

Tel Kabri - Textile Technical Textile Tools Report

A total number of 90 textile tools are recorded in the CTR db. 67 tools have been dated to MBIIB while the other 23 tools have very wide range of dates, from late Neolithic until Ottoman E1. In this report we will therefore focus on the tools from MBIIB contexts. The textile tools are all from the palace area and tools coming from the same context will be discussed together.

Only 4 spindle whorls are recorded in the CTR db. 1 spherical and 1 lenticular spindle whorl are made of clay while 2 convex shaped whorls are made of bone and stone respectively.

Find ID	Material	Type	Weight	Diameter
KBR-2606/101	clay	spherical	8	28
KBR-2699/100	stone	convex	14	30
KBR-2910/100	bone	convex	not known	26
KBR-9312/100	clay	lenticular	21	42

Figure 1. spindle whorl information on material, type, weight and diameter.

The spindle whorls are from different contexts and only one is found in a room. The analysis of the spindle whorls indicates a production of thin to medium spun yarn (c. 0.3-0.7 mm).

Only 1 loom weight is made of stone while the majority of the weights are made of fired clay. In the dB there is no information, due to the preservation status of the weights, on loom weight type on 19 of the loom weights. 37 loom weights have a conical shape while the remaining 9 weights are conical truncated.

The majority of the loom weights are from different contexts but in two contexts 7 and 9 weights respectively were found in same contexts. However it is unclear if the loom weights were found together and they can therefore not be considered as sets of loom weights.

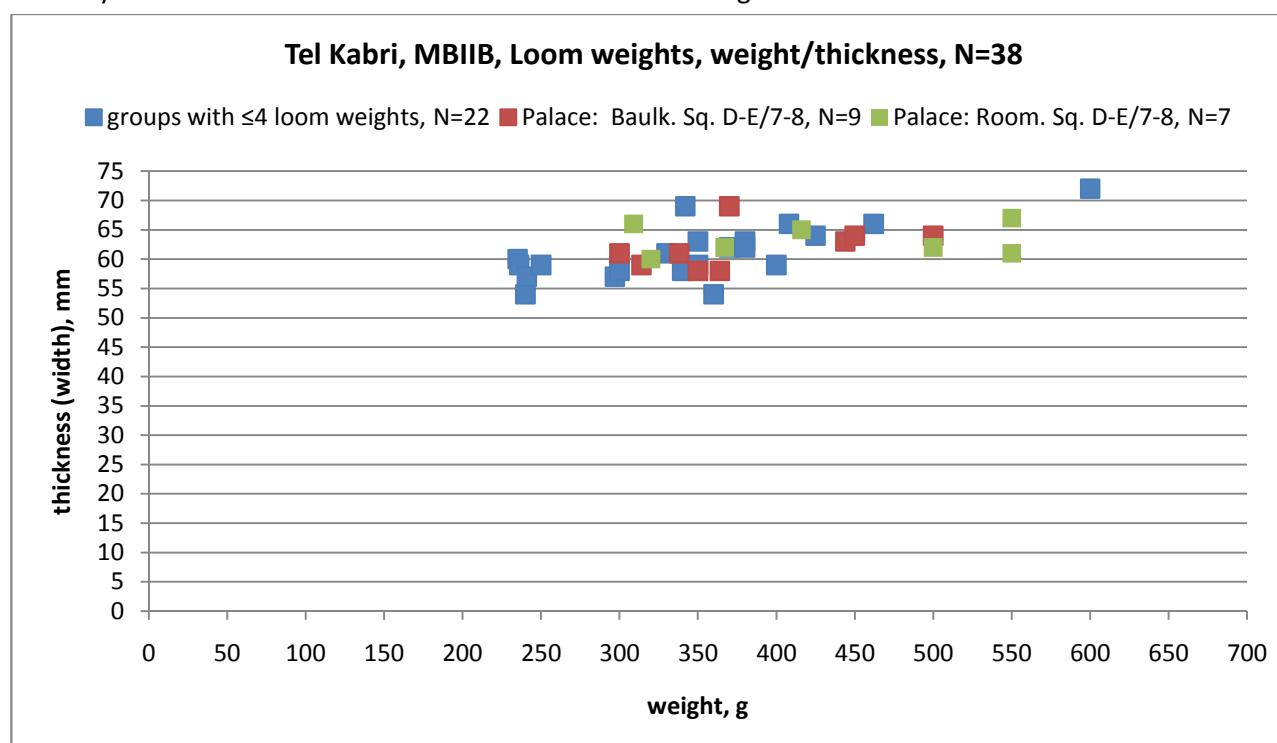
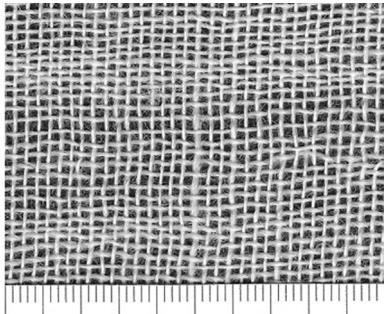


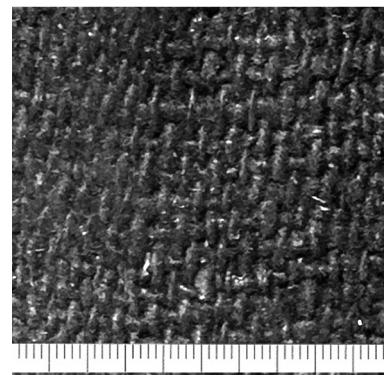
Figure 2. The relation between loom weight weight and thickness.

38 loom weights had a recordable weight and thickness (width). As can be seen in figure 2 the loom weight weight varies between 235 g to 600 g and the thickness varies between 55 and 72 mm.

When analyzing these loom weights it is clear that they could have been used for producing different types of fabrics. All weights could have been used in both tabby and twill set-ups. The smallest loom weight would function in a set-up with threads needing 10-15g tension (0.2-0.3 mm in thread diameter) and the fabric would have 4-8 warp threads per centimetre in a tabby weave using 2 rows of loom weights, 6-8 warp threads in a 2/1 twill and 8-16 warp threads in a 2/2 twill using 4 rows of loom weights. The heaviest and thickest loom weight was used in a set-up, if this weight would function best with threads needing 20-60 g tension (0.4-1.2 mm in thread diameter). This fabric would have 3-8 warp threads per cm in a tabby, 4-13 warp threads in a 2/twill and 6-17 warp threads in a 2/2 twill. It is clear that these two loom weights would not have functioned optimally together however, it is likely that the majority of the loom weights, even if not recovered from the same area, could function in the same set-up. The two examples above just give the outer range in maximum and minimum qualities that could have been produced.



(i)



(ii)

Figure 3i and 3ii. Two fabrics, both with 6 warp threads per cm, but totally different, one open and with a thread diameter of ca. 0.5 mm (i) and one dense and with a thread diameter of ca. 0.9 mm. (ii).

As written in the introduction, the thread thickness does affect the fabric so even if the number of warp threads per centimetre does not vary so much the suggested fabrics above would be completely different, depending on the choice of loom weight and thread. Figure 3i and 3ii demonstrates an example of a tabby with approximately 6 warp threads per centimetre. Even if the difference in thread diameter is only 0.4 mm the tabby woven with thicker thread is much denser than the fabric woven with a thread diameter of 0.5 mm. The results of the analyses of the lighter loom weight also indicates that the fabrics would be either very open and or weft faced while the other loom weight are more suitable for denser fabrics.

To produce 2m² of the coarsest suggested fabric with 4 threads in warp and weft in a balanced tabby one would need to spin 1632 m yarn . According to the TTTC experiments it would take approximately 33 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Starting border (width of the fabric): 100 cm

Number of loom weights needed: 28 (2 rows of 14)

Number of warp threads: 400 threads, 2 m each=800 m

Weft in a balanced tabby = 800 m

Total amount of yarn with weft 1 (+ 2%) = 1632 m

Figure 4. A balanced tabby setup calculated on 60 g warp tension with 4 threads per cm.

To produce 2m² the suggested twill fabric with 16 threads in warp and weft one would need to spin 6528 m yarn. According to the TTTC experiments it would take approximately 187 hours to spin the thread needed to produce the fabric in this setup. Time for sorting and preparing the fibres is not included, neither is time for preparing the setup, weaving and finishing.

Starting border (width of the fabric): 100 cm

Number of loom weights needed: 68 (4 rows of 17)

Number of warp threads: 1600 threads, 2 m each=3200 m

Weft in a balanced twill = 3200 m

Total amount of yarn with weft 1 (+ 2%) = 6528 m

Figure 5. A balanced 2/2 twill setup calculated on a thread needing 10 g warp tension (c. 0.2mm) with 16 threads per cm.

In these two examples we have chosen one tabby and one twill set-up. As mentioned in the introduction there are very few finds of twill fabrics from the Bronze Age Mediterranean but it should be noted that a production of twill fabrics cannot be excluded because of the tools: the warp weighted loom and the loom weights.

Summary

The analyses of the tools from Tel Kabri dated to MIIB indicate a varied production of different types of textiles, textiles woven with thin threads and textiles woven with thicker thread. However, the analyses of the 4 spindle whorls demonstrate that only the thinner threads would have been spun with these whorls. It cannot be proved that the weavers in Tel Kabri produced twill fabrics but the nature of the loom weights themselves means that this cannot be excluded as a possibility.