

INTERNATIONAL  
**COTTON  
CONFERENCE  
BREMEN**

2024



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## PRESENTATION

Session:

Spinning And Textile Processing

Title:

Cotton and hemp - Possibilities for joint processing

Speaker:

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Conference Organization

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# Cotton and hemp

Possibilities for joint processing

Cotton Conference Bremen 2024

Ralf Müller

20.03.2024

# Cotton and hemp

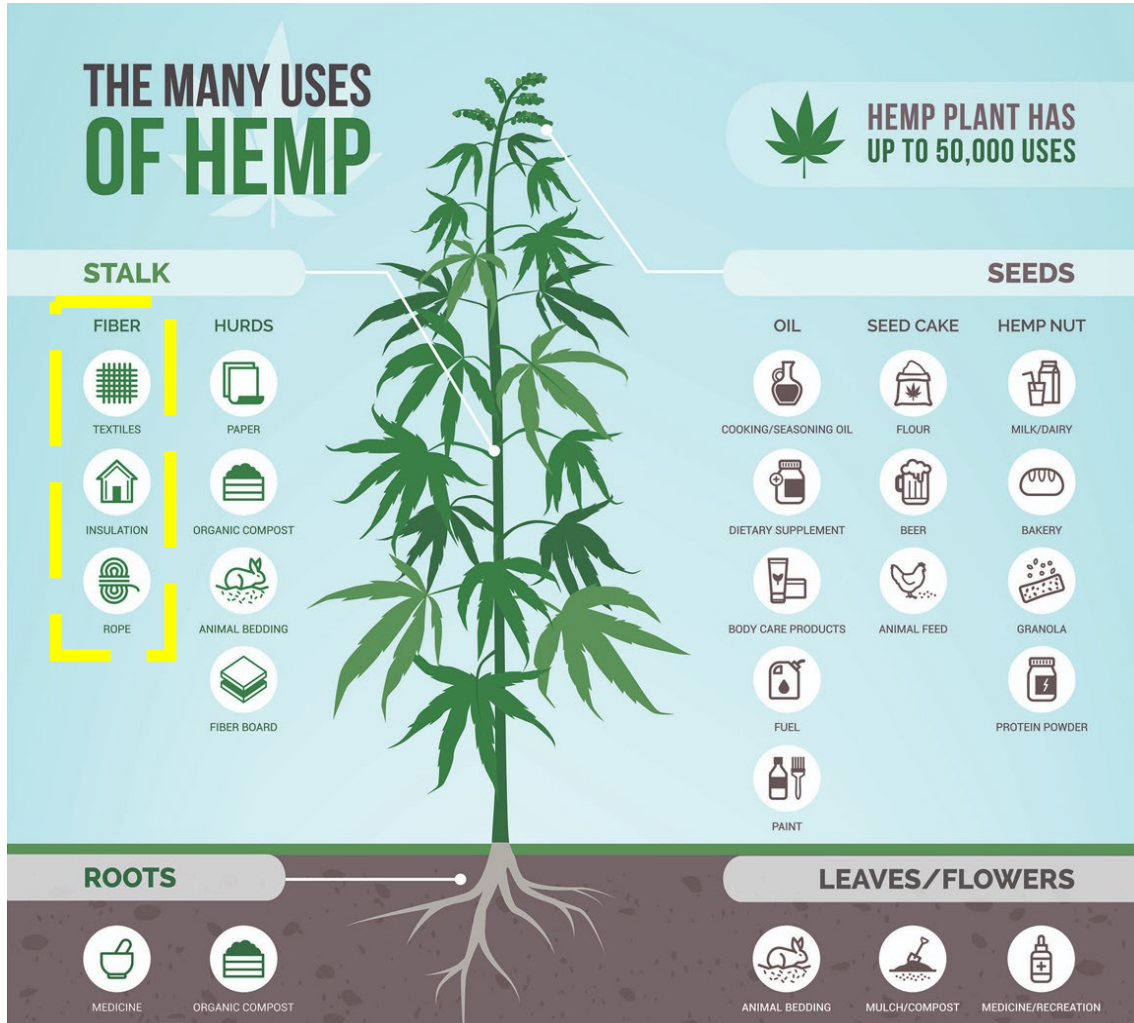
## The view of Trützschler Spinning

- Innovations in machines for spinning preparation
- Increasing debate and demand for sustainability
- Hemp is in focus as a natural sustainable fiber



# Hemp

The many uses





# World Natural Fiber Production

## 2022

Fiber	2022 [t]	Share [%]
Abaca	80.000	0,2
Agave Fibers	41.000	0,1
Coir, without pith	1.119.000	3,4
<b>Cotton Lint</b>	<b>25.093.950</b>	<b>76,3</b>
Other fiber crops, raw, n.e.c.	504.000	1,5
Flax/linen, processed but not spun	1.018.000	3,1
<b>Hemp, raw or retted</b>	<b>247.000</b>	<b>0,8</b>
Jute, Kenaf & Allied fibers	3.095.000	9,4
Kapok fiber	90.000	0,3
Ramie, raw or retted	60.000	0,2
Sisal, Henequen and similra hard fibers	262.000	0,8
Silk, raw	173.000	0,5
Wool, clean	1.089.900	3,3
Other animal fibers	27.000	0,1
<b>TOTAL NATURAL FIBERS</b>	<b>32.899.850</b>	<b>100,0</b>

With 0,8 % share of the cotton-dominated natural fiber market, hemp is a niche application.

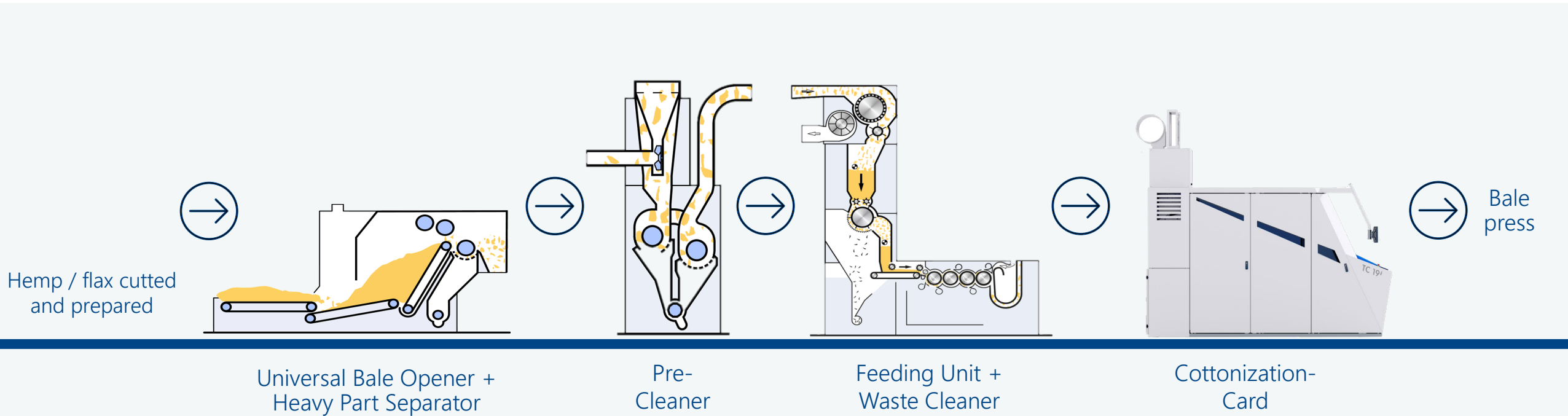
# Hemp

## Average of industrial hemp in Germany

Bundesland	Anbaufläche in Hektar	Anzahl der Anbauer
Niedersachsen	1932	215
Bayern	832	214
Sachsen-Anhalt	763	44
Mecklenburg-Vorpommern	700	28
Thüringen	578	32
Baden-Württemberg	453	118
Brandenburg	452	33
Hessen	376	61
Nordrhein-Westfalen	333	62
Sachsen	230	22
Schleswig-Holstein	182	24
Rheinland-Pfalz	102	28
Saarland	6	5
Hamburg	3	1
Berlin	1	2
Bremen	0	0
<b>Summe</b>	<b>6.943</b>	<b>889</b>

- The area has doubled from 3,114 → 6,943 hectares compared to 2018
- Individual customers are starting to cultivate hemp – e.g. single customer in Turkey 2.000 ha

# Cottonisation process of bast fibers



## Further processing:

- ▶ Blending with cotton / MMF fibre on spinning preparation line
- ▶ Rotor spinning machinery



# Fiber examples

100% hemp fibers



After mechanical cottonisation

Cottonized hemp fibers	
Mean length [mm]	41,34
Micronaire (cotton equivalent)	7,32
Long fiber length (UQML) AFIS [mm]	49,02



# Hemp

## Challenges during processing

- ▶ Natural Structure of Hemp Fibers:
  - ▶ Brittle, straw-like
  - ▶ Electrostatic charge
- ▶ Aftermath:
  - ▶ Jamming and clogging
  - ▶ Imperior quality
  - ▶ Yarn breaks
- ▶ Counter measures:
  - ▶ Moisture content 14 – 15%
  - ▶ Deployment of avivage





# Hemp

## Treatment practices

### ▶ Degumming

- ▶ By cooking
- ▶ Results in the removal of pectins and hemicellulose
- ▶ Low fiber to fiber friction

### ▶ Bleaching

- ▶ By bleaching agents
- ▶ Results in finer and shorter fibers
- ▶ Increased fiber to fiber friction





# Spinning preparation

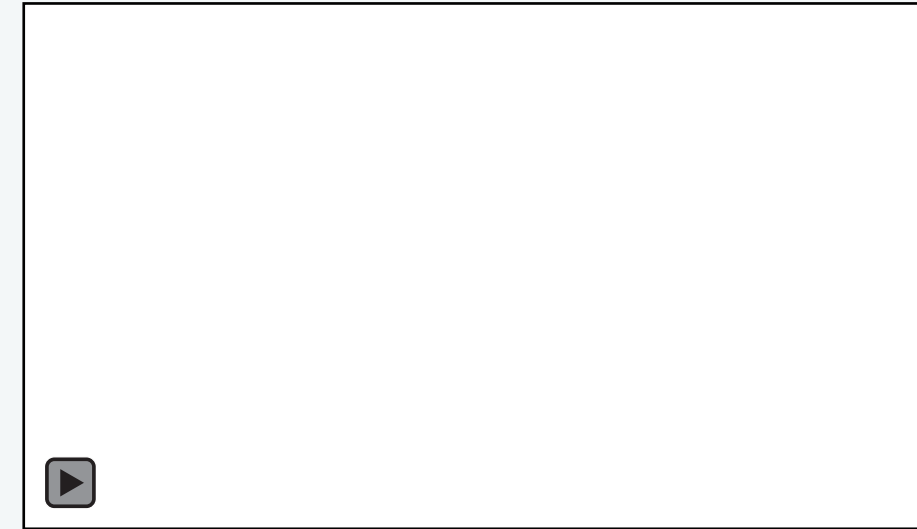
## Overview



Blending with Cotton or MMF



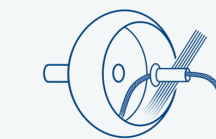
Mixing



Carding



Spinning preparation with integrated draw Frame IDF



Rotor spinning



Recommended

- ▶ A shortened drafting process is an advantage for the processing of blends with high bast fiber content. Conventional processing through draw frames will result in high loss of bast fibers proportion.

# Silver and blend examples

## Comparison



30% hemp / 70% cotton



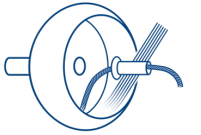
50% hemp / 50% cotton



70% hemp / 30% cotton

# Silver and blend examples

## Spinning Limit



Rotor Direct

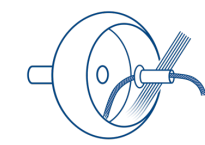
	gek. HA/CLY	gebl. HA/CLY	gek. HA/BW	gebl. HA/BW	gek. HA/CLY	gebl. HA/CLY	gek. HA/BW	gebl. HA/BW	gek. HA/CLY	gebl. HA/CLY
	90/10		75/25				50/50			
Nm 10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Nm 15	✗	✗	✗	✓	✓	✓	✓	✓	✓	✓
Nm 20			✗	✓	✗	✓	✗	✓	✓	✓
Nm 24							✗	✓	✗	✓



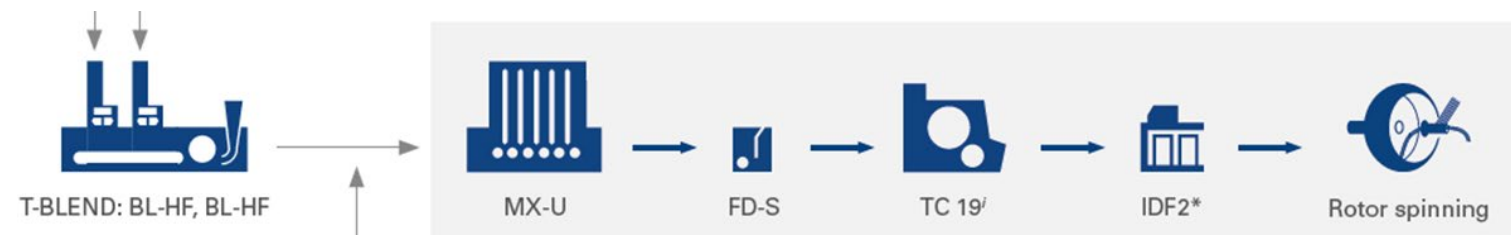
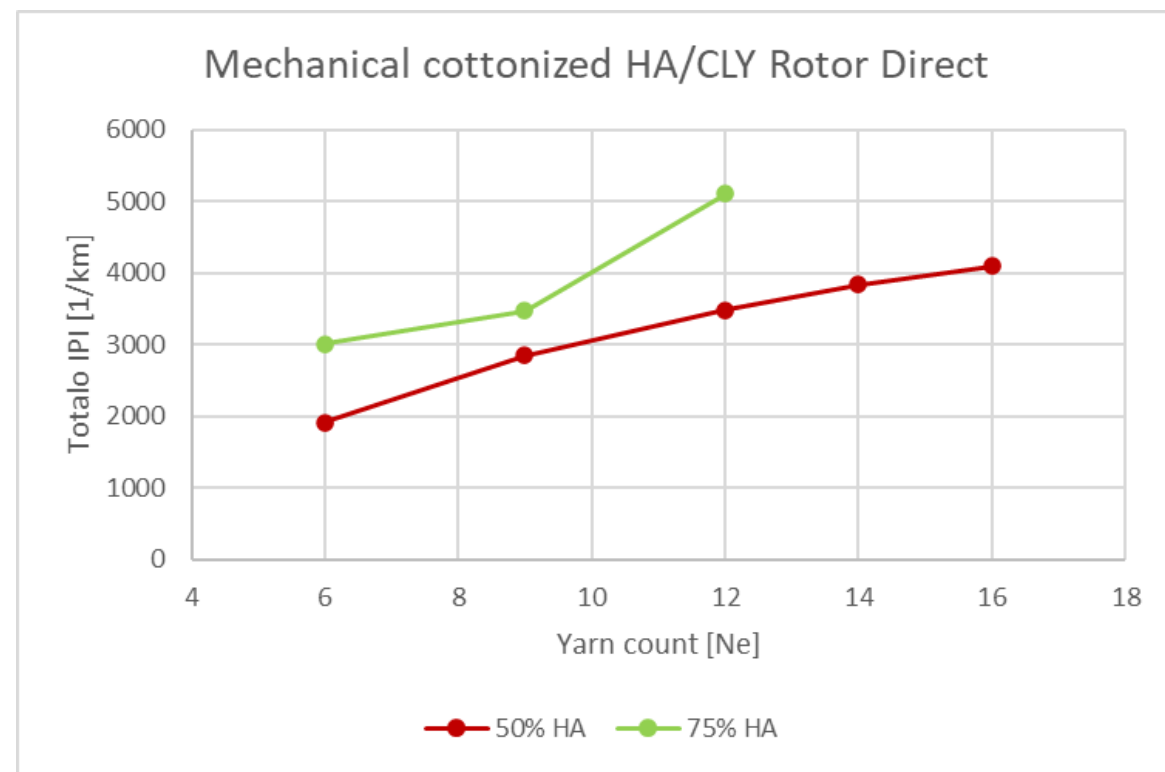
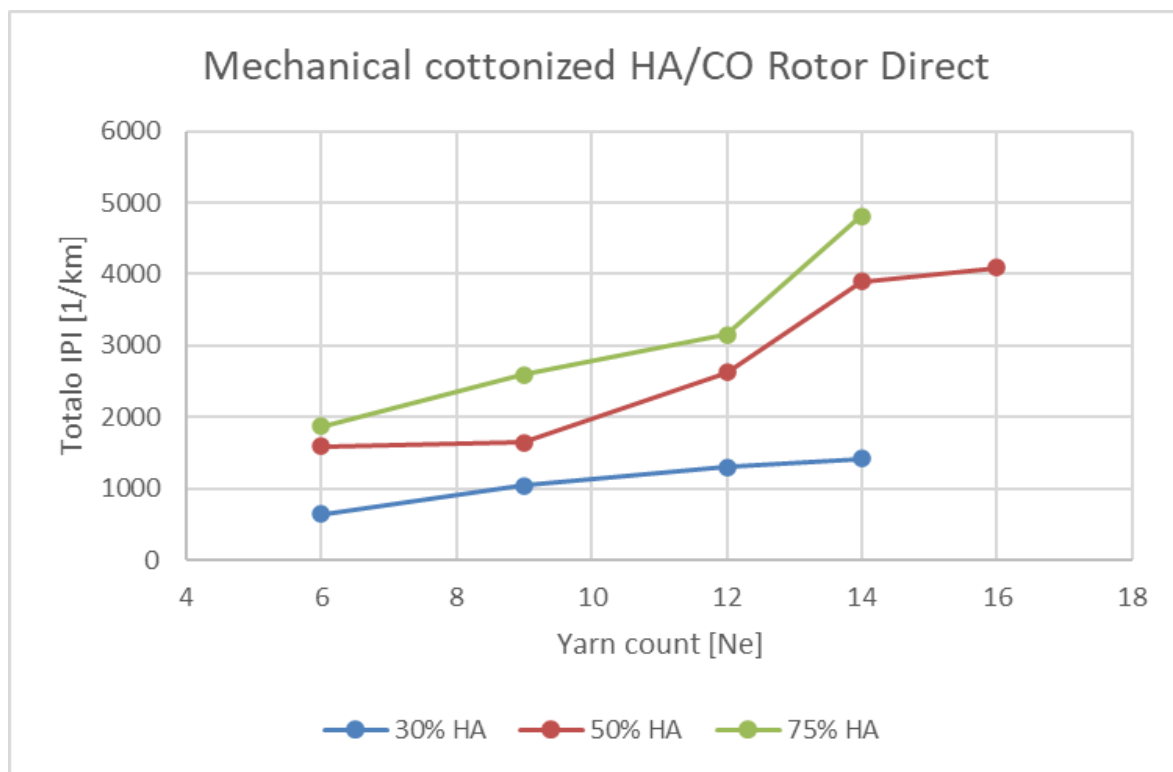


# Rotor yarn spinning: Short process examples

Blends Hemp with CO and Lyocell: Imperfections

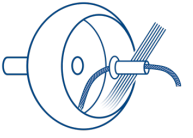


Rotor Direct

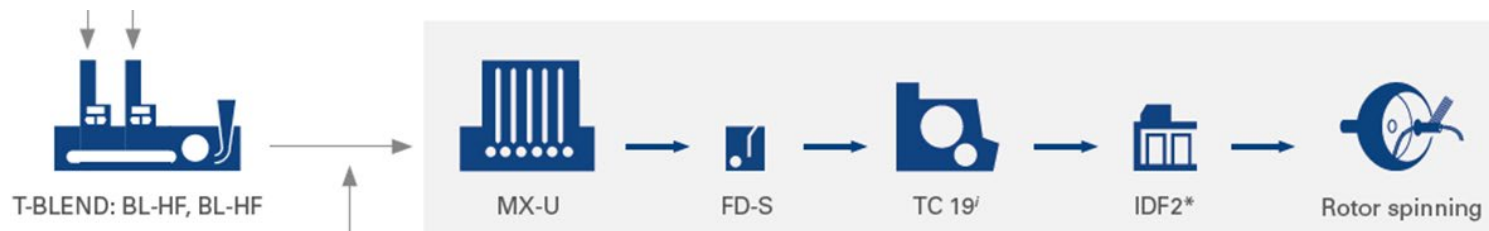
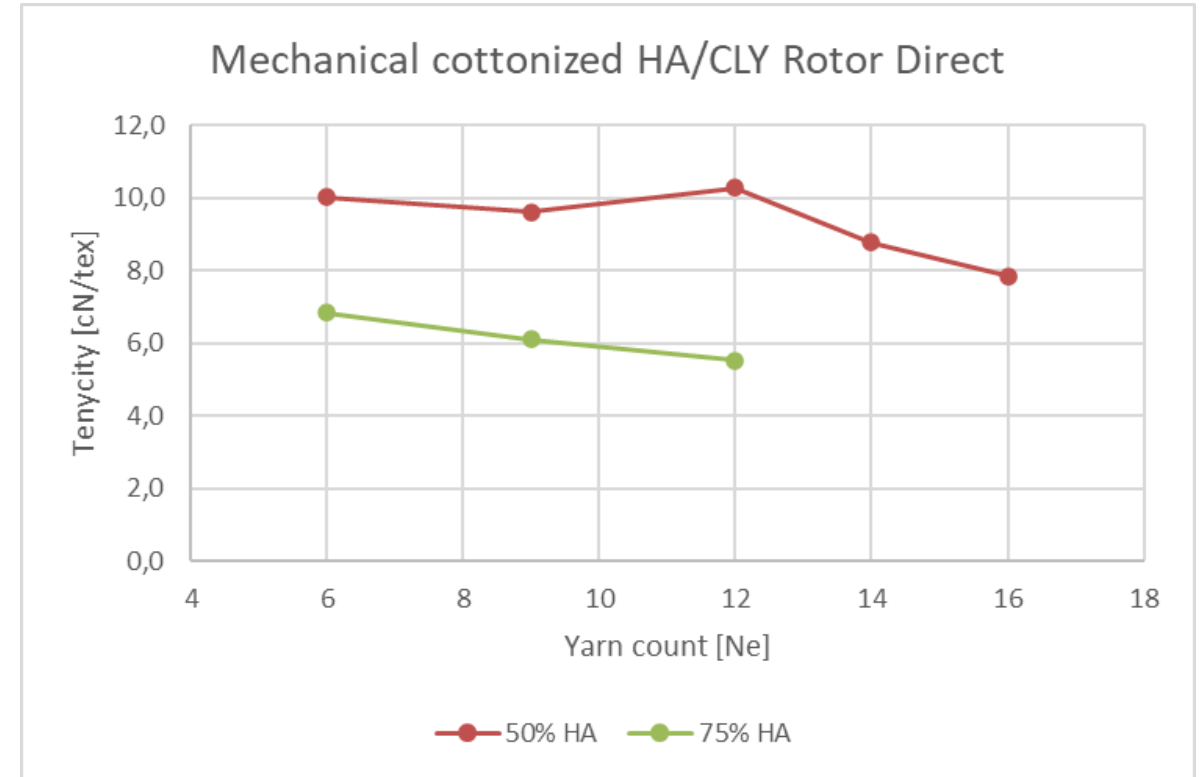
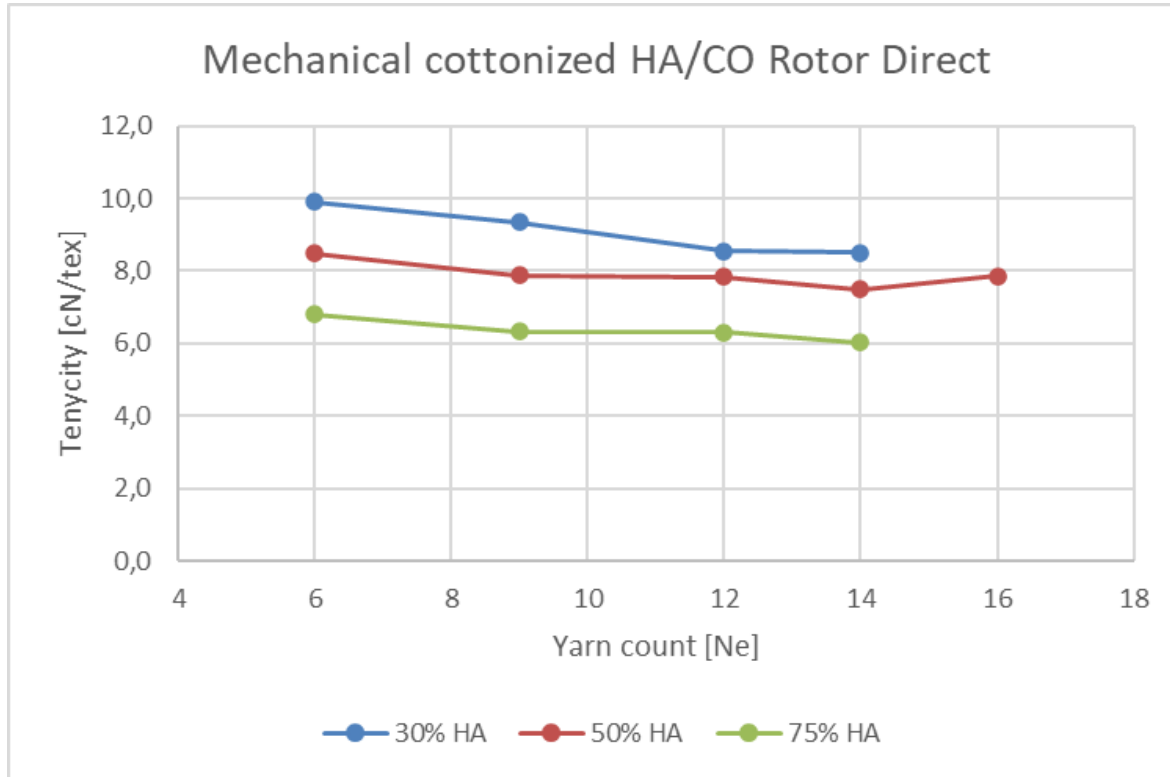


# Rotor yarn spinning: Short process examples

Blends Hemp with CO and Lyocell: Tenacity

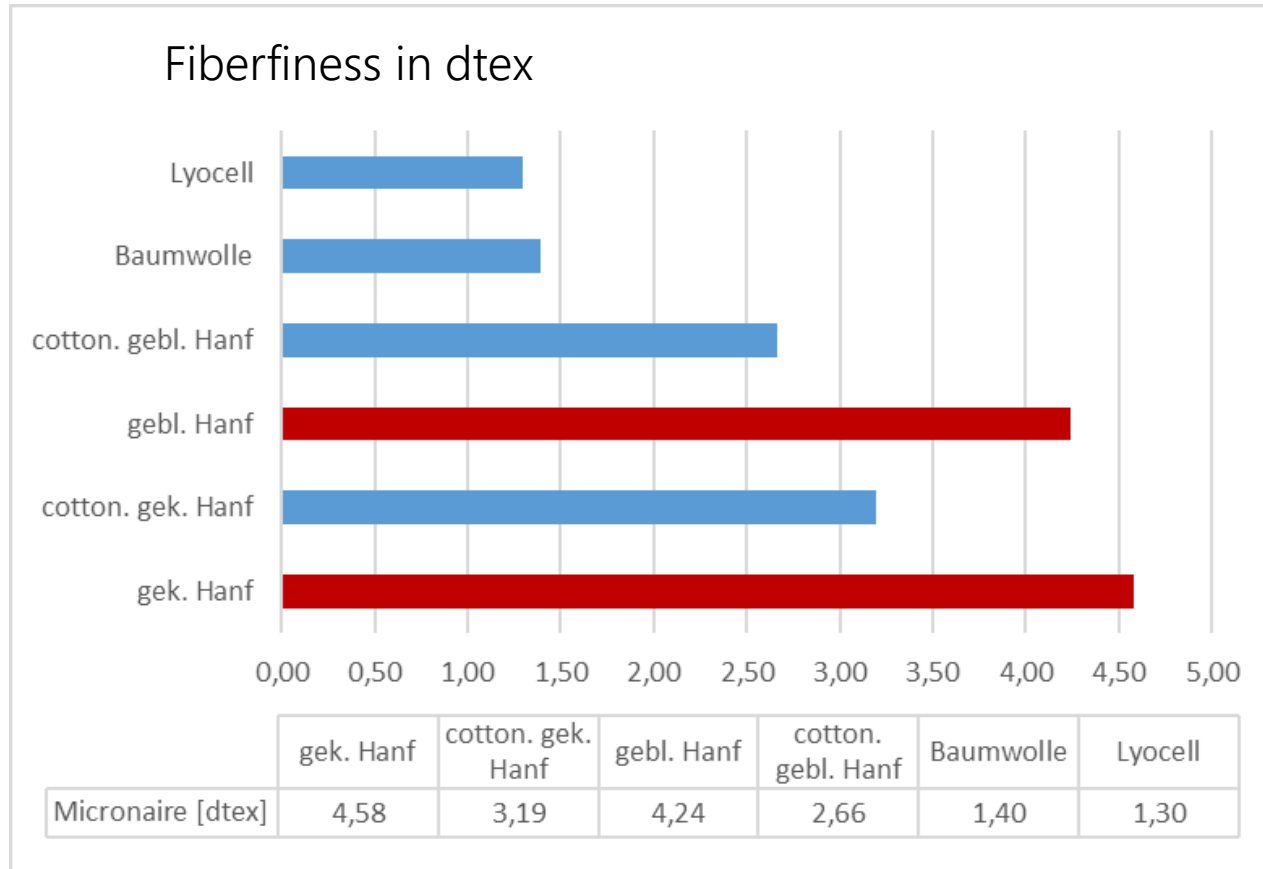


Rotor Direct



# Cotton and hemp

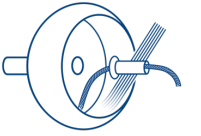
## Fiberfineness of materials



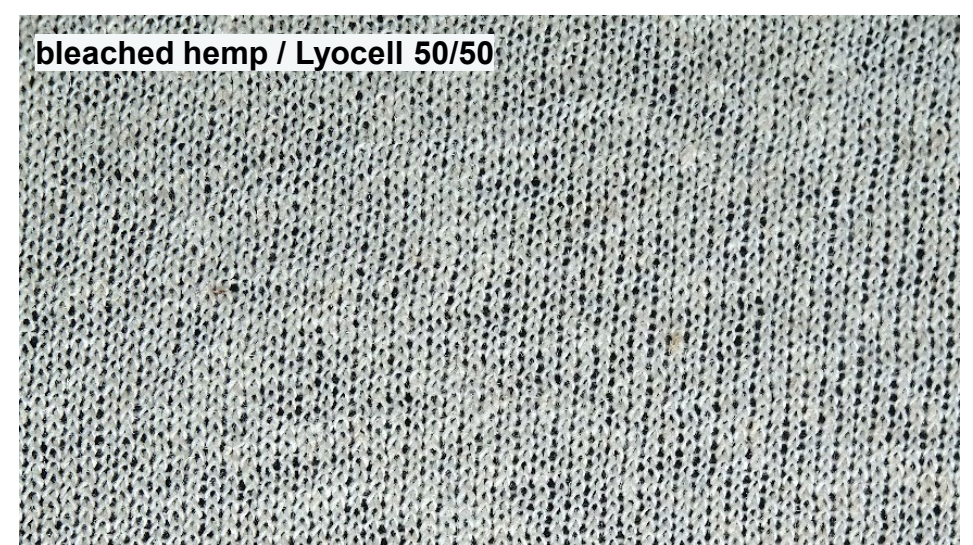
- Cottonized hemp - cooked
- Cottonized hemp – cooked and bleached
- Cotton - Ucak
- Lyocell – Lenzing



# Rotor yarn spinning: Short process examples



Knitting





# Hemp and cotton in a comparison

## Pros and Cons of Hemp



- ▶ Climatically adaptable
- ▶ Large CO2 storage tank
- ▶ Water consumption for cultivation: 1 kg HA 2.4 to 3.4 l (75% less than cotton)
- ▶ No pesticides
- ▶ Versatile use
- ▶ Full use of the hemp plant
- ▶ Robust and durable
- ▶ Dirt-repellent
- ▶ Antibacterial
- ▶ Growth period 3-5 months (vs. 5-6 months)



- ▶ Elaborate workmanship
- ▶ Negative influences due to processing
- ▶ No special equipment for hemp processing yet
- ▶ 3 times higher price
- ▶ Different textile and haptic experience

THANK YOU FOR YOUR  
ATTENTION!



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