

Title: - Striyasha: Research on Biodegradable Sanitisation materials

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Abstract:

About Striyasha: The research is all about creating an effective sanitary product. It was customised and named as Striyasha, which means a ray of hope for women. These pads are made up from waste materials like jute fibres from waste gunny bags and waste cotton from mattresses. These raw materials were sterilised in autoclave machine before using. The autoclave machine was attached with the Solar panel. The entire project was made absolutely sustainable by using Solar Energy to run the machine. A thorough research was conducted on the absorbent materials. The best suitable materials were selected for Striyasha pads. The different layers of these absorbent materials were arranged differently. Their Absorbency Test was conducted. The best series of layers; i.e, Cotton + Jute + Cotton was selected. The Striyasha pads has a uniquely designed shape drawn by using a special stencil. These pads were compared with commercial products in several domains like Liquid Absorbency Angle Test, Absorbency Time Test, Total bacterial count, Cost and Polymer Test. A proper survey also was done on Menstrual Cups and Tampons. The survey helped us in evaluating the efficiency of both the mentioned products. After the making of Striyasha pads, they were distributed amongst the needy masses. For this, we took help of Dr. Pradip Joshi. He helped us to reach out post natal mothers, female patients, teenage girls, etc. Our Striyasha sanitary napkins were proved to be efficient in most of the aspects.

All the tests were conducted at a reputed Analytical laboratory. The product is applied for the Trademark TM to make it customised.

Introduction:

Plastic pollution is a big nuisance to the environment. Commonly available sanitary napkins constitute 90% Plastic, the report claimed. Indian generates 3.3 million tonnes of plastic waste every year, according to a central Pollution Control Board report (2018-19). During menstruation, maintaining the hygiene is very crucial. Hence, use of sanitary napkins is unavoidable for women. It is the need of the hour to come up with an absolutely eco-friendly and effectively made sanitary napkins. The motto of this research is to construct a sanitary pad that is 100% biodegradable and caters no addition of plastic into the environment.



Hypothesis:

Striyasha sanitary napkins can be more effective than the other commercial sanitary products.

Aim:

- To construct an effective sanitary product with a thorough experimentation and research.

Objectives:

- To conduct experiments on various materials for selecting the suitable absorbents.
- To select different materials to check their efficiency for sanitary pads.
- To make a cost effective sanitary pad.
- To make a germ free sanitary pad.
- To create plastic free sanitary pad.

Selecting the best absorbents:

Sr. No.	Materials	Absorbency Test – Liquid Absorbency Time (milliseconds)	Remarks
1.	Cotton from the waste mattress	03	White and soft textured
2.	Banana fibre	13	Linear, pokey fibres
3.	Jute fibre from the waste gunny bags	05	Smooth textured
4.	Bamboo fibre	39	Excessively rough fibres
5.	Organic cotton cloth without dye	09	Soft off-white materials
6.	Synthetic materials	22	Nylon material
7.	Cotton Sofa cover - other side covered with plastic layer	67	Thick material with plastic layer
8.	Coconut fibre	11	Rough textured

After the selection of the best absorbent materials, the selected materials are then taken for further processes. These materials are arranged in various series to check the best absorbent set for creating Striyasha sanitary napkins.

Selected materials are then arranged in different series to make Striyasha pads: (table given below)

Sr. No.	Materials in various series	Absorbency Test – Liquid Absorbency Time (milliseconds)	Remarks
1.	Jute + Cotton + Jute	03	Itchy and pokey surface
2.	Cotton + Jute	07	Not leak proof
3.	Cotton + Jute + Cotton	02	Leak proof. Proper absorption done.

From the tests, it was proved that the Cotton + Jute + Cotton layer is the best for Striyasha sanitary napkins.

The making of Striyasha pads:

A comparison between the shapes of the sanitary pads

Sr. No.	Shape of the pads	Observation	Remarks after using them
1.	Rectangular without wings	Stain was observed	Not reliable
2.	Rectangular with oval shaped wings	Slight stain was seen	Not completely reliable
3.	Rectangular with curved wings	Stain not observed	Much more reliable ✓☐

- A sanitary pad was constructed in a rough manner using the above mentioned series. The pad had organic cotton layer as the above and below layers and in between, was taken Cotton + Jute + Cotton layered series. The pad was completely hand stitched. It was made wingless. After a gradual use, the pads showed some leakage from the sides.
- So a winged pad was mandatory to be constructed.
- A specially winged shaped wooden stencil was made to create uniform Striyasha pads.
- The cut-outs of the organic cloth were stitched together using a portable sewing machine. The upper and the lower ends were kept unstitched to fill in the absorbent layers.

- After systematically filling the C+J+C layers, stitch the upper and lower ends; either manually or with the help of the sewing machine.
- The metal press buttons were attached to the wings of the Striyasha pads in order to fix it properly.
- A proper survey of was conducted on Menstrual Cups and Tampons. The study reveals that the menstrual cup is only effective if a proper size is selected. Moreover, there are some complications in using them which cannot be neglected.

Sr. No.	Samples for comparison	Liquid Absorbency Angle Test (Degree)	Absorbency Test (Time – milliseconds)	TBC (cfu/ Unit)	Cost (Rs.)	Polymer Test Plastic Content %	Bio-Degradable
1.	S1	45	10	02	05	23.67	✗
2.	S2	46	09	09	05	27.66	✗
3.	W1	42	07	07	06	36.90	✗
Avg		44.3	8.67	6	5.3	29.11	
4.	Claimed Biodegradable B1	102	22	167	150	05.17	✗
5.	B2	110	21	118	150	05.17	✗
6.	B3	127	21	121	150	06.80	✗
Avg		113	21.3	135.3	150	5.713	
7.	Striyasha 1	67	09	01	Zero	00.00	✓
8.	Striyasha 2	69	08	01	Zero	00.00	✓
9.	Striyasha 3	70	09	00	Zero	00.00	✓
Avg		68.67	8.67	0.6	0	0	
10.	M.Cups 1	NA	NA	1190	250	Plastic Silicon	✗
11.	M.Cups 2	NA	NA	1700	370	Plastic Silicon	✗
12.	M.Cups 3	NA	NA	2670	450	Plastic Silicon	✗
Avg		NA	NA	1853.3	357.7	Plastic	
13.	Tampons 1	60	08	207	10	19.67	✗
14.	Tampons 2	62	07	190	12	10.11	✗
15.	Tampons 3	67	09	179	10	10.45	✗
Avg		63	8	188.67	10.67	13.41	

Comparison between the Commercial products and Striyasha pads:

A systematic comparison was made between commercial non – biodegradable napkins, commercially claimed biodegradable napkins, Striyasha napkins, m – cups and tampons, taking several criterias into consideration. We took three samples in each category. So we will take their averages for comparison. Liquid absorbency angle test – Non - biodegradable pad shows 44.3 degrees claimed bio – degradable pads shows 113 degrees, Striyasha pad shows 68.7 degrees and tampons shows 63 degrees.

Liquid absorbency time test: Non – biodegradable parts show 8.7 milisec, claimed biodegradable pad shows 21.3 milisec, Striyasha shows 8.7 milisec and tampons shows 8 milisec.

Total bacterial count:

Non – biodegradable pad shows 6 cfu/unit, claimed biodegradable pad shows 135.3 cfu/unit, Striyasha pad shows 0.6 cfu/unit, reused menstrual cups shows 1853.3 cfu/unit and tampons shows 188.67 cfu/unit.

Cost:

Non – biodegradable pad is of 5 rupees per piece, claimed biodegradable pad is of 150 rupees per piece, whereas Striyasha pad is of 0 rupees, menstrual cups are of 357.7 rupees per piece and tampons are of 11 rupees per piece.

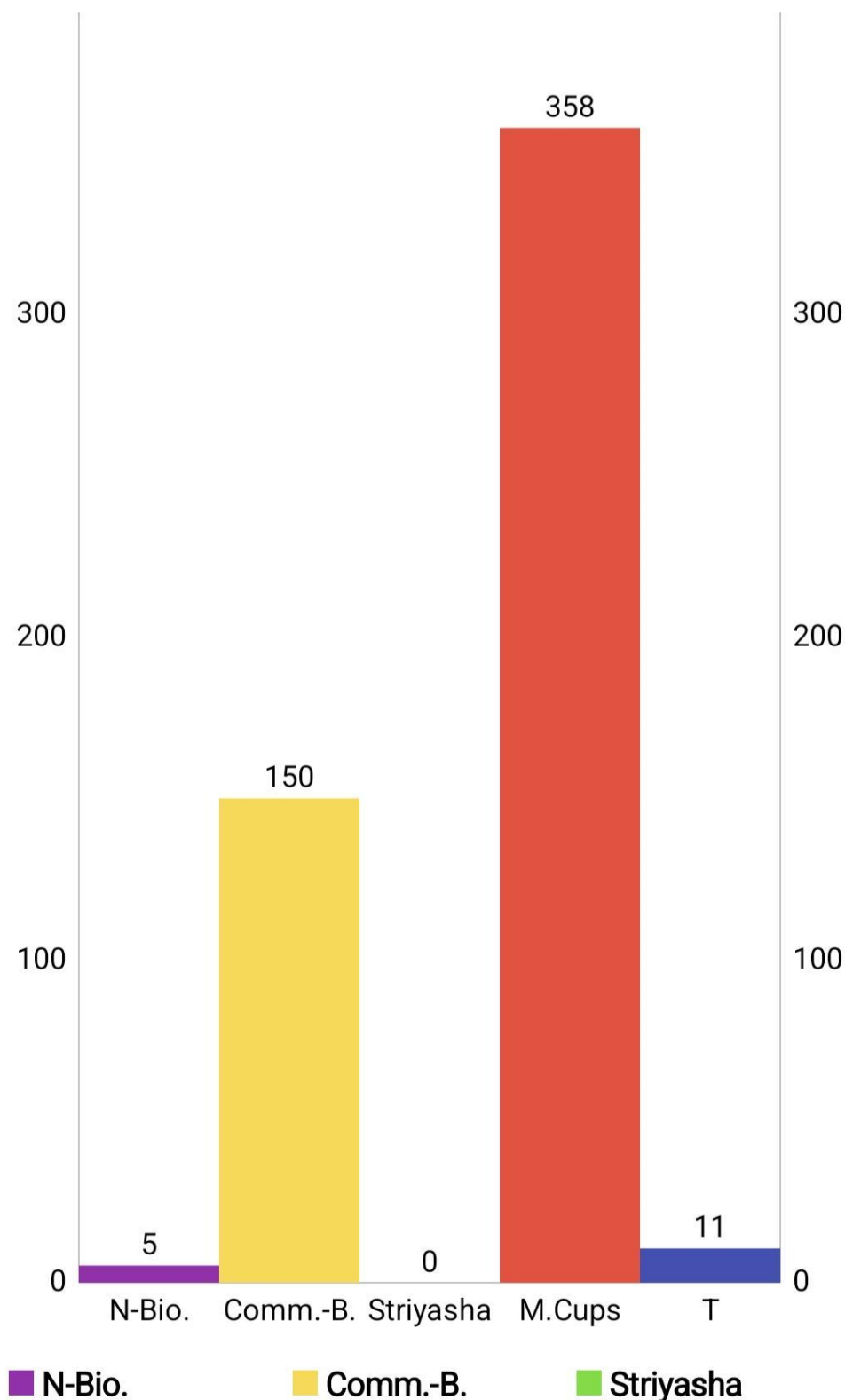
Polymer test to check plastic content was also conducted Non – biodegradable pads contains 29.11% plastic, claimed biodegradable pads contains 5.713% plastic, whereas Striyasha pads contains 0% plastic, menstrual - cups are themselves made of complete plastic and tampons contains 13.41% of plastic. Out of all these sanitary materials, only Striyasha is completely biodegradable.

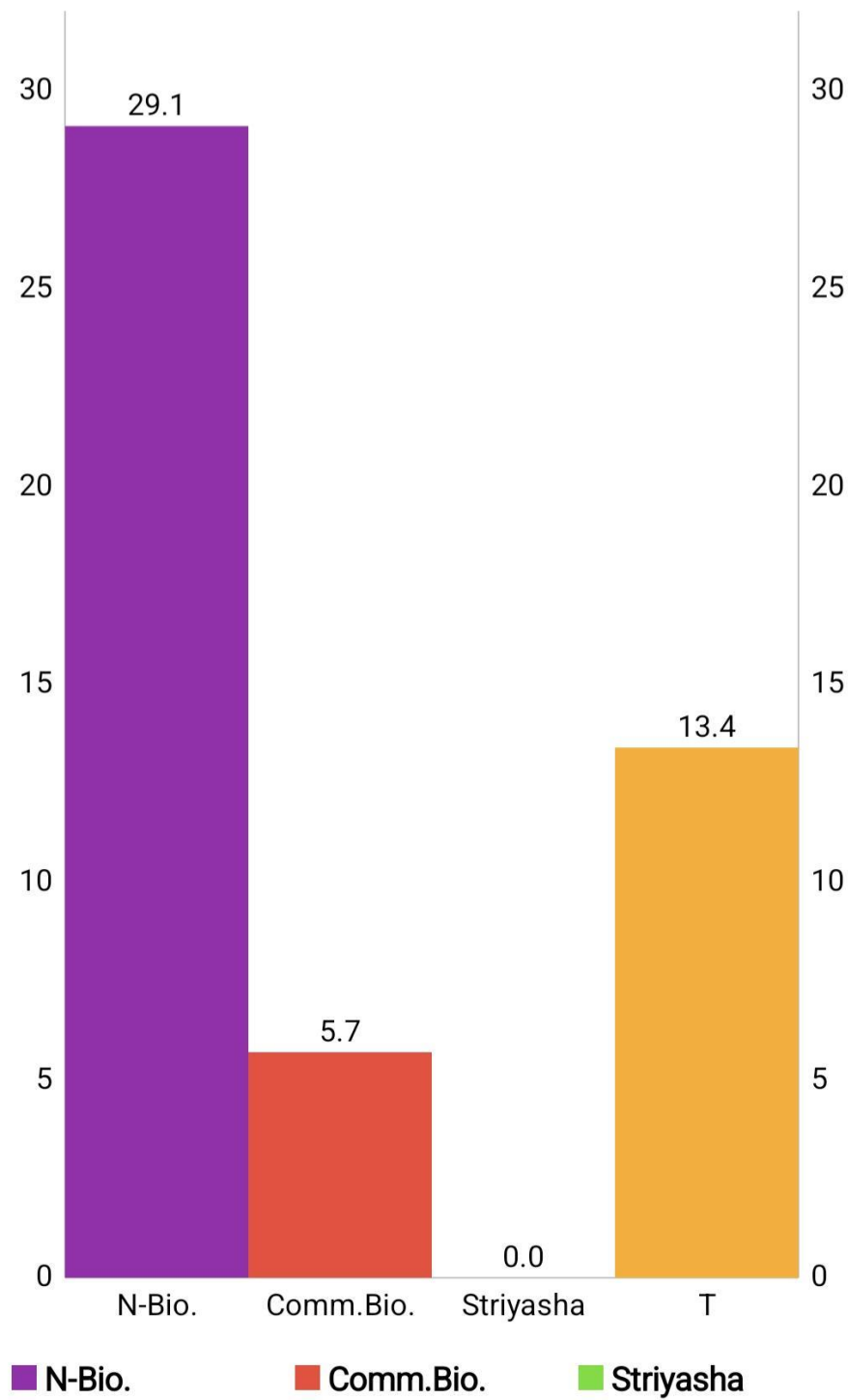
Here, Striyasha falls under TREATED GROUP and other commercial products come under CONTROLLED GROUP. A thorough comparison has been made between commercial products and Striyasha pads.

Data Analysis:

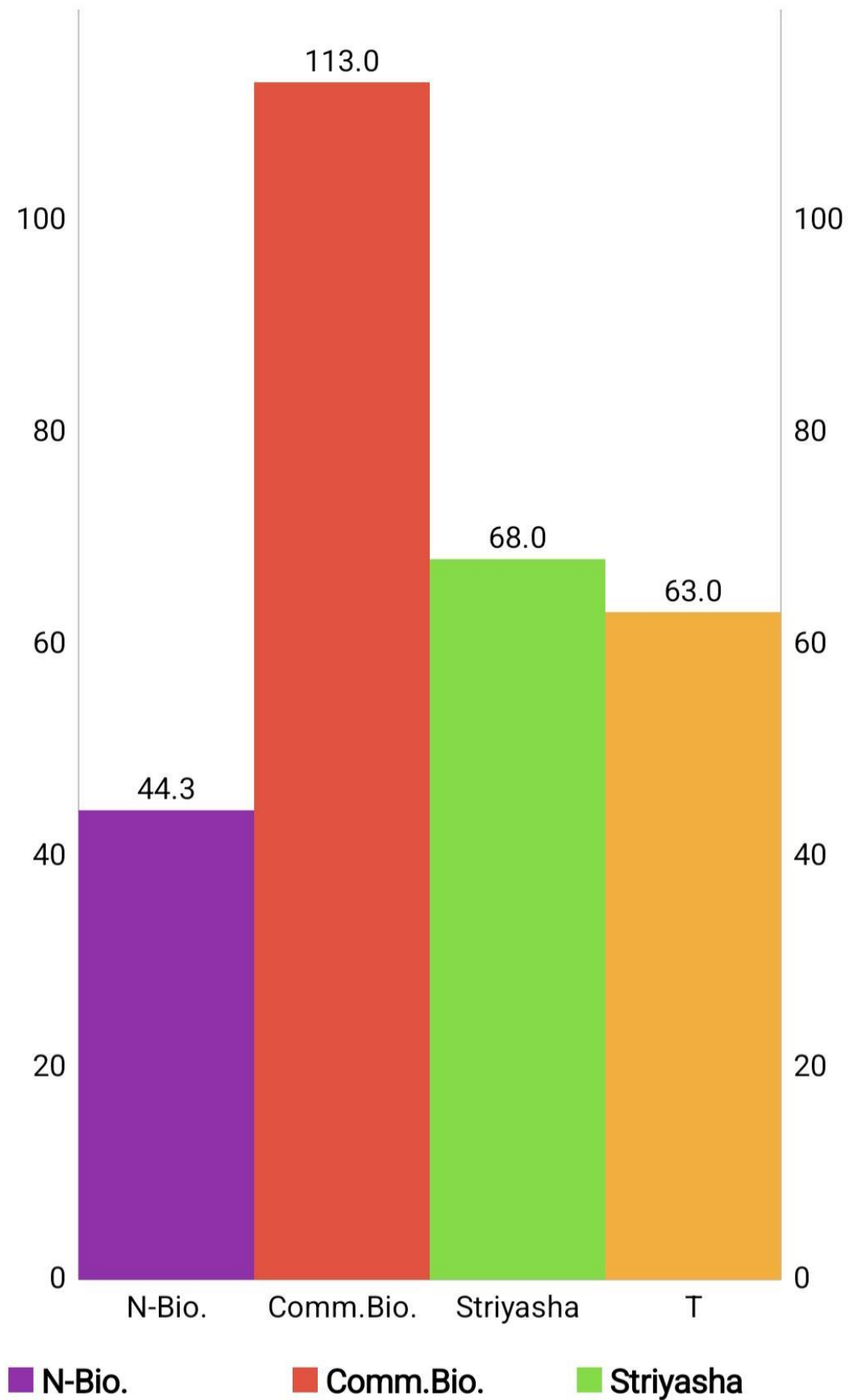
❖ Total Bacterial Count
Menstrual Cups are more difficult to keep clean.
 ❖ Cost

Comparison between Striyasha pads and other commercial sanitary pads



Menstrual Cups are the most expensive sanitary products❖ Plastic ContentCommercial biodegradable pad has highest amount of Plastic in it.

Liquid Absorbency Angle Test



Conclusion:

- ✓ 100% biodegradable (no plastic):
Striyasha sanitary napkins are absolutely biodegradable as no plastic is used in the making. It is also safe for the soil as it is organic and gets biodegradable.
- ✓ Liquid Absorbency Capacity:
Striyasha pad has comparatively good liquid absorbency capacity. It has been observed that in a day it can absorb 60 to 80 ml liquid.
- ✓ Germ free:
Before practically using it, we had autoclaved all the pads and also the raw materials to make them germ free. No microbial traces were found.
- ✓ Cost effective:
Striyasha pads are made from waste materials available in our surrounding which make the cost absolutely low. In fact the cost is of Zero Rs. Hence, it is said to be cost effective.
- ✓ Sustainability:
We collected the waste materials which needed complete sterilisation, so we autoclaved the raw materials using Solar power which makes this research project absolutely sustainable.
- ✓ Community Work:
We collaborated with two clinic in Kandivali and Malad and did the community work. We distributed 50 Striyasha pads amongst the common people, which includes adolescent girls to women on the verge of menopause.
The review from the treated group showed much satisfactory results. Dr. Pradip Joshi helped us in understanding the reviews and the community work.
- ✓ We have given our logo and the Brand name, TM □ Trademark and © □ Copyrighted.

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