile production can be visualised in different contexts, periods and regions and how it is possible to combine the recording of textile tools, textile technology, experimental archaeology and context description in order to obtain a better understanding of textile production in the past.

Note

1 Please note that the analyses of textiles and textile production at the two sites, Arslantepe, Turkey and Ebla, Syria have already been published (Frangipane *et al.* 2009; Andersson *et al.* 2010).

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