

Original Article

Writing Materials Associated with the Modi Script: Ink-Making Techniques, Paper Manufactories, and the Physical Preservation of Records

Dr. Kapil Vandana Anadpind Rajahans

Asst. Professor, Department of History, Jaywant Mahavidyalay, Ichalkaranji

Email: kapilrajahans@gmail.com

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Abstract

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*This paper analyzes the material culture, physical mediums, and preservation technologies that supported the administrative bureaucracy of the Maratha Empire through the cursive **Modi Script**. Moving past purely textual or linguistic histories; this study evaluates the specific physical elements of pre-colonial documentation. Utilizing primary historical sources—including the administrative karkhana accounts from the Selections from the Peshwa Daftar, the Adnyapatra, and regional record bundles—this paper explores the chemical composition of indigenous black inks (Shahi), the manufacturing of specialized hand-made papers like **Junnari paper**, and the precise physical methods utilized by the state record office (Daftarkhana) to preserve documentation.*

Keywords: Modi Script, Maratha Administration, Indigenous Ink (Shahi), Junnari Paper, Daftarkhana, Archival Preservation, Material Culture, Paper Manufacturing, Iron-Gall Ink, Maratha Bureaucracy

1. Introduction: The Materiality of Administrative Literacy

The capacity of an early modern empire to govern vast subcontinental territories depended on its ability to produce millions of reliable, long-lasting records. In the Maratha state, this bureaucratic need was fulfilled by the cursive **Modi Script**, which allowed state scribes (*Karkuns*) to write rapidly without lifting the reed pen from the paper [1].

However, the speed of this script required an equally functional material infrastructure. Scribes required inks that dried quickly without smudging, paper that could withstand rough field transport, and storage methods that protected documents from the tropical climate [2].

The Maratha court institutionalized this production process under the state-regulated *Karkhanas* (manufactories). The state recognized that the physical durability of a document was essential for protecting land titles, tax ledgers, and diplomatic agreements, prompting precise standards for ink compounding, paper making, and archival protection across the Deccan [3].

2. Chemical and Artisanal Composition of Modi Inks (Shahi)

The ink used for writing Modi records had to possess specific material qualities: it required an intense black pigment for legibility, a fluid viscosity to prevent clogging the reed pen, and natural chemical properties to resist fading and water damage over centuries. The production of this ink, known as *Shahi* or *Mas*, followed a standardized chemical formula managed by specialized court artisans [4]:

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Address for correspondence:

Dr. Kapil Vandana Anadpind Rajahans Asst. Professor, Department of History, Jaywant Mahavidyalay, Ichalkaranji

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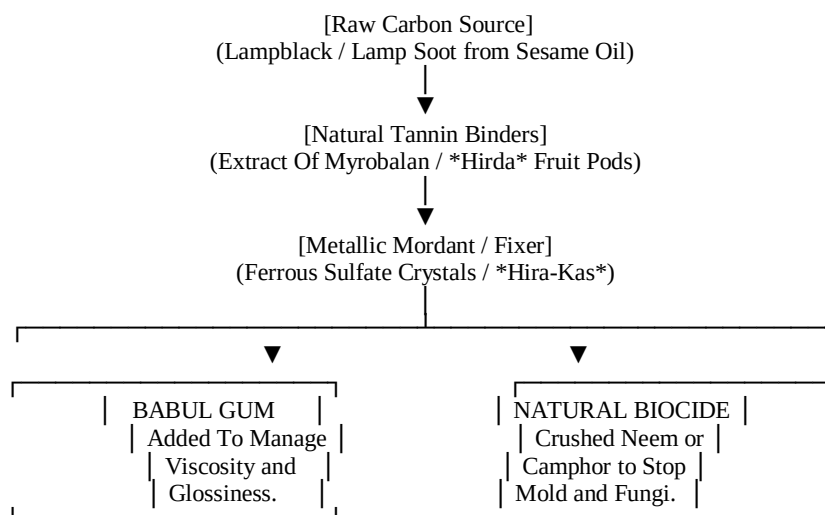
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2.1 Carbon Black Collection and Tannin Blending

The base pigment was carbon black, collected as lamp soot (*Kajali*) by burning organic oils, primarily sesame or castor oil, under earthen vessels. This pure carbon was then blended with a concentrated extract derived from boiling the dried pods of the **Hirda fruit** (Chebulic myrobalan), which grows abundantly in the Western Ghats. The *Hirda* extract provided essential natural tannins that bound the carbon particles together [4].

2.2 Metallic Fixation and Chemical Reaction

To make the ink permanent, compounds added ferrous sulfate crystals, locally known as **Hira-Kas**. The iron in the *Hira-Kas* chemically reacted with the tannins from the *Hirda* fruit, converting the solution into a rich, permanent iron-gall ink. This formulation chemically bonded with the cellulose fibers of the paper, making the text virtually impossible to wash off or erase without destroying the underlying paper sheet [5]. Scribes completed the recipe by adding gum arabic (from the *Babul* tree) to control viscosity and a small amount of camphor or crushed neem extract to serve as a natural biocide against mold and fungal growth [6].

3. Paper Manufactories: The Dominance of Junnari and Daulatabadi Papers

The Maratha administration consumed vast quantities of hand-made paper, which led to the development of dedicated paper-making quarters known as *Kagzipuras* in key strategic towns across the empire.

3.1 Junnari Paper and the Basaltic Water Advantage

The town of **Junnar** in the Pune district emerged as the premier paper-manufacturing hub for the Maratha state. Scribes prized **Junnari paper** for its exceptional toughness, smooth surface texture, and resistance to tearing [7].

The manufacturing process utilized raw materials like old jute gunny bags, flax fibers, and waste cotton rags. These materials were thoroughly washed, macerated in water-driven stamping mills, and converted into a fine pulp.

The primary advantage of Junnar was its access to the clean, lime-free, and mineral-rich mountain water flowing over the local basaltic beds. This pure water composition prevented the paper pulp from turning acidic, giving Junnari paper an organic longevity that preserved it from turning brittle over time [8].

3.2 The Sizing Process (*Khala*)

Once the paper sheets were lifted from the pulp vats using fine bamboo screens, they underwent an intensive sizing process known as *Khala*. Scribes applied a thin paste made from rice starch or wheat flour to both sides of the dried sheet.

Once dry, the paper was polished using a smooth piece of agate stone (*Ghotas*) [7]. This sizing layer closed the pores of the paper, preventing the iron-gall ink from bleeding or feathering during rapid Modi writing and creating a smooth surface that allowed the reed pen to slide quickly across the page [9].

4. The Writing Instrument: Boru (The Reed Pen)

The physical execution of the Modi script was entirely dependent on the **Boru** (a pen fashioned from natural hollow reeds). Scribes sourced these reeds from the marshy banks of the Godavari and Krishna rivers, selecting stalks that had been naturally dried and seasoned to achieve optimal structural rigidity [10].

The preparation of the *Boru* was an art form that directly dictated the fluid execution of the script. Scribes used a sharp pen-knife (*Chasni*) to execute a precise, angled diagonal slice at the tip of the reed, followed by a subtle central split (*Chas*) [1]. This central split acted as a micro-reservoir, utilizing capillary action to draw ink from the well and distribute it smoothly onto the paper.

Because Modi is characterized by its continuous loops and variable line thicknesses, the tip of the *Boru* was carved with a specific slant. This allowed the scribe to shift from thick downward strokes to fine upward curves simply by varying the angle and pressure of the pen, maximizing writing speed across administrative ledgers [3].

5. Archival Preservation and Environmental Defense in the Daftarkhana

Once a document was written and verified, it was transferred to the **Daftarkhana** (Central Record Secretariat), which deployed a highly organized, indigenous system of physical preservation to defend the paper records from environmental decay.

5.1 The Rumal System and Fabric Culling

Individual paper sheets were rarely kept loose or bound into heavy leather books, which were prone to rotting in the humid Deccan climate. Instead, documents were stacked flat and tied securely inside square pieces of dyed cotton cloth known as **Rumals** [2].

These *Rumals* were color-coded by department or geographical province, allowing archivists to locate specific files quickly without exposing adjacent bundles to light and dust. The tight wrapping pressed the sheets together, minimizing the circulation of oxygen between the pages and significantly reducing the rate of paper oxidation and yellowing [11].

5.2 Natural Pest Repellents and Vault Design

To counter the constant threat of wood-boring beetles, termites, and silverfish, archivists placed natural insect repellents inside every *Rumal*. They utilized dried roots of **Vekhand** (Sweet Flag / *Acorus calamus*), which emits a natural aromatic oil that deters paper-eating pests [5].

The physical record rooms were constructed within stone fortresses or palaces featuring thick masonry walls, elevated stone platforms that isolated the files from ground dampness, and strict ventilation controls to manage indoor humidity during the heavy monsoon seasons, ensuring the safety of the empire's institutional memory [12].

6. Comparative Assessment: Material Properties of Contemporary Records

To understand the specific material durability and design choices of the Maratha documentation system, its components can be compared with contemporary regional networks:

Material Dimension	European East India Companies	Later Mughal Presidencies	Maratha Her Khate & Daftar
Primary Paper Medium	Imported European rag paper; high uniform quality but prone to foxing.	Premium hemp or linen paper manufactured in Northern <i>Kaqzipuras</i> .	Localized Junnari or Daulatabadi starch-sized basalt-washed paper.
Ink Chemistry	Standard carbon-logwood inks; water-soluble and vulnerable to washing.	Carbon-soot and gum Arabic ink; rich color but easily smudged if exposed to dampness.	Iron-Gall formulation (<i>Hira-Kas + Hirda</i>); permanent chemical binding.
Storage Technology	Heavy bound leather volumes stored on open wooden shelving units.	Bound leather-and-silk manuscript folders kept in library vaults.	Loose-sheet stacks secured inside chemically treated, color-coded fabric Rumals .

7. Conclusion: The Material Foundations of Durability

The technical analysis of the writing materials associated with the Modi script demonstrates that the administrative efficiency of the Maratha Empire was anchored in a sophisticated understanding of material chemistry, paper manufacturing, and environmental preservation. Far from being a loose or temporary system of record-keeping, the Maratha bureaucracy created a robust, deeply functional infrastructure designed to survive the climate and resource constraints of the Deccan.

By combining iron-sulfate mordants with local *Hirda* tannins to create permanent iron-gall inks, utilizing the pure mountain water of Junnar to manufacture acid-free paper, and using the *Rumal* system with *Vekhand* roots for pest defense, the **Daftarkhana** ensured that its legal and financial records remained legible across centuries.

The structural survival of millions of these historical documents into the modern era—retaining their deep black text and flexible paper structure—stands as clear material proof of the accuracy, efficiency, and advanced technological maturity of pre-colonial Indian archival governance.

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