

ADAPTED FROM A VERSION BY RURAL INDUSTRIES RESEARCH & DEVELOPMENT CORPORATION, ACT AUSTRALIA

THE NZHIA

iHEMP

DISCOVERY & INVESTMENT

TOUR 2022

FOOD • FIBRE • HEALTH



Exploring hemp's
economic and
sustainability potential

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Wednesday 17 August 2022
PRESENTED BY RICHARD BARGE

THE NZHIA

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SPEAKERS



RICHARD BARGE
(NZHIA)

The NZHIA chair presents the background of the emerging Aotearoa NZ iHemp industry.



CRAIG BUNT
(UNIV. OF OTAGO)

How does iHemp fit into Food Science and Agricultural innovation.



RAECHEL LAING
(UNIV. OF OTAGO)

What is the potential for hemp? Current international and national issues in relation to natural fibres will be outlined, with questions raised on hemp in the New Zealand fibre/textile sector.



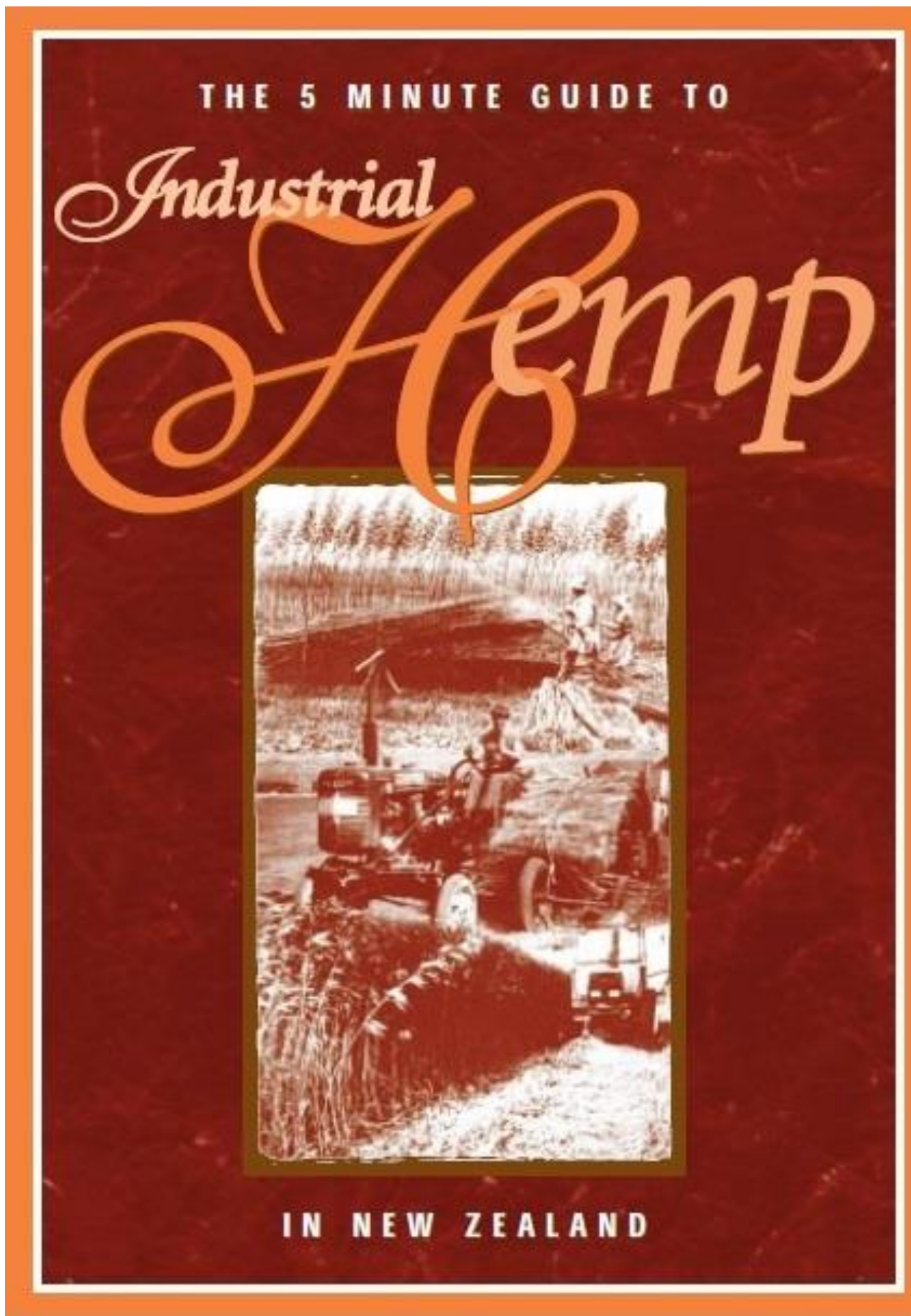
PAT SILCOCK &
GRAHAM EYRES
(UNIV. OF OTAGO)

Product Development Research Centre -
Capabilities that will be of interest to hemp oil and protein
producers wanting to develop new products.



LOAMÉ KOK
(ABACUS BIO)

Using economic analysis and new genetic tools to develop more profitable,
sustainable hemp cultivars.



NZ HEMP EXPORT DRIVEN INVESTOR REPORT:
\$2 BILLION AND
20,000 REGIONAL JOBS BY 2030
JUST NEEDS THE NOD...

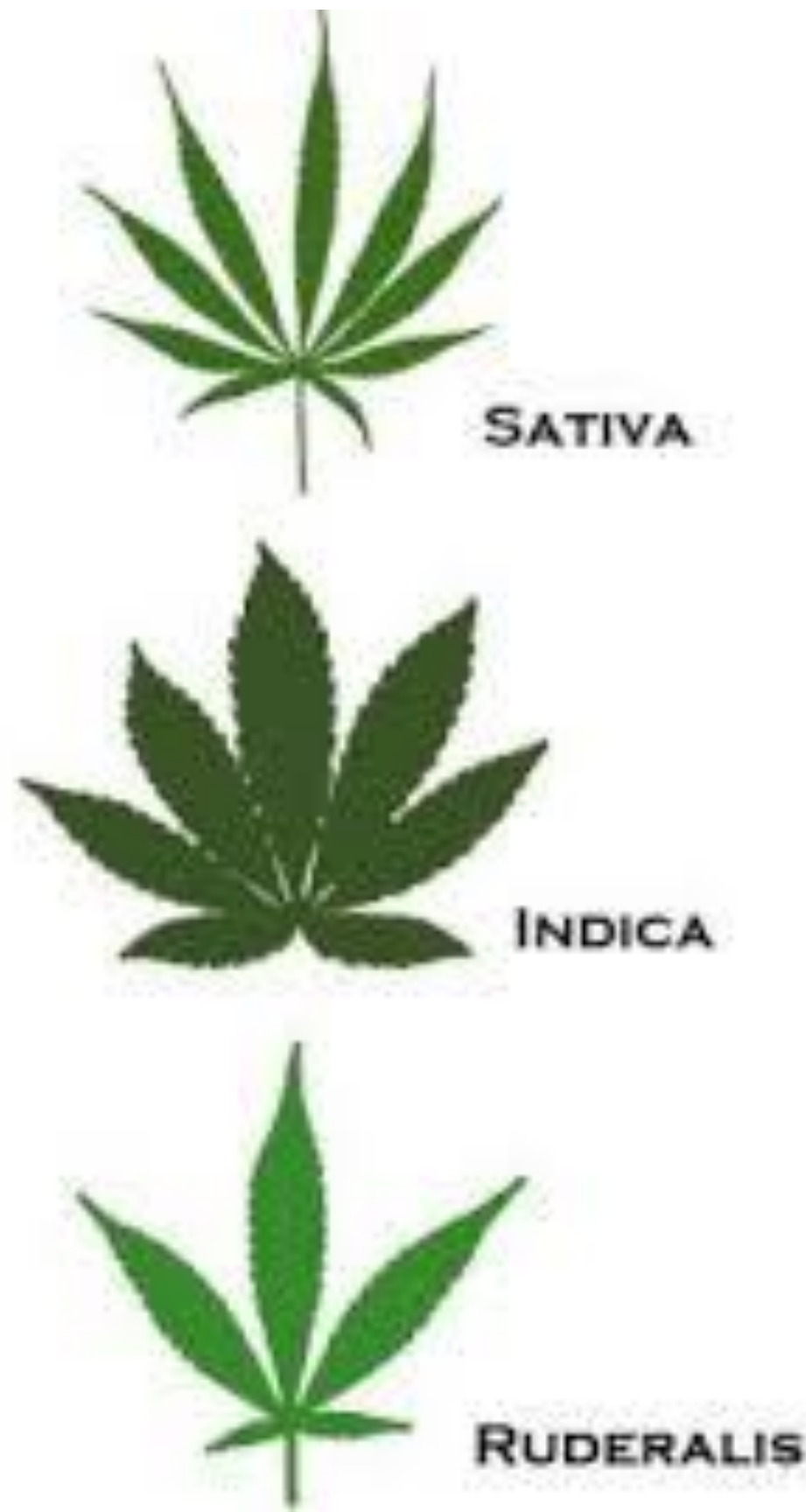
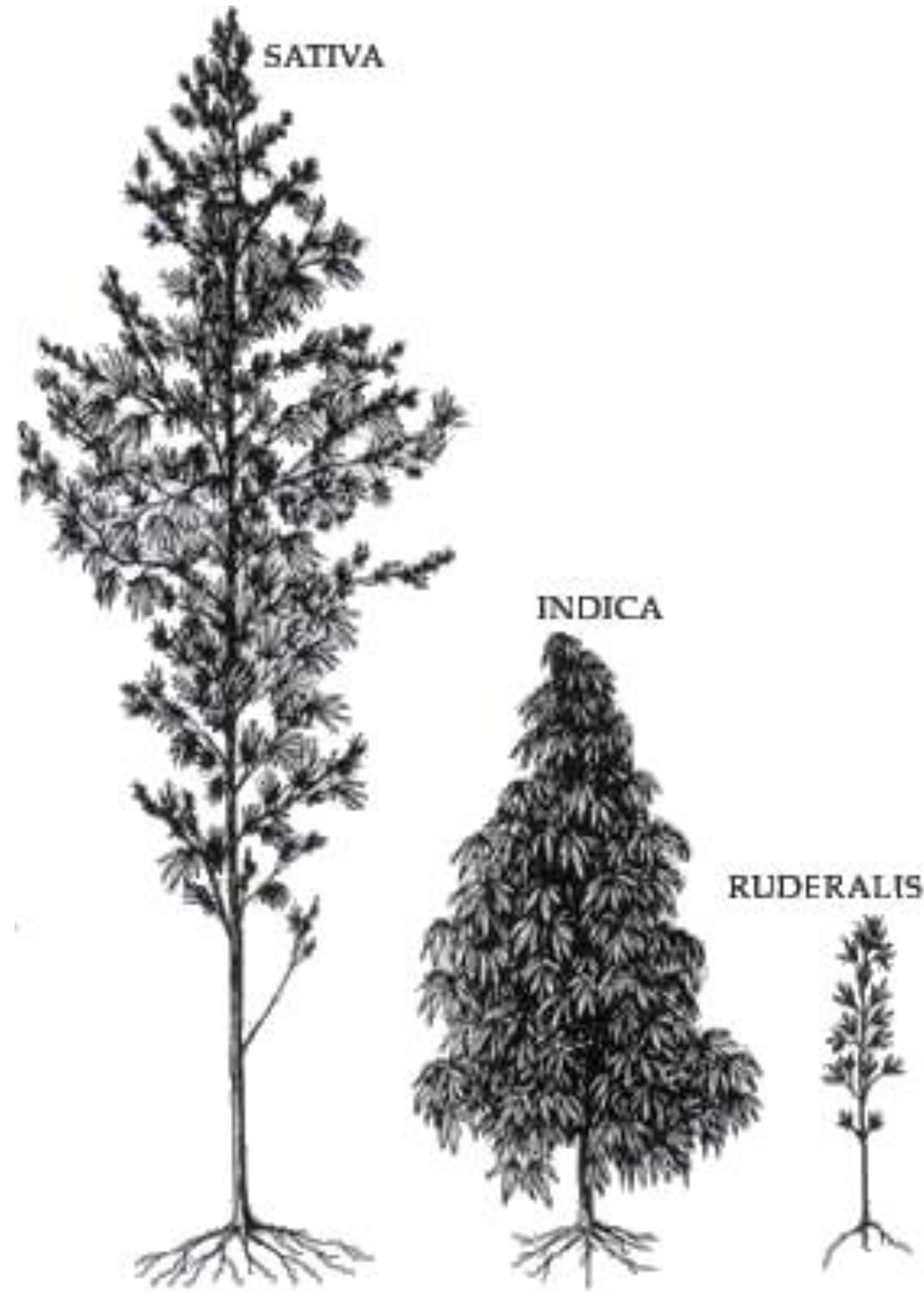
EUROPE CHINA NORTH AMERICA SOUTH AMERICA
INDIA AUSTRALIA NEW ZEALAND

G R O W T H

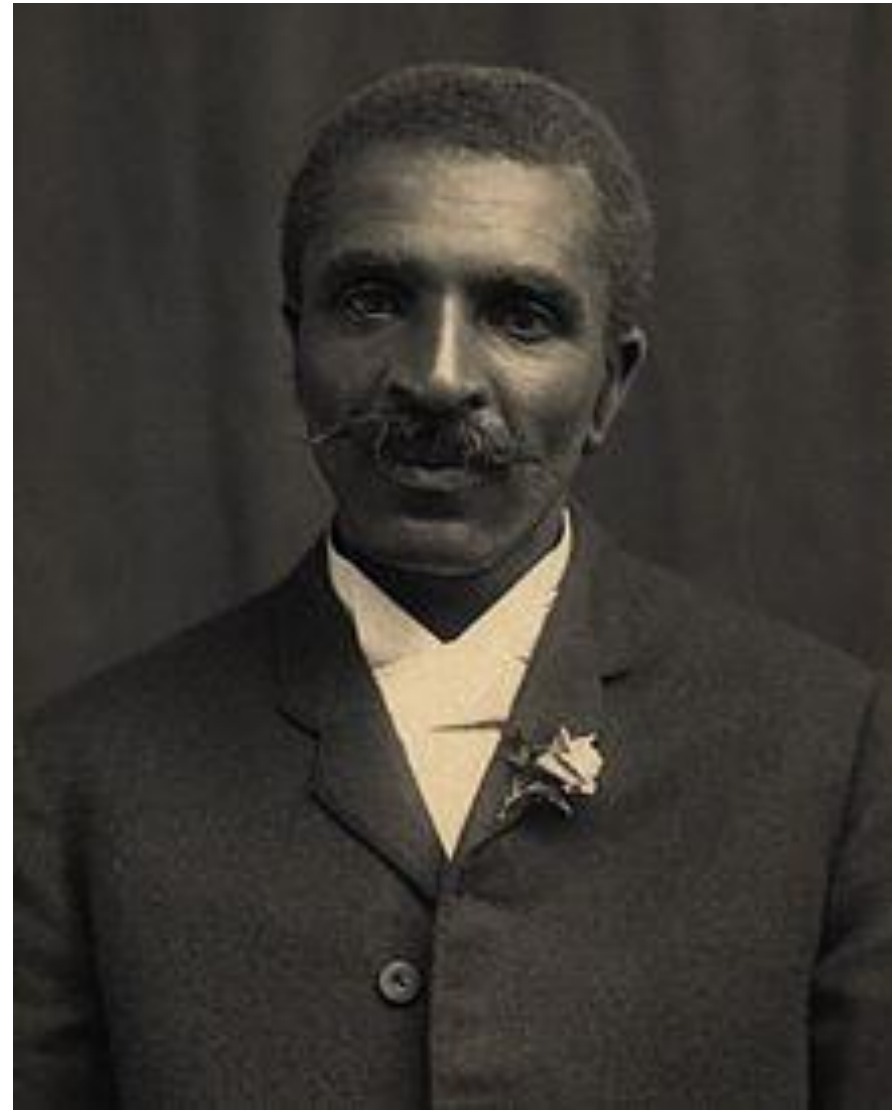
FULL REPORT

The graphic features a world map with yellow dots and dashed lines connecting to New Zealand, representing export destinations: Europe, China, North America, South America, India, and Australia. Below the map, a path of wooden blocks spells out 'G R O W T H' with an upward-pointing arrow. A 'FULL REPORT' button is in the bottom right. A small collage of images (hemp field, processing, grocery store, salad) is at the top.





Chemurgy is a branch of applied chemistry that is concerned with preparing industrial products from agricultural raw materials

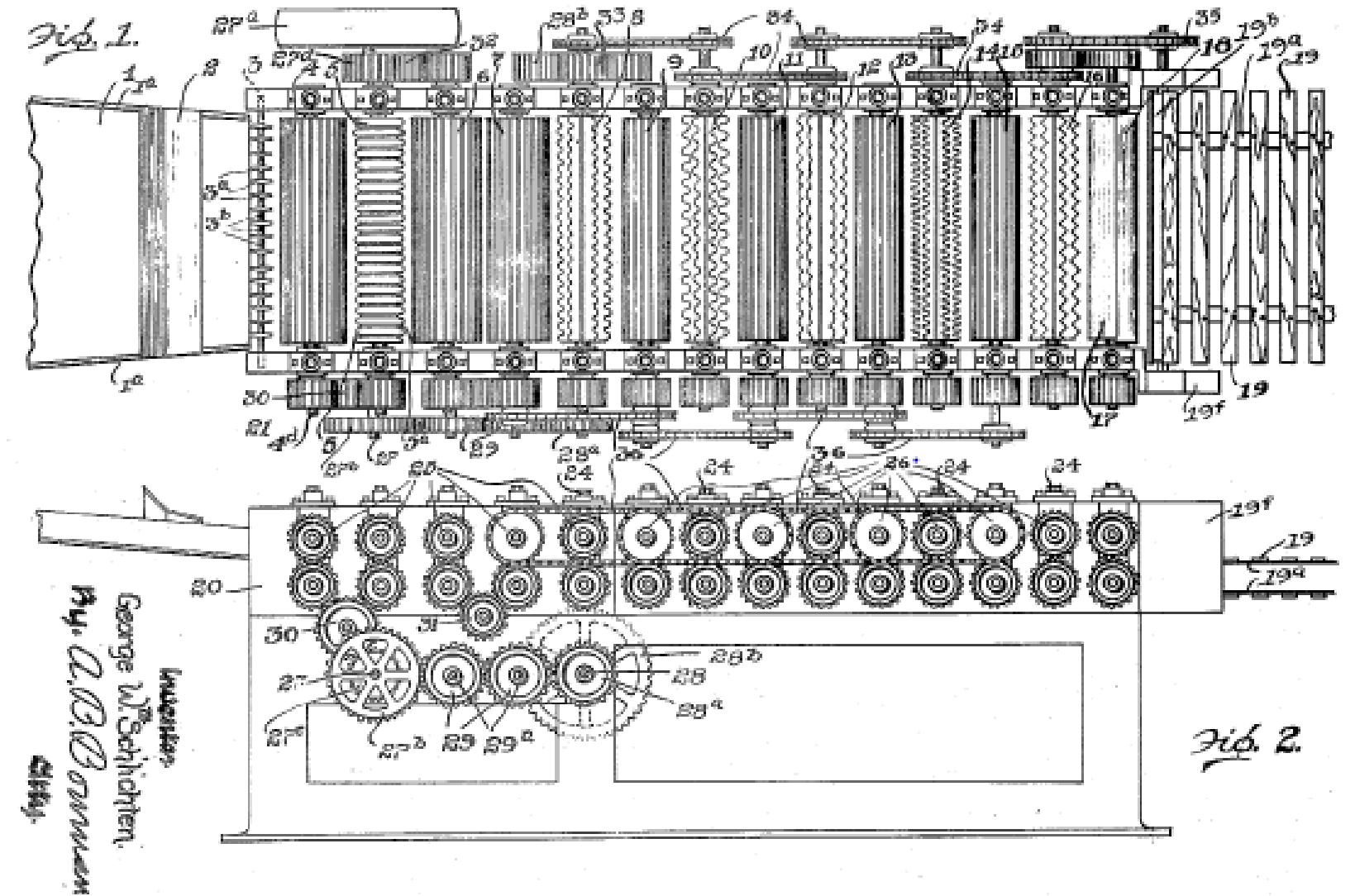
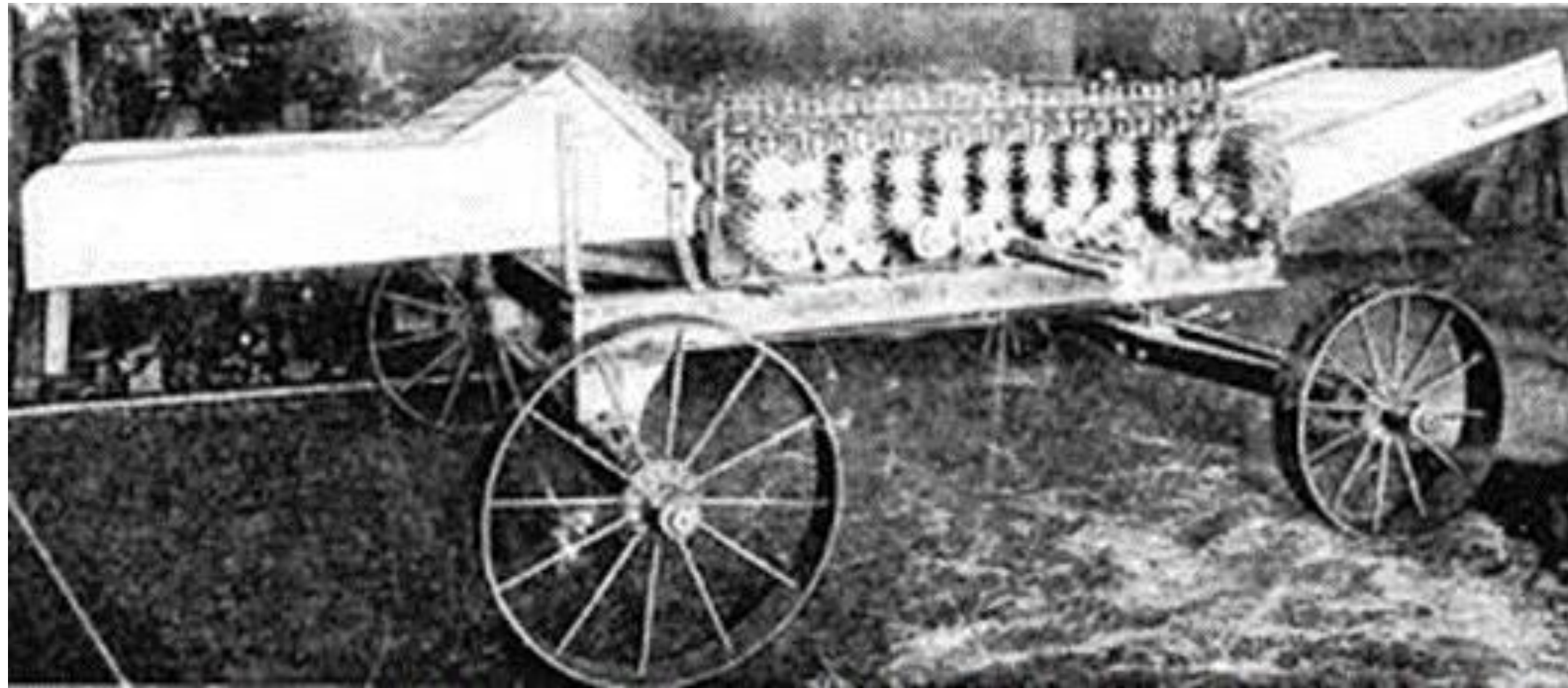


George Washington
Carver c1910



Henry Ford c1930





G. W. SCHLICHTEN.
MEANS FOR TREATING FIBER BEARING PLANTS.

APPLICATION FILED DEC. 27, 1916.

1,308,376.

Patented July 1, 1919.

8 SHEETS—SHEET 1.



NEW BILLION-DOLLAR CROP

American farmers are promised a new cash crop with an annual value of several hundred million dollars, all because a machine has been invented that solves a problem more than 6,000 years old.



Hemp fiber being delivered from machine, ready for baling. Pile of pulverized hurds beside machine is 77 percent cellulose..

BILLION-DOLLAR CROP

petition with coolie-produced foreign fiber while paying farmers fifteen dollars a ton for hemp as it comes from the field.

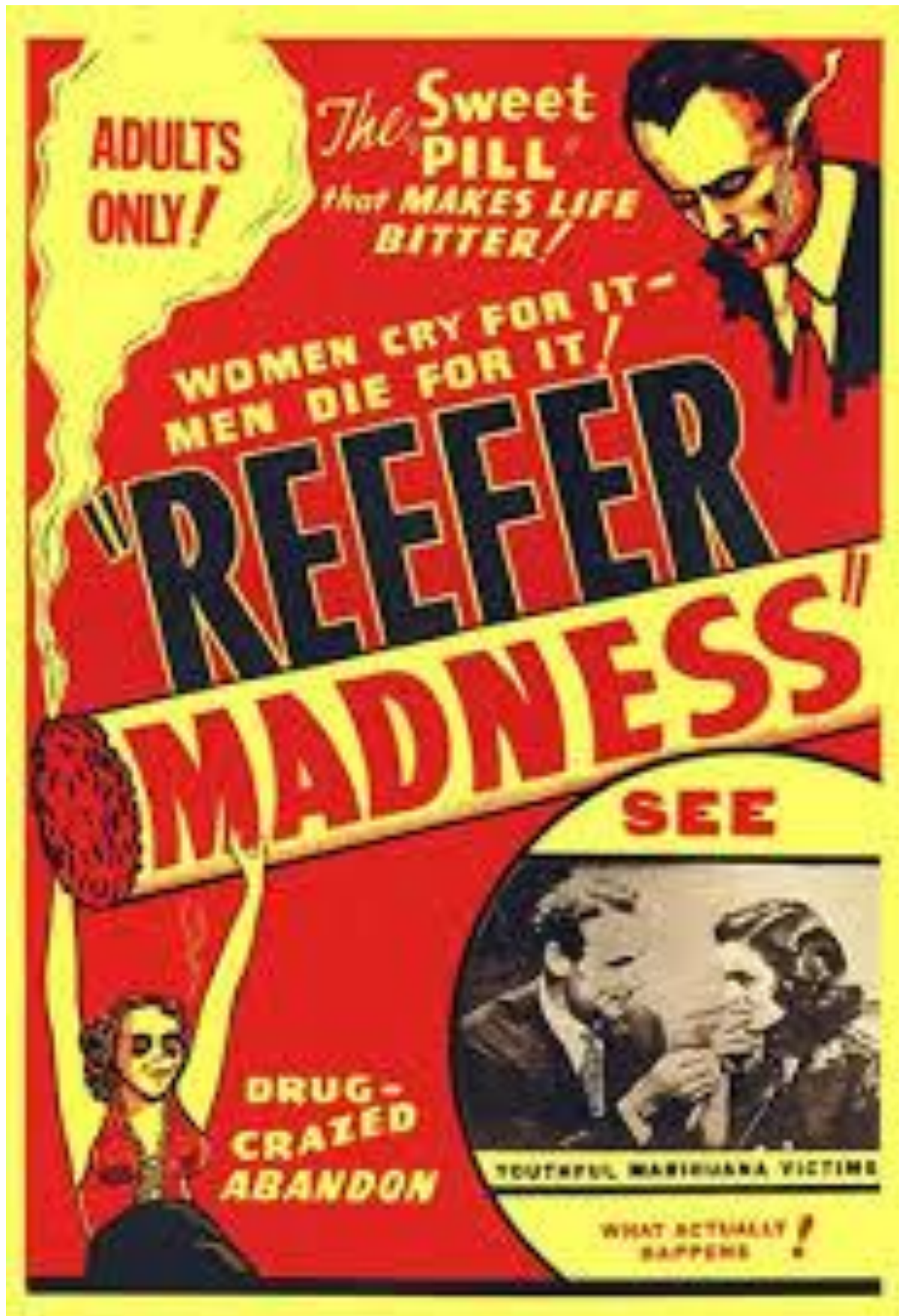
From the farmers' point of view, hemp is an easy crop to grow and will yield from three to six tons per acre on any land that will grow corn, wheat, or oats. It has a short growing season, so that it can be planted after other crops are in. It can be grown in any state of the union. The long roots penetrate and break the soil to leave it in perfect condition for the next year's crop. The dense shock of leaves, eight to twelve feet above the ground, chokes out weeds. Two successive crops are enough to reclaim land that has been abandoned because of Canadian thistles or quack grass.

Under old methods, hemp

(Continued to page 144A)



After 85 years of prohibition it is now one of the most studied plants in the world.



Why are we doing the iHemp tour

To raise awareness within industry and the R&D community

**Discuss the vast opportunities and potential within the
iHemp industry**

**To build a collaborative inclusive industry that is going to
rewrite the rules**

The Why - Value Chain



Growers and
Cultivators



Testing and
Development



Processors and
Manufacturers



Distributors and
Consumers

We need R&D done in all the above

**We need to train people and develop tech in these areas
Industry is about to spend on the mega trends, sustainability,
climate, resilience, plant based, consumer lead**

Why do we need R&D - iHemp the great disruptor



New technology for processing and production

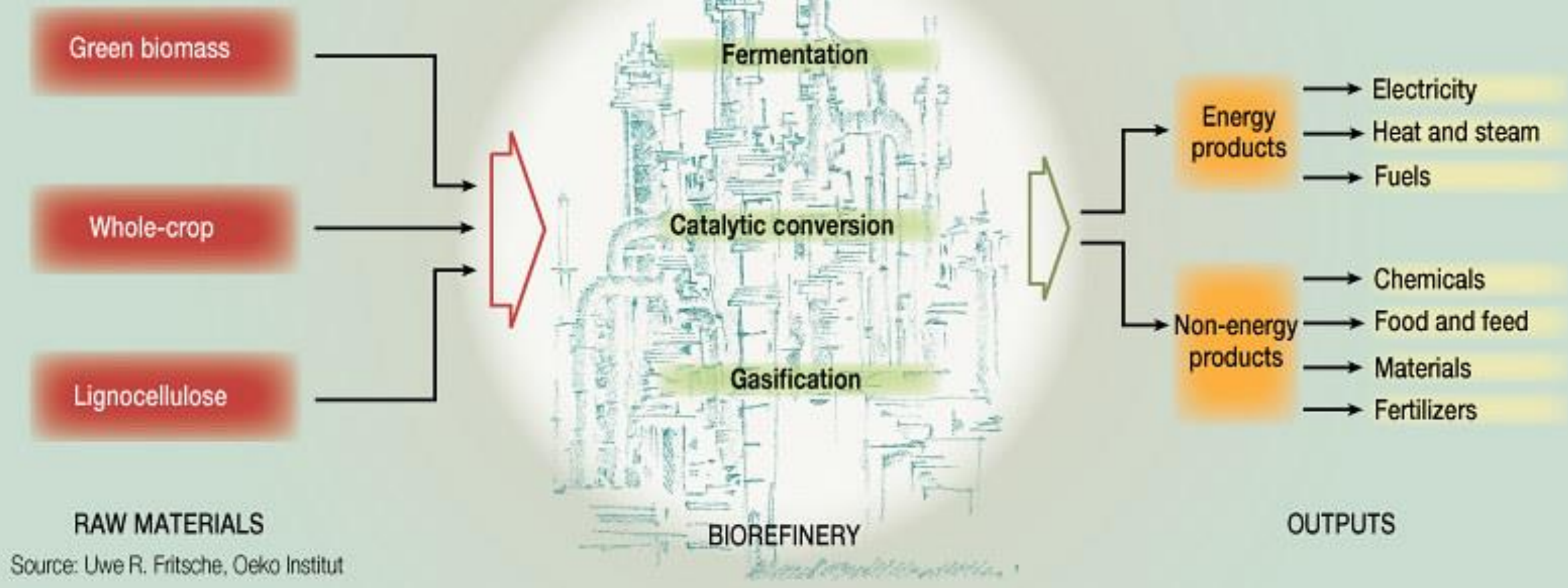
Export potential

Services to support the industry
From testing and compliance to logistics, distribution
and Marketing



Why do we need R&D – The Circular Economy

Biorefinery, general concept



The 4 Corners - On Farm and Fibre

Farmers/Growers

Plant Breeding
Crop rotation
Seeding and Nutrients
Harvesting and storage
Primary production and
Extraction

Fibre Sector

Primary processing
What sector are you interested
in?
Building materials
Textiles – fabric and technical
Plastic & composites
Paper, fuel, mulch/compost



Hemp Construction Materials



< Previous Next >



HempWood® Gazette March 2022



The 4 Corners - Food and Health

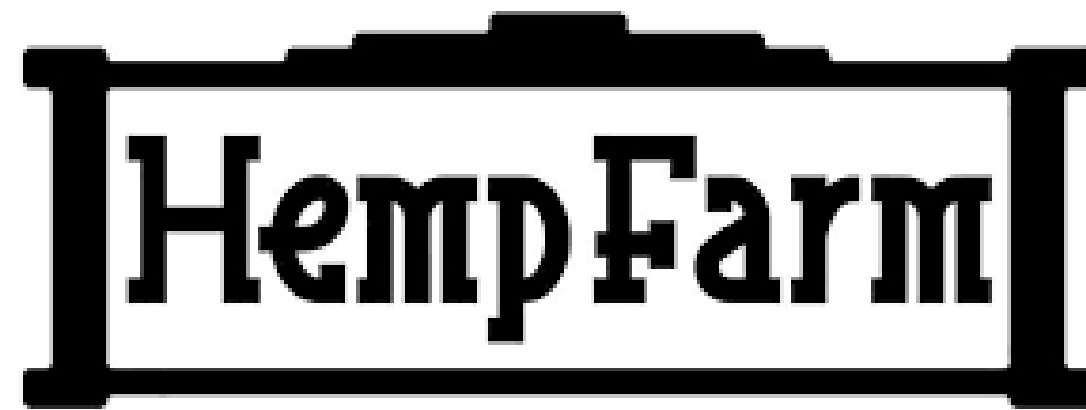
Food Sector

Functional foods
New product development
By product utilisation
Industrial uses of oil and other
abrasive fluids

Health Sector

Terpenes, Flavonoids and
Cannabinoids

Cosmetics
Natural health products
Nutraceuticals



hempfarm.co.nz



RESOURCES

The Next Step

Join the NZHIA so we can keep in touch

- We need a:
 - Hemp Industry Strategy Reset
 - Capability Development Program

Callahan Innovation:
[Capability Road Maps](#)

Tupu.nz: [Fact sheets for industrial hemp](#)

CallaghanInnovation
New Zealand's Innovation Agency

 **Te Puni Kōkiri**
MINISTRY OF MĀORI DEVELOPMENT

It's time to unlock hemp's potential for Aotearoa.

SUSTAINABILITY



NUTRITION



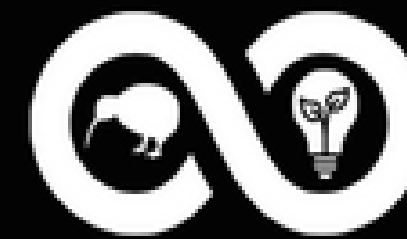
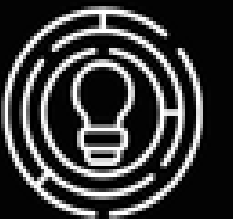
BIOMATERIALS



HEALTH



INNOVATION



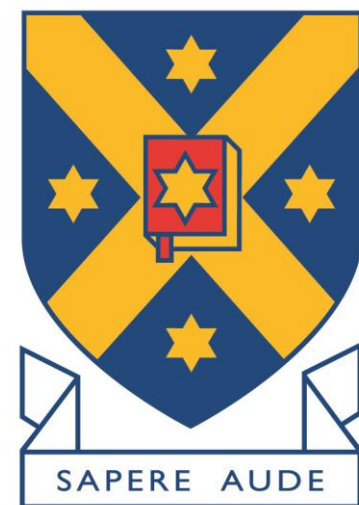
**Aotearoa New Zealand
Hemp Alliance**

Coming soona new community building portal

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WITH THANKS

With thanks to our speakers from



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GET INVOLVED - JOIN



Our mission is to promote the growth and development of the industrial hemp industry in New Zealand in all aspects. Now is the perfect time to become a member and be part of this growing industry.

Join at www.nzhia.com



Growers and
Cultivators



Testing and
Development



Processors and
Manufacturers



Distributors and
Consumers

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How does iHemp fit into Food Science and Agricultural Innovation

Prof Craig Bunt | May 2022

6 NOVEMBER 2018

Hemp seed can now be sold as food

Hon Damien O'Connor

Agriculture

Food Safety

Regional economies are the biggest winners of rule changes that allow hemp seed to be treated as just another edible seed, Food Safety Minister Damien O'Connor announced today.

“Hulled, non-viable seeds and their products will be now be viewed as just another edible seed. Growing, possession and trade of whole seeds will still require a licence from the Ministry of Health.


“Hemp seeds are safe to eat, nutritious and do not have a psychoactive effect.











“The Misuse of Drugs (Industrial Hemp) Regulations 2006 and the Food Regulations 2015 will be amended to allow the sale of hemp seed as food. Hemp flowers and leaves will not be permitted.











“We will continue to ease pathways for our farmers and growers to produce the finest food and fibre for the world's most discerning customers,” Damien O'Connor said.

- new zealand
- plant based
- hemp farm
- hemp industry
- hemp hearts
- hemp seeds
- superfood garnish
- seed oil
- hemp flour
- protein powder
- brothers green
- organic hemp
- hemp oil
- hemp protein
- recipe

Ads · Shop hemp food zealand

| | | | | | | | | | | | | | | |
|---|---|--|---|--|--|--|--|---|--|---|--|--|---|---|
|  <p>Macro Hemp Seeds 200g NZ\$8.50 Countdown Super...</p> |  <p>NZ Hemp Seed Hearts NZ\$64.99 The Brothers Green Free shipping</p> |  <p>NZ Hemp Protein Powder NZ\$54.99 The Brothers Green Free shipping</p> |  <p>NZ Hemp Seed Oil 1L NZ\$69.99 The Brothers Green Free shipping</p> |  <p>Macro Protein Powder Hemp Seed NZ\$8.50 Countdown Super...</p> |  <p>Bean Supreme Vegetarian Burger... NZ\$7.50 NZ\$8 Countdown Super...</p> |  <p>Hearty Hemp Mylk Base 1L Jar (mak... NZ\$72.00 Mylk Made - Nut a...</p> |  <p>Hemp Connect Hemp Hearts - 1k... NZ\$64.90 Sportsfuel.co.nz Free shipping</p> |  <p>National Distillery Co. Hemp Gin NZ\$109.99 Premium Liquor</p> |  <p>Blue Frog Manuka Honey & Hemp... NZ\$7.99 Blue Frog Breakfast</p> |  <p>Pure Hemp Protein Powder 500g NZ\$30.00 Ephraim Health</p> |  <p>Hulled Hemp Seeds 1kg Organic 1kg NZ\$69.00 Matakana Superfo...</p> |  <p>The Brothers Green - Gut Health Protei... NZ\$19.99 Viberi NZ ★★★★★ (6)</p> |  <p>Certified Organic Plant Based Hem... NZ\$44.99 Rainbow Child</p> |  <p>The Ultimate Milk It Bag HEMP or... NZ\$27.00 Healthproducts Co...</p> |
|---|---|--|---|--|--|--|--|---|--|---|--|--|---|---|

| | | | | | | | | | |
|---|---|--|--|---|---|---|--|---|--|
|  <p>Hemp Hearts (1kg) Grown &... hemppconnect.co.nz - In stock</p> |  <p>Health Benefits Of Hemp Foods hemppnz.co.nz</p> |  <p>Hemp-based meat: New Zealand firm eyes ... foodnavigator-asia.com</p> |  <p>Just another edible seed: New Zealand ... foodnavigator-asia.com</p> |  <p>Organic NZ Hemp Seeds ... thebrothersgreen.co</p> |  <p>Hemp Hearts 500g - GOOD... goodfarmers.nz</p> |  <p>Hemp: The Brothers who want you to make ... stuff.co.nz</p> |  <p>NZ Hemp Seeds x Hemp Oil x He... thebrothersgreen.co</p> |  <p>Hemp Food Combinations TOP ... tophemp.co.nz - In stock</p> |  <p>Hempfarm Kiwi Hemp Hearts - ... hempstore.co.nz - In stock</p> |
|---|---|--|--|---|---|---|--|---|--|

| | | | | | | | | | |
|---|---|---|--|---|---|--|--|---|--|
|  <p>Hemp Food Products Approved For ... foodmatters.com</p> |  <p>Hemp Recipes - Hemp Connect Premium ... hemppconnect.co.nz</p> |  <p>Startup To Launch Plant-Based Hemp M... greenqueen.com.hk</p> |  <p>Gut Health Protein Pow... hempwellness.co.nz - In ...</p> |  <p>New Zealand reclassifies hemp seed as ... smallcaps.com.au</p> |  <p>Trio team up to trial innovative hemp ... riddet.ac.nz</p> |  <p>Food Nation Magic Mince - Mushroom & He... foodnation.co.nz</p> |  <p>Hemp Seed Oil, Cold Pressed ... purenature.co.nz - In stock</p> |  <p>Hemp New Zealand Facebook facebook.com</p> |  <p>Wild Rivers NZ Hemp H... kakarikifinefoods.com - I...</p> |
|---|---|---|--|---|---|--|--|---|--|

| | Peanuts | Hemp heart | Hulls | Palm Kernel Expeller (PKE) |
|-------------------|---------|------------|-------|----------------------------|
| Energy (MJ/kg DM) | 13 | 22 | 15 | 12 |
| Protein (%) | 13 | 30 | 13 | 17 |
| Fat (%) | 49 | 45 | 11 | 9 |
| Fibre (%) | 42 | 4 | 65 | 54 |



Friday, **15 April 2022**

Trial cannabis farm in Mataura a success

After the flowers were extracted from the plant most of the biomass of the plant was left and would be processed into dried pellets for animal food, he said

Trials would be undertaken at Lincoln University to confirm it was suitable as stock food.

Otago Daily Times



ACVM Alert Notification 20-001

Industrial Hemp as Agricultural Compounds Supersedes ACVM Alert Notification 18-001



ACVM Alert Notification 18-001

Hemp and hemp-based products used as agricultural compounds: Animal feeds and animal treatment products

Hemp-based nutritional products for animals, such as hemp protein powders, could be considered **exempt from registration if they have no detectable tetrahydrocannabinols** (including THC and CBD) and meet all other the requirements for exemption status under the ACVM Act and regulations. (If a product is determined as exempt from registration, the exemption applies only if the controls and conditions are adhered to.)

Feeding unprocessed, harvested hemp to animals without registration is not permitted under the ACVM Act and may also be an offence under the Misuse of Drugs Act. (Misuse of Drugs Act offences are a matter for the Police.)

Industrial hemp is primarily regulated under the Misuse of Drugs Act 1975 and the Misuse of Drugs (Industrial Hemp) Regulations 2006, both of which are administered by the Ministry of Health. Under these pieces of legislation, industrial hemp is defined as a cannabis plant, seed, or fruit with a THC content that is generally below 0.35% and is not above 0.5%. Although the amount of THC typically found in industrial hemp is low, the Misuse of Drugs Act does not prescribe a limit for the presence of a controlled drug, and so any amount of **THC above zero**, and anything containing that THC, is **classified as a Class B controlled drug**.



MIDLAND SEEDS

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NZ natural fibres and products: what is the potential for hemp?

Raechel Laing

raechel.laing@otago.ac.nz

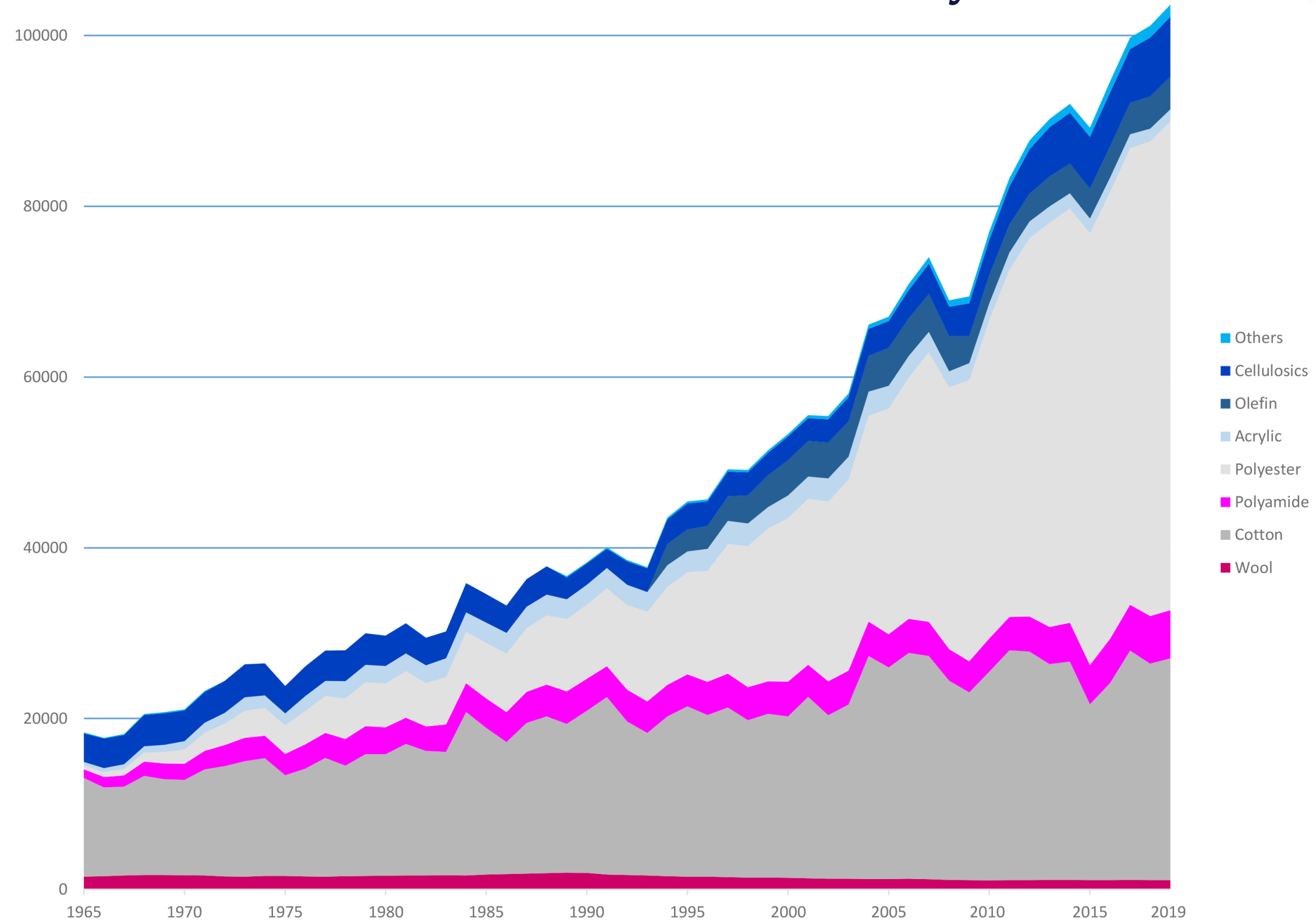
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1 Fibres synthetic/manmade, natural fibres

- international trends (Production by fibre (CIRFS, 2022))



• international trends contd



- environmental issues in production
 - raw material sources (synthetic, natural)
 - water requirement in plant production, processing (cleaning, coloration)
 - also in materials processing

<https://sourcingjournal.com/denim/denim-mills/candiani-denim-lenzing-tencel-limited-edition-hemp-coreva-stretch-fabrics->

• international trends contd

- LCA textile products; include all phases
 - raw materials, processing, manufacture of end products, duration of use/care/re-use
 - end of life/biodegradable/compostable; product disaggregation and re-processing (ideally up-cycling continuing in fibre cycle: i.e. maintaining circularity)

2 NZ natural fibres and processing requirements

- protein (wool, alpaca, possum, cashmere)
- cellulose (*Phormium tenax* - harakeke, flax), *Ti kouka* - cabbage tree), *Houhere* lacebark), hemp (*Cannabis sativa ssp. sativa*)
- requirements for processing natural fibres to textiles - (cultivar(s) with known properties; measurable fibre properties (length, strength, diameter, colour); independent laboratory testing (e.g. SGS, NZWTA); reliable and sufficient supply, over time

end user requirements for textiles

- **apparel fabrics** - durable, pill free, washable/cleanable, resistant to creasing, soft to handle, moisture absorbent....thus fine, uniform, long fibres for spinning
 - 100% hemp used as fibre OR blended with another fibre OR processed as viscose (man made) OR as non-woven
- **composites** – accommodate variability in properties of fibre, end-use dependent

3 Questions re NZ hemp (permitted cultivars)

- have properties of fibres from these been determined?
- do these yield optimum fibre properties for **textile** uses or are they a by-product from seed/oil sector?
- how variable are fibre properties across these: sourced from different NZ? geographical regions; year to year?
- required infra-structure?

4 References

European Man-made Fibres Association CIRFS,
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<https://doi.org/10.3390/ma15051901>

Acknowledgements

- present and former colleagues, UoO
- industry collaborators, NZ, International
- NZ Product Accelerator





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Engaging with the Product Development Research Centre to exploit hemp

Patrick Silcock

Manager, Product Development Research Centre

Hemp opportunities in food

- Hemp seeds
 - Rich source of plant-based protein
 - rich in omega 3 fatty acids; desirable omega 3: omega 6 ratio
 - good source vitamin E, vitamins B1 and B6, iron, magnesium, zinc, and potassium
 - phytosterols
- However, depending upon processing may have an unfavourable sensory profile

Unfavourable sensory profile

Why?

- Chlorophyll, phenolic compounds including tannins
- Lipid oxidation products
- Terpenes - confer the typical aroma and flavor

Potential Products

Consideration: What processing pathway allows greatest utilization of seed and value?

- Hemp seeds
- Hemp protein concentrates and isolates
- Hemp oil (cold pressed, Supercritical CO2 extracted)
- Hemp milk
- Formulated food and cosmetic products

Core Skills

- Product Development
- Flavour chemistry
- Sensory Science
- Food Chemistry
- Microbiology
- Food Processing

Our strength: the integration of these skills

Services

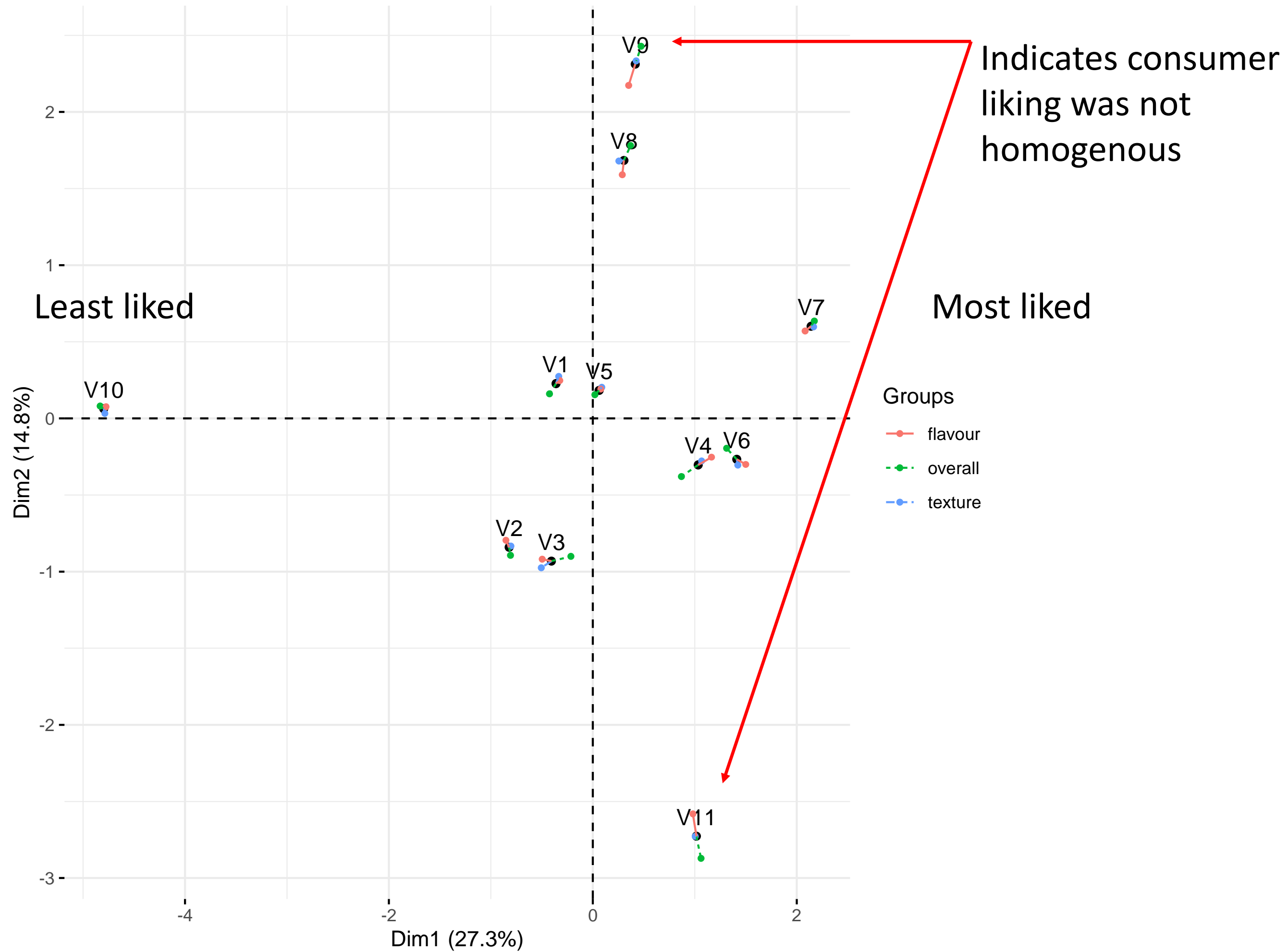
- Product and Process Development
- Product Quality and Functionality Testing
- Shelf Life testing
- Flavour Science
- Sensory Science
- Analytical Services
- Food Safety and Food Spoilage
- Troubleshooting and General Consultancy

Linked into NZFIN though joint venture with FoodSouth

Case Studies – FoodSouth Otago/ PDRC

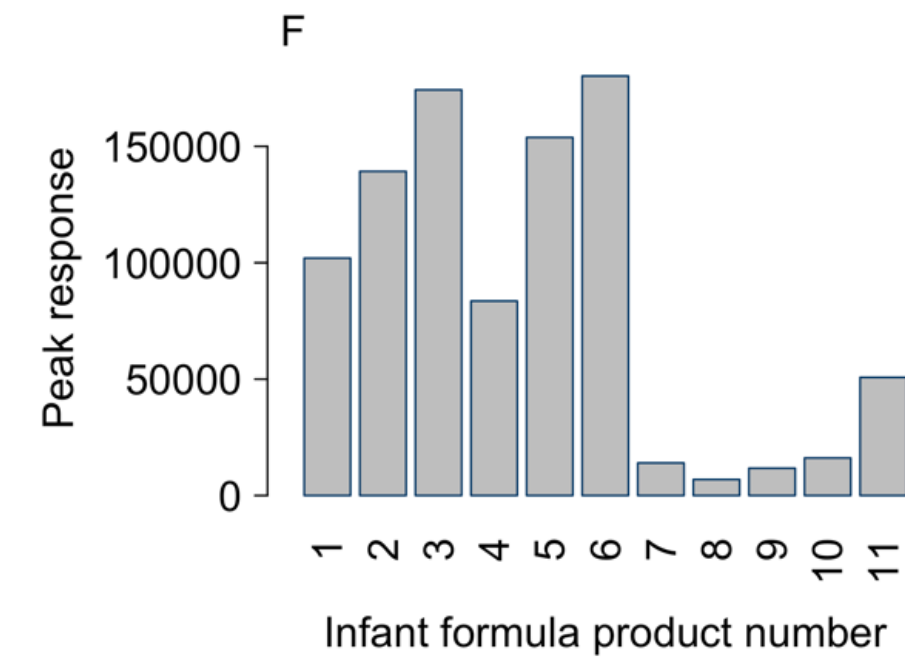
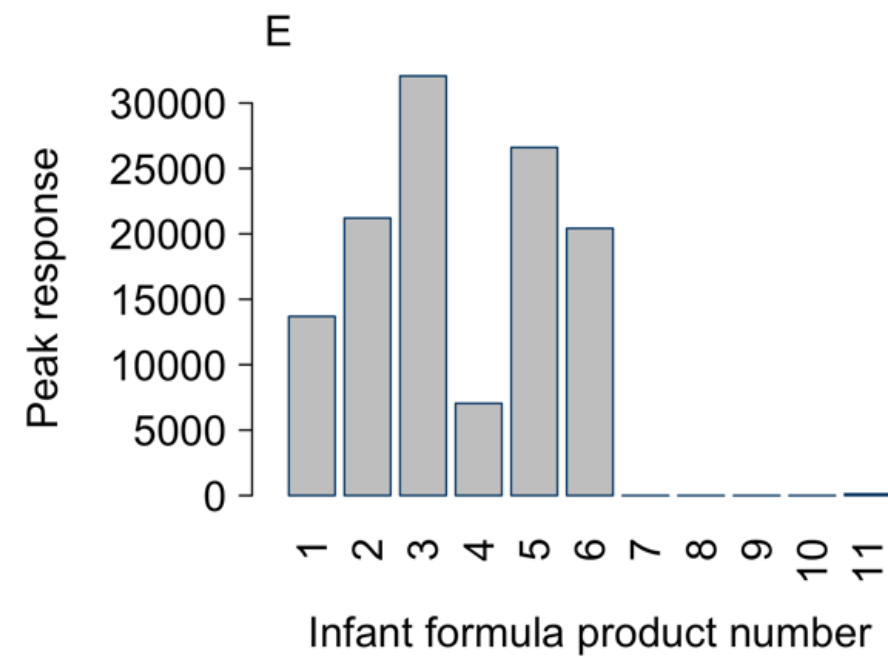
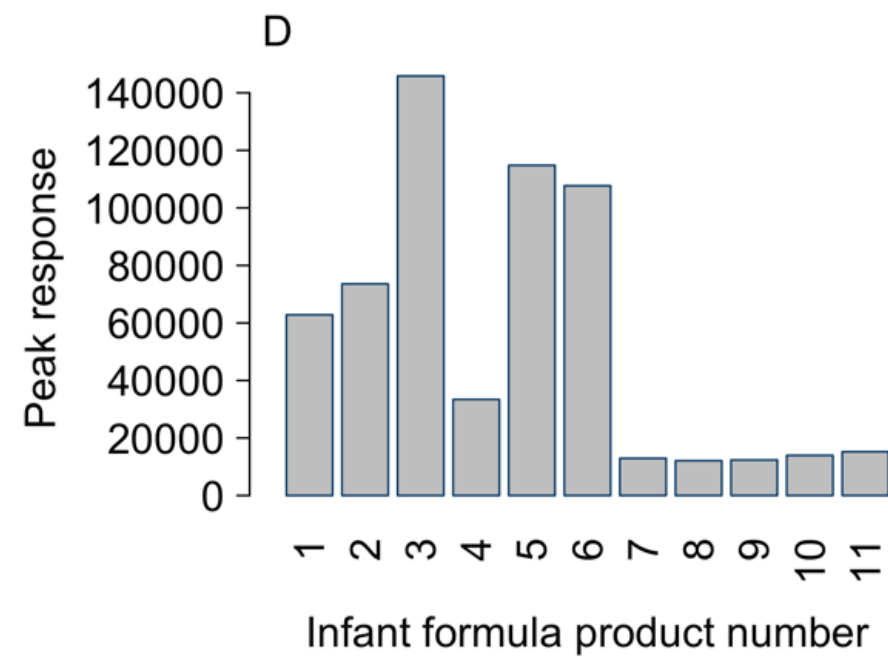
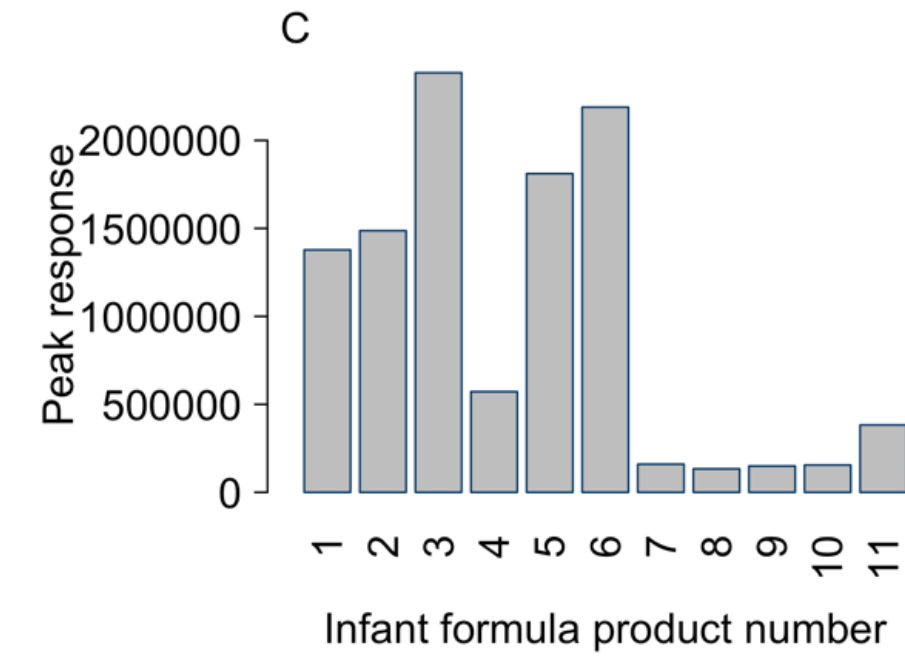
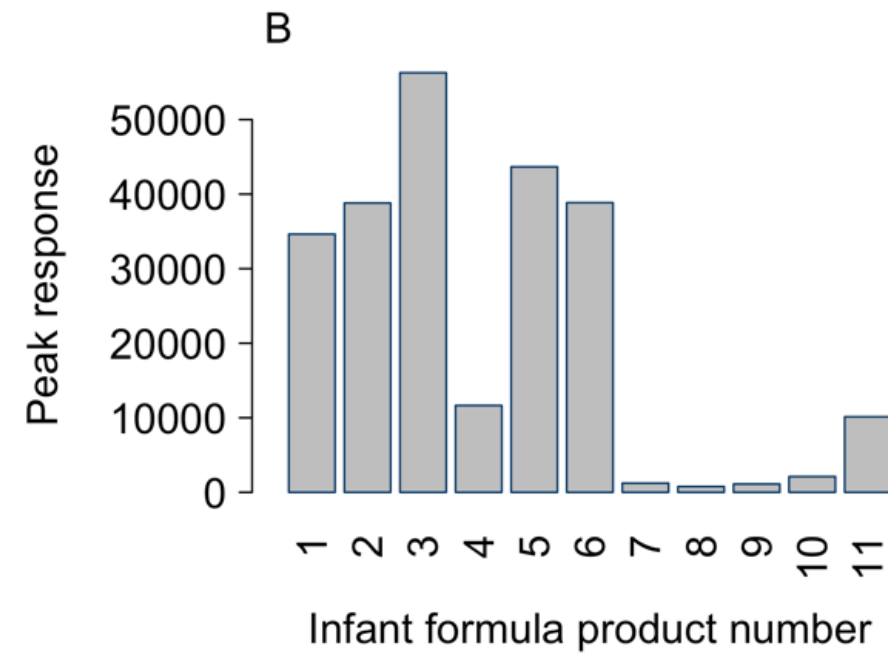
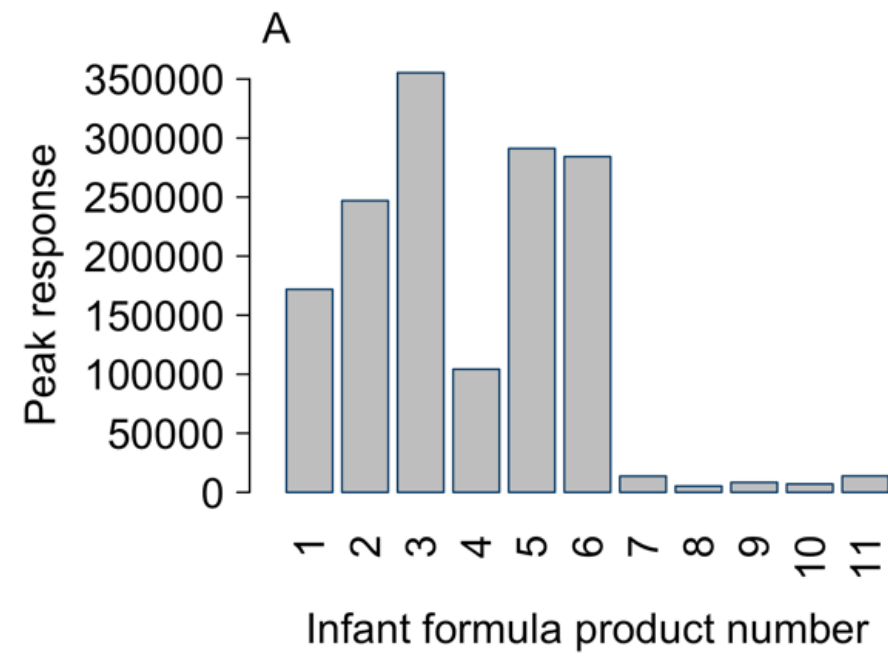


Consumer preference maps



Selected VOC for the 11 infant formula products.

A. 4,5-dimethyl-2-Hepten-3-ol, B. (E,E) 2,4-Dodecadienal; C. (E)-2-Octenal; D. 1-(1,2-propadienyl)-Cyclohexanol; E. Unknown; F. 4-Ethylcyclohexanol



What is the Process?

- We generally start with a chat about what you want to do
- If you have not already prepared a brief we will get you to prepare one
- If other expertise is required a further meeting may be required
- Using the details from the chat and brief we will prepare a proposal including costs and time frame
- If you wish to proceed we will prepare a contract
- Then it is time to make your product real

Contact details

Patrick Silcock

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p: 03 479 7564

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(ABACUS BIO)

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sustainable hemp cultivars.

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Loamé Kok



The main difference between hemp and cannabis



Both are broad classifications of Cannabis adopted into our culture

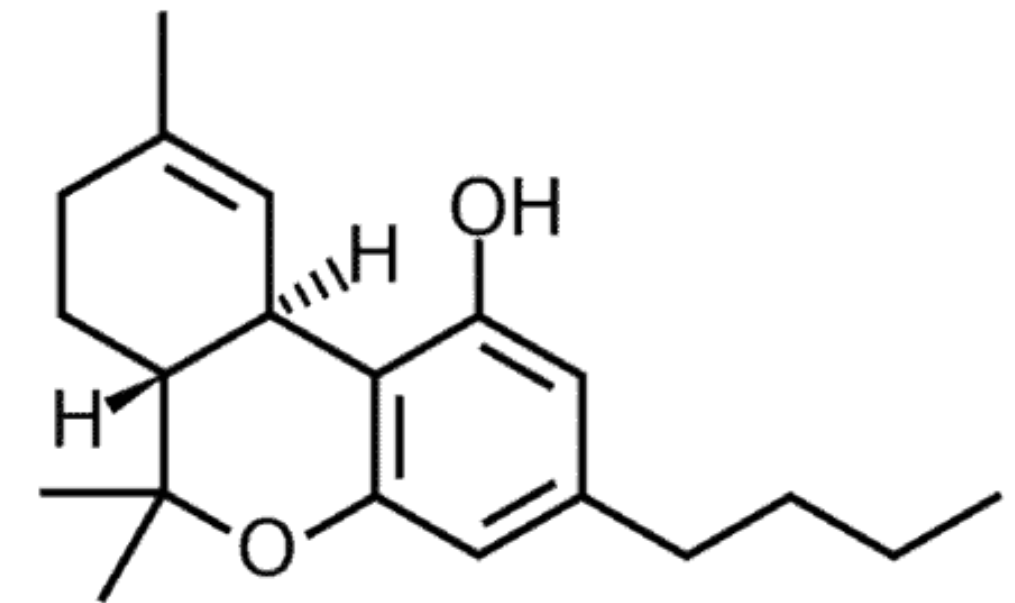
- Cannabis plants can be male, female, or hermaphrodite

Hemp varieties contain 0.3% or less THC content by dry weight

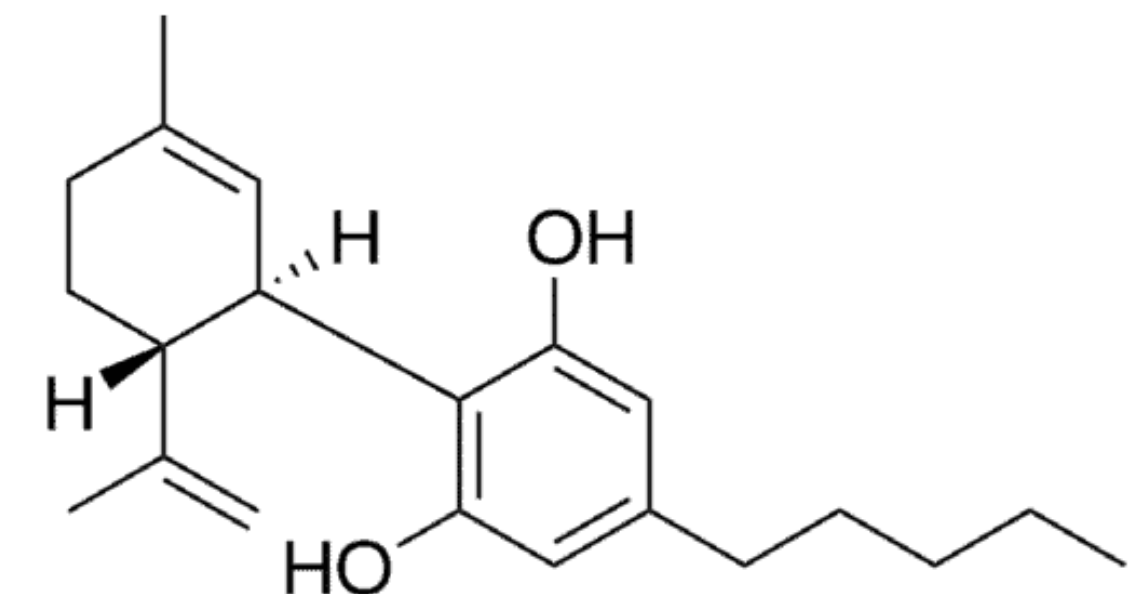
- Hemp is now legalized (2018) after being banned in 1930 in the US, non-intoxicating cannabis that is harvested for the industrial use of its derived products
- Hemp is grown to maximize its size and yield; to achieve this, hemp is typically grown outdoors (less controlled, male preferred)

Cannabis varieties that contain between 0.3% and up to 30% THC by dry weight

- Induces psychotropic or euphoric effects on the user and is still prohibited in many regions
- Cannabis varieties are selectively bred in controlled environments designed to optimize the breed's characteristics and produce female plants that yield budding flowers



Tetrahydrocannabinol



Cannabidiol

Hemp's potential as a cash crop

Hemp is believed to be one of the first crops cultivated by mankind and is therefore considered the catalyst for our earliest innovations, especially in agriculture.

Copies of the US Constitution were found written on hemp paper

HEMP IS THE STRONGEST NATURAL FIBRE IN THE WORLD. IT'S KNOWN TO HAVE OVER 50,000 DIFFERENT USES!

TEXTILES

- Clothing
- Diapers
- Handbags
- Denim
- Shoes
- Fine Fabrics

INDUSTRIAL TEXTILES

- Rope
- Canvas
- Tarps
- Carpeting
- Netting
- Caulking
- Moulded Parts

PAPER

- Printing
- Newsprint
- Cardboard
- Packaging

FOODS

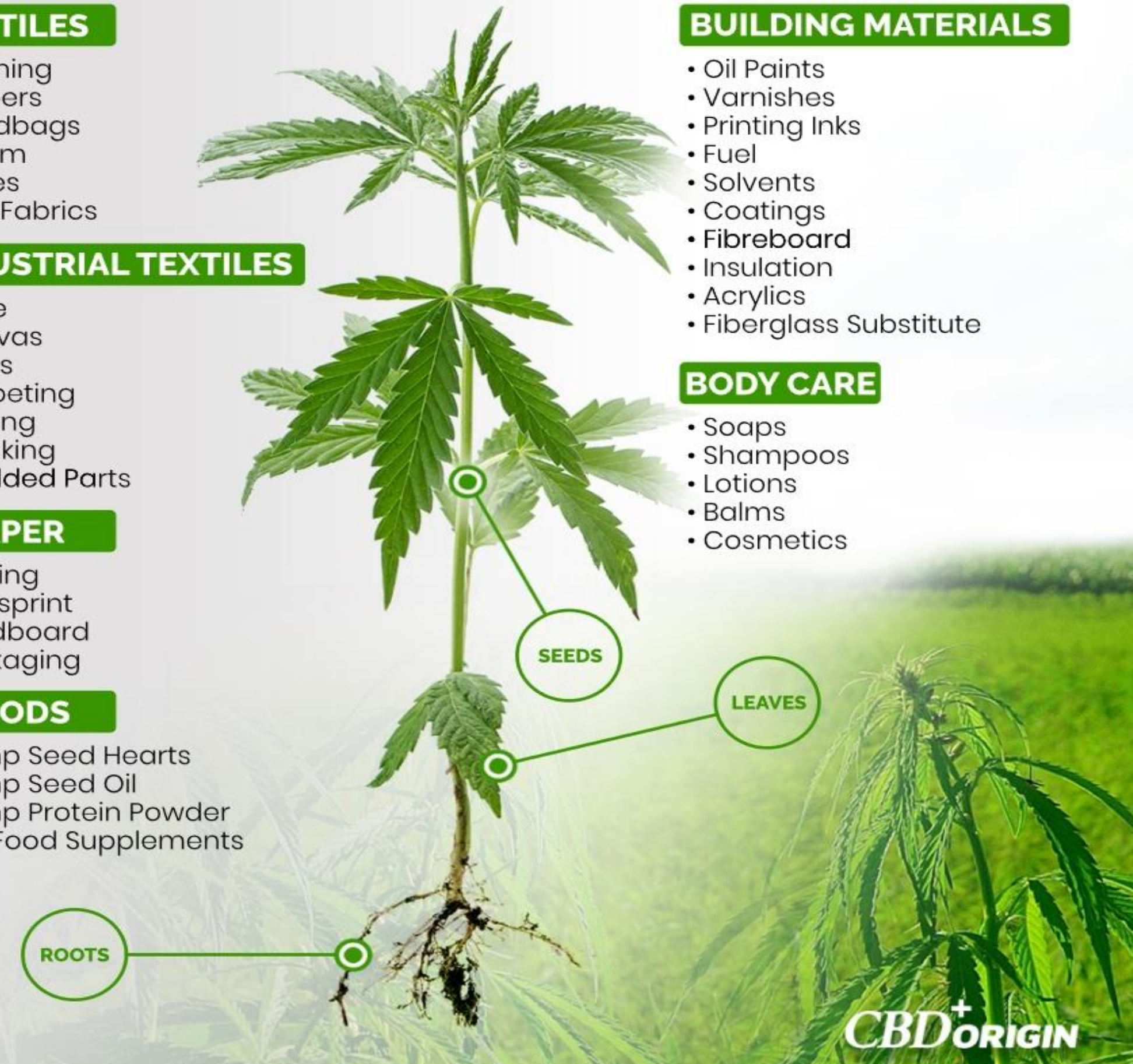
- Hemp Seed Hearts
- Hemp Seed Oil
- Hemp Protein Powder
- EFA Food Supplements

BUILDING MATERIALS

- Oil Paints
- Varnishes
- Printing Inks
- Fuel
- Solvents
- Coatings
- Fibreboard
- Insulation
- Acrylics
- Fiberglass Substitute

BODY CARE

- Soaps
- Shampoos
- Lotions
- Balms
- Cosmetics



Hemp's potential as a cash crop

- A hemp fibre crop will deliver around **10 tonne of fibre per hectare** with a gross value of \$400 per tonne (2019)
- In 2019 hemp seed sold for around \$5,000 per tonne
 - An average crop will produce around 900kg/ha although the yield ranges from **0 – 2,000kg/ha**

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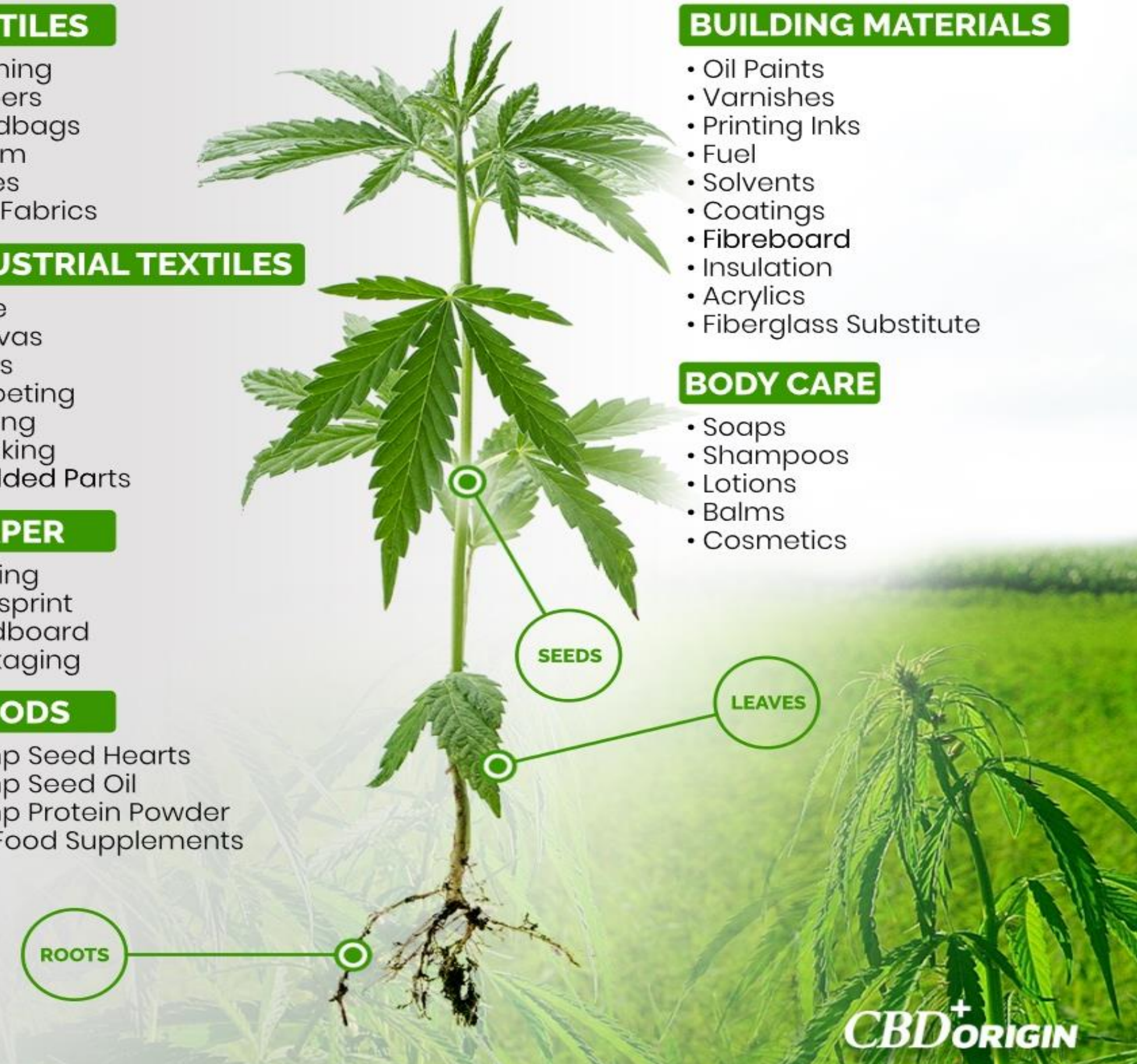
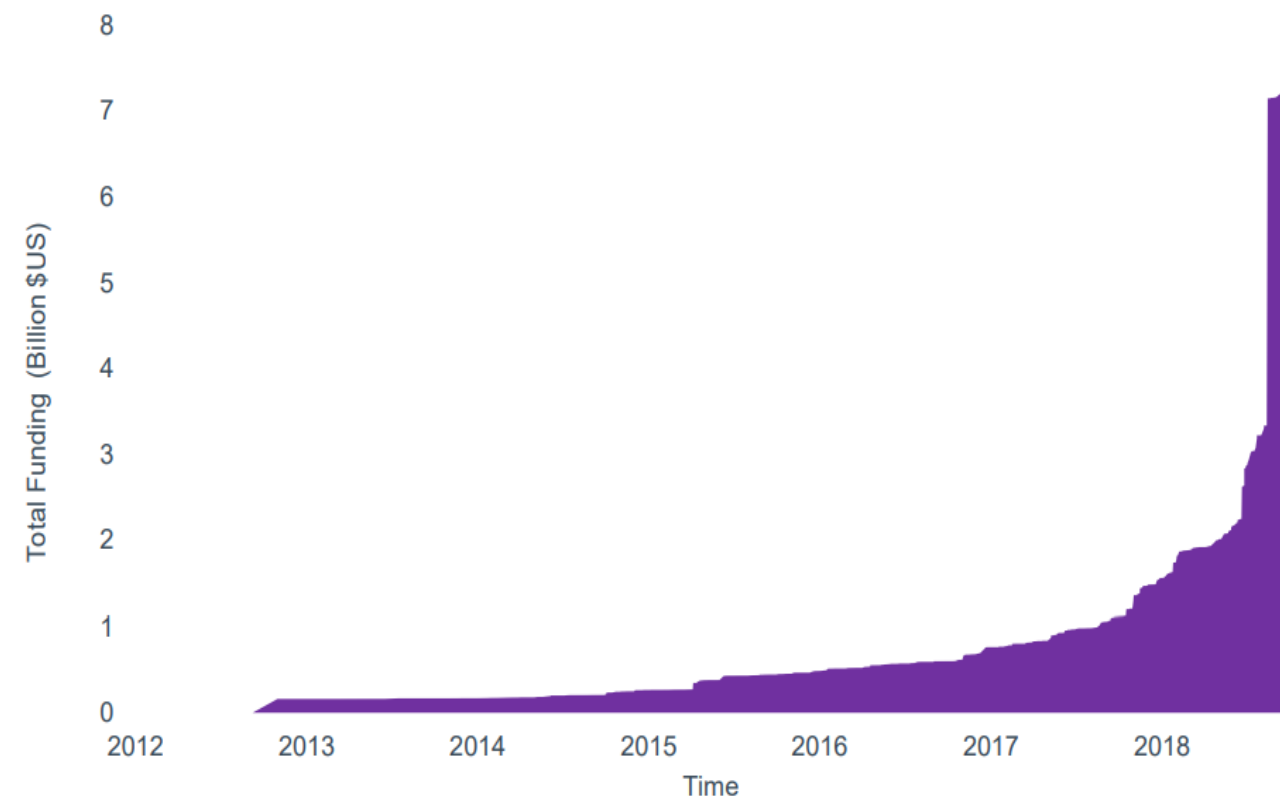
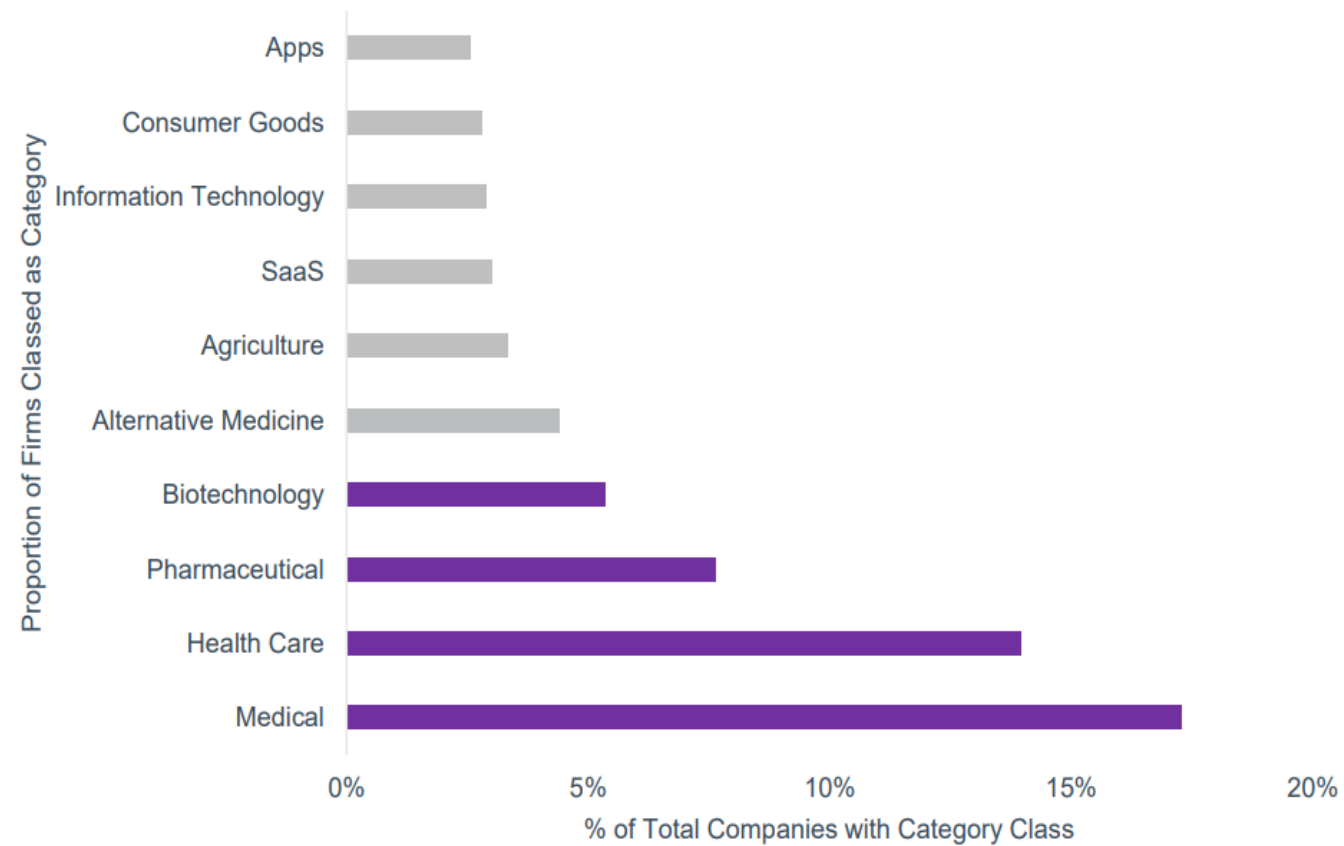


Figure 1: Total Funding for Cannabis Companies (2012 – Oct 2018)



Source: MPI, Crunchbase (2018) © all rights reserved.

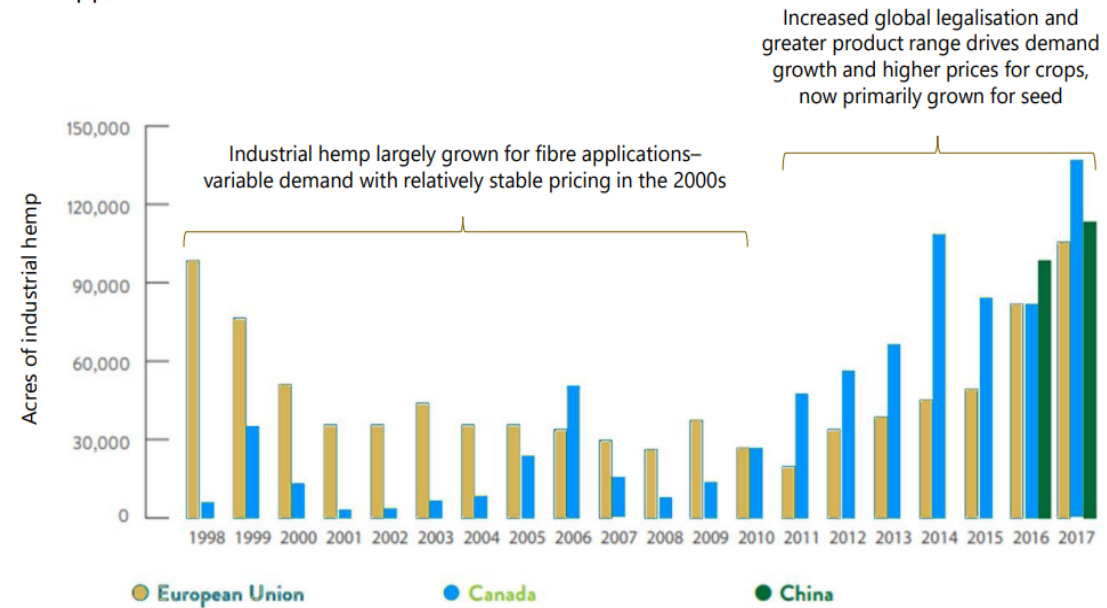
Figure 2: Key firm categories involving cannabis as at October 2018⁽⁷⁾



Source: MPI, Crunchbase (2018) © all rights reserved.

Global industrial hemp production

Hemp production has grown strongly in recent years but remains dominated in volume by the three largest producers – Canada, China and the EU (France, Netherlands). A number of other jurisdictions (notably the USA) are expected to become major suppliers in the future.



Source: New Frontier Data (2019) The Global State of Hemp 2019

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KEY NUMBERS AT A GLANCE

654

Hemp related products launched in 2018⁽⁶⁾

209%

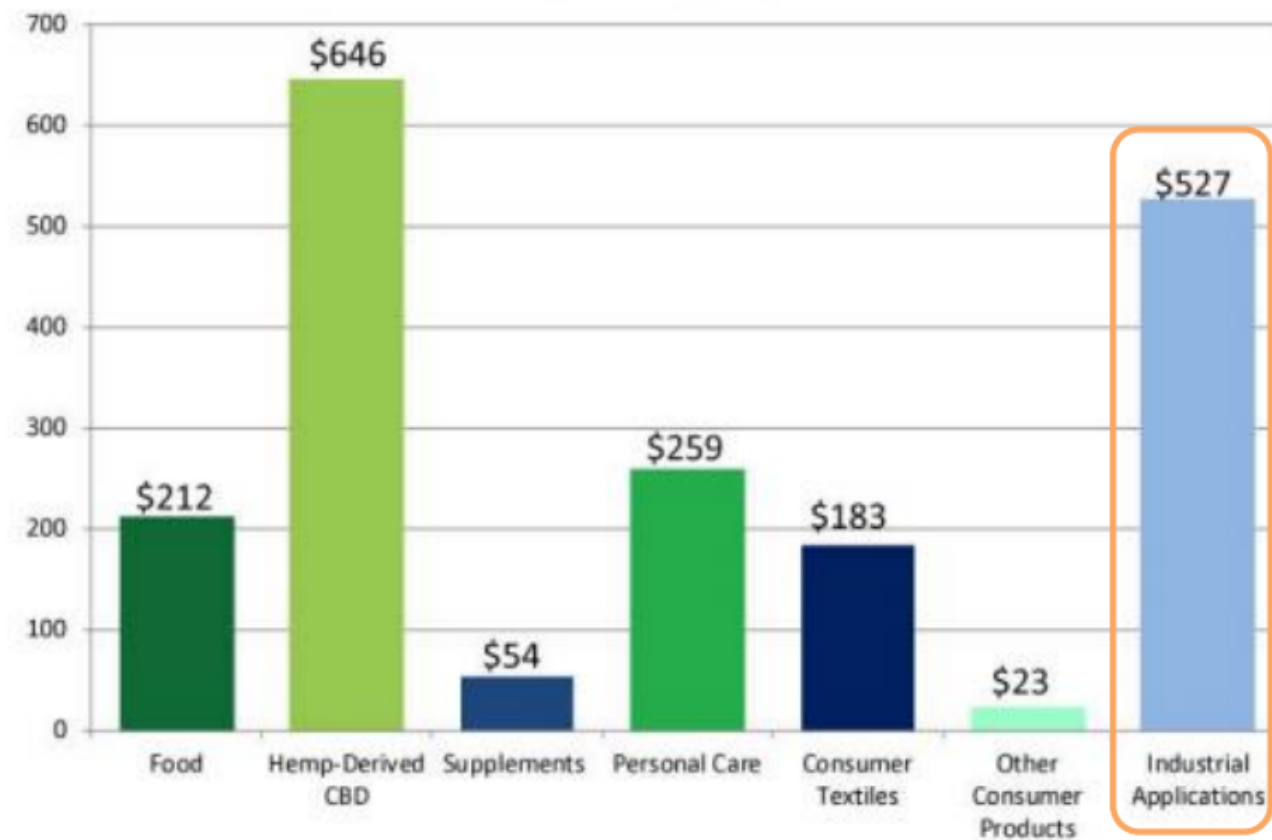
CAGR growth rate of investment amounts from 2013 – 2017⁽⁵⁾

Market scope

Figures from MPI reports 2019 & 2021

Future growth is expected to be driven by CBD and industrial fibre applications

Forecast of expected US hemp-based product sales by category



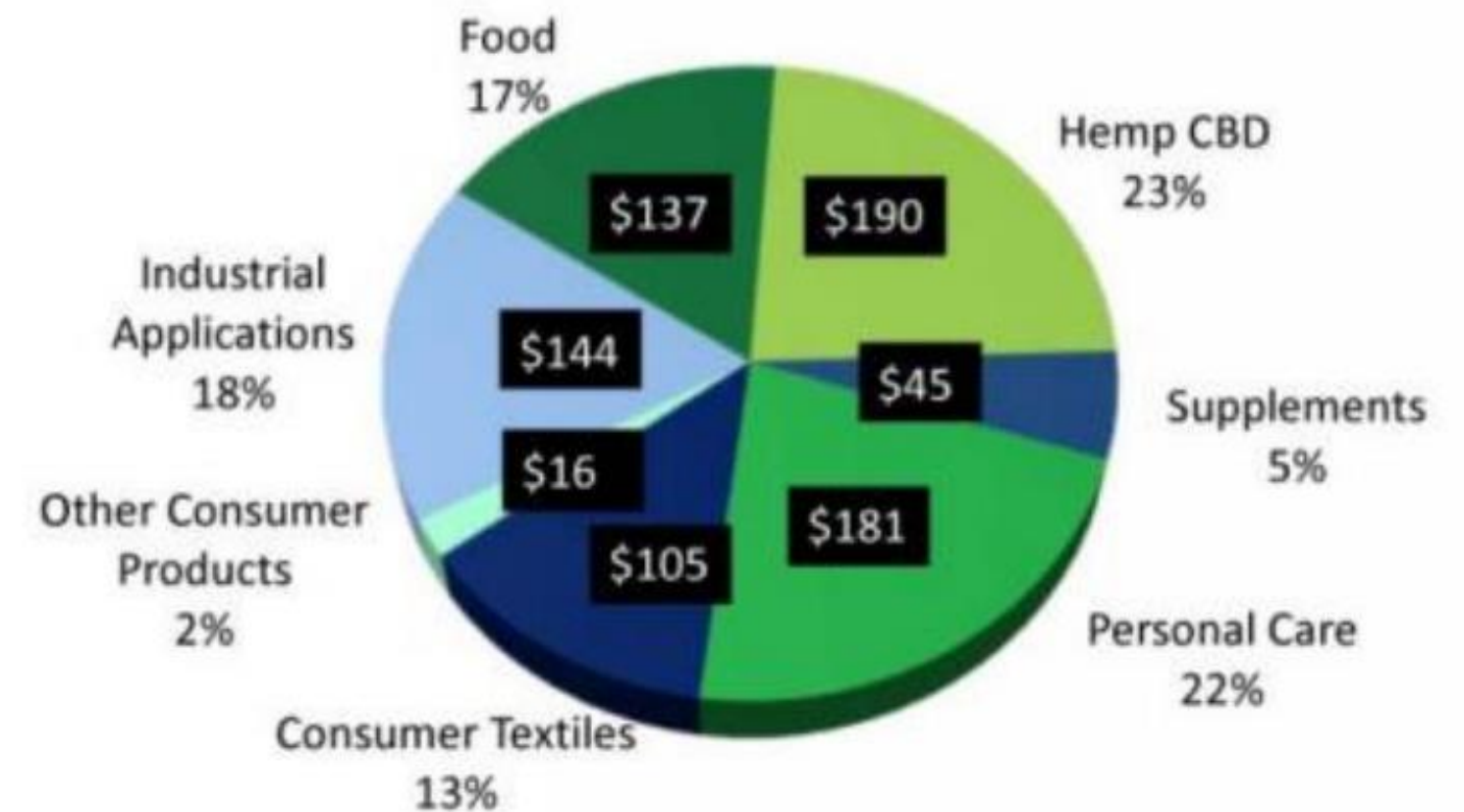
New Frontier forecasts \$318m of the industrial applications to be in automobiles

Source: Hemp Business Journal (2018)

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Consumer spending across product types is broad based

\$820 Million U.S. Hemp-Based Product Sales by Category in 2017



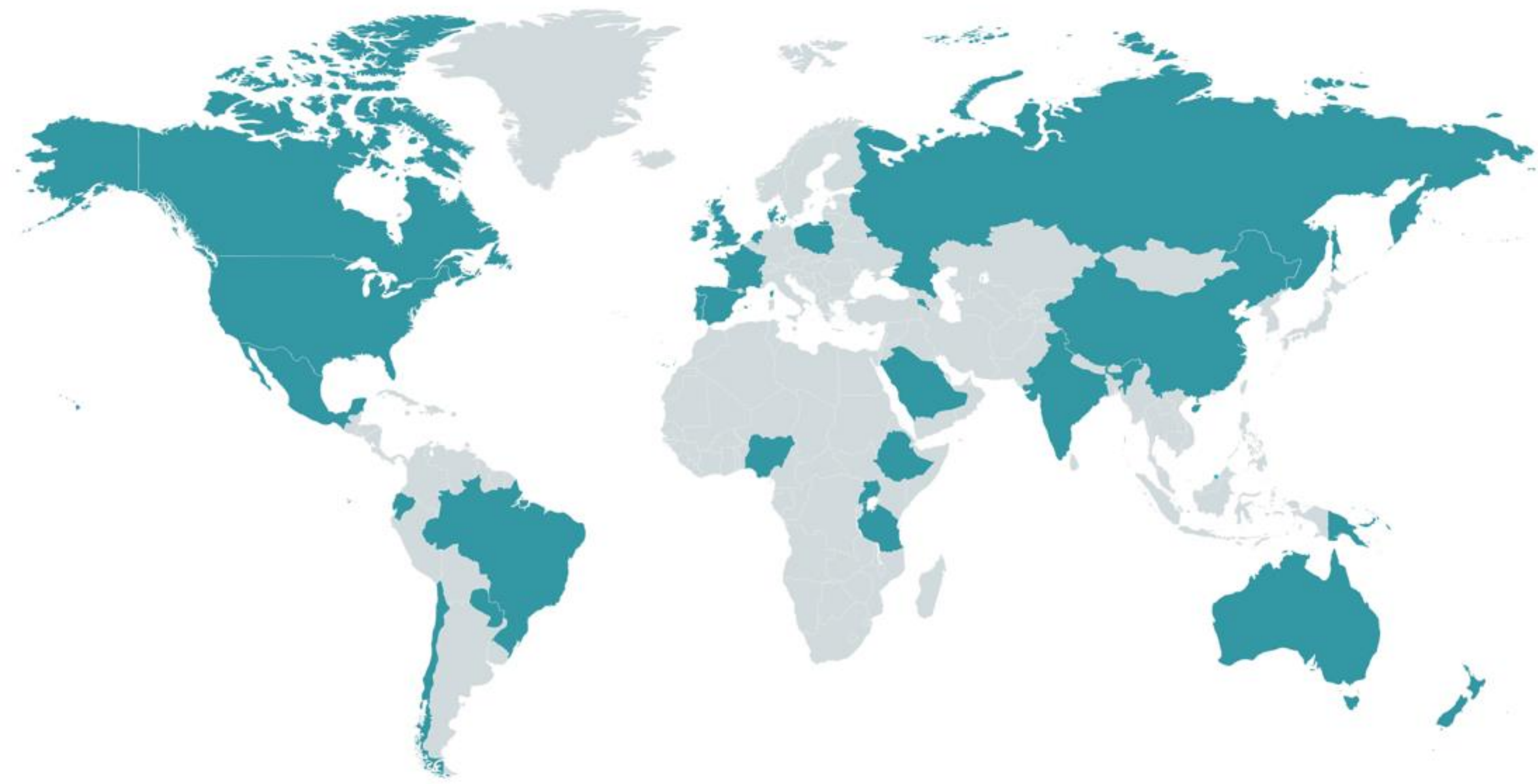
Source: Hemp Business Journal (2018)

Who is AbacusBio

- Independent consultancy providing services and products for over 20 years
- +60 specialists covering
 - Science
 - Strategy
 - Technology
- In agriculture, horticulture, forestry & aquaculture
- +20 PhDs
- 16 nationalities
- 3 Offices
- 100+ Internships
- Bridge between science outputs and business needs
- Focused on creating impact



Where do we work



Who we work with



What we do

Plant & Animal Improvement Programs



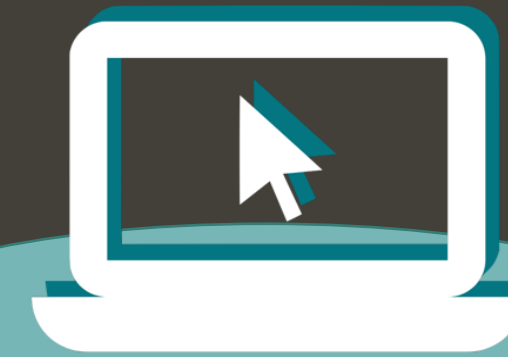
- Breeding program design and management
- Trait Prioritisation and selection index development
- Optimisation
- Genetic and Genomic evaluation, implementation and support

Strategy & Value Chain



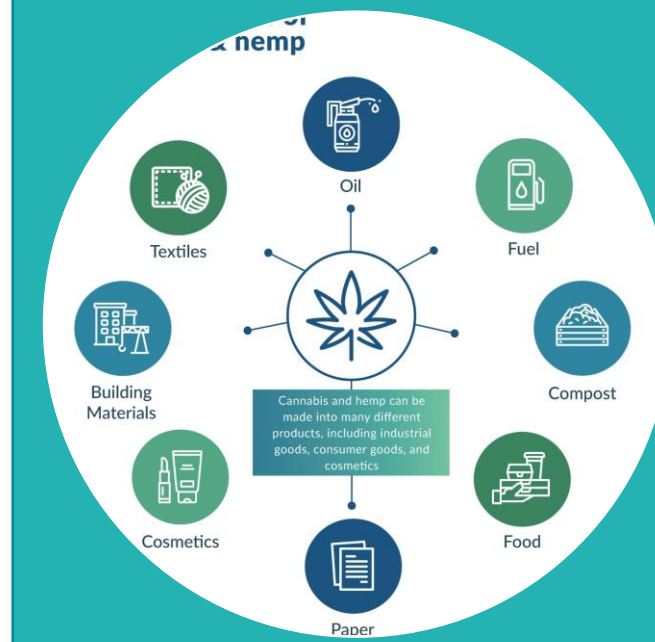
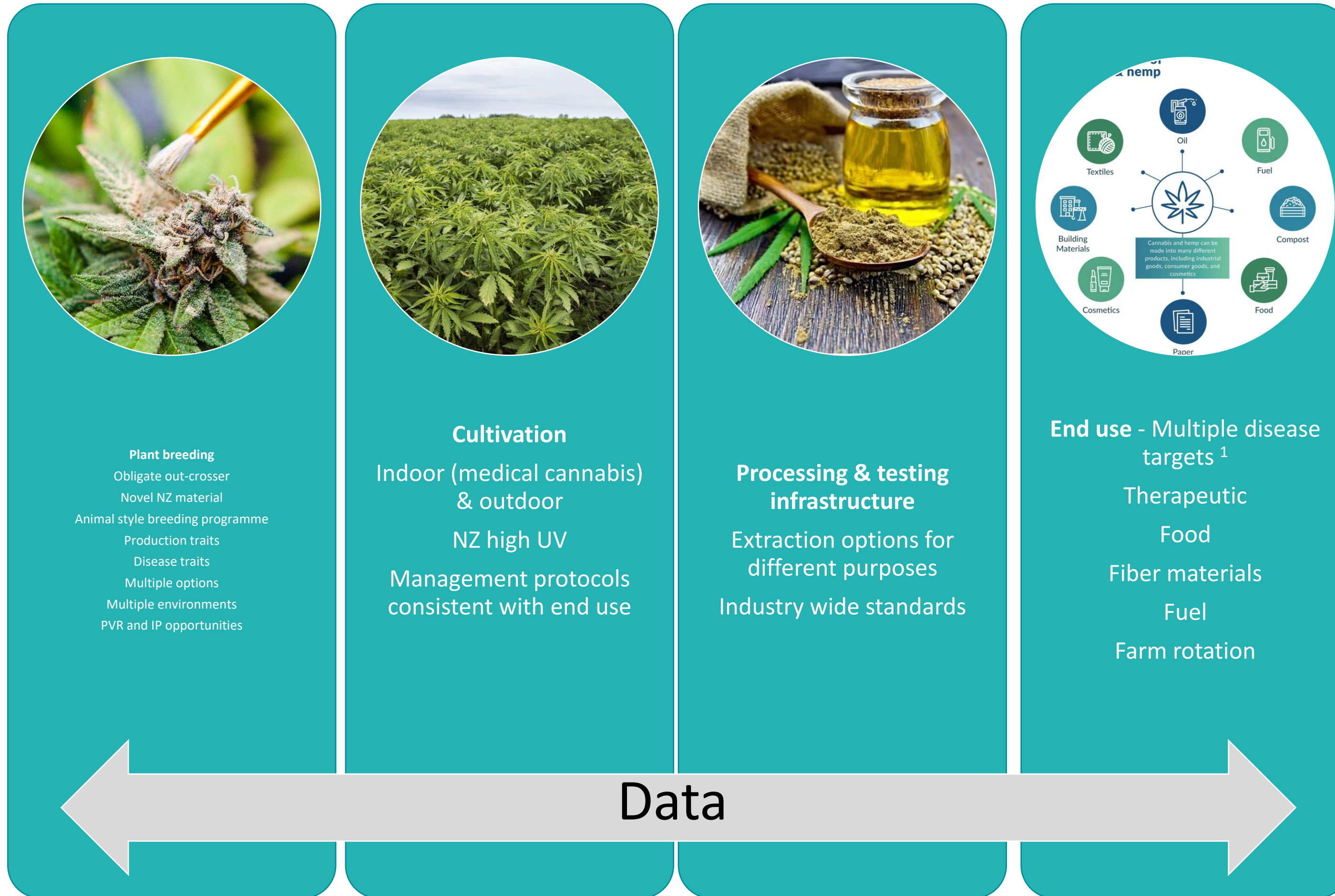
- Technology evaluation
- Food security
- Environment and consumers
- Industry development and assessment
- Commercialization of genetic assets

Supporting Technology



- Custom breeding app design
- Machine learning and AI
- Analytics and visualization
- Database and evaluation platforms

Integrated Value Chain

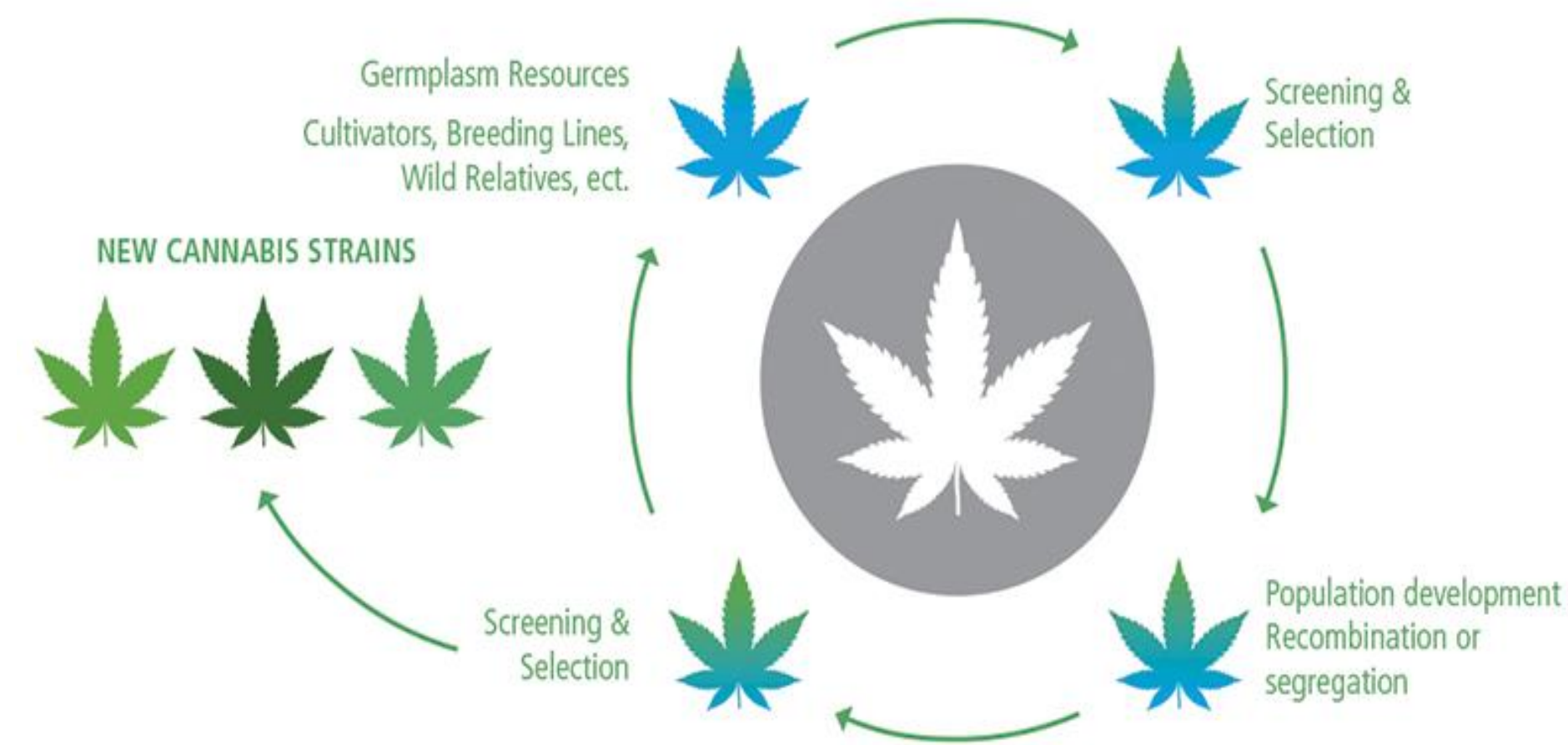
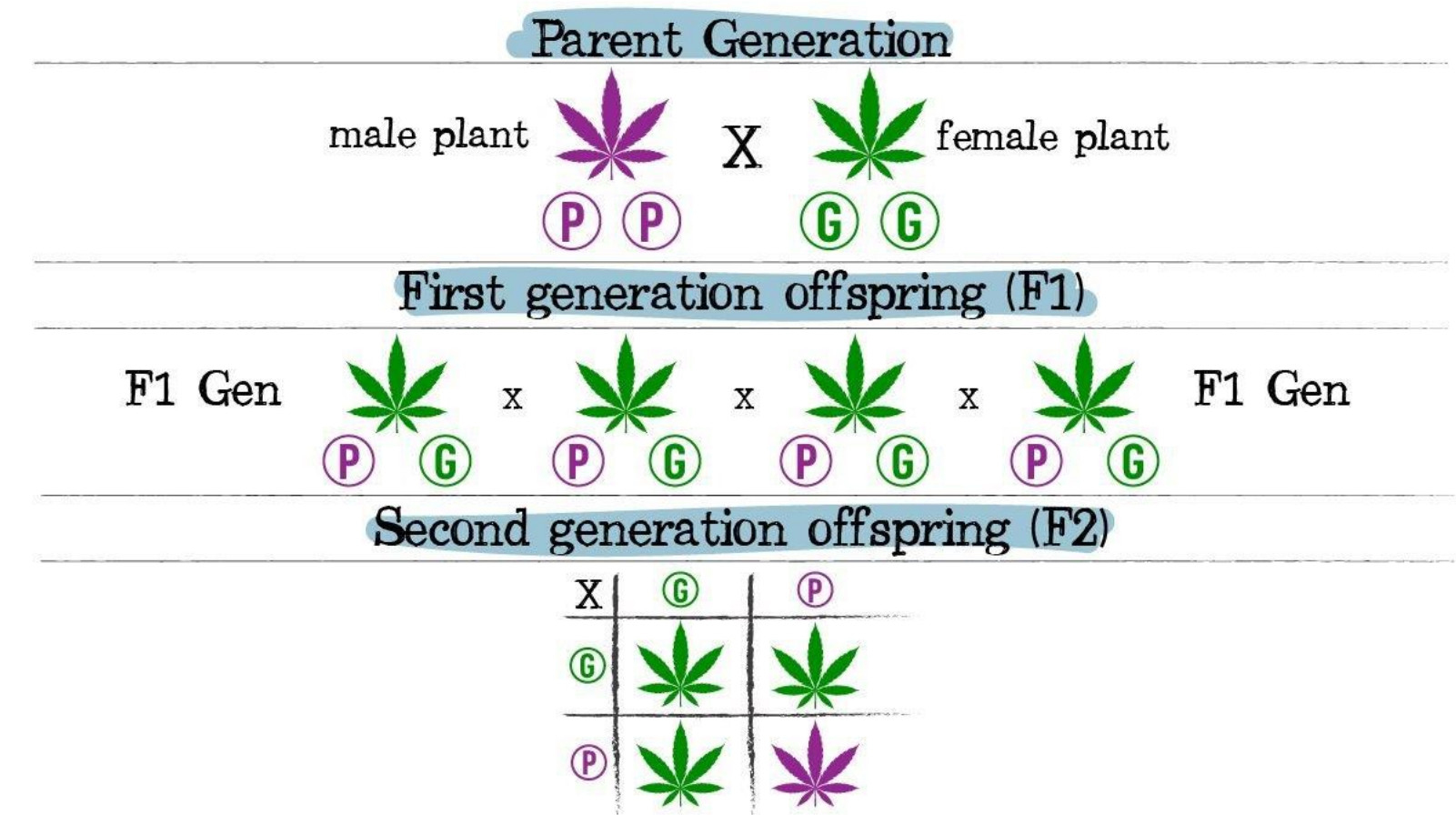


¹European Journal of Internal Medicine 49 (2018) 7–11



How does genetics fit into the wider value chain?

- Genetic variation is crucial
- A breeding program will make more genes/ cultivars available for selection and crossing
- Crops already contain lots of genetic variety – which can be used to assemble a breeding population from which we select plants to produce progeny/ clones for experimental trials
- The trials (a set of plants organized to be measured at an individual plant level) will help to separate the genetic and environmental components
- From here we measure and screen the plants using tools such as trait prioritization, genomics, propagation and selection indexes to find the best cultivars in each breeding cycle to select and use in commercial plantations



Why does data matter?

- Data is still a challenge in the cannabis industry and through the screening and trialing process we're going to be handling a lot of data
- Breeding tools operate from the data
 - Hence it needs to be properly managed to operate a successful breeding program
- The way we've been facing the gap in data is through Gemview - an app used for capturing, organizing, analysing, sharing and reporting data
 - An app like this would help the industry to progress and create opportunities for all involved
- Collaborative approach using the same platform
 - Between companies, within companies, among growers, between companies and external service providers
- Ability to share information while respecting privacy
 - The right permission granted for the right access
- Same data/ information and critical tools can be used to communicate across communities and the value chain

The screenshot displays the Gemnetics dashboard interface. On the left is a dark sidebar with navigation options: Analytics, Dashboard, Interactive reports, Data templates, Browse trials, Browse genetics, Extracts, Advanced extracts, Documents, Reference information, and Admin. The main content area features a welcome message for 'Mike' and a summary of key metrics: 8 Trials, 180 Genetic Entities, 4,800 Trees, 31 Assessments, and 3 Documents. Below this are three tables: 'Latest Trial Updates' with columns for Trial series, Trial ID, Location, Established date, and Last updated; 'Latest New Documents' with columns for Title, Document date, Author, and Content type; and 'Latest New Assessments' with columns for Trial ID, Assessment date, and Age (months). A 'Quick Links' sidebar on the right lists Trial Series, Trials, Documents, BVs & Indexes, Selections, Full-sib Families, and Seedlots.

| Trial series | Trial ID | Location | Established date | Last updated |
|--|-----------------|-----------------|------------------|--------------|
| Eucalyptus nitens Provenance Trials | Elite_Nitens_04 | Para, Brazil | 22/05/2011 | 26/08/2021 |
| Eucalyptus regnans Validation Trials | VAL_Regnans01 | Central, Brazil | 1/06/2003 | 20/08/2021 |
| Eucalyptus regnans Validation Trials | VAL_Regnans03 | South, Brazil | 16/06/2005 | 19/08/2021 |
| Eucalyptus regnans Validation Trials | VAL_Regnans04 | Coastal, Brazil | 25/06/2006 | 19/08/2021 |
| Eucalyptus regnans Validation Trials | VAL_Regnans02 | North, Brazil | 9/06/2004 | 19/08/2021 |
| Eucalyptus nitens Provenance Trials | Elite_Nitens_03 | Bahia, Brazil | 17/07/2010 | 19/08/2021 |
| Eucalyptus nitens Provenance Trials | Elite_Nitens_02 | Para, Brazil | 8/05/2009 | 19/08/2021 |
| Eucalyptus nitens Provenance Trials | Elite_Nitens_01 | Santa, Brazil | 1/04/2008 | 19/08/2021 |

| Title | Document date | Author | Content type |
|---|---------------|----------|--------------|
| Eucalyptus forest | 10/06/2021 | J. Smith | .jpg |
| VAL_Regnans01 Trial Map | 10/07/2003 | J. White | .xlsx |
| Eucalyptus in Brazil | 10/06/2020 | B. Black | .docx |

| Trial ID | Assessment date | Age (months) |
|---------------------------------|-----------------|--------------|
| Elite_Nitens_03 | 12/08/2016 | 73 |
| Elite_Nitens_04 | 8/08/2016 | 63 |
| VAL_Regnans04 | 2/08/2016 | 122 |
| Elite_Nitens_02 | 12/10/2015 | 77 |
| VAL_Regnans01 | 25/08/2015 | 146 |



How can AbacusBio assist the industry?

Trait Prioritisation Project Structure

01

Economic Modelling

Focuses on quantifying trait economic values from a range of perspectives across different production systems.



03

Selection Index

Incorporates economic information and trait preferences into customized selection indexes.



02

Stakeholder Surveys

Applies methods to capture preferences for trait improvements as well as the non-market drivers, informing development of selection indexes.



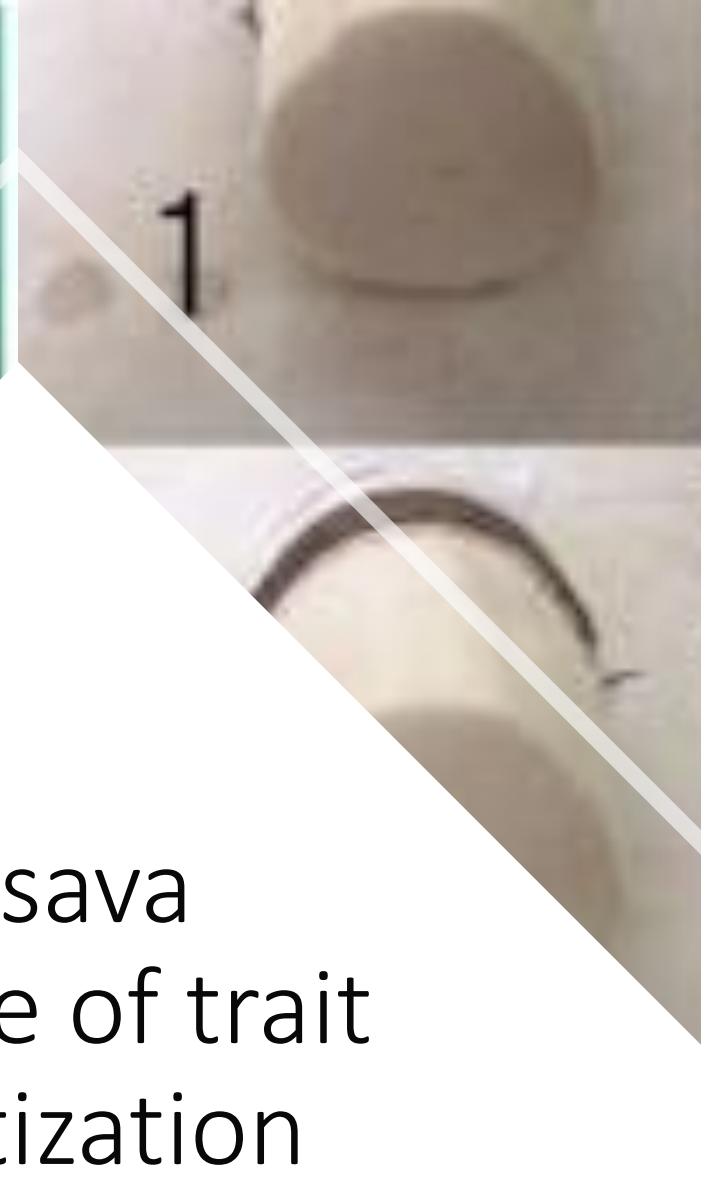
04

Deployment

Applies elements from packages 1, 2 and 3 to the structure of existing breeding programs..



- There isn't currently an established breeding program for NZ
 - Benefits of a collaborative (joint) approach
 - Want to breed cultivars suited to NZ environment and the kinds of products we want to produce
 - Plants need to adapt to express expected traits
- Producing the right seed is the key through which people can purchase genetics
- Breeding objectives + selection indexes
 - A guide for seeds to cater for specialized breeding goals/ direction so that genetics can work for specialized market segments/ regions with unique environmental conditions/ people
- Plants can be selected in and for local conditions
- Package of decisions expressing the value of the breeding program to be delivered via improved seeds or plants to the farmers
- Tools mentioned previously can also enable us to quantify the economic impact on farm
- Land use change options, long-term sustainability mission (Iwi)



Cassava
Example of trait
prioritization

NextGen Cassava project, Nigeria

Recent land use change projects we have worked on

- Case studies





Zespri

- Investment into health research
- Marketing as a functional fruit
- Long-term investment into breeding & production
- Pressure on to keep innovating with China IP situation

What does good look like?

Evidence-based Products

- Structured & co-ordinated R&D
- Plants (breeding & cultivation)
- Chemical analyses
- Medical & agricultural research

Delivering value for New Zealand

- Affordable (& legal)
- Consistent
- High quality
- Fit for purpose

Alternative options

- More accessible & affordable products & materials
- A more diverse, sustainable, organic and regenerative agricultural crop

International premium

- Niche target/s and products
- Traceability & product integrity
- Robust, evidence based claims
- NZ factor



How can hemp fit into our NZ Inc story?

Thank you!



AbacusBio



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www.abacusbio.com

The hemp industry supply chain

