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# *Sansevieria trifasciata* (Baghachoker): A Potential and Sustainable Natural Fiber

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## Abstract

Environmental sustainability is a great potential for any textile fiber. Textile industry is indicated as the biggest polluter of environment and enhance ecological imbalance and global climate change. Possibility of discovering non-conventional renewable biomass as natural fiber is being explored. *Sansevieria trifasciata* is a leafy plant. It grows in different parts of the world including Indian subcontinent. Locally, it is called Baghachoker. Recently, a proximate study was undertaken in Primeasia University and preliminary information indicate its possibility for using as textile fiber for different diversified and value-added development.

**Keywords**— *Sansevieria trifasciata*, fiber, retting, different fiber properties: strength, cellulose content etc.

### 1. Introduction

*Sansevieria trifasciata* is a lignocellulosic leafy natural fiber. It grows mainly in Asia, Africa, Brazil and China. It is called snake fiber, mother in laws tongue, St. Jorge's swords, etc. It is an evergreen perennial plant. Presently, 70million tons of fiber are used, but 40 million tones are synthetics, 30 million tones are cellulosic and protein fiber.

But, cellulosic fiber demands is increasing due to nondestructive and environmentally polluting characteristics properties of synthetic. Natural fiber are bio-degradable, photo-degradable, reusable, recyclable and environment friendly. *Sansevieria trifasciata* fiber (STF) have more than 70 species and grow in different climate tropical, subtropical and desert countries. Presently,

different studies have been undertaken for extraction of fiber. And physical, chemical and biological properties along with structural features and crystallinity functional group were studied. It is a lignocellulosic fiber. Cellulose and lignin structural and functional groups were observed. It has medicinal properties; different parts of India using as medicine in indigenous way [1].

Presently, this plant is imported in our country from China to be used as urbanized garden as a decorative plant for air purification by converting CO<sub>2</sub> to O<sub>2</sub> at night. Major benefits of *Sansevieria trifasciata* plant (STP) are:

(a) Air purification by cleaning toxic substances: phenol, formaldehyde, xylene etc.

(b) Home decoration for its shape and size for fitting in any place such as home, office and garden.

(c) It is drought tolerant plant and are grown in wide range of humidity, climate and soil condition.

(d) It is a green perennial plant and it can be propagated from leaf cut and rhizome cut in any kind of soil even water jar. It needs very little care for nursing.

(e) It reduce CO<sub>2</sub> levels at night by absorbing it by Crassulacian Acid Metabolism (CAM) process, thus capability to perform a certain type of photosynthesis at night.

(f) Textile uses: It is a source of white, strong, shining elastic fiber, commonly used of rope, fishing line, cordage, fine matting, bowstring, cloth, designing and decorating thread.

(g) Other uses: Pulp/paper, cosmetics, medicine, nanofiber etc.

Recently, textile engineering department of Primeasia University has undertaken a proximate study of *Sansevieria trifasciata*, locally collected from Kapasia Bush and locally it is called Baghachoker [2]. Extraction

properties along with various textile properties and their comparison studies were made and published in a local journal. Another study is also undertaken about various wet processing treatment such as scouring, bleaching and dyeing and accepted for publication in the PAU journal under printing process [3].

## 2. Materials, methods and results

Some of the results and comparative research information are given below (Table-1). The information of proximate study in Primeasia University and other known sources and their comparative information –

*Table-1: Comparison of extracted fiber properties with that of other sources*

Fiber properties	Observed value	Other sources	
		Value	References
Average number of fibers/single leaf	680-720	772	[4]
Fiber yield in %	2-3	3-4	[4]
Fiber length in cm	60-85	90	[4]
Diameter in micron	45-48	50-76	[1]
Breaking strength in gram	110-112	114.99	[1]
Elongation at the break in %	2.9-3.1	3.27	[1]
Moisture content in %	12-13	13.1/13.9	[4]
Tensile strength in gm/denier	12-14	15.54	[4]
Color	Gray-white	Gray-white	[4]
Color change in sun light after exposur in normal sunlight from 10 am to 3 pm for 100 hours	Color change to yellow to brown	-	-
Cellulose content in %	70-75	-	-
Lignin content in %	16-18	-	-
Ash content in %	2-3	-	-
Fatty martial in %	8-10	-	-

## 3. Wet processing technologies

Different wet processing technologies such as scouring, bleaching and dyeing for STF were formulated with certain modification of jute wet processing technologies as both are lignocellulosic fibers (Table-2,3 and 4).

*Table-2: Recipe for scouring of STF*

Recipe	Amount
Detergent	2cc/L
Sequestering agent	1cc/L
Alkali (NaOH)	3-5 gm/L
pH	10-11
Time	60 minutes
Temperature	90°C
M:L	1:50

Table-3: Recipe for bleaching of STF

Recipe	Amount
Detergent	3cc/L
Wetting agent	1cc/L
H <sub>2</sub> O <sub>2</sub>	7-10cc/L
Alkali (NaOH)	3-5 gm/L
pH	9-11
Time	80-90 minutes
Temperature	80-90°C
M:L	1:50

Table-4: Recipe for dyeing of STF

Recipe	Amount
Dye (Reactive)	0.5%, 1%, 2%, owf
Salt(NaCl)	60gm/L
Soda (NaOH)	20gm/L
Levelling agent	1cc/L
Sequestering agent	1cc/L
Wetting agent	1cc/L
pH	11-12
Time	60 minutes
Temperature	60°C
M:L	1:50

[Note: All commercial grade of chemicals and dyes were used]



a) Raw fiber b) Bleached Fiber c) Dyed Fibers d) Plant

Figure 1: a) Raw fiber b) Bleached fiber c) Dyed fibers d) Plant [5].

With the applications of above standard recipes fibers were bleached, dyed with reactive dyes. Yellow, red and blue shaded-colored fibers were transfer to BiBi Russel the renowned fashion

designer for different value-added products developments with cotton (Zamdani), Silk (Banaroshi) and Jute (Bleached jute fabrics) by decoration.

#### 4. Discussions and conclusions

Above tables were shown different textile properties of STF collected from local bush of Kapashia. New accelerated retting method with chemi-biochemi-mechanical was innovated. Different chemical and physical properties and their comparison with other sources are shown in table-1 which clearly indicated some validation of newly innovated method and results. Again, different wet processing technologies such as scouring, bleaching and dyeing were undertaken and optimum results were observed. These dyed colored fibers now under study for product development in collaboration of DSK (NGO), PAU and BiBi Russel production for comprehensive study, in cultivating and in commercial scale along with marketing as products and plant. *Sansevieria trifasciata* plant has definite CO<sub>2</sub> mitigation and air purification properties. And if valuable textile products can be produced with this natural, renewable, bio-degradable, environment and ecofriendly fiber that definitely will be a sustainable economically, ecologically and socially for inclusive development.

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