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Harappan Textiles and Tools of Trait from Rakhigarhi, Haryana

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Introduction

Textile based cottage industry of the Harappans primarily thrived on quality products of cotton and woollen fabrics, carpets and embroidery but due to the perishable nature of fibrous components their archaeological records are few and far between. Handful of Harappan figurines bedecked with stitched and unstitched apparel suggests preference of inhabitants for woven fabrics both in clothing and furbishing furniture and floorings. It was an important traditional household craft of the Harppans, producer of high-quality fabrics, inherently to meet the requirements of inland and overseas trade. There might have been some state control over the sale of fabrics and carpets as the sale of finished products was an important source of earning. Reason behind reliance on the textile industry was production of cotton in the provinces of Sindh, Rajasthan, Punjab, Haryana and parts of western Uttar Pradesh where Harappan settlements were located. The Mesopotamian text narrates import of textile products (Ratnagar, 1981) from Meluhha (greater Sindh region). Subsequently cotton grown in this region became an early source of development of textile industry and products thereof served as commodity of the Indian Ocean trade network in the Roman world. Terms like *sindhu* and *sindon* occurring respectively in the Babylonian and Greek texts for cotton were derived from the Indus region.

In spite their perishable nature, palaeobotanical evidence of cotton (Table No.1) and linseed/flax (Table No. 2) and artefactual remains of tools of trait from the Harappan occupations located in the Indus and the Sarasvati system provides reasonable clue for the reconstruction of structure of textile industry. Relevant data obtained from the excavations at Rakhigarhi (29^0 17' 30"N; 76^0 06' 50" E) have been pieced together to understand, with the help of ethnographical parallels, the stages of production the Harappan textile industry had to undergo. The site catchment analysis carried out at Rakhigarhi (Nath and Garge, 2014) supports the intensity of exploitation of resources by ancient community which included availability of suitable arable land to cultivate domesticated fibrous plants like cotton and possibly flax as well. Further, accessibility of ancient community to agriculturally marginal lands for pastoral use and pockets of gallery forests extended up to the edges of hilly zones had offered an opportunity to rear sheep and goat to shear wool as another vitalsource of fibre. The cultivation of domesticated cotton crop and breeding of sheep and goat in the region of Rajasthan, Haryana and Punjab are vital source of subsistence and sustenance of fabric based industry in the region.

Present study highlights exploitation of resources by the Harappans in nourishing the textile industry at the site by piecing together the actual remains.

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of woven fabrics, tool components and activity area used in the process of manufacture.Like previous works on textile remains, the present study has also relied on actual finds to determine the nature of fabric(s). The present study based on specific micro morphological determination of species of fabrics has creditably been carried out by Prof. S. M. Ishtiaque in his dedicated laboratory of Polymer and Textile Department of the Indian Institute of Technology, Delhi. Two pieces of fabrics were found inadvertently sticking over the painted surface of the Black-on-Red Ware. This unregistered specimen of medium size vase could be located in the course of periodical dusting of pottery kept in the study collection of the Rakhigarhi report writing unit, currently housed in the PuranaQuila, New Delhi. Other registered fragment of a terracotta horned cattle toy cart frame included here for study retains cord remains of vegetable fibre across the perforated part of the frame. Third example is impressions on the copper toe-rings, a rare example of thread of fine fabric preserved due to process of metal salts.

Figure 1: Rakhigarhi: Black –on-Red ware vase fragment showing remains of textiles enlarged at A and B
Photo Courtesy: Author

Figure 2: Rakhigarhi: *Charkhi* or *dabbi* type bobbin, wooden stick and thread restored as part of experiment , Photo Courtesy: Author

Fourth sample of burnt fabric was found sticking to the mud floor. In addition to these examples of woven fabrics, dyeing vat floor, archaeo-botanical remains, terracotta figuring showing stitched and unstitched clothing, and certain tools of trait denoting the nature of onsite textile craft have also been incorporated in the discussion. Pursuance of methodical study of these materials may enable in structuring the textile based cottage industry and its impact on the contemporary subsistence pattern.

Textilesand ArchaeobotanicalRemains of the Harappans

The earliest evidence of cotton seeds and mineralized thread in a copper bead was recorded in the Neolithic context (*c.* 6000-4500 BCE) at Mehrgarh (Costantini, 1983) while seeds of linseed/flax (*Linumusitatissimum*) from Sub-period IB (*c.* 2850-2600) and cotton (*Gossypiumarboreum/herbaceum*) from Sub-period IC (*c.* 2600-2500) were noticed in the Early Harappan horizon at Kunal (Acharya, 2008). Apart from these finds, Kunal has also reported indigo seeds in the Early Harappan context. Likewise weeds of goosefoot (*Chenopodium album*) and worked specimen of hematite for extracting vegetable and mineral colours were documented from the Early Harappan horizon at Rakhigarhi (Nath, 2017). Other important findings of the Mature Harappan period were from Mohenjodaro (Gulati and Turner, 1928), Harappa (Weber, 1999), Banawali (*IAR* 1994-95: 96) and Late Harappan period reported at Sanghol (Saraswat, 1997) and Hulas (Saraswat, 1993).

Figure 3: Rakhigarhi: Terracotta spindle, wooden stick and thread restored as part of experiment, Photo Courtesy: Author

Excavated remains from Harappa have provided examples of plain-weave fabric impressions on the interior of faience vessels. Suspected cotton fabrics from Harappa were found wrapped around the handle of a copper mirror and another around the handle of curved razor (Kenoyer, 1998). At Mohenjodaro similar fabrics were found preserved over a corroding silver jar and copper tools (Kenoyer, 1998).

Apart from these textiles find, evidence of silk thread inside copper and steatite beads from Harappa and Chanhudaro respectively, dating back to *c.* 2450-2000 BCE, accounts for the earliest archaeological occurrence of silk outside Chinese domain. Consequently, the traditional historical notion of sericulture being Chinese invention deserves to be viewed in a wider perspective. Specific micro morphological study of silk finds from Harappa compares well with wild species of *Antheraceassamensis,* while Chanhudaro species, a type of South Asian moth, relates to *Philosamia* spp. (Eri silk) (Good *et al*.,2009) (Table No. 3).

Figural Exemplification of Apparel

Figural representations of human and animal forms are marked with woven fabrics of stitched and unstitched varieties. Male apparel of unstitched type for covering upper part of body was generally seen worn by priests or nobility both in covering and uncovering modes. In case of covering mode both the shoulders were covered and uncovering or open mode one shoulder was left bare. In case of formal wear in open mode there were two ways of shrouds; the example from Rakhigarhi had left shoulder bare while the priest from Harappa whose shawl bedecked with trefoil appliqué motif had right. Another unstitched garment was *dhoti*. Here also the affluent had long dhoti to wear, extended below the knees, and the marginalized had short *dhoti* draped above knees. These observations are based on painted scenes occurring over Black-on-Red Ware vase fragments reported from Rakhigarhi (Fig. 1) and Harappa. The specimen from Harappa depicts a fishermen wearing short *dhoti*. Similarly, the length of *kurta* of rich was long and loose, while poor relatively short and tight. Sash and scarf were another formal wear of the nobles.

Table No. 1: Palaeobotanical remains of cottonseeds and fabric from Indo-Pak region

Name of site	Nature of finds	Chronology	Source of publication(s)
Mehrgarh, Baluchistan	Seeds; thread in copper bead	Neolithic, 6000-4500 BCE	Costantini, 1983; Moulherat*et al,* 2002
Mohenjodaro	Cloth	Mature Harappan, 2600-2000 BCE	Gulati and Turner,1929
Balakot, Sindh	Type of pollen akin to *Gossypium*	Mature Harappan, 2500-2000 BCE	Dales, 1986
Harappa	Seed(s); earlier reported as textile	Mature Harappan, 2600-1900 BCE	Weber, 1999
Kunal	Seed(s)	Early- Mature Harappan, Period-IC, 2600-2500 BCE	Saraswat and Pokharia, 2003; Acharya, 2008
Banawali	Seed(s)	Mature Harappan 2200-1900 BCE	*IAR 1994-95*:96
Rakhigarhi	Cotton cloth remains	Mature Harappan 2200-1900 BCE	Author's unpublished data
Rakhigarhi	Charred cloth remains	Mature Harappan 2200-1900 BCE	Author's unpublished data
Sanghol	Seed(s)	Late Harappan, 1900-1400 BCE	Saraswat, 1997
Hulas	Seed(s)	Late Harappan, 1800-1300BCE	*IAR 1986-87*:132
Kanmer, Kacchh	Seed(s)	Late Harappan, 2000-1700 BCE	Kharakwal*et al*.2007

Table No. 2: Palaeobotanical remains of linseed/flax (*Linumusitatissimum*) from Indo-Pak region

Name of site	Nature of finds	Chronology	Source of publication(s)
Harappa	Seed(s)	Mature Harappan, 2600-1900 BCE and Late Harappan, 1900 - 1700BCE	Weber, 1999;
Kunal	Seed(s)	Sub Period IB Early Harappan 2850	Saraswat and Pokharia, 2003; Acharya, 2008
Nausharo, Baluchistan	Seed(s)	Mature Harappan, 2500-2000 BCE	Costantini, 1992
Rakhigarhi	Fossilized thread possibly of flax	Mature Harappan, 2500-2000 BCE	Author's un published data
Balathal, Rajasthan	Seed(s)	Chalcolithic, 2500-2000 BCE	Kajale, 1996
Sanghol	Seed(s)	Late Harappan, 1900-1500 BCE	Saraswat, 1997
Rojdi, Saurashtra	Seed(s)	Late Harappan, 2000-1700 BCE	Weber, 1991

Table 3: Remains of Silk in the Harappan context

Name of site	Nature of finds	Chronology	Source of publication(s)
Harappa	Thread in copper bead	Mature Harappan, 2450-2000 BCE	Good *et al*., 2009
Chanhudaro	Thread in steatite bead	Mature Harappan, 2450-2000 BCE	Good *et al*., 2009

As compared to formal clothing of male, the female dresses had variety, more in terms of stitched and embroidered than unstitched type. Terracotta female figurines reported from Harappa and Mohenjodaro represents a variety of dresses, to mention a few, chess board patterned full sleeved ball gown type party wear, short skirt girdled by *mekhala* (waistband), tight fitted tunic with overlapping knee length skirt. The famous seal of a *pipal* tree divinity, depicting in its lower segment a row of seven female figurines each wearing close fitted tunic and leggings. Here, lower portion of tunic is seen obliquely cut resultantly the back portion is elongated while the front shortened. These varieties in stitched clothing indicate contemporary consciousness towards the elements of fashion in setting trends. Incidentally, legacy of such trendy skirts, cloaks, tunics and leggings has been revived as fashion statement in modern times.

In addition to rich evidence of human apparel, there were a couple of terracotta models of furniture furbished up with designer cloaks. The cot from Kalibangan was furbished of embroidered bedspread (Lal*et al*., 2003), while the stool from Chanhudaro covered by printed/painted variety cloth (Kenoyer, 1998). In this series two stools from Rakhigarhi had untreated plain wash top perhaps to suggest spread of plain cloak. Apart from furbishing furniture, the Harappans had insight to design animal outfits for their domesticated animals; their legacy survives even today. A terracotta bull figurine embodies an outfit which was bedecked with beaded central strap spreading over the back and appliqué design elements stitched at intervals over the body cloak (Fig. No.3). Another example of a terracotta pet dog with a strap around the neck suggests use of leather in leashing pets (Fig. No.4). All these evidences put forward the types of products the Harappans had to manufacture to meet their social obligations of an urbanized society.

Tools of Trait and Activity Area

Excavations at Harappan sites have recovered specimens of impressions of plain weave fabrics. These fabrics indicate more or less uniform thickness of warp and weft threads reflecting use of spindle whorls and manually operated loom. Traditionally the loom was made of wood and had all those basic components comparable to back strap loom, still operative in the rural India. In rural Indian looms, woods of rosewood, *deodar, sisam, neem*, *pipal*, bamboo etc. are used, and the Harappans were familiar with these types of wood (*IAR 1975-76:87*; Saraswat and Pokharia, 2003; Lal*et al*., 2003). Discovery of accessories like loom weights of dressed bricks and stones from Mohenjodaro (Mackey, 1937-38) and Harappa (Vats, 1940), probably for upright frame looms and terracotta bobbins from Harappa (Vats, 1940) deserves mention(Gupta and Pathak 2008).

Other than a few accessories of loom weights roughly dressed out of burnt bricks and stones, and terracotta spool, *charkhi*, bobbin and square tablet used as weaving apparatus, the excavations at Rakhigarhi have recovered numerous examples of spindle whorls dressed and moulded out of pottery, stones and terracotta. Ethno archaeological parallels suggest the use of large rounded stones wrapped in sets of cords (heddles) to weigh down extra warp thread. Similar function of sling balls was observed in the early historical context (Mitra, 1972). Couple of loom weights of bricks of cylindrical shape from Rakhigarhi was possibly used for holding the loom in position Identical one was reported from Lothal (Rao, 1985). Terracotta bobbin, a kind of spool or reel for holding spun yarn or thread was another rare discovery so was *charkhi* or *dabbi* type bobbin (Fig. 2). Earlier, Lothal had reported two variants: one with three perforations on the margin of disc and other six (Rao, 1985). Handful occurrence of earlier terracotta spindles suggests its specific nature of product as compared to those dressed out of pottery found in good number. The tablet weaving apparatus from Rakhigarhi was perhaps used in weaving narrow strips of fabric to produce shawls or clothing as body shrouds. These narrow strips of fabrics are still being sewn together to form wide shawls or spreads in parts of rural India. Types of needles were introduced in sewing, piercing, knitting and embroidery. Traditionally needlecraft or embroidery was done in the home as a cottage industry by needlewomen as their pastime. A copper needle with pointed end and an eye for thread at the other end, providing an indirect evidence

of sewing and embroidery was reported from this site Another evidence of indirect nature was that of a copper/bronze adze with distinctive curve, functionally akin to the one being used in cutting the unwanted projecting threads of pile carpets Similar finds were earlier made at Harappa (Kenoyer, 1998) and at Banawali (Bisht, 1993).

Apart from tools and implements used in the textile manufacture, the site had exposed a dedicated structure of burnt brick-bats paved floor which functioned as dyeing space. It was aligned parallel to the public drainage system, located on the southern edge of the settlement of RGR-1.

The floor as such had natural gradient towards the public drain for smooth discharge of wet wastes. There were remains of four circular pit-like cuttings to accommodate dyeing vats. Two sets of postholes seen on either side of the circular cuttings over the floor were supporting parallel wooden bar for squeezing dyed hanks. This activity area was located towards the southern margins of habitation with a purpose to prevent the inhabitants from the smelly generated in the process of dyeing. The floor had reported weeds of goose foot (*chenopodiumalbum*) in two consecutive field seasons, which were used in extracting green colour. Speculatively, location wise away from the habitation, the other function of this floor could be flax retting. Such operation is normally carried out in special locations where vats or pits are constructed for this process (Fuller, 2008). Here, at Rakhigarhi, location of activity area on the peripheral zone of habitation area and evidence of four circular pit-like cuttings to accommodate vats suggests this possibility of additional function. Evidence of working space used for colouring textiles was reported from Mohenjodaro and Harappa in the Mature Harappan context. Mohenjodaro had revealed a floor with a specially prepared a series of brick basins over a water tight floor and corner drains which was identified as a workshop for starching or dyeing cloth. (Kenoyer, 1998). At Harappa a series of circular brick platform was possibly utilized in the preparation of indigo dye or dyeing (Kenoyer, 1998). Incidentally indigo seeds were reported from Kunal (Acharya, 2008) in the Early Harappan context and Mohenjodaro (Kenoyer, 1998) reported madder, an herbaceous plant (*Rubcatinctorium*) with yellowish flowers, from which red dye was obtained from its roots.

Textiles evidence from Rakhigarhi

As noted above, the site had good fortune to report four woven fabric related evidence, out which charred piece of textile imbedded over mud floor in a poor state of preservation could not be lifted. It was an evidence of fine plain weave produced out of cotton threads (Fig. No.12). Another specimen of corroded jumble of toe-rings originally wrapped in cloth with gold and silver ornaments were found in a hoard kept in a copper vessel. Tradition of wrapping of ornaments in fine piece of cloth is still prevalent in parts of India. The bezel attached to ring had impressions of fine weave preserved by metal salt. A terracotta bull headed toy-cart frame had remains of fossilized cord of vegetable fibre sticking to its perforation. The substance was fragile and its quantity too meager to dispense with, hence it was preferred to keep laboratory analysis in abeyance. The bast-like stuff is of pale yellow colour, suspected to be that of linseed/flax (*Linumusitatissimum*). Indian flax notable for high yield is yellow textured fibre was reported from Harappansites which included Harappa and Kunal as well (Table No.2).

Of all these limited evidence, the discovery of a pottery fragment of Black-on-Red ware vase bearing two pieces of woven fabrics glued to its upper painted surface has become rarest of the rare textile finds of the Harappans discovered as of now (Table No.1). The one slightly bigger in size (27 x 13 mm) is affixed over shoulder portion of the pot while the tiny one (4 x 4 mm) below neck (Fig. No.15). The microscopic examination of these fibres was creditably carried out by Prof. S.M. Ishtiyaque of Polymer and Textile Department of the Indian Institute of Technology, Delhi. The analysis of the fibres in his laboratory has revealed that these were of cotton fabric (*Gossypiumarboreum L/ herbaceum L*). Although the fibres were evenly twisted, marked with tight weave, retained the characteristic feature of cotton thread, i.e. hollowness at irregular intervals throughout their length.

The weave of these fabrics was plain, i.e. with an almost equal number of picks and ends per unit length. The even thickness of threads reflects use of spinning wheels, which allowed more uniform tension and twisting than hand-spun threads.

Concluding Remarks

An attempt has been made to take stock of textiles finds and artefactual evidence from Rakhigarhi with a view to evaluate its contribution to the history of cottage industry of textile of the Harappans. Artefactual specimens have offered clue to various stages of manufacture. Archaeobotanical evidence suggests cultivation of cotton, followed by labour intensive processes of plucking of cotton ball, cleaning, ginning, carding and twisting etc. to prepare cotton spinning-worthy. Excavations at Rakhigarhi have recovered spindle whorls common to other Harappan sites, but occurrence of other tool components like spinning wheel (*charkhi*), pre-loom preparation equipment like spool or reel and bobbin, hand loom weaving accessories like loom weights and perforated tablet apparatus used in weaving strip of cloth may be regarded as new spares in the reconstruction of yarn to fabric stage of textile industry. Discovery of copper needle, in addition to stitching, indicates other functions of ornamentation of fabrics through embroidery and appliqué work. Likewise, copper adze functionally akin to the curved blades used today by the carpet weavers for cutting the knotted threads of pile carpet, undisputedly trace back the history of carpet making to the Harappan era.

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