

Hemp for sustainable textile market developments

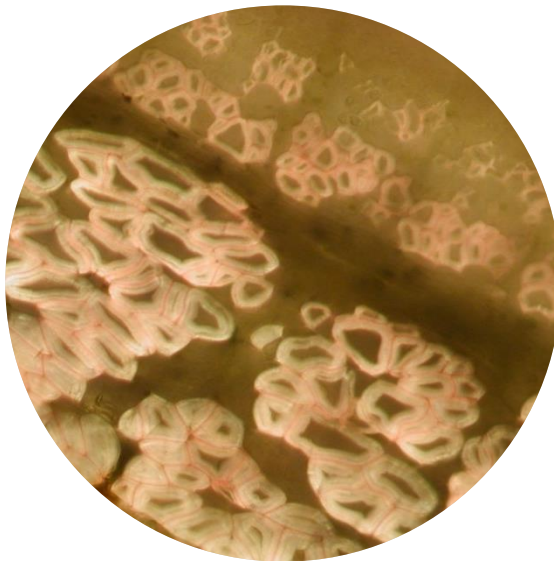
Jan E.G. van Dam, Martien J.A. van den Oever

WFBR

Eelkje Oldenburger and Mark Reinders

HempFlax

12-06-2018 15th Int Conf EIHA, Köln



Out-line Hemp for textiles

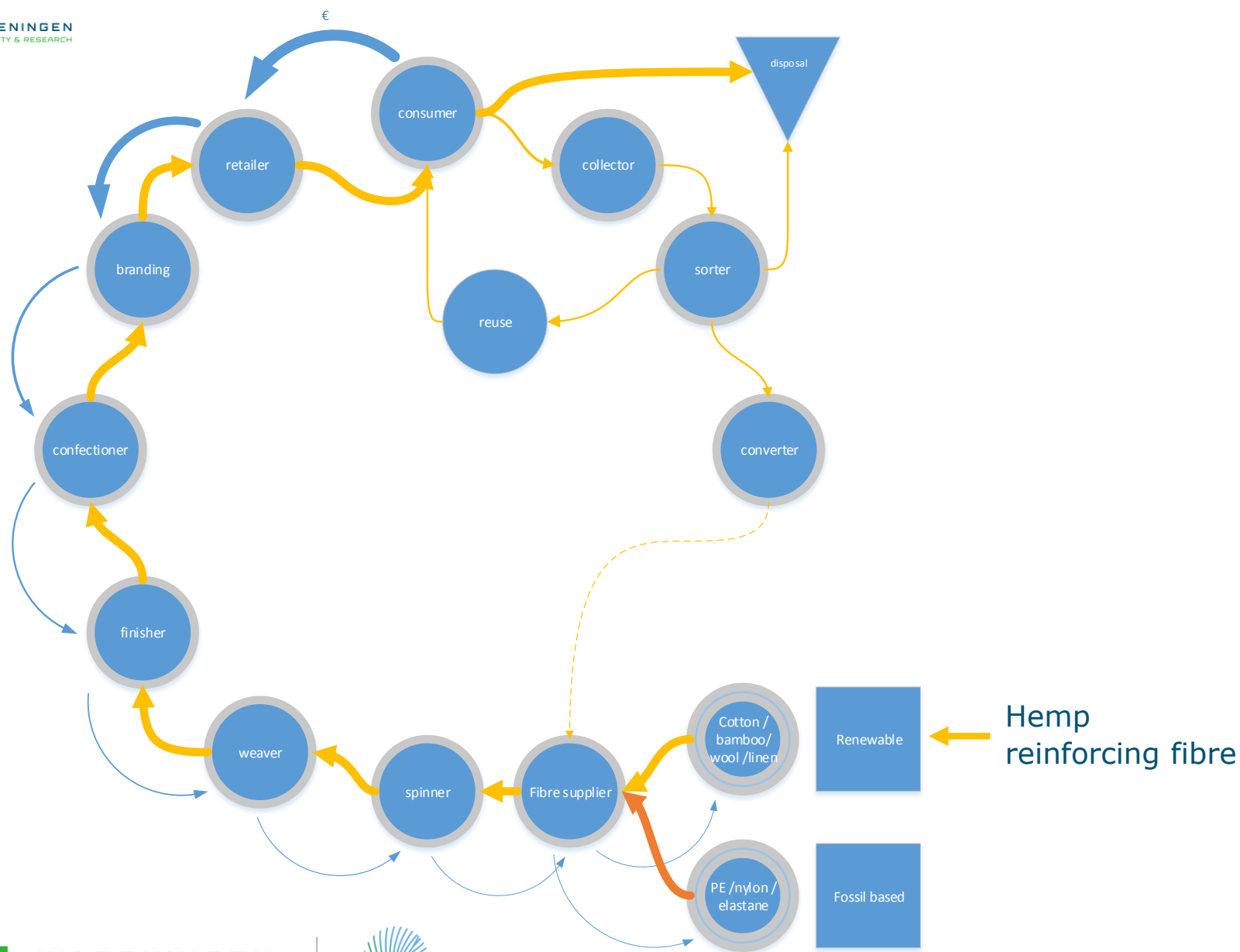
- Wageningen R&D on hemp fibres
- Trends in circular textiles
- Cellulosic textile fibre markets
- Hemp fibre
 - production and markets
 - quality for textiles
 - Growth potential
- Logistics of supply and demand

Circular economy and textiles

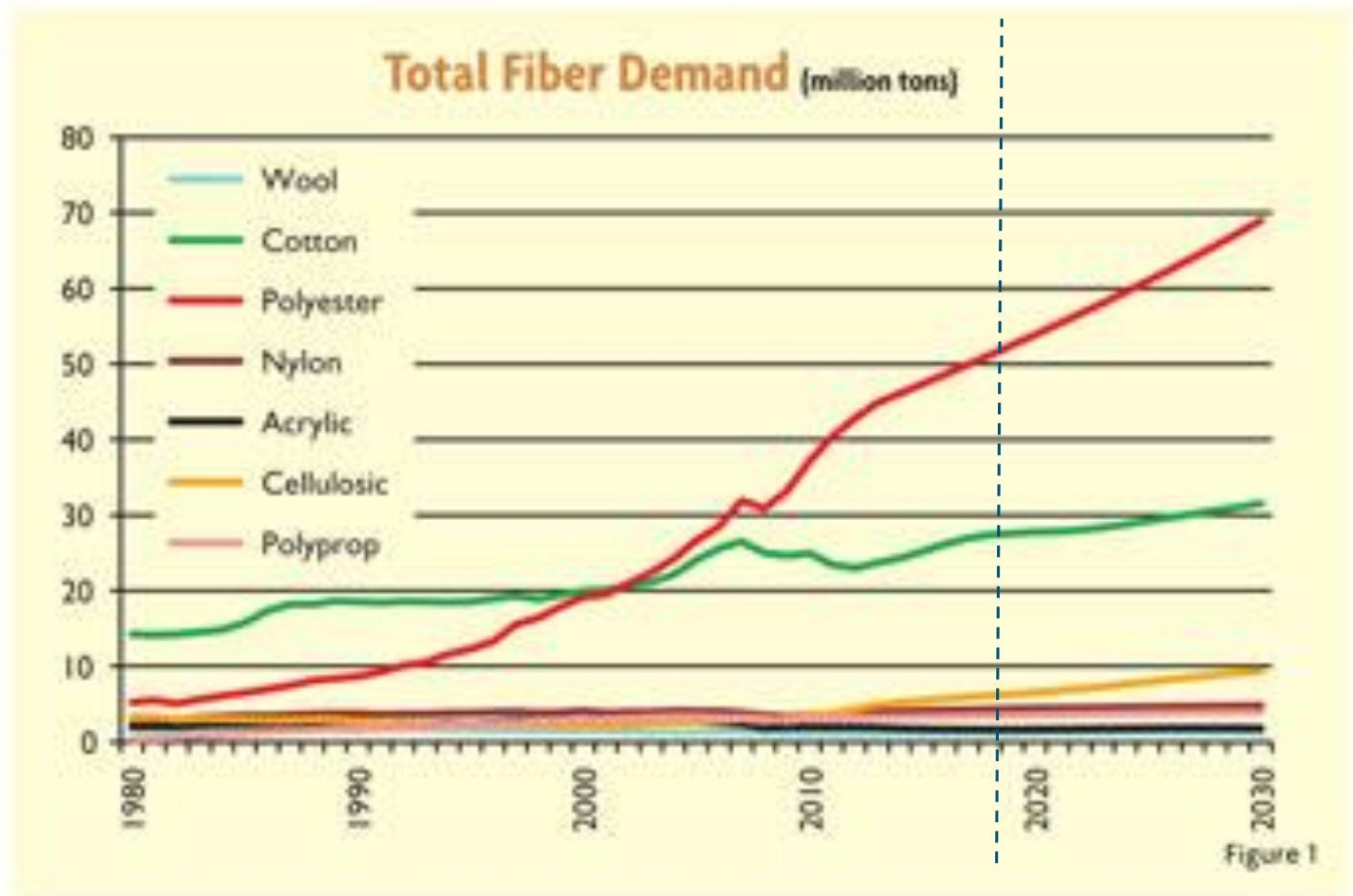


European Polysaccharide
Network Of Excellence

- Growing interest sustainable textiles
(NL: Roadmap Circulair Textiel 2017, I&M / Modint)
- Biobased raw materials for Circular Fashion:
 - Cotton
 - Bast fibres niche market (linen, jute, ramie, **hemp**)
 - Man-made cellulose (viscose/rayon, modal/lyocell)
 - Wool, silk
 - Bamboo fibres
- Reuse options recycled fibres



World fibre production

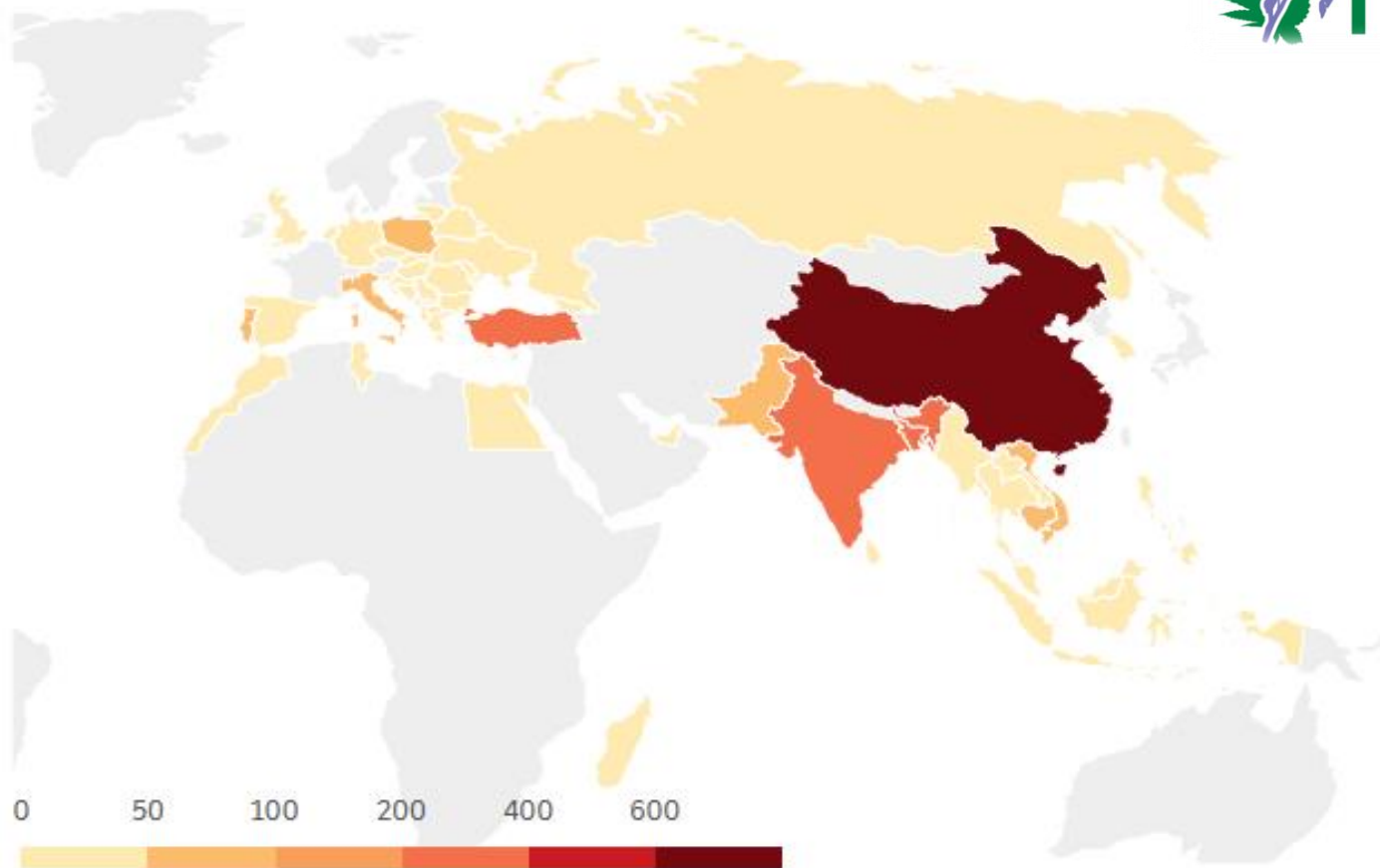


Issues on sustainable textile industries



- Cotton dispute, GMO vs organic cotton
 - Pesticide and water use
- Labour conditions, low wage countries & Fair trade
- Pollution of textile processes
 - Degumming processing
 - Dyeing, bleaching, finishing
 - Washing
- **Textile waste recycling**

Production sites for textiles



Door: NRC Gemaakt met Localfocus

Bron: SER

Fashionable industries



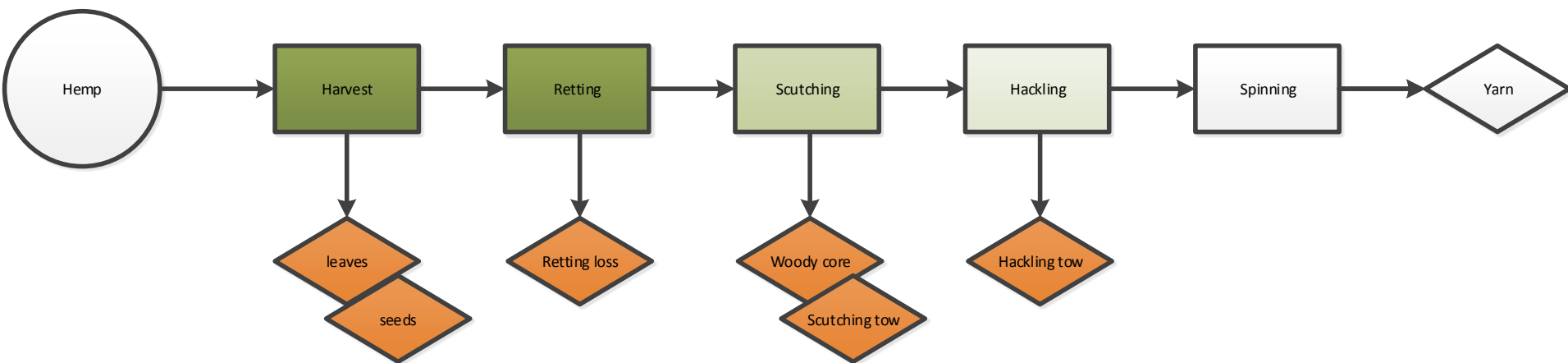
- Short living trends
 - Exclusive branding
 - Poor quality products
 - Very cheap for customers
-
- Flax linen industries: supply and demand fluctuations
 - Unpredictable prices
 - Unreliable customers
 - Incomplete supply chain



Fibre crop textiles production chain

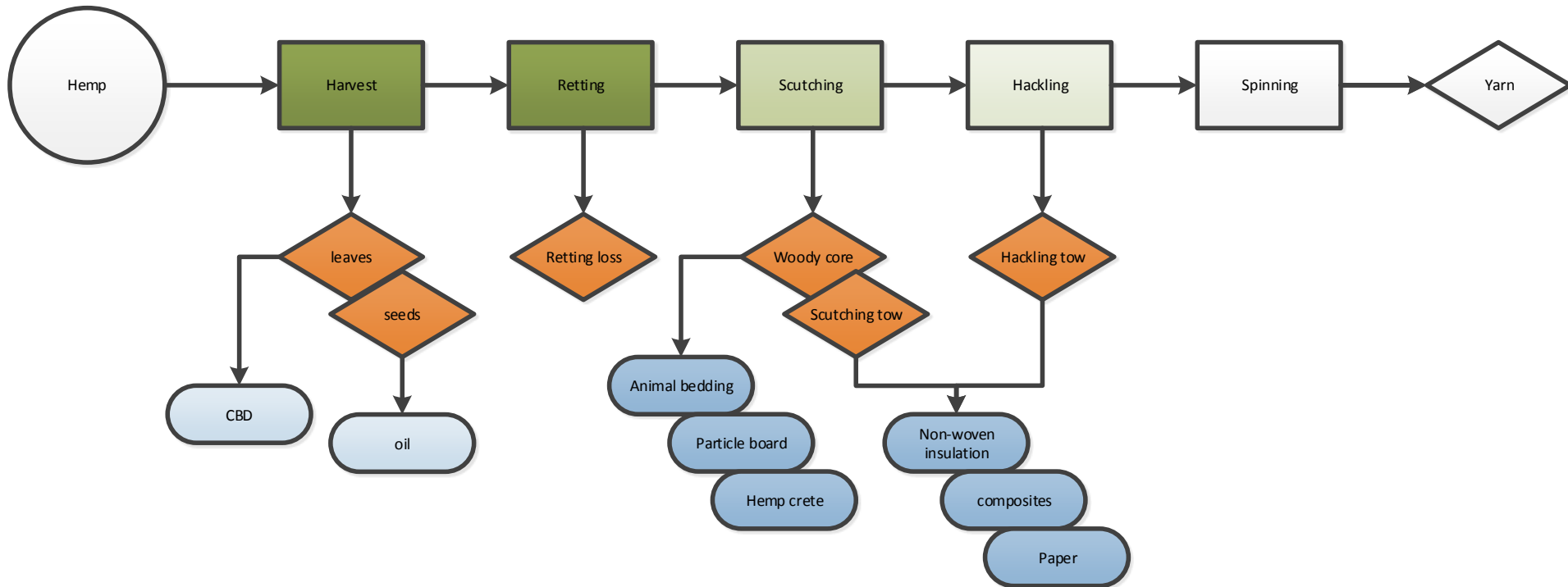
■ Bast fibre crops

● Processing steps to yarn and fabric



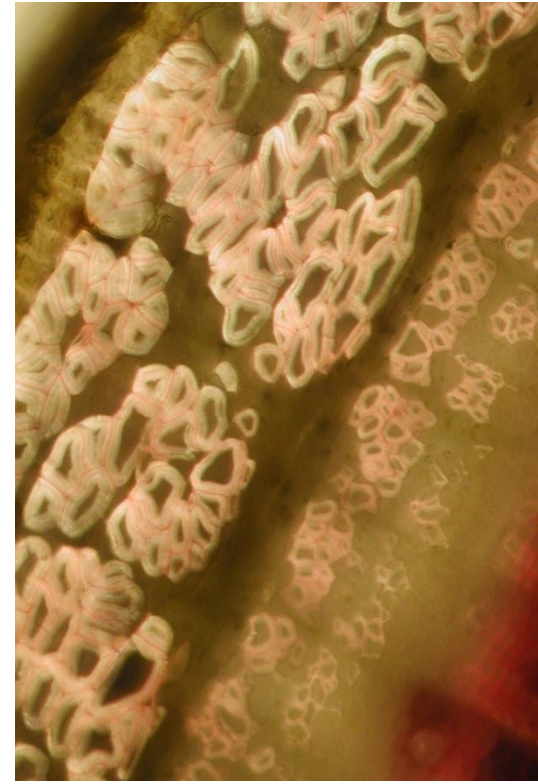
Hemp fibre uses / whole crop utilisation

- Pharma (cannabinoids)
- Food (seeds, oil)
- Building and composites, paper



Processes from stem to yarn (1)

- From stem to bast fibre bundles
 - Separation of leaves, roots and seeds
 - Separation of bast (phloem) and wood (xylem) (scutching)
 - Green decortication
 - Retting: field / water / enzymes
 - Microwave assisted
- From bundles to fibres (hackling)
 - Degumming
 - Steam explosion / ultrasonic
 - Chemical extraction (NaOH)
 - Enzymatic



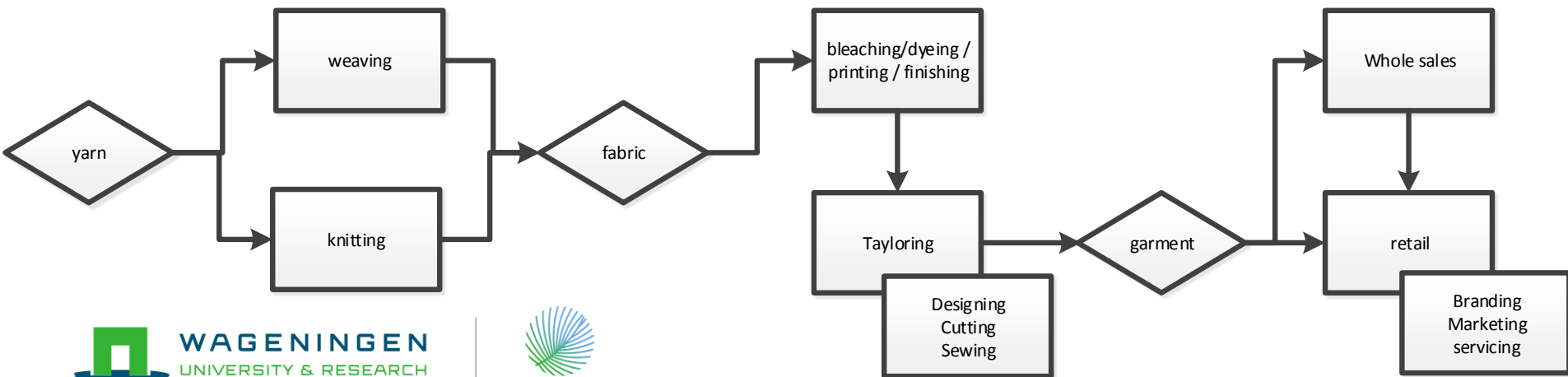
Processes from stem to yarn (2)

■ From fibre to yarn (spinning)

- cottonizing / cutting
- Carding / combing (sliver)
- roving / drafting (roving / blending)
- (ring) spinning / wet spinning
 - open end / rotor



■ From yarn to fabric and market (weaving to retail)



Yarn qualities

- The value of the yarn produced is highest for yarns produced on wet ring spinning frames, that are suitable for spinning finer counts of hemp yarn. With hemp fibre spinning of yarns of above **Nm 20** can be achieved.
- Other innovations on spinning frames are allowing for the dry spinning of both long fibre and tow from sliver for the yarn range **Nm 7** to **Nm 15**
- Interests for blends of hemp fibre with cotton / viscose or recycle fibres for improved strength

Hemp production capacity



European Polysaccharide
Network Of Excellence

- EU increase hemp fibre cultivated area to ca 30.000 ha (4-7 ton dm/ha)
 - 10-25.000 ton fibre → max 7.500 ton yarn
 - Competing applications (insulation, composites, paper) can use lower quality grades (tow)
 - Potential for expansion (1% cotton share = 300.000 t/y or ca 40x current area)
- Lack of infrastructure in EU for hemp textile processing
- Logistics of supply and demand
 - From farm to customer

Recommendations hemp fibre textile quality

- Hemp stem maturity at harvest
 - Middle part for textile fibre production
 - Top and bottom parts for technical uses
- controlled retting process
 - water-based retting / green decortication (wastewater treatment required/ drying)
- microwave retting (viable option?)
- degumming process necessary
 - steam explosion
 - chemical degumming
 - enzymatic degumming,
 - ultrasonic degumming

Conclusions & recommendations

- Large potential demand for sustainable hemp textiles
- Breeding and growing of hemp as a fibre crop for agriculture, has been optimised for fibre yield since the farmer is paid per weight
- Textile applications: most important economic parameters are fibre quality (fineness, strength and cleanness) rather than quantity
- Establishment of post-harvest processing facilities (decortication / degumming) / storage and transports
- Standardized quality rating system
- Involvement of textile industry (processing and design)
- Niche market development (fashion & technical textiles)

Thank you
for
your attention

jan.vandam@wur.nl

Bio2HighTex

KB-26-010-003



WAGENINGEN
UNIVERSITY & RESEARCH



100years
1918 — 2018



Europese Unie



Europees Fonds voor Regionale Ontwikkeling