



## Design and Development of Jamakkalam using Recycled Fibres- Part 1

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### Abstract:

Jamakkalam was introduced to the market in the late nineteenth century to compete with British-made textiles. They are typically woven from coarse yarns and are available in six standard colours: red, blue, green, white, orange, and yellow. The goal of this project is to design and develop jamakkalam using cotton as the warp and recycled cotton as the weft. The warp yarn will be spun on a rotor spinning machine with a yarn count of 5s Ne. Weft yarn will be prepared on a rotor spinning machine with a yarn count of 5s Ne. Natural dyes will be used to colour the weft yarn. The yarns mentioned above will be handloomed into jamakkalams. In the jamakkalams, design intervention will be done with jacquards, transforming the weave (twill weave), and varying pastel hues in the weft direction. The jamakkalams would serve a variety of aesthetic purposes with our design intervention. Product diversification is also being pursued. The physical, mechanical, and comfort properties of the raw materials (fibres), yarns, and fabrics will be tested. The results of the tests will be assessed and reported.

**Keywords:** Recycled cotton fibre, natural dyeing, rotor spinning, handloom, jacquard.

### 1. Introduction

Jamakkalam is more than a textile; it is a traditional craft practised for nearly two centuries that reflects the rich craftsmanship. Jamakkalam's relevance in today's world is dwindling. It is critical to act on its revival. This begins with understanding the origins, art, and artisans involved in the production of jamakkalam. It is originated in the Erode district of Tamil Nadu, in the village of Bhavani. It was first woven by the Jangamars, a community of weavers. They used a variety of coloured coarse threads. Bhavani jamakkalam has a GI label. Jamakkalams were originally woven in the homes of independent weavers. Hand looms supervised by master weavers became popular over time. Master weavers leased handlooms and contract weavers. These handlooms are owned by trade merchants, who obtain raw materials such as thread from neighbouring cities such as Coimbatore, Salem, and Karur. Nearly 20,000 weavers contribute to the development of Jamakkalam, with women accounting for two-thirds of the workforce. Because of the product's critical acclaim, other weavers began producing jamakkalams instead of traditional sarees and other cloths. These traditional carpets of Tamil Nadu are woven in a variety of sizes to meet a variety of needs — puja mats, dining mats, and so on. Jamakkalams are made to order for weddings and other social gatherings based on the dimensions required. Bhavani makes two kinds of jamakkalams. A type of jamakkalam with coloured bands is made with coarser cotton threads. Weavers were unable to incorporate design into the jamakkalams due to the coarseness of the thread. To address this issue, a second variety made of synthetic silk threads was introduced. These jamakkalams were softer, and weavers were able to incorporate different border designs. Pitlooms, stand looms, and other looms are examples of handlooms. Jamakkalams are woven on pit looms. Pit looms are made of wood. Threads run horizontally from one end to the other of these pit looms. The weaver sits in a pit dug in the ground, level with the weaving surface. The weaver operates the two pedals with their legs while simultaneously moving the shuttle across to produce the weaving pattern. Bhavani jamakkalams are exported to countries such as the United Kingdom, the United States, Sweden, Germany, Italy, and Singapore. In 1993, the Swedish company IKEA began importing jamakkalams from Bhavani for sale in its stores. Power-loom products have posed a challenge to hand-woven Bhavani jamakkalams since the year 2000.

#### 1.1 OBJECTIVES:

- To design and develop Jamakkalam from recycled fibre (cotton).
- Using Jacquard to design the Jamakalam.
- Yarns are dyed with natural dyes to achieve sustainability.
- To promote sustainability in the apparel industry, resulting in less pollution.
- Introducing designs in Jamakkalams using Jacquard, changing the weave, and introducing pastel colours.
- To put the jamakkalams through various physical and mechanical tests.
- To produce things that are beneficial to society.

## 1.2 MATERIALS

### 1.2.1 RECYCLED COTTON FIBRE:

Recycled cotton is defined broadly as the conversion of cotton fabric into cotton fibre that can be reused in textile products. This allows the item to be repurposed as something else, keeping it out of landfills and incinerators. There are two types of recycled cotton sources:

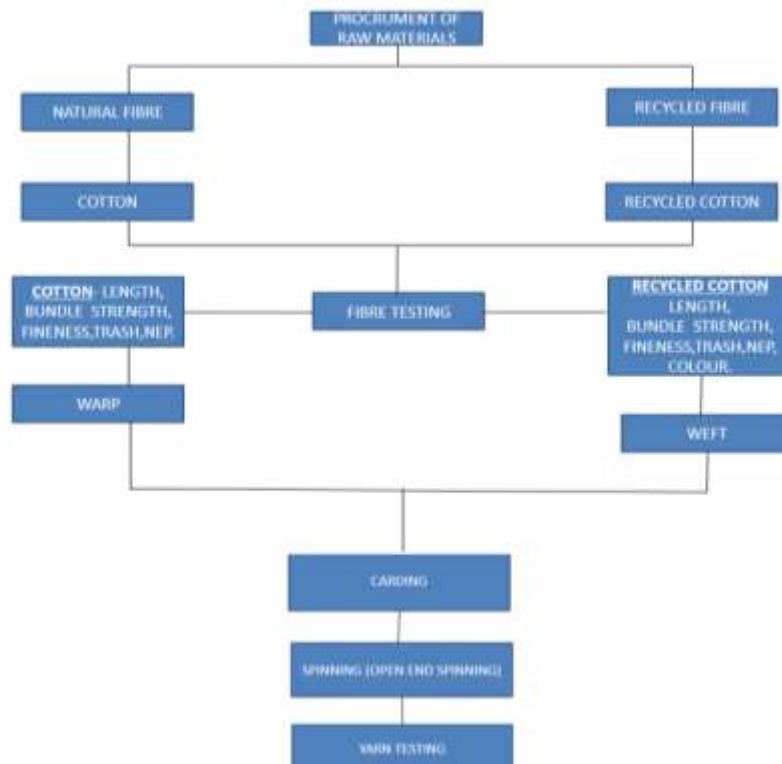
- Excess material from the production of yarn, fabrics, and textile products (post-industrial/pre-consumer)
- Post-consumer
- Used clothing
- Upholstery
- Towels
- Household items

Because of the shorter length of recycled cotton fibres caused by mechanical recycling, recycled cotton is less durable than virgin cotton. As a result, to improve durability, recycled cotton requires the addition of additional materials such as polyester. Raw cotton harvesting is a resource-intensive process that requires a lot of water, energy, and chemicals. Cotton recycling reduces waste and can be a more sustainable alternative to disposal because products can be made from existing textiles rather than raw materials, reducing the resources needed to harvest raw cotton. However, there are costs associated with cotton recycling, such as the risk of problem shifting and the environmental impact of transporting collected materials, that may outweigh the benefits.

### 1.2.2 COTTON FIBRE:

Cotton is a soft, fluffy staple fibre that grows in a boll, or protective case, around the seeds of cotton plants in the Malvaceae family. The fibre is almost entirely cellulose, with minor amounts of waxes, fats, pectins, and water. Cotton bolls will aid in the dispersal of seeds in natural conditions. Cotton fibres are naturally hollow fibres that are soft, cool, breathable, and absorbent. Cotton fibres can hold up to 24-27 times their own weight in water. They are durable, dye absorbent, and resistant to abrasion and high temperatures. Cotton wrinkles, so combining it with polyester or applying a permanent finish gives cotton garments the proper properties. Cotton fibres are frequently blended with other fibres such as nylon, linen, wool, and polyester to maximise each fibers properties. The fibre is typically spun into yarn or thread and used to create a soft, breathable, and long-lasting textile.

## 1.3 METHODOLOGY



## 1.4 Testing

### 1.4.1 Recycled cotton fibre

| <b>Fibre Length Analysis</b>          |        |
|---------------------------------------|--------|
| 2.5% Span Length (mm)                 | 24.60  |
| 50% Span Length (mm)                  | 11.50  |
| Uniformity Ratio                      | 46.75  |
| Approx. Hand Staple (mm)              | 23.69  |
| <b>Fibre Fineness Analysis</b>        |        |
| Fibre Fineness (micronaire)           | 3.50   |
| <b>Fibre Bundle Strength Analysis</b> |        |
| Breaking Strength (g/tex)             | 26.00  |
| Elongation (%)                        | 8.00   |
| <b>Trash Analysis</b>                 |        |
| Lint (%)                              | 98.00  |
| *Trash Content (%)                    | 0.78   |
| Invisible Loss (%)                    | 1.22   |
| <b>Nep Analysis</b>                   |        |
| Neps/gm                               | 457.00 |
| <b>FIBRE QUALITY INDEX</b>            |        |
| Short Fibre Percent                   | 17.70  |

### 1.4.2 Recycled cotton yarn

| Parameters  | value  |
|-------------|--------|
| Elongation% | 8.81   |
| Yarn count  | 6      |
| Twist       | 19.734 |

### 1.4.3 Sample fabric test

| Parameters                                       | value    |
|--|----------|
| Fabric count                                     | 22       |
| Water vapour permeability(g/m <sup>2</sup> /day) | 1446.972 |
| Thermal resistance (m <sup>2</sup> .mkv/w)       | 37.28    |
| Air Permeability(l/min)                          | 31.38    |

## 2. CONCLUSION

Replacing cotton with recycled cotton in Jamakkalam leads to sustainable development and cost savings. It has a lower environmental impact than conventional cotton. The incorporation of various design elements will make the jamakkalam appealing and alluring to the customer. This, in turn, will increase the sales of jamakkalams, directly benefiting the weavers who rely on weaving for a living. As a result, the once-dying jamakkalam business is expected to resurface.

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