

International Scientific Conference
Circular bioeconomy
a shift towards sustainable food production

13-14 October 2022 | hybrid event | Tartu, Estonia

CROP VALORISATION POTENTIAL AND INITIATIVES IN ESTONIA

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October 14, 2022



The Bioeconomy in the European Union

Primary sector



Source: Bioeconomy Report 2016, Joint Research Centre, EC

Europe's **bioeconomy**
weaving it all together



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Bioeconomy resources



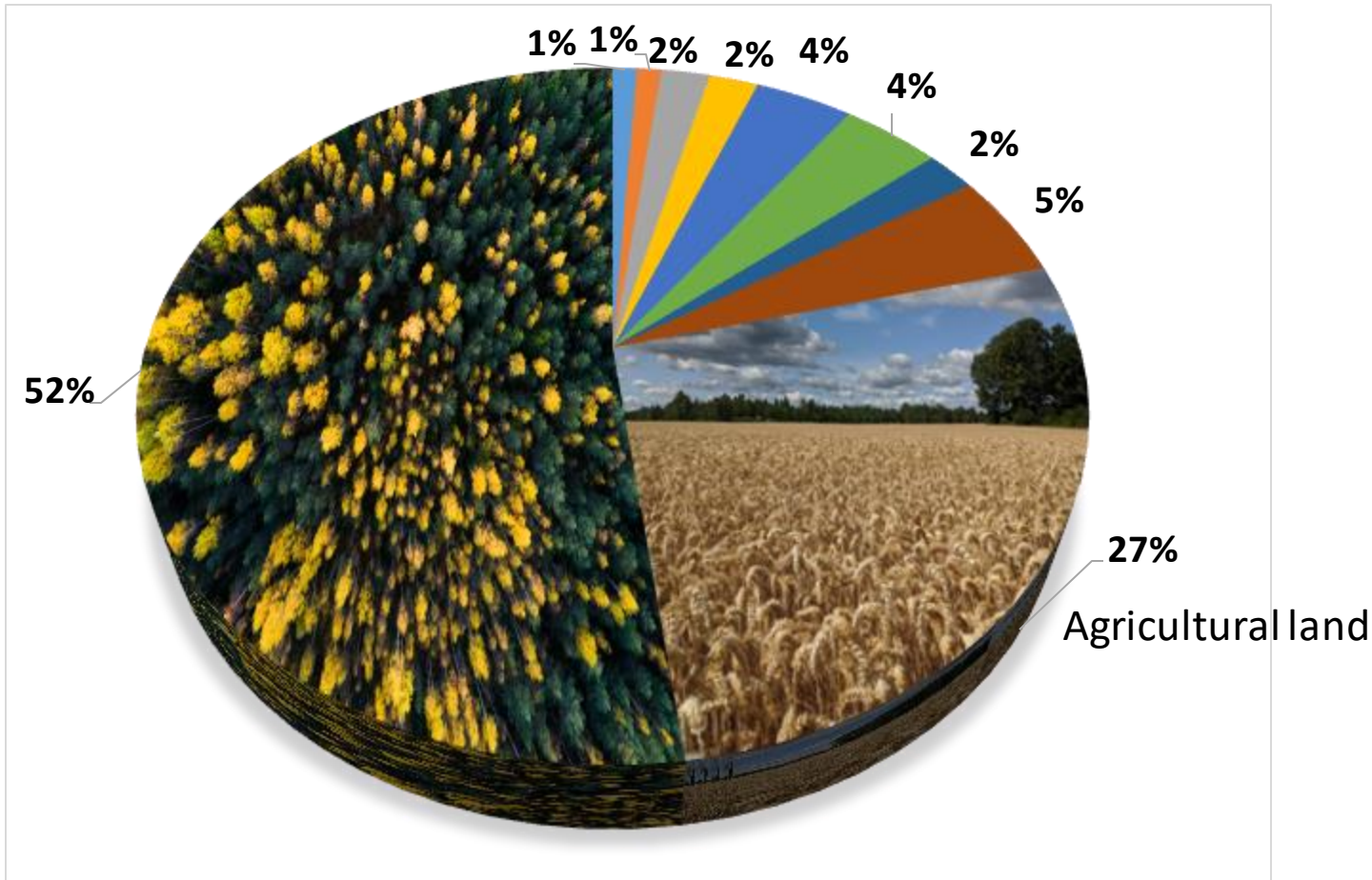
Primary sector



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Land resource and use in Estonia



Over 1 million ha of agricultural land

ca 800 000 ha is necessary to provide **food security** in major agricultural products in Estonia.

WATER as resource

Sometimes it is in the wrong place at the wrong time, but in general Estonia has (and, based on current models, will have) more fresh water than it needs.

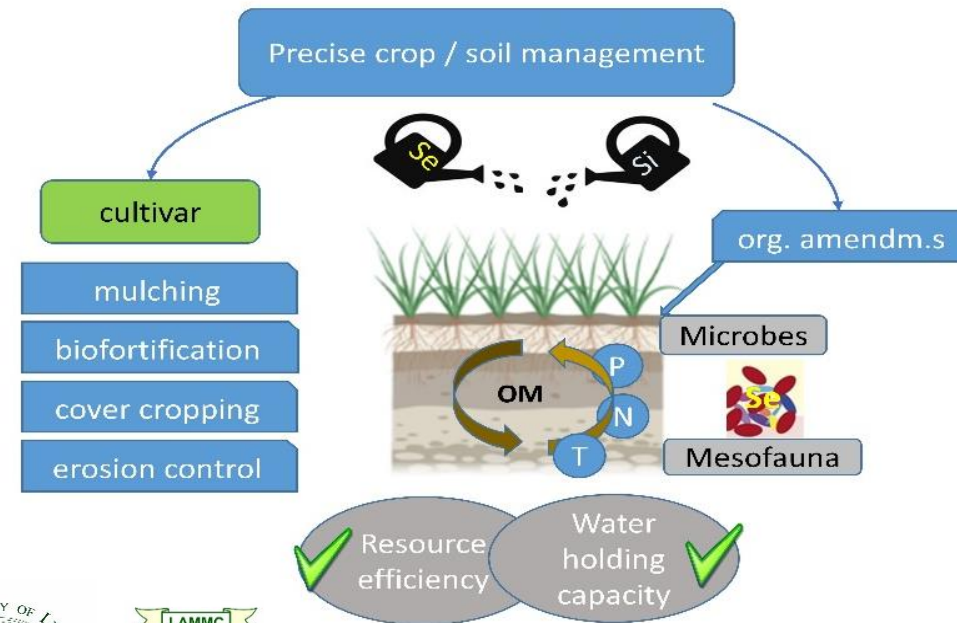


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Land and water resource is limited: Biofortified and climate-resilient food and fodder production on marginal soils

Mapping of potential crop yields and the valorization opportunities on **marginal soils** under various regional conditions in Europe and trying to optimize the biomass production and valorization with biofertilizers or soil additives, like silicon and selenium.



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FACCE SURPLUS
SUSTAINABLE AND RESILIENT AGRICULTURE
FOR FOOD AND NON-FOOD SYSTEMS



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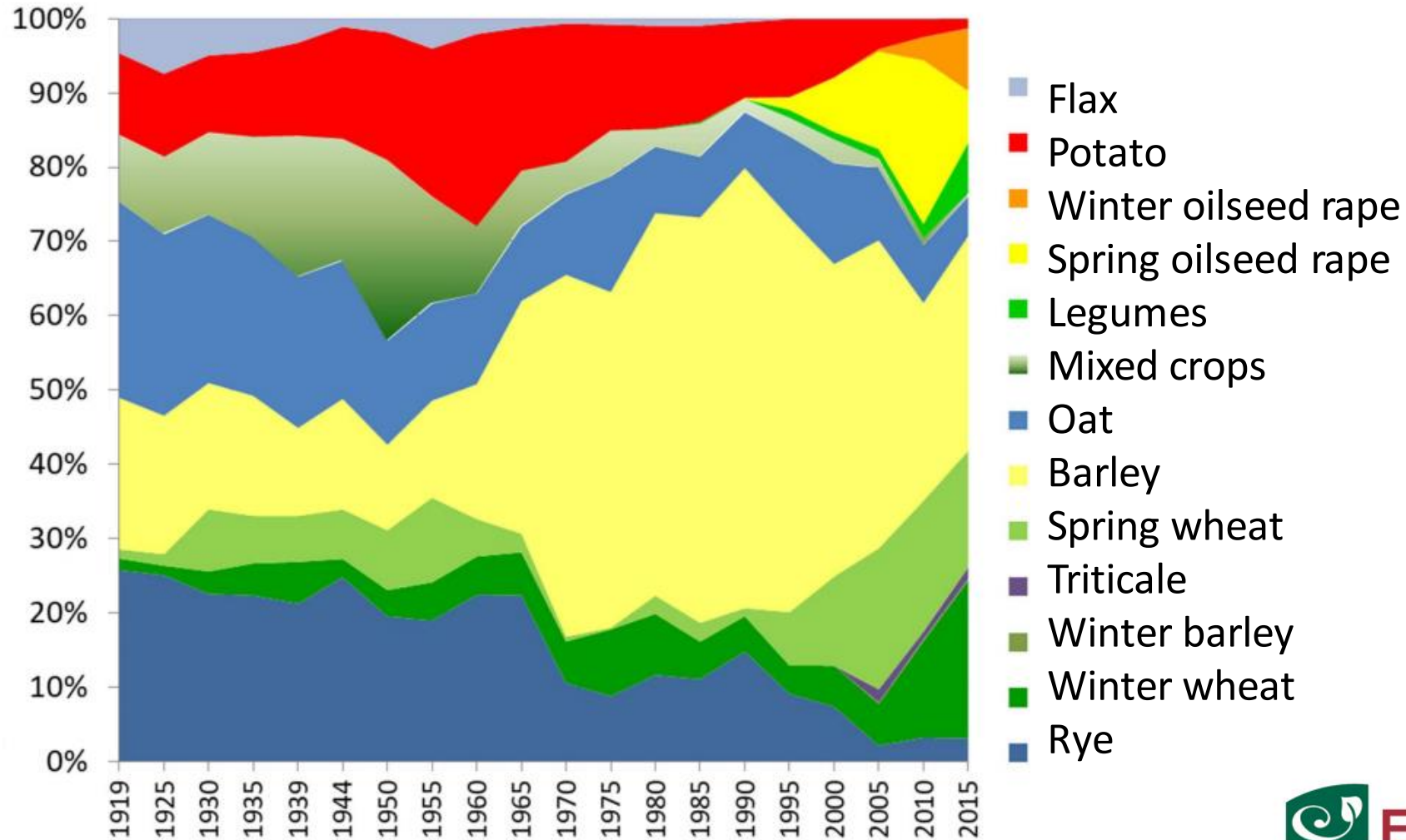
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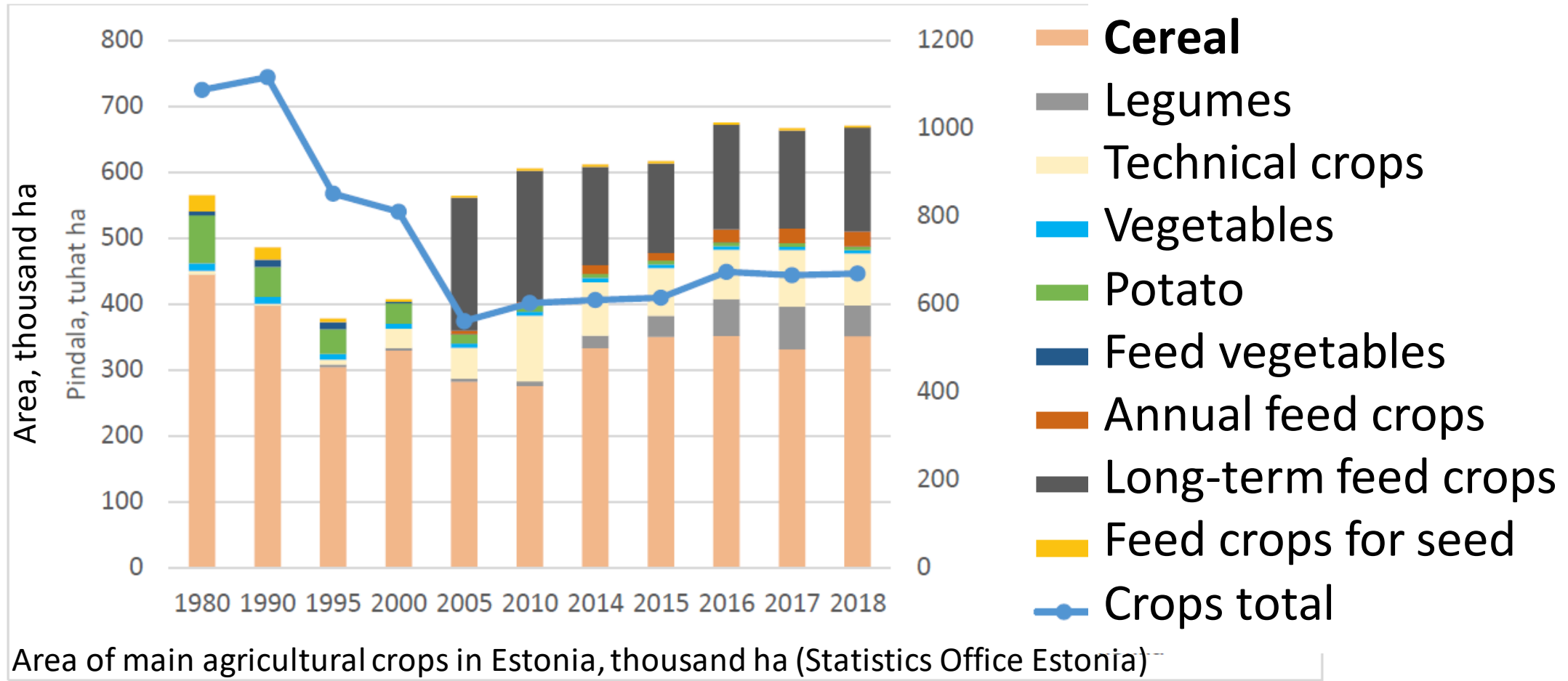
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Everything changes!

100 years of crop production in Estonia



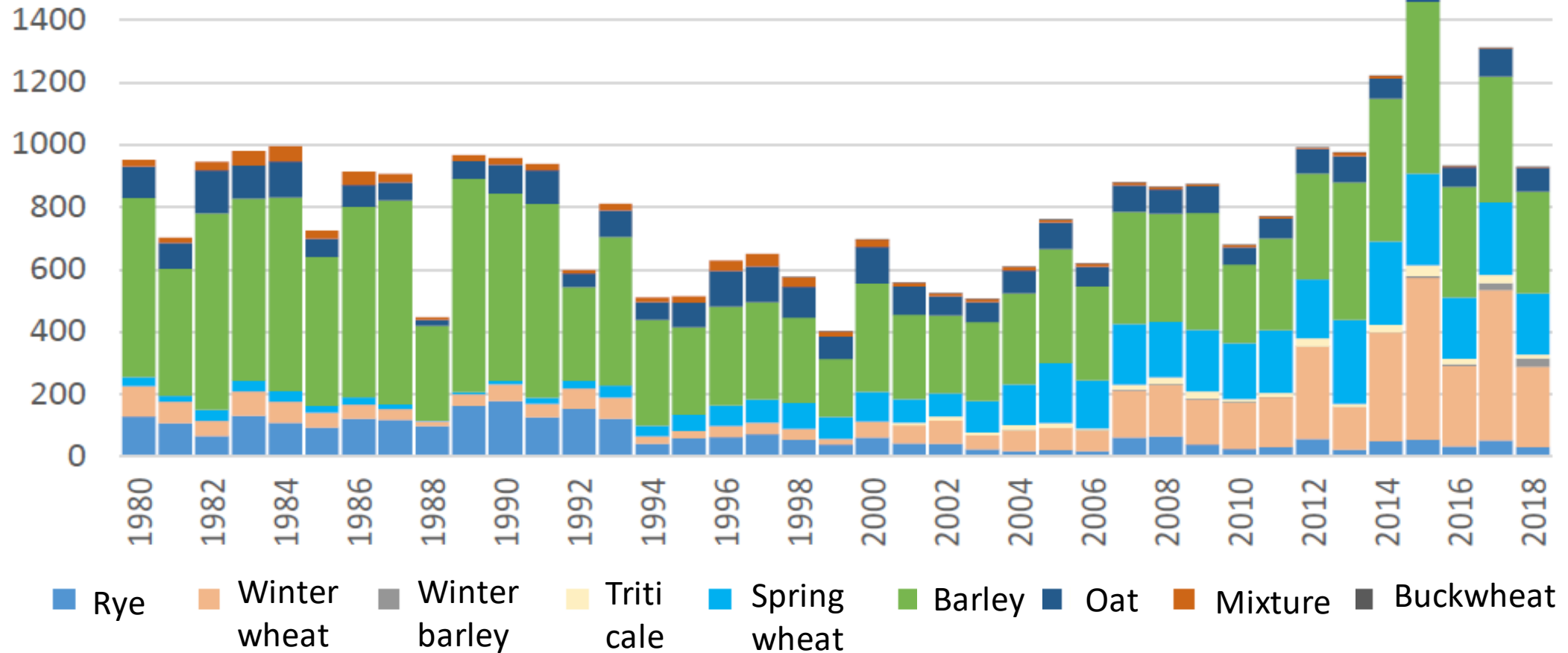
Estonia is a cereal and grassland country



Area of main agricultural crops in Estonia, thousand ha (Statistics Office Estonia)

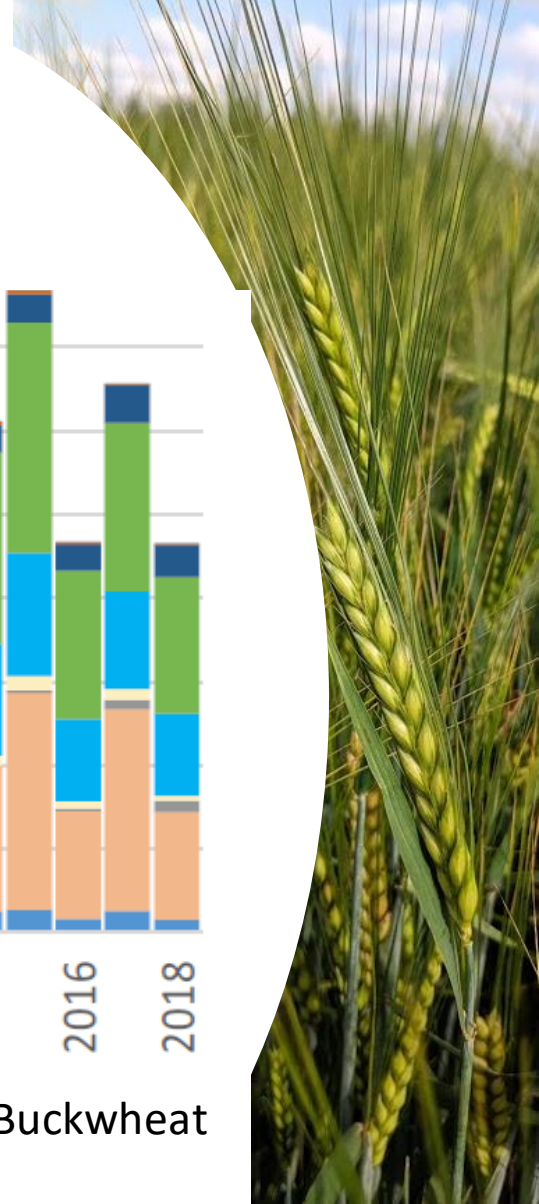


How much cereal is produced (total)?

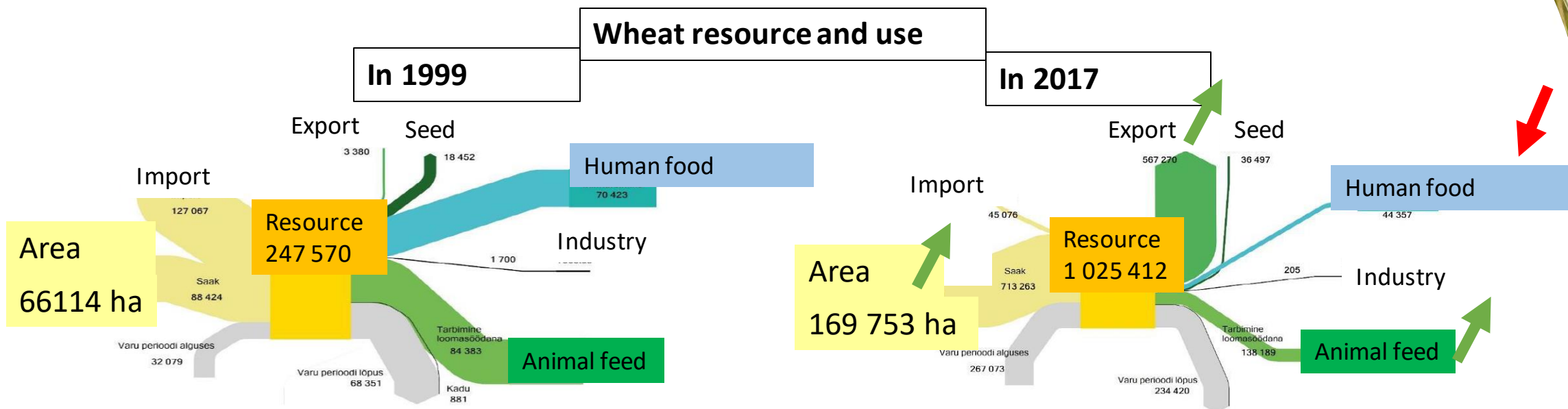


Yield of cereals during 1980 – 2017, thousand t (Statistics Office Estonia)

ADDVAL-BIOEC <https://taltech.ee/biomajandus>

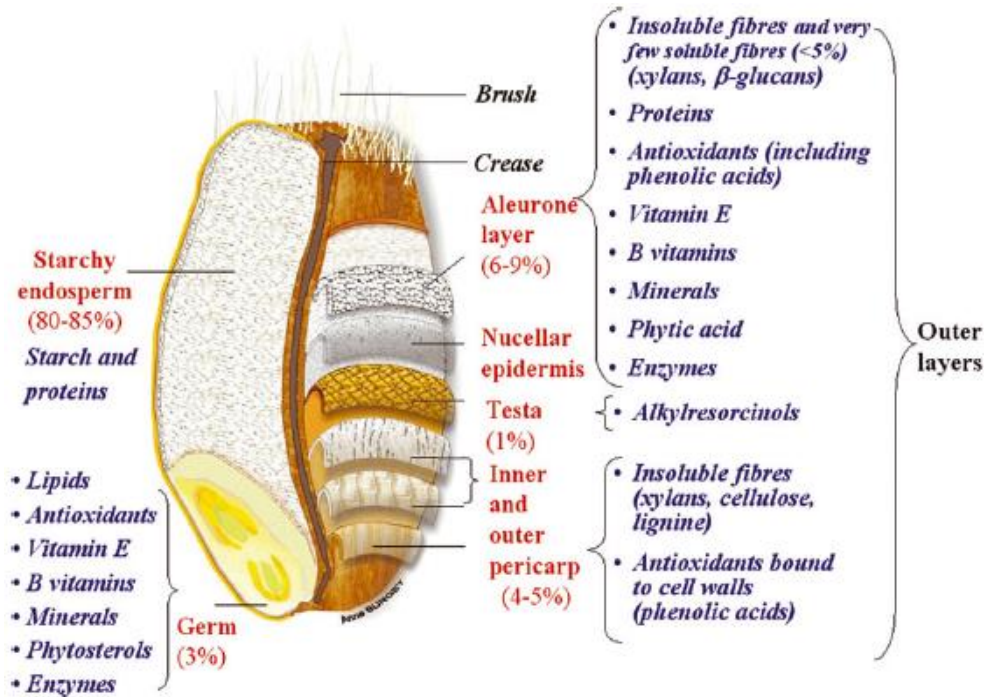


More wheat is used for feed than food

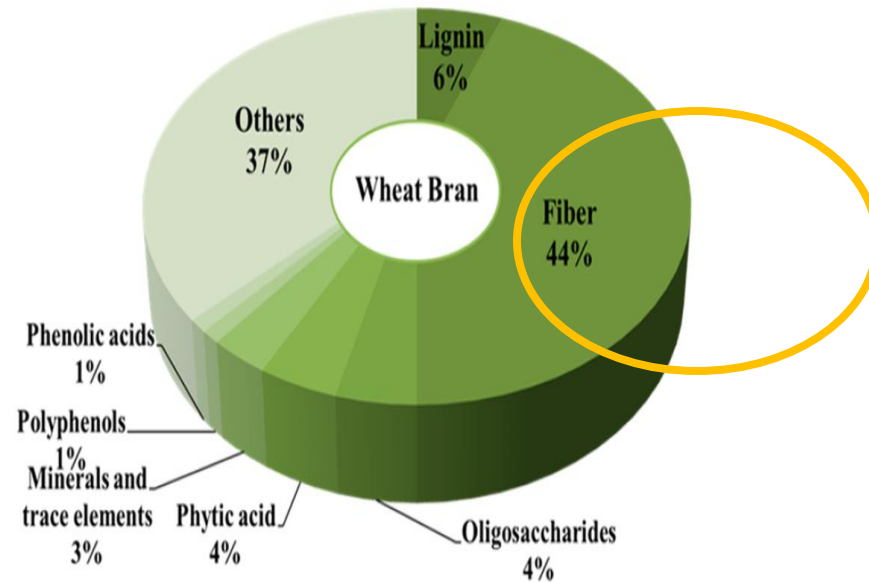


In addition to grain there is calculated to be available straw ca 500 000 tons = 486 GWh

Wheat grain contains much more



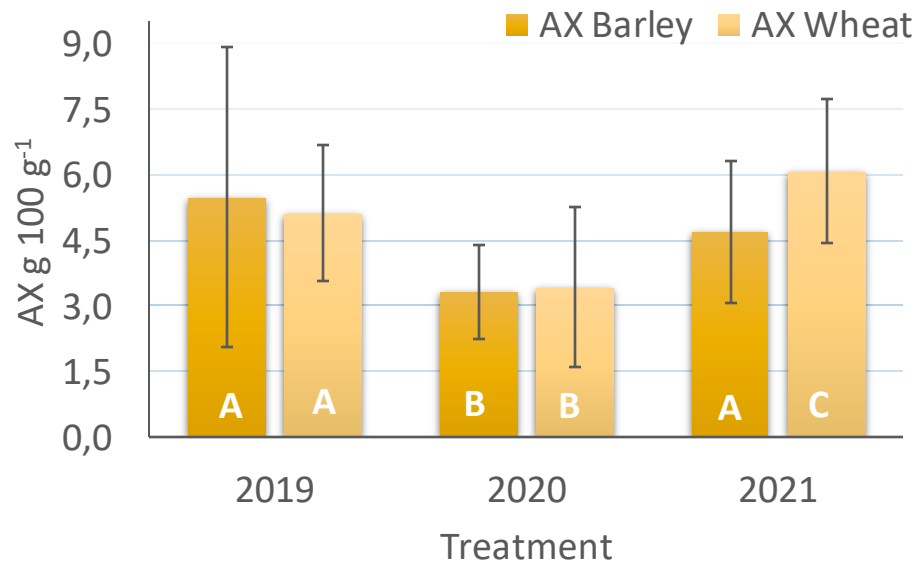
The wheat grain and its components (adapted from Surget & Baron and Henry et al.).



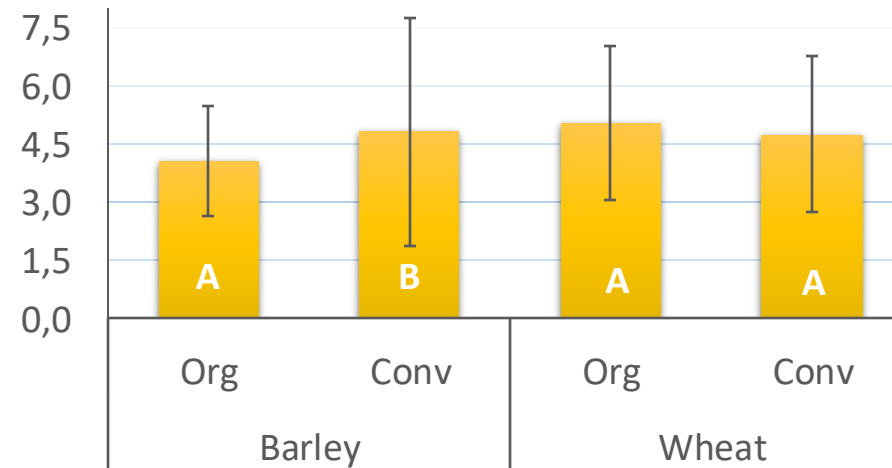
Average percentage content of bioactive compounds of wheat bran industrial processing byproducts (ElMekawy et al.).

Arabinoxylan content depends on year and species

Barley and wheat grains arabinoxylan content was affected by the experimental year

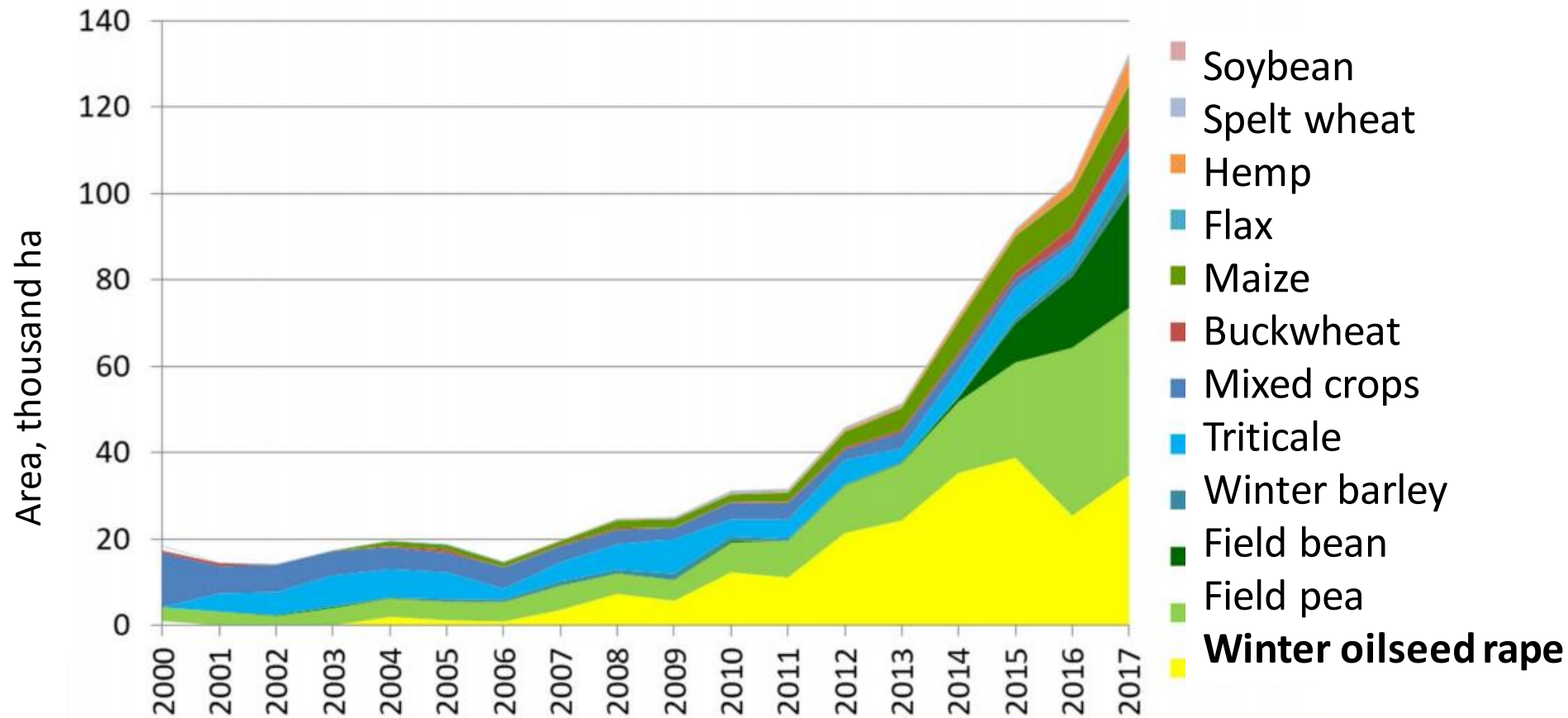


Cropping system had impact on barley arabinoxylan content, but not in wheat.



Content of AX in barley and wheat depending on the year and cropping system (means \pm SD); values bearing different capital letters within a species are significantly different ($P < 0.05$).

Novel crops in Estonia



Use of oilcrops

- Area increase 10 times from 7300 ha to 73 000 ha In 17 years.
- Majority of it is made into oil.
- Oilseed presscake is used as animal feed, but it is also used to extract protein by Vegetein and within RESTA28 project we are testing out different uses for it in human food.

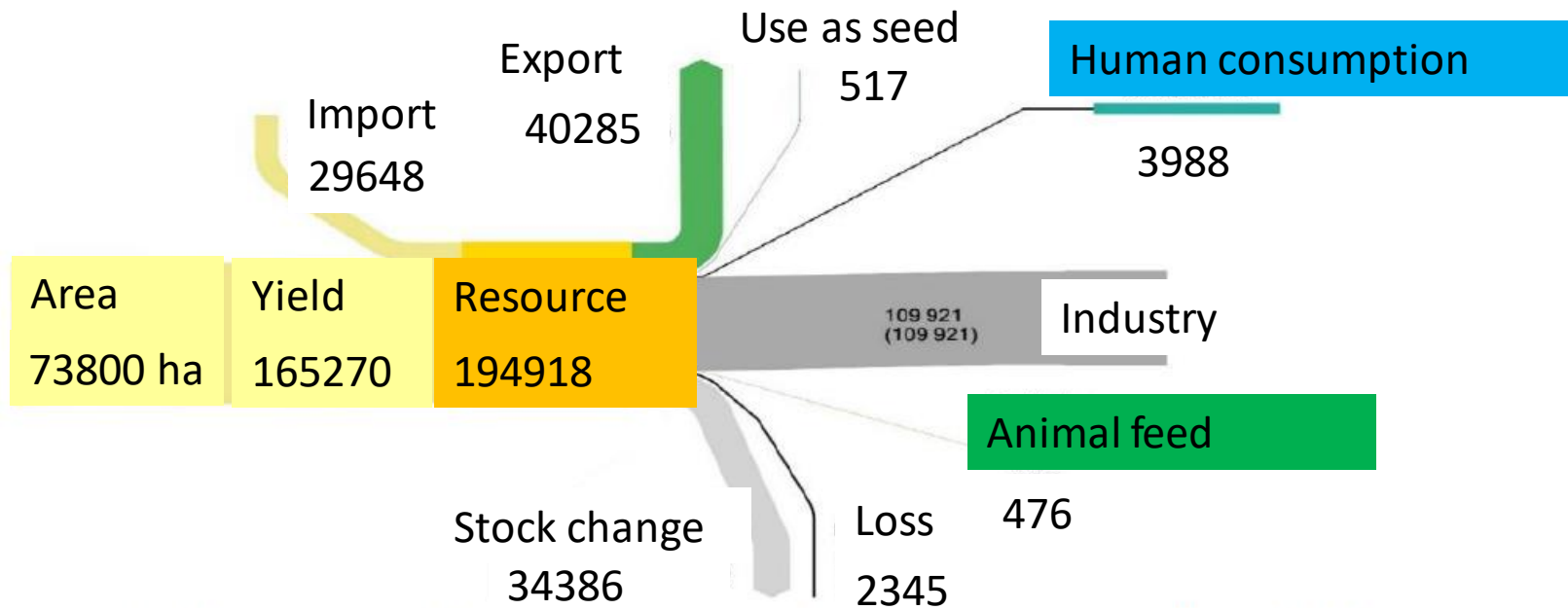
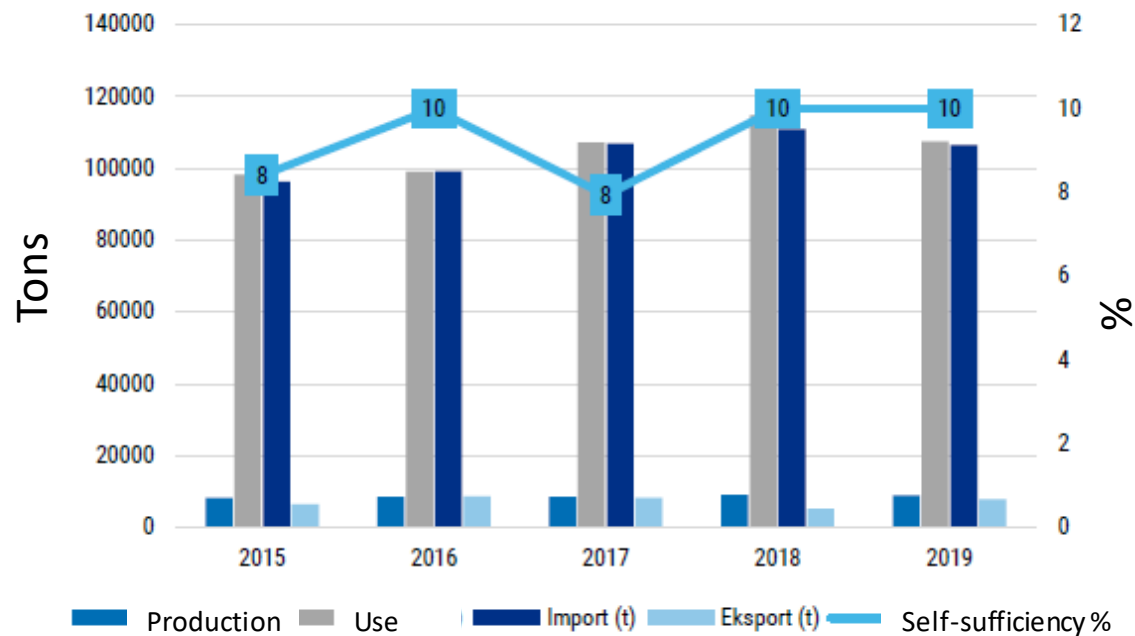


Figure. Resource and use of oilseed crops in 2017, tons (Stat Office)

What about fruits?

- Strawberries, currants, apples
- All very seasonal



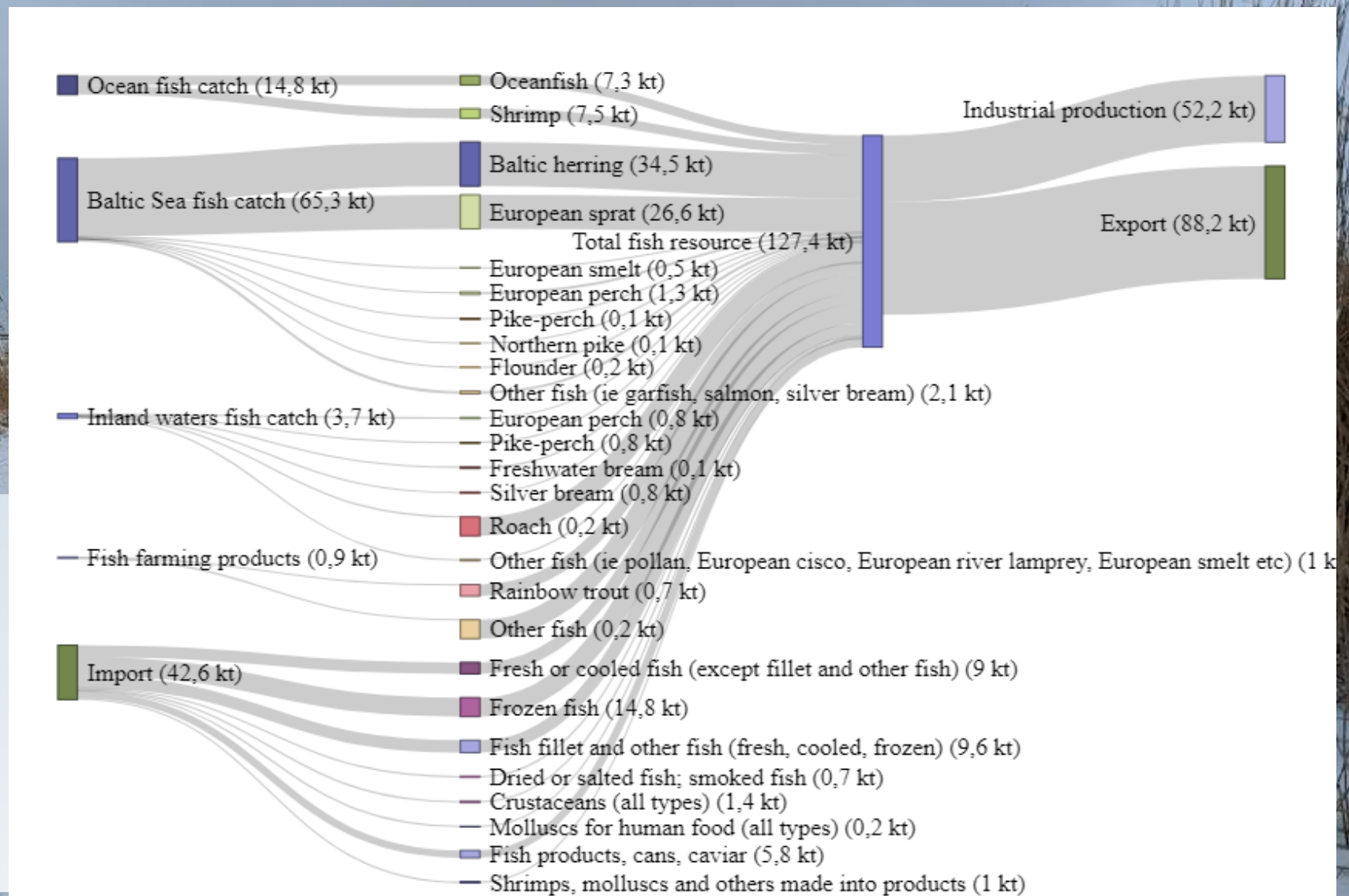
Production and consumption of fruits and berries 2015 - 2019
(Statistical Office of Estonia and Ministry of Rural Affairs)



Fishing and aquaculture



- Fishing has long history in Estonia and fish is well used in value chain
- New ideas with reed
- There is still potential to develop shellfish farming, microalgae etc.



Red algae case study

- Furcellaran from the red seaweed *Furcellaria lumbricalis* can be extracted and used as gelling agent.



Nordregio

BioBaltic

Nordic-Baltic cooperation within bio-circular-economy

<https://nordregioprojects.org/biobaltic/>

<https://estagar.ee/>



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There is more to discover

Estonia: research-business partnerships in the bioeconomy

The BioBaltic is presenting the third, and final story from the storymap series on the bioeconomy state of the art in three Baltic countries. This time, the storymap brings us to Estonia. We focus on efforts made in valorising bio-resources, in particular red seaweeds, and boosting the blue-bioeconomy.

Among the three Baltic countries, Estonia has the strongest marine culture. Given the geographical position, the country's coastline is five times longer than its landline.

Despite marine characteristics, the Estonian bioeconomy is yet driven by primary activities on land; i.e. biomass production from agricultural fields and forests. The valorisation of leftover or side-products from bioresources is yet limited.

In the BioBaltic project, Estonian partners draw attention to the untapped potential of marine bio-resources, taking red seaweed, as an example. By exploring innovation ecosystem models, project partners aim to identify ways of valorising marine bio-resources and developing a bioeconomy in Estonia.

This storymap welcomes you to dive into the Estonian bioeconomy journey.



Estonia: research-business partnerships in the bioeconomy

This is a story about Estonian efforts in valorising bio-resources, in particular red seaweeds, and boosting the blue-bioeconomy

3. oktoober 2022

Visit the storymap

<https://storymaps.arcgis.com/stories/6bb6eada087b48a9a0ed6c939a14e0dc>

In conclusion

Estonia:

- has enough land, more-less acceptable soil conditions
- has, and most likely continue to have, fresh water
- produces mostly cereals and oilseed crops
- produces some fruits and berries and vegetables
- has motivated and skilled people

To continue to develop circular bioeconomy!



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Thank you!

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European Union
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Development Fund



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Projects involved:

"Nordic-Baltic collaboration to boost the bio- and circular-economy" (2021– 2023)

"Valorization of cereal and oil seed crops" (2021– 2023). Supported by ERDF and Estonian Research Council via project RESTA28.

„Biofortified and climate-resilient food and fodder production on marginal soils“ (2020-2023). “The project *BioFoodOnMars* was initiated under the ERA-NET Cofund FACCE SURPLUS (Grant N°652615), being part of the Joint Programming Initiative on Agriculture, Food Security and Climate Change (FACCE-JPI). FACCE SURPLUS has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 652615. ”

„Maximising added value and efficient use of raw materials in bioeconomy and its sectors in Estonia“ (2018 - 2021)



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