



biospain

2016

8th INTERNATIONAL  
MEETING ON  
BIOTECHNOLOGY



# Final Event

# SEACOLORS

LIFE SEACOLORS – Demonstration of new natural dyes from algae as substitution of synthetic dyes actually used by textile industries.

LIFE13 ENV/ES/000445





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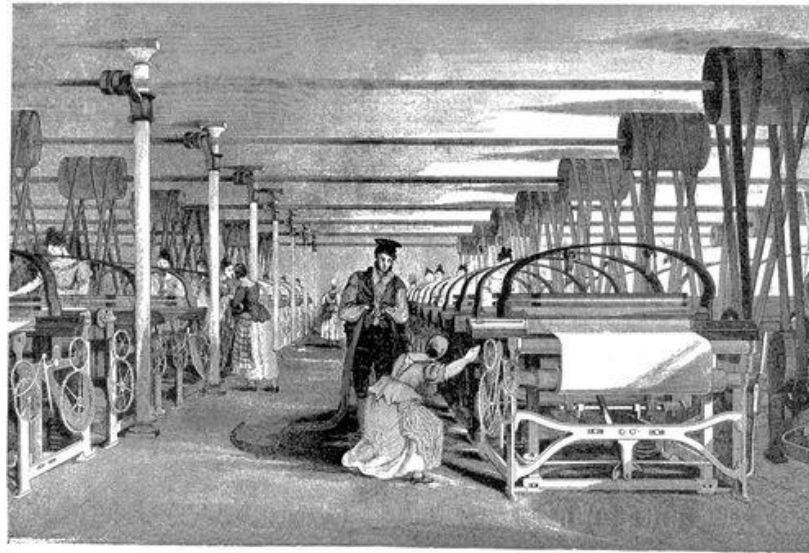
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## 1. INTRODUCTION

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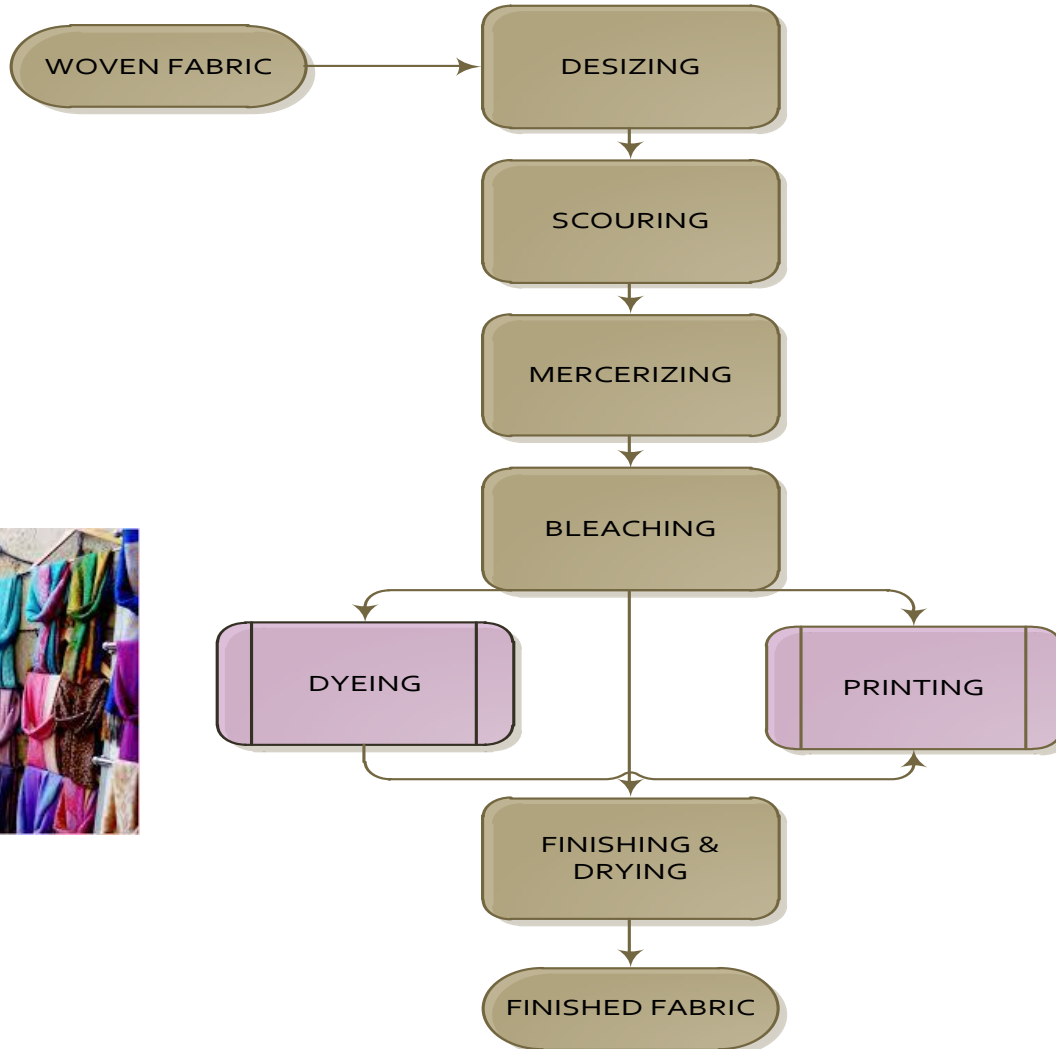


The **textile industry** or **apparel industry** is primarily concerned with the design and production of yarn, cloth, clothing, and their distribution. The raw material may be natural, or synthetic using products of the chemical.

# 1. INTRODUCTION

## FINAL EVENT SEACOLORS

Finishing sector



## 2. DYEING PROCESS

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### EXHAUST DYEING



The use of a dye bath of moderately large liquor to goods ratio, in which the fiber is immersed for some time, allowing the dye molecules to leave the bath and attach to the fibers.

! Pretreatment= MORDANTING PROCESS !



➔ is the typical process for most commercial fabric dyeing!!!

## 2. DYEING PROCESS

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### SEACOLORS DYEING PROCESS

Algae strains		Substrates	Optimization process
<b>Microalgae</b>	<b>Macroalgae</b>	COTTON WOOL	Initial
<i>Synechococcus sp.</i>	<i>Gracilaria sp.</i>		85°C
<i>Erythrotrichia sp.</i>	<i>Grateloupia turturu</i>		140 MIN
<i>Arthrospira platensis</i>	<i>Phorphyra dioica</i>		↓
<i>Leptolyngbya sp.</i>	<i>Osmundea sp.</i>		Optimized
<i>Nostoc sp.</i>	<i>Ulva rigida</i>		65°C
<i>Halochlorella rubescens</i>	<i>Bifurcaria bifurcata</i>		60 MIN
<i>Sarcinochrysis marina</i>			
<i>Caespitella pascheri</i>			





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## 2. DYEING PROCESS

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### EXHAUST DYEING-LABORATORY SCALE


Conclusions:

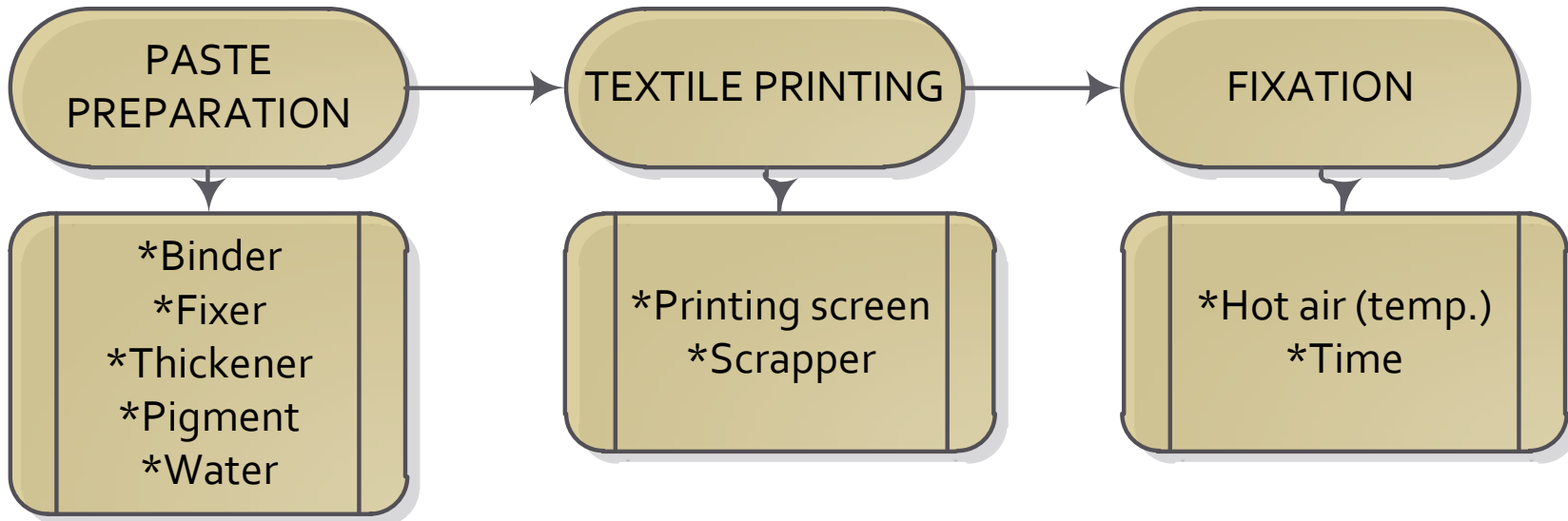
Process	<i>Arthrospira platensis (CO)</i>	<i>Arthrospira platensis (WO)</i>	<i>Porphyra sp.(CO)</i>	<i>Porphyra sp. (WO)</i>
<i>Initial</i>				
60 MIN-40°C				
70 MIN-40°C				
140 MIN-38°C				
90 MIN-50°C				
60 MIN-65°C+ <i>stabilizer</i>				



### 3. PRINTING PROCESS

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PRINTING  Applying colored patterns and designs to decorate a  finished fabric

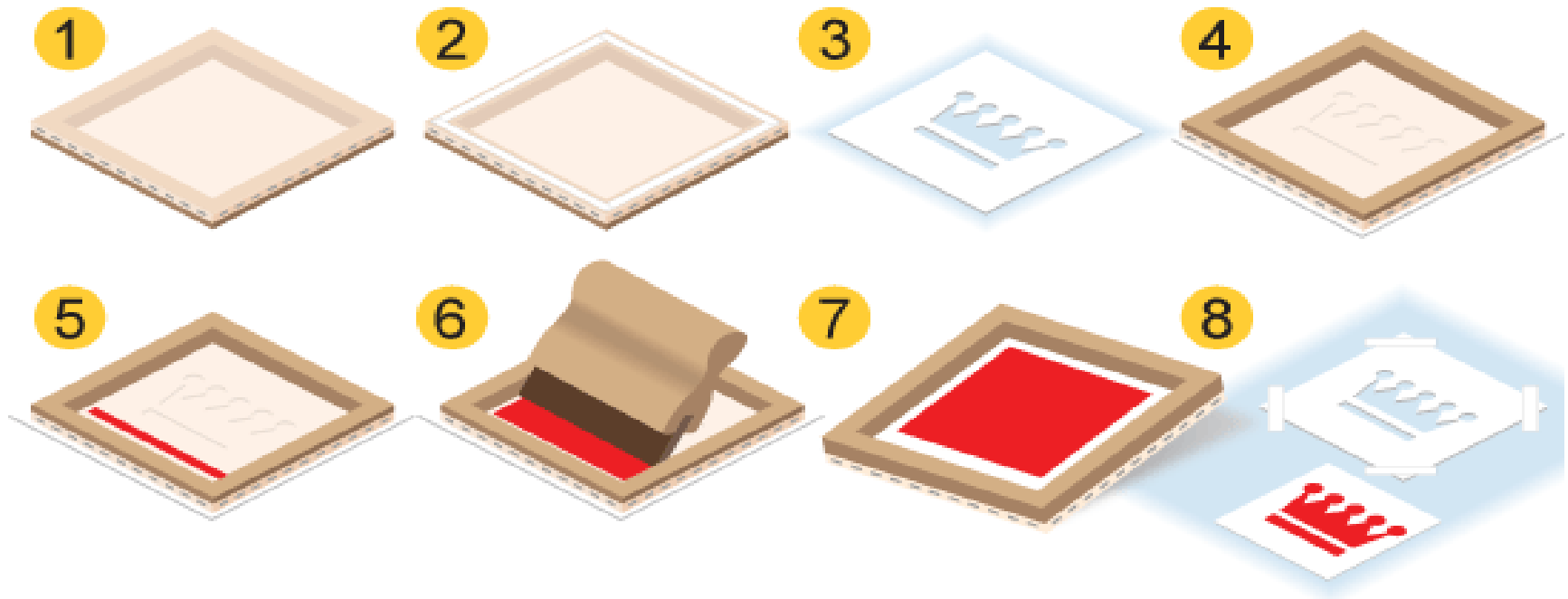




### 3. PRINTING PROCESS

### FINAL EVENT SEACOLORS

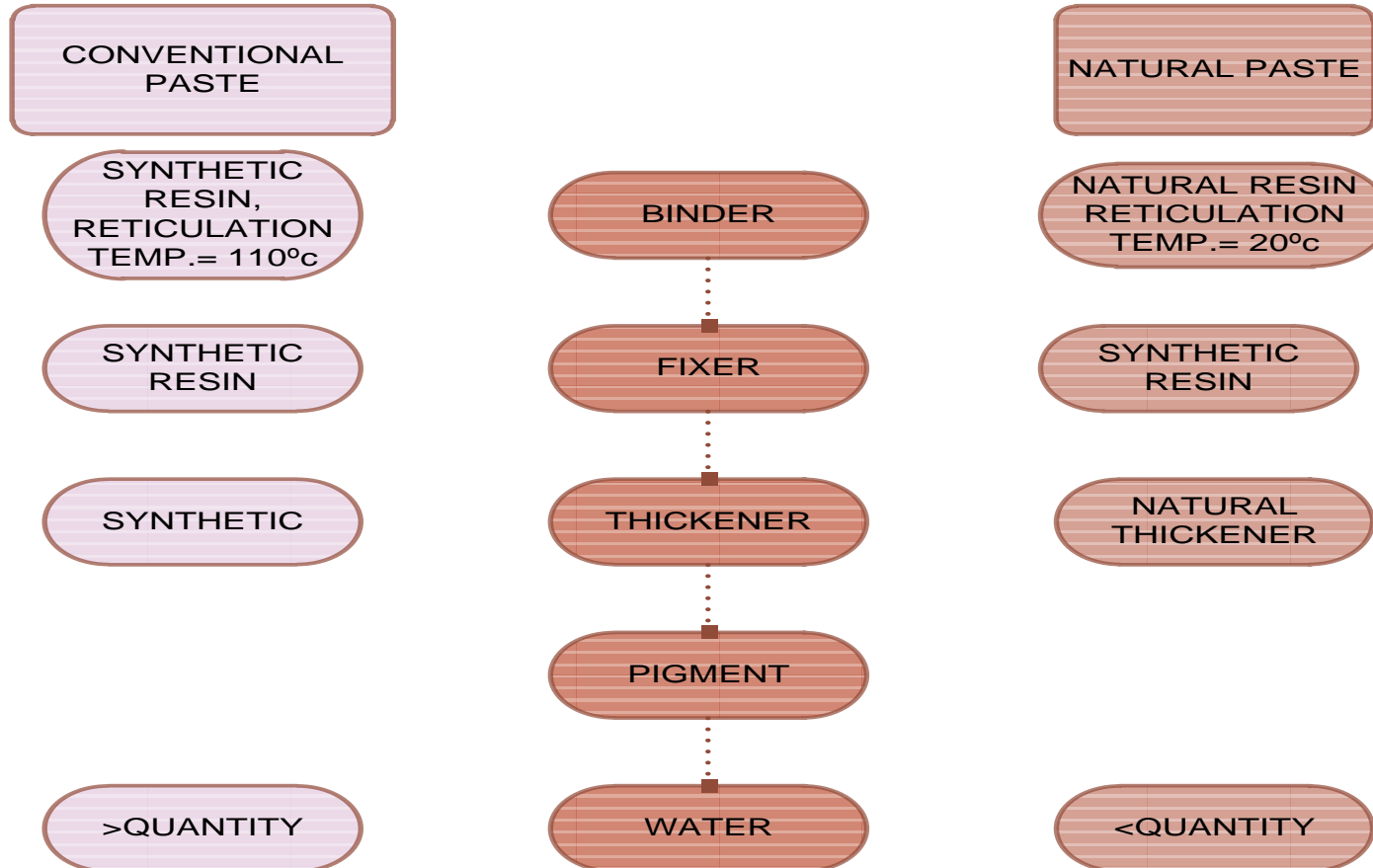
## PRINTING



### 3. PRINTING PROCESS

### FINAL EVENT SEACOLORS

## PRINTING





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### 3. PRINTING PROCESS

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## PRINTING

SYNTHETIC PRINTING		NATURAL PRINTING	
COTTON	WOOL	COTTON	WOOL
LIQUID PIGMENT		LIQUID PIGMENT	
			
LYOPHYLIZED ALGAE			
			



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## 4. RESULTS

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### TEXTILE CHARACTERIZATION

- ➔ LAUNDERING FASTNESS
- ➔ RUBBING FASTNESS
- ➔ LAUNDERING FASTNESS
- ➔ SPECTROPHOTOMETRICAL ANALYSIS

- CIELab coordinates
- Reflectance spectrum
- Color strength



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## 4. RESULTS

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### TEXTILE CHARACTERIZATION

Laundering fastness		No stab.		Stab.	
		40°C	25°C	40°C	25°C
Change in color		2-1	3	3-2	4-3
Staining	Wool	4	4	4	4
	Acrylic	4	4	4-5	4-5
	Polyester	4-5	4	4-5	4-5
	Polyamide	4	4	4-5	4-5
	Cotton	4-5	4	4-5	4-5
	Acetate	4	4	4-5	4-5
Rubbing fastness					
Staining	Dry	4-5		4-5	
	Wet	4		4-5	

Change in color	Staining
5- Good behavior	5 Very good-Excellent
<b>4-3 Fair behavior</b>	<b>4 Good</b>
2-1 Poor behavior	<b>3 Fair</b>
	2 Poor
	1 Very poor



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## CONCLUSIONS

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✓ It is possible to extract colorants from algae (=SUSTAINABLE SOURCE) and apply them in a textile dyeing process on cotton and wool fibers.

✓ POTENTIAL:  
to substitute **synthetic colorants** (reduction of petroleum consumption and CO<sub>2</sub> generation).  
to substitute **natural colorants** from other sources (reduction of non-sustainable land use and CO<sub>2</sub> generation).



RED=PHYCOERYTHRIN  
BLUE=PHYCOCYANIN  
YELLOW=CAROTENOIDS

✓ SUSTAINABILITY:  
-nutrients: CO<sub>2</sub>  
solar light  
wastewater from aquaculture  
-residual biomass can be reused for the extraction of other compounds of interest for other industries: cosmetics, pharmaceuticals, feed and food



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THANK YOU FOR YOUR ATTENTION!!