Teraviljafoorum *7.12.2021*

Käes on aeg hakata armastama GM-taimi?

Hannes Kollist

www.plantsignalresearch.com

www.plantinvent.com

PLANT SIGNAL RESEARCH GROUP

Plant Invent

1632

Euroopa Liit maaelu arenguks

Euroopa Maaelu Arengu Põllumajandusfond: Euroopa investeeringud maapiirkondadesse

INARI™

SEEDesign™ platform.

Satisfying demand.
Enriching the environment.

PRODUCTIVITY GOALS

UP TO

+20%

YIELD IN CORN AND SOY

Compared to historical yield improvements of ~1% per year

WATER USAGE GOALS

-40%

WATER NEEDED FOR CORN

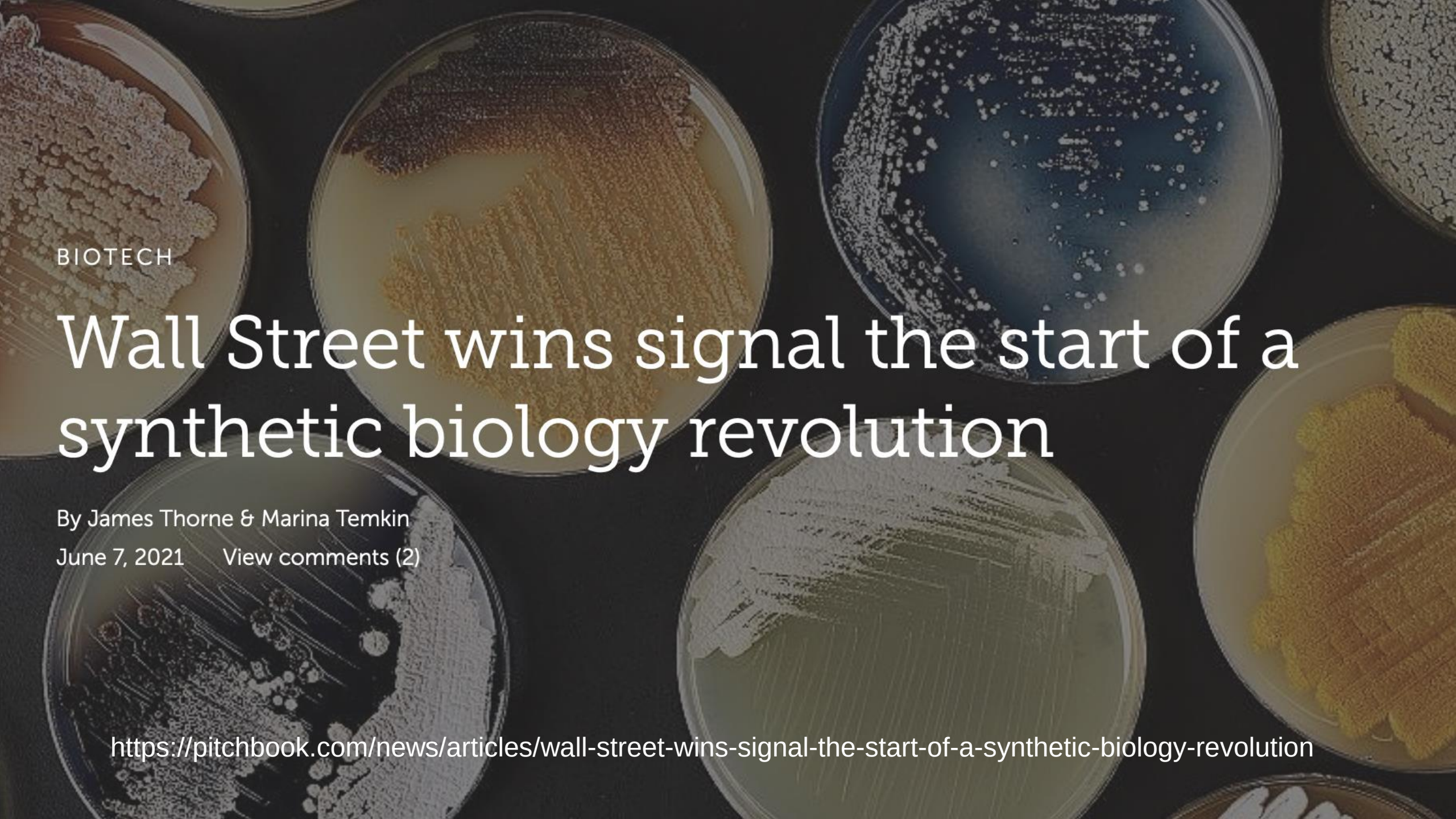
Equivalent to approximately 2.1 years of US total water consumption from domestic and public supply

CLIMATE CHANGE GOALS

-40%

NITROGEN NEEDED FOR CORN

Equalling a reduction of half a metric ton of CO_2 per acre of corn



BIOTECH

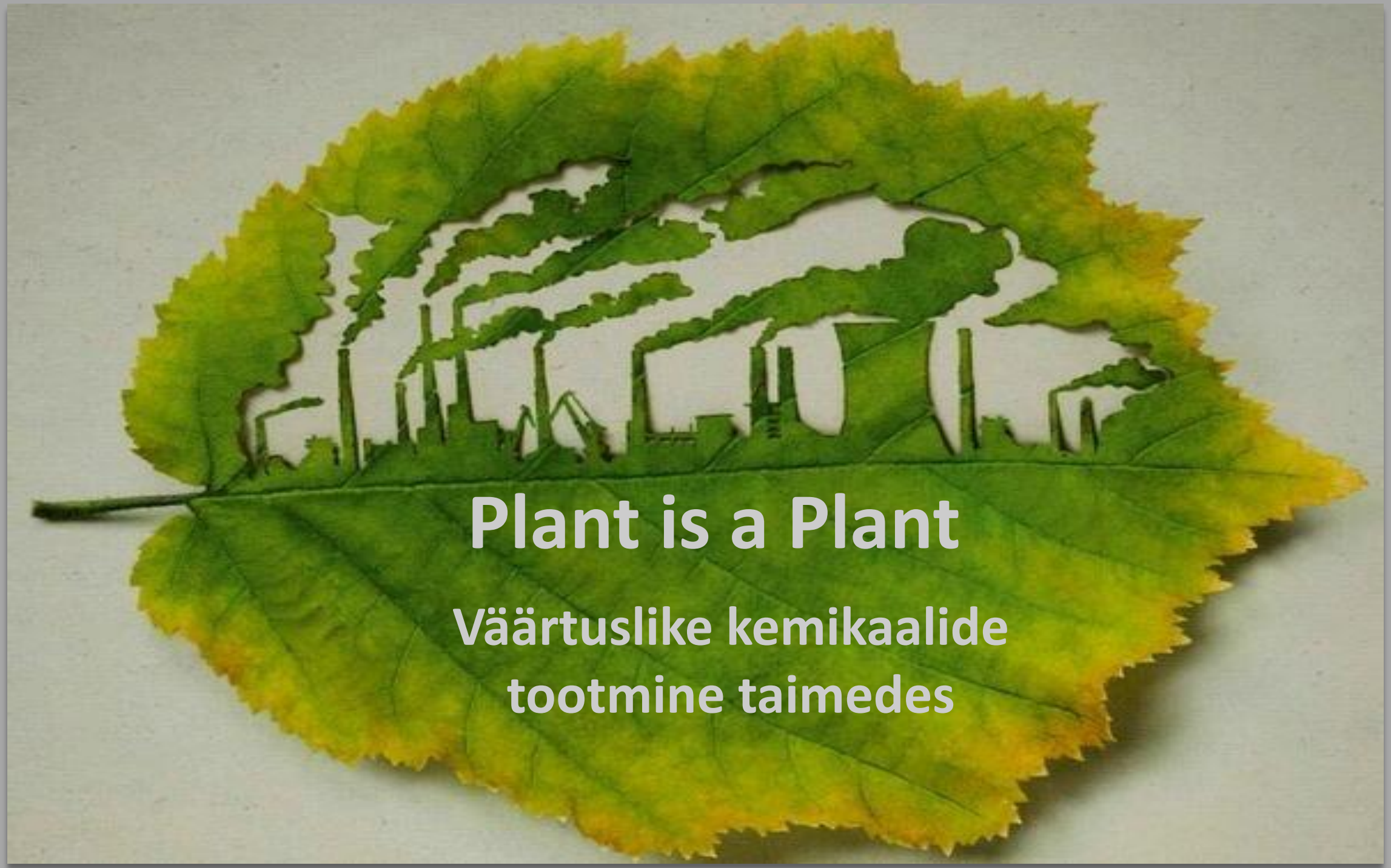
Wall Street wins signal the start of a synthetic biology revolution

By James Thorne & Marina Temkin

June 7, 2021 View comments (2)

https://pitchbook.com/news/articles/wall-street-wins-signal-the-start-of-a-synthetic-biology-revolution

The Boston-based company's patience recently paid off: Last month, Ginkgo landed a blank-check deal that valued the company at $15 billion, more than triple what it was worth last year, according to PitchBook data. Its rival Zymergen also took a platform-first approach to biomanufacturing and rode it to an IPO in April at a roughly $3 billion valuation.



Plant is a Plant

Väärtuslike kemikaalide tootmine taimedes

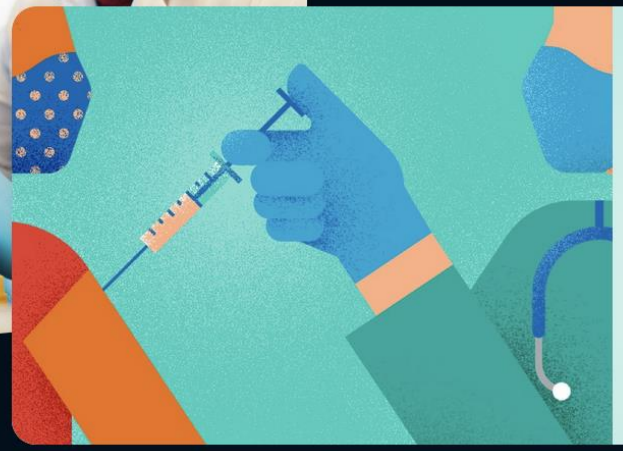
medicago

Our company Our science Our technologies

Health is in our nature

Medicago develops vaccines and treatments to help fight emerging global health challenges, today and in the future.

Discover our business →



COVID-19

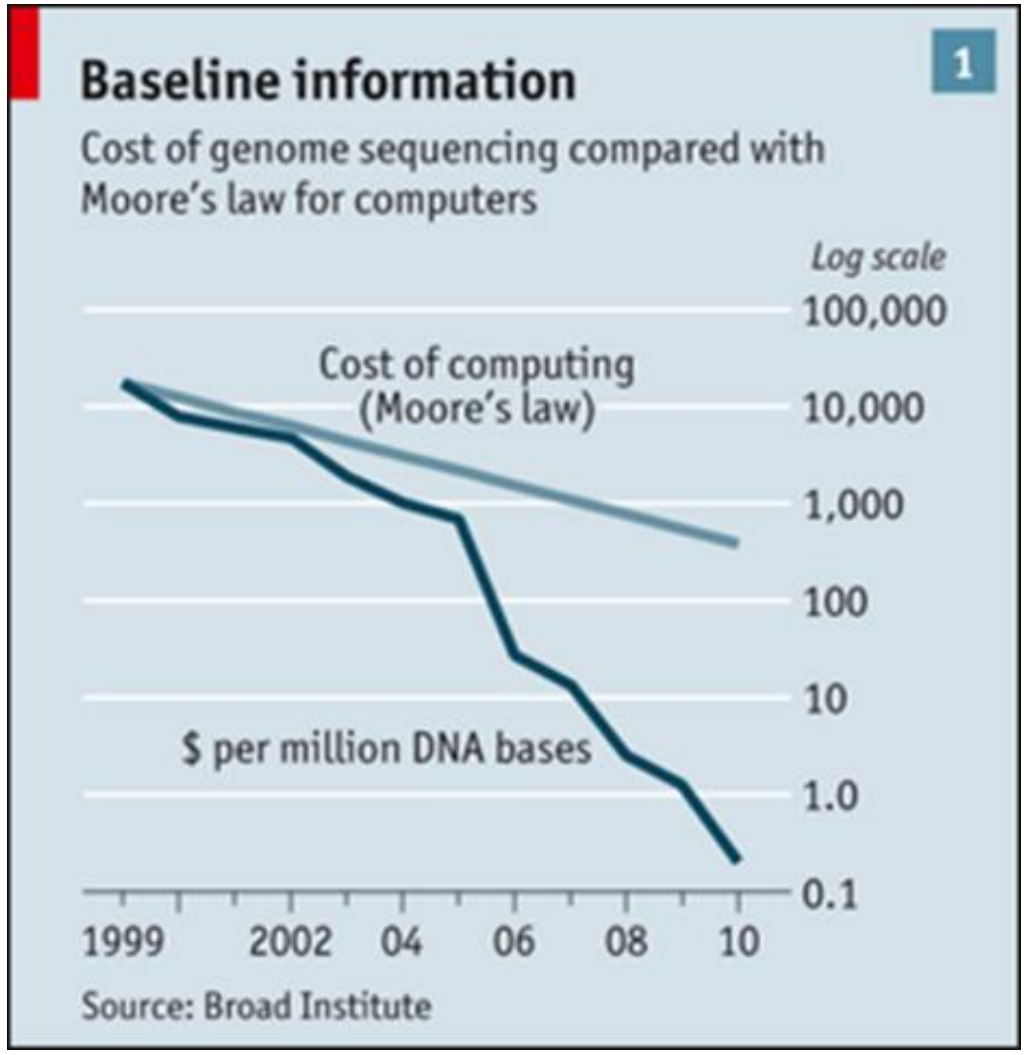
Do you have a question about our COVID-19 vaccine candidate?

→

Terapeutiliste valkude tootmine taimedes

Kust on tulnud areng?

DNA sekveneerimine ja süntees



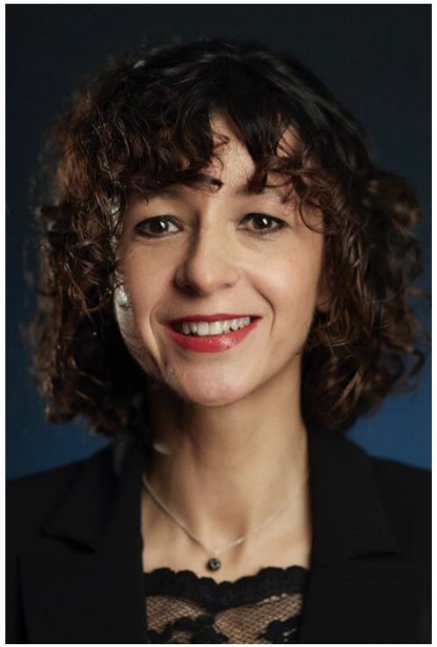
Kust on tulnud areng?

- CRISPR/Cas9 tehnoloogia

Genetic scissors: a tool for rewriting the code of life

© Johan Jarnestad/The Royal Swedish Academy of Sciences

The Nobel Prize in Chemistry 2020



© Nobel Prize Outreach. Photo: Bernhard Ludewig

Emmanuelle Charpentier

Prize share: 1/2

© Nobel Prize Outreach. Photo: Brittany Hosea-Small

Jennifer A. Doudna

Prize share: 1/2

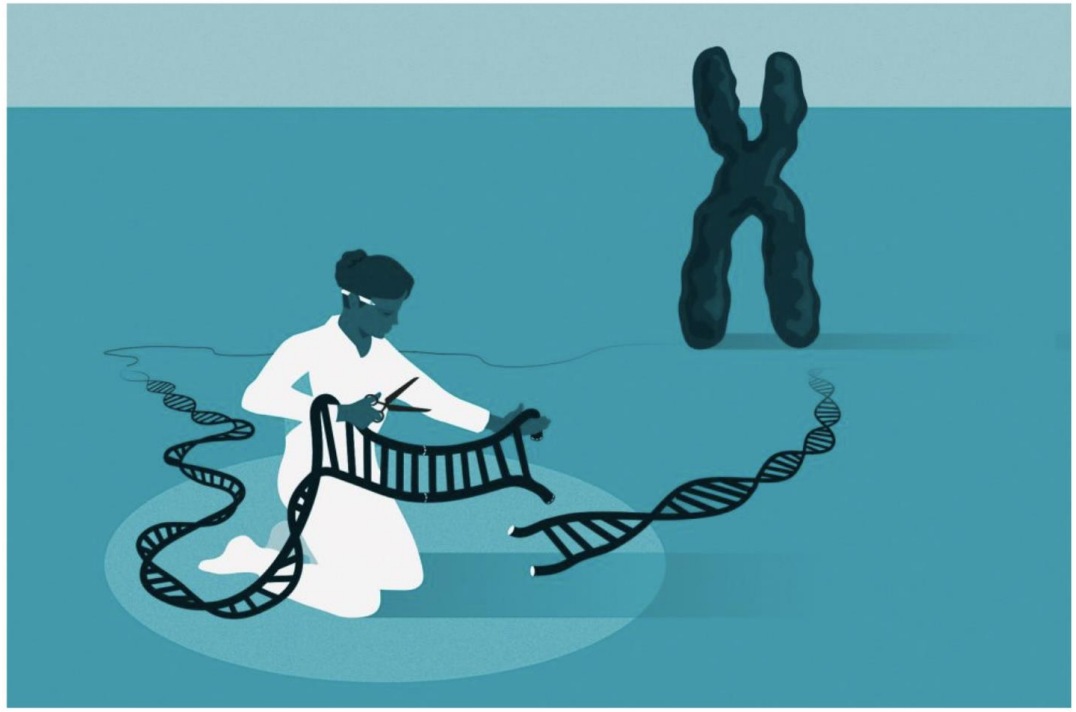
Kust on tulnud areng?

- Molekulaarbioloogia

Mis on kujunenud pudelikaelaks?

- Fenotüpiseerimine

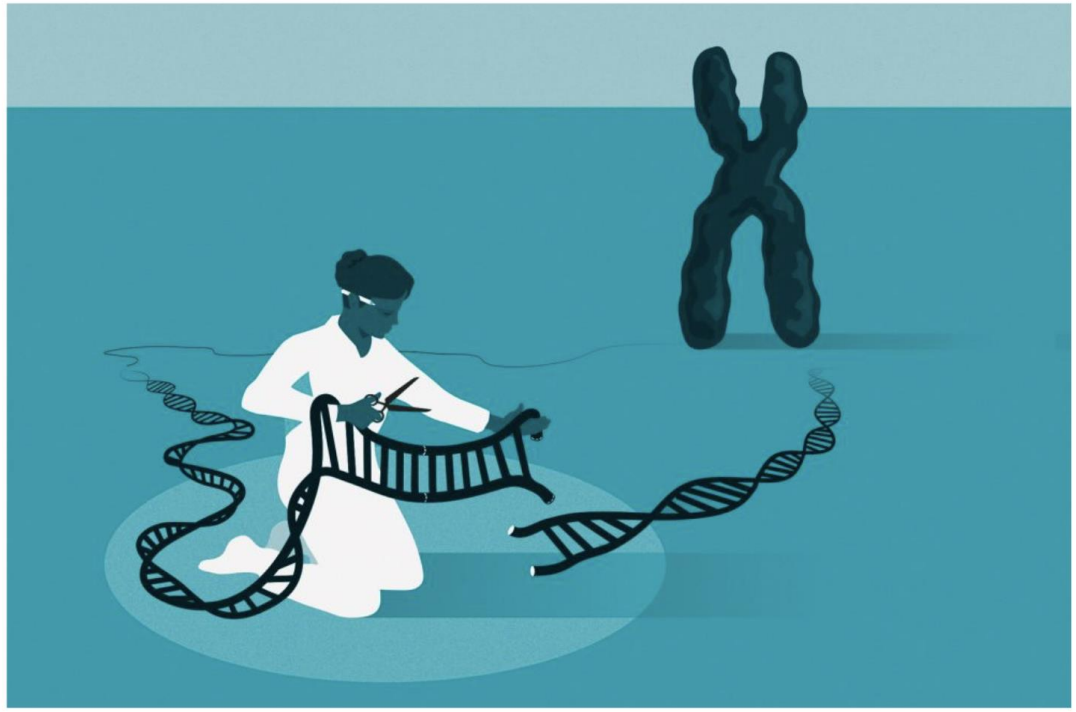
Genetic scissors: a tool for rewriting the code of life



Kust on tulnud areng?

-Molekulaarbioloogia

Genetic scissors: a tool for rewriting the code of life



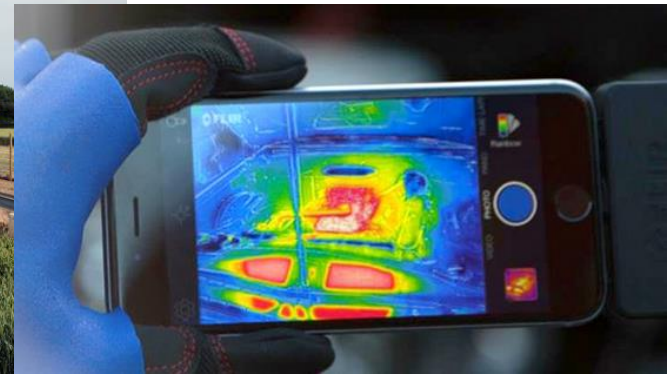
© Johan Jarnestad/The Royal Swedish Academy of Sciences

Mis on kujunenud pudelikaelaks?

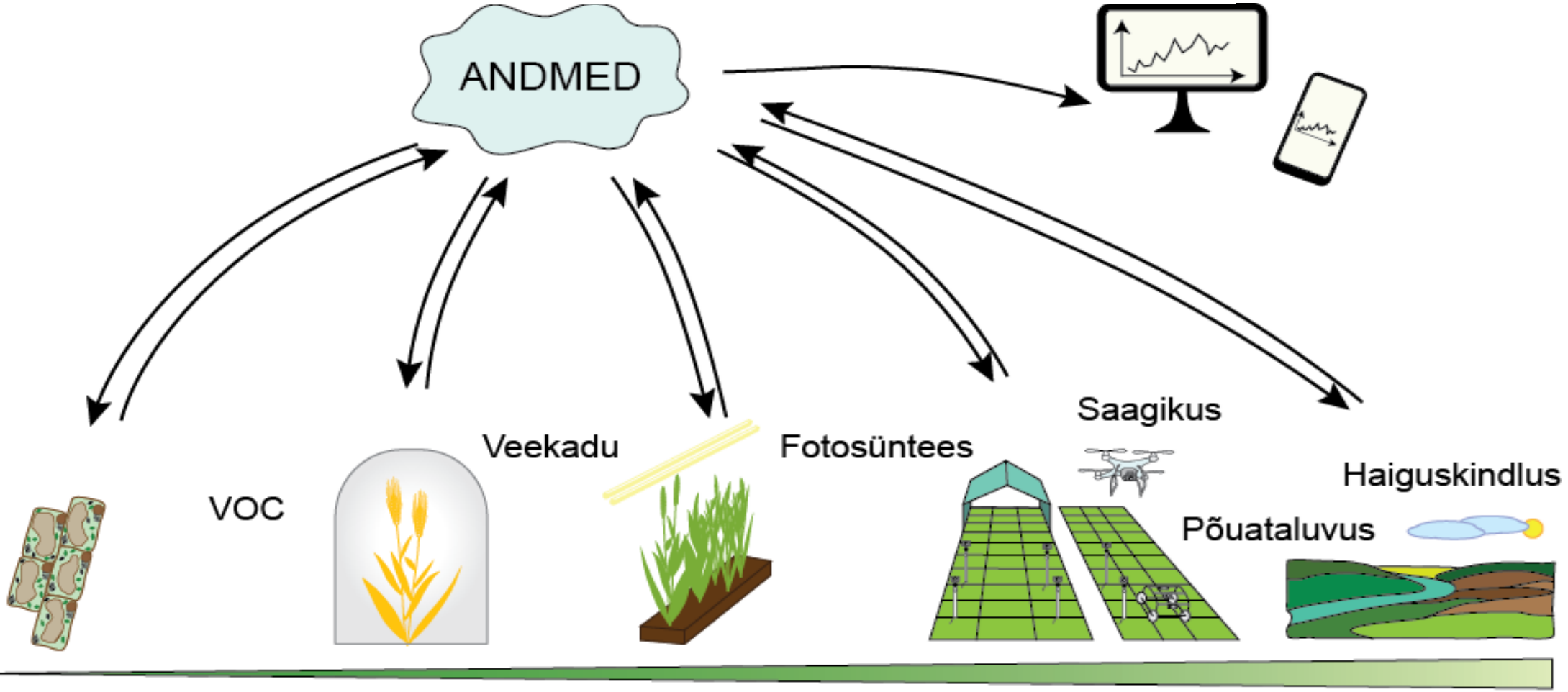
- Fenotüpiseerimine

Flying platforms

Portable sensors („cheap“)



Taimebioloogia Infrastruktuur



TÜ, TalTech, EMÜ	TÜ, TalTech, EMÜ	TÜ, TalTech, EMÜ	ETKI	ETKI, EMÜ


Euroopa Liit
Euroopa Regionaalarengu Fond
Eesti tuleviku heaks
TAIM
Taimebioloogia infrastruktuur
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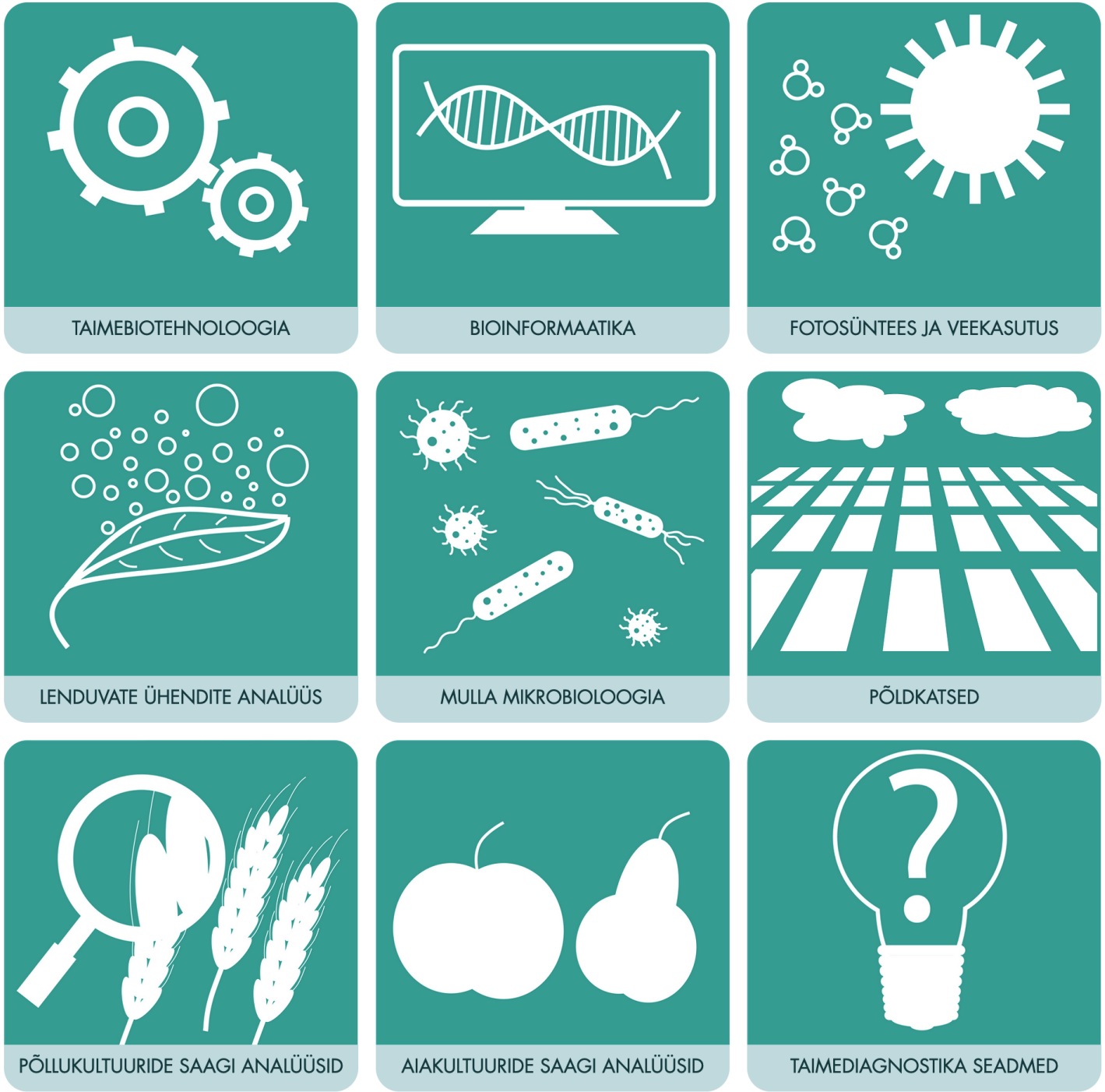

Tartu Ülikool taimediagnostika tehnoloogiad

Plant Invent

Photos by: Kaspar Koolmeister

Plant Invent

Taimediagnostika instrumendid

Photos by: Kaspar Koolmeister

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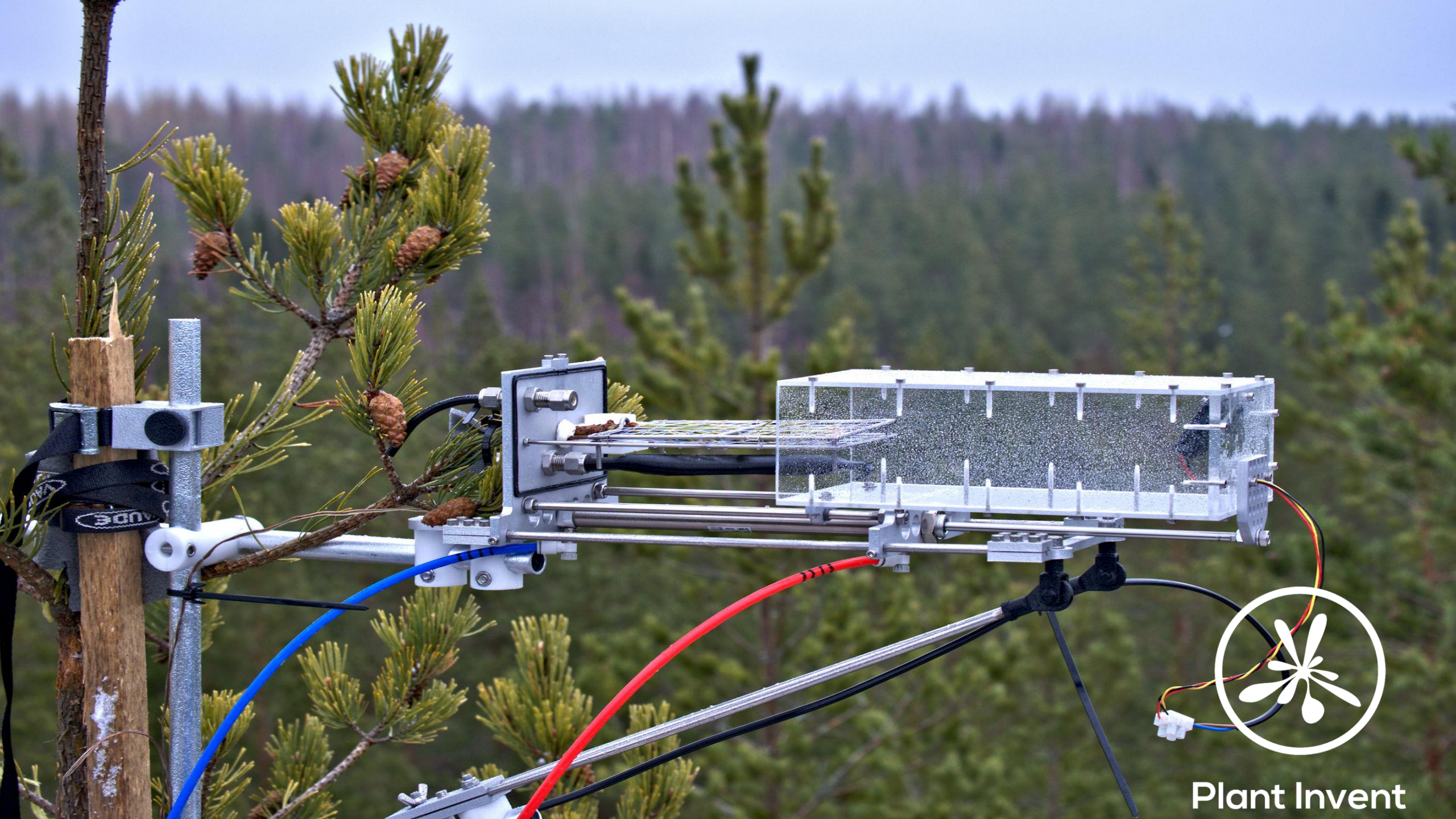
Plant Invent

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Rahvusvahelised projektid – kliimakindel & ressursisäästlik oder ja nisu

barista
FOR SUSTAINABLE BARLEY

BRACE – *põuakindel oder, odra genoomi editeerimine*

NOBAL wheat

MAAELUMINISTEERIUM

Horizon 2020
European Union Funding
for Research & Innovation

Põud Eestis, 2021

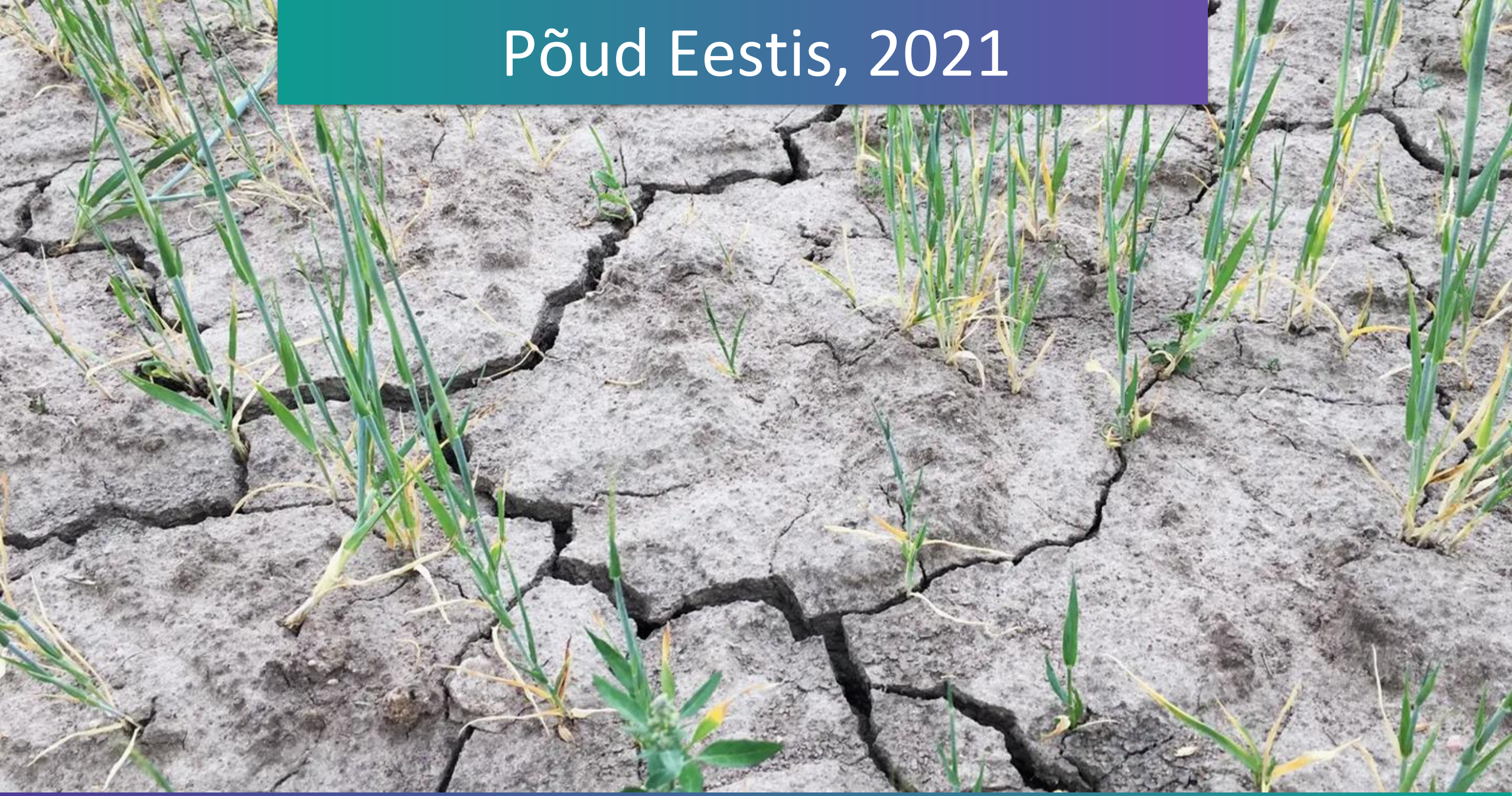


Photo: Olev Kenk/ERR

Põldkatsete prototüüp - KaRaL

Mõõdab taime transpiratsiooni, õhulõhede juhtivust ja CO_2 omastamist fotosünteesis

Lisaks mõõdab instrument lehe temperatuuri, valguse intensiivsust ja valideerib jooksvalt tulemuste kvaliteeti

1 taimelehe mõõtmiseks kulub – 8 sekundit.
1 katselapi mõõtmiseks (20-30 taimelehte) kulub 7-8 min

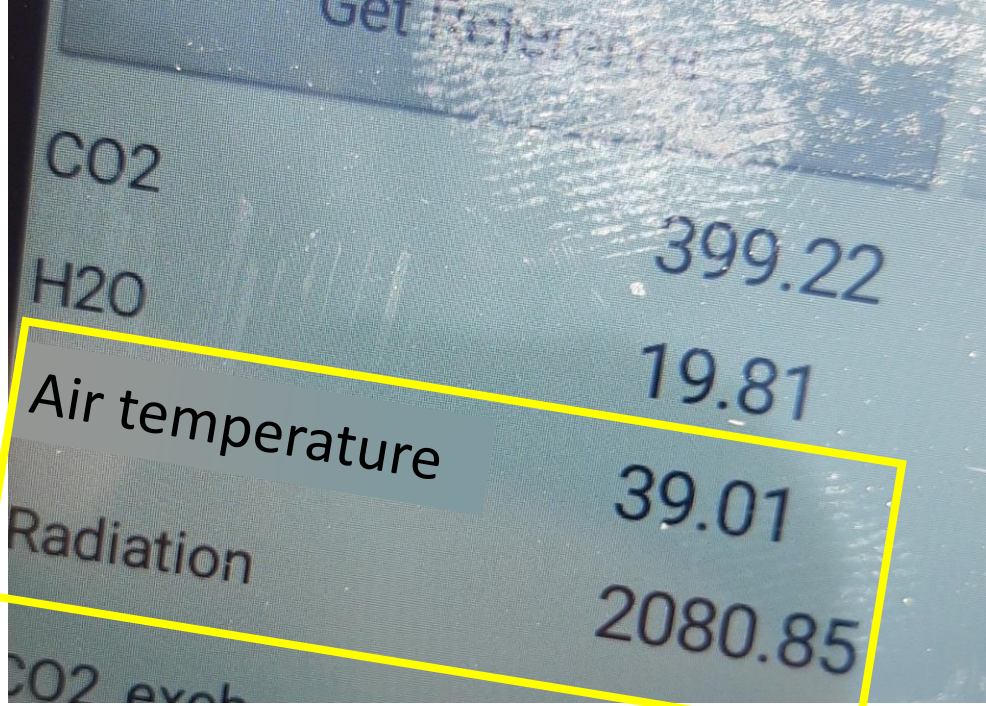
NOBALWheat – Norra, Läti, Leedu, Eesti nisusortide aretusprojekt

- ~75 nisu sorti kõigist osalevatest riikidest
- põldkatsed 300 sordiga, 3 aastat kõigis riikides
- erinevad analüüsid, TÜ teeb vee kasutuse ja fotosünteesi analüüse
  - 7 sorti
    - N75 and N150
      - 2 korduses

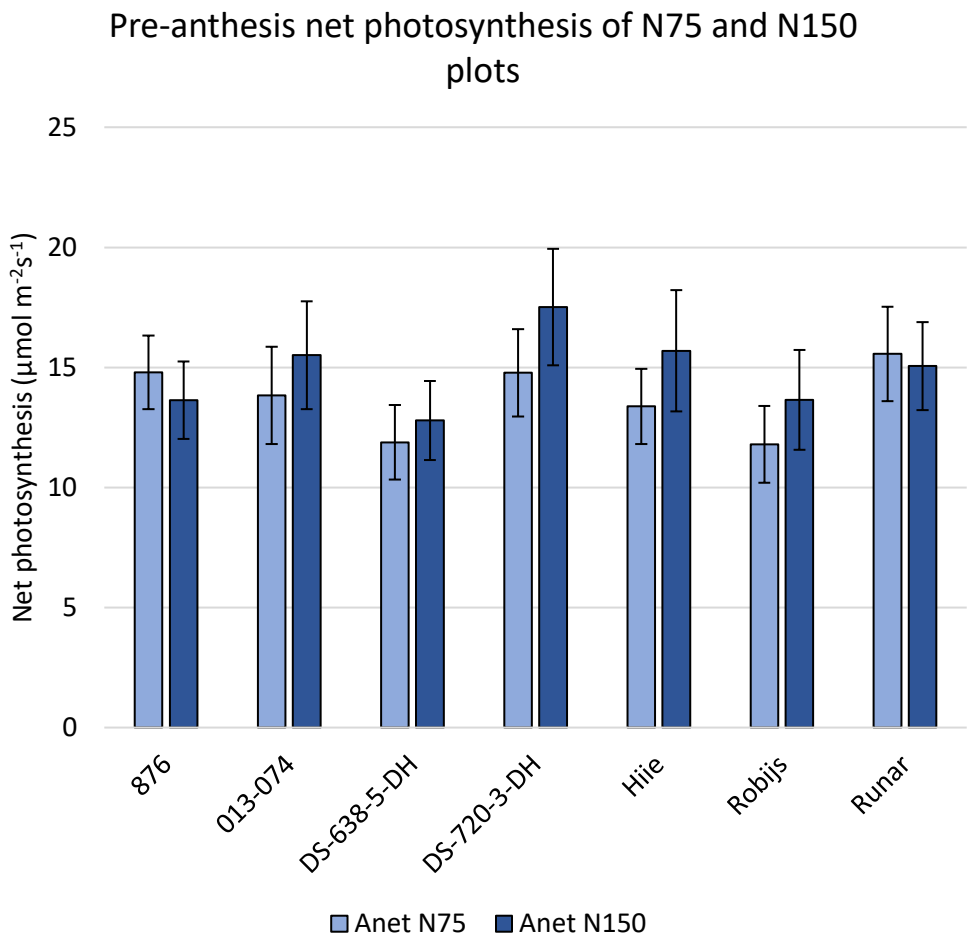
20 lehte igast katselapist, 8 minutid 1 lapi mõõtmiseks
Mõõtepäevadel uuriti 1000+ lehte

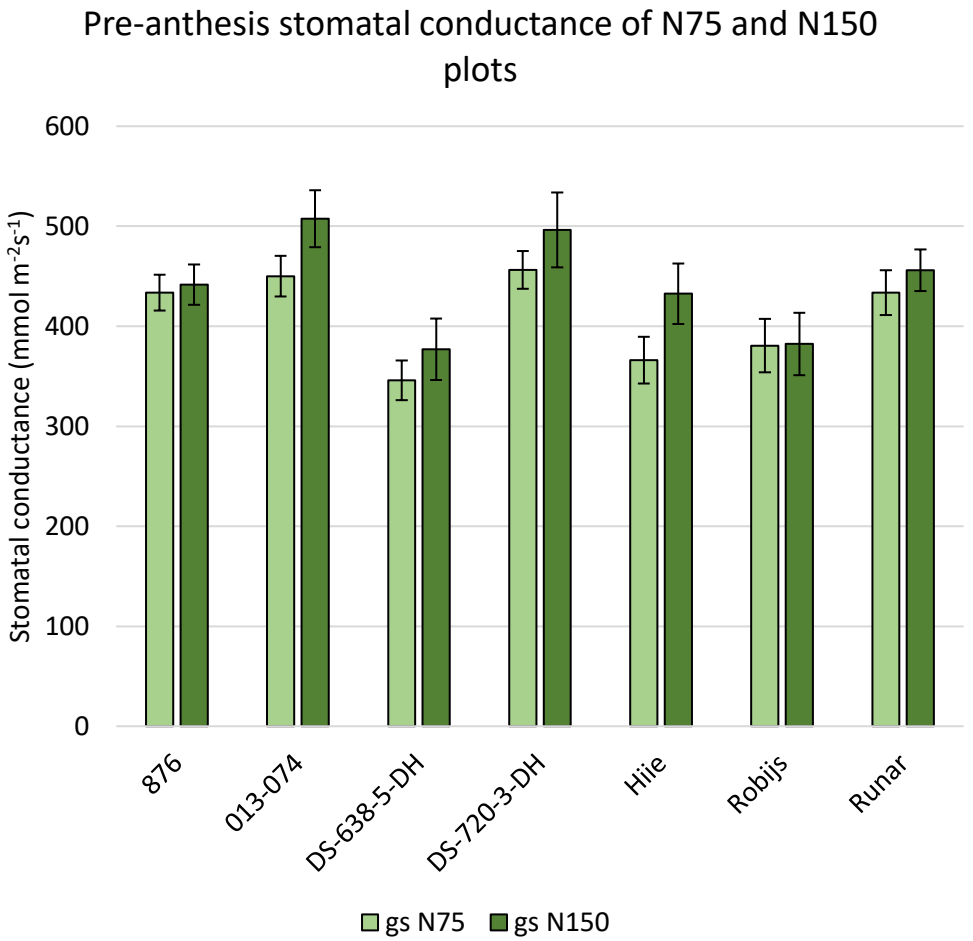
Helen Parik

Egon Meigas

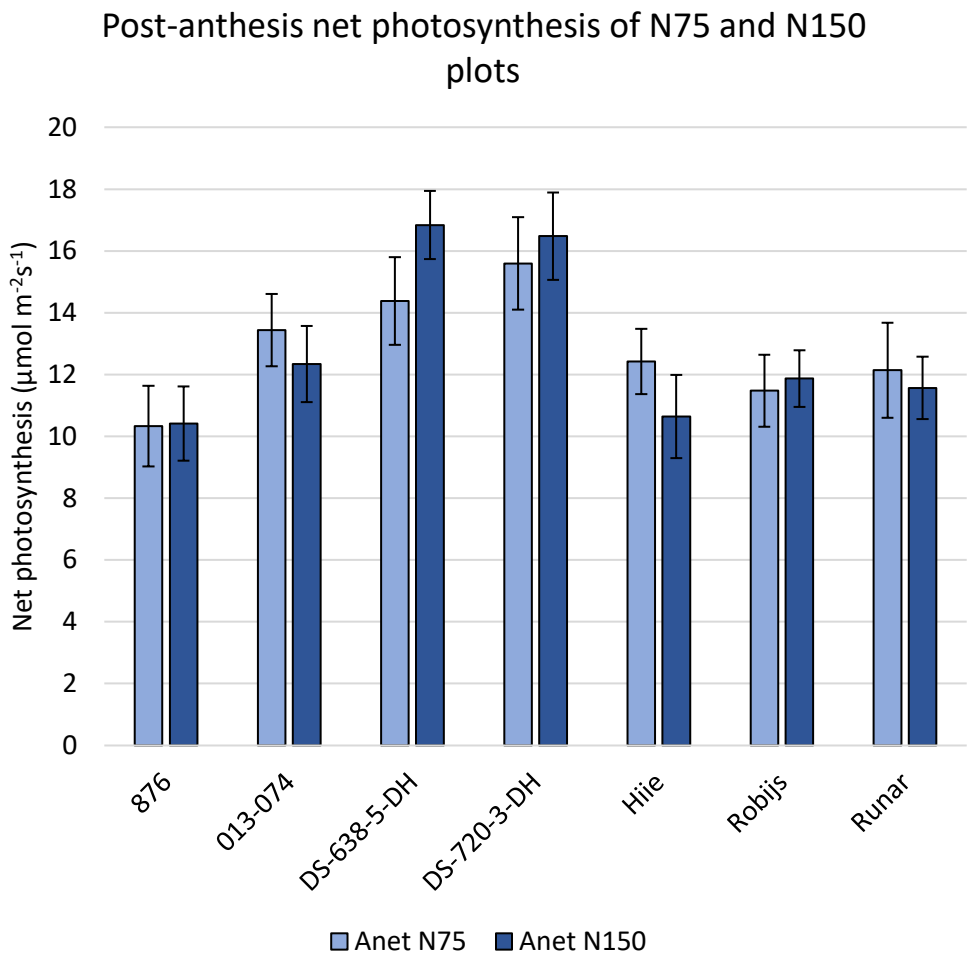


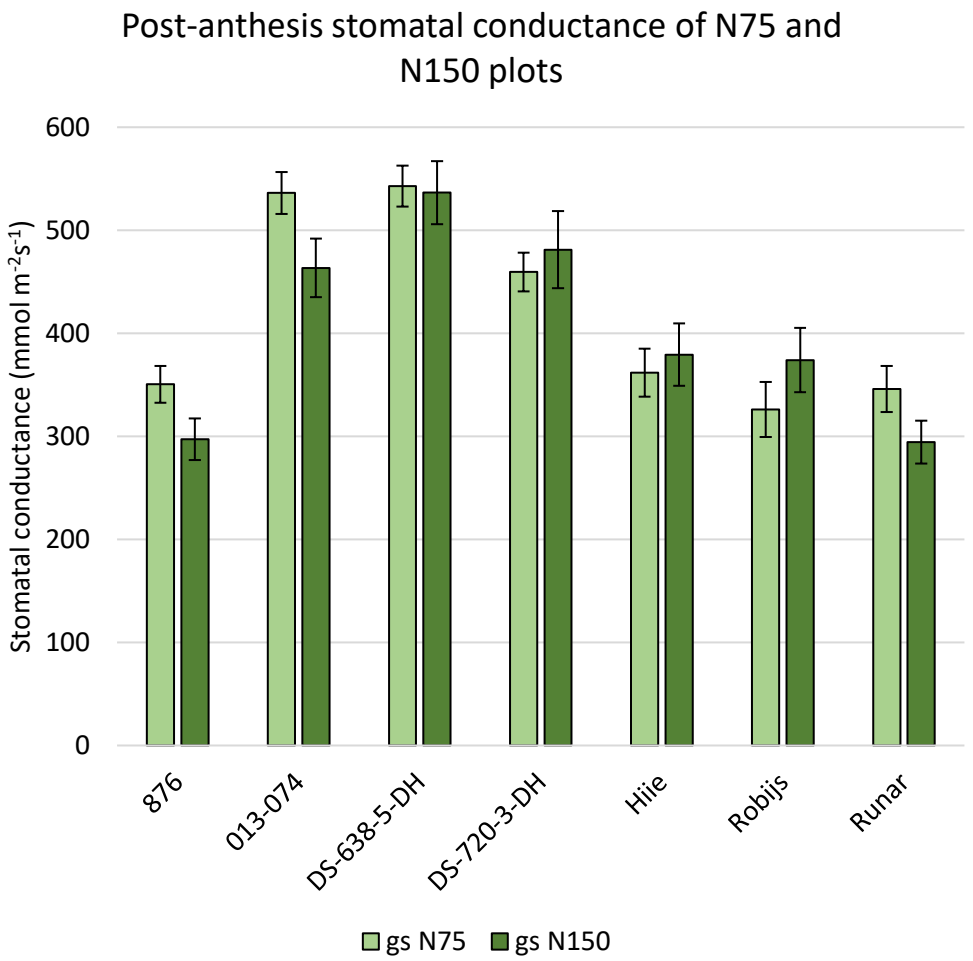
Nisu gaasivahetuse tulemused – enne õitsemist



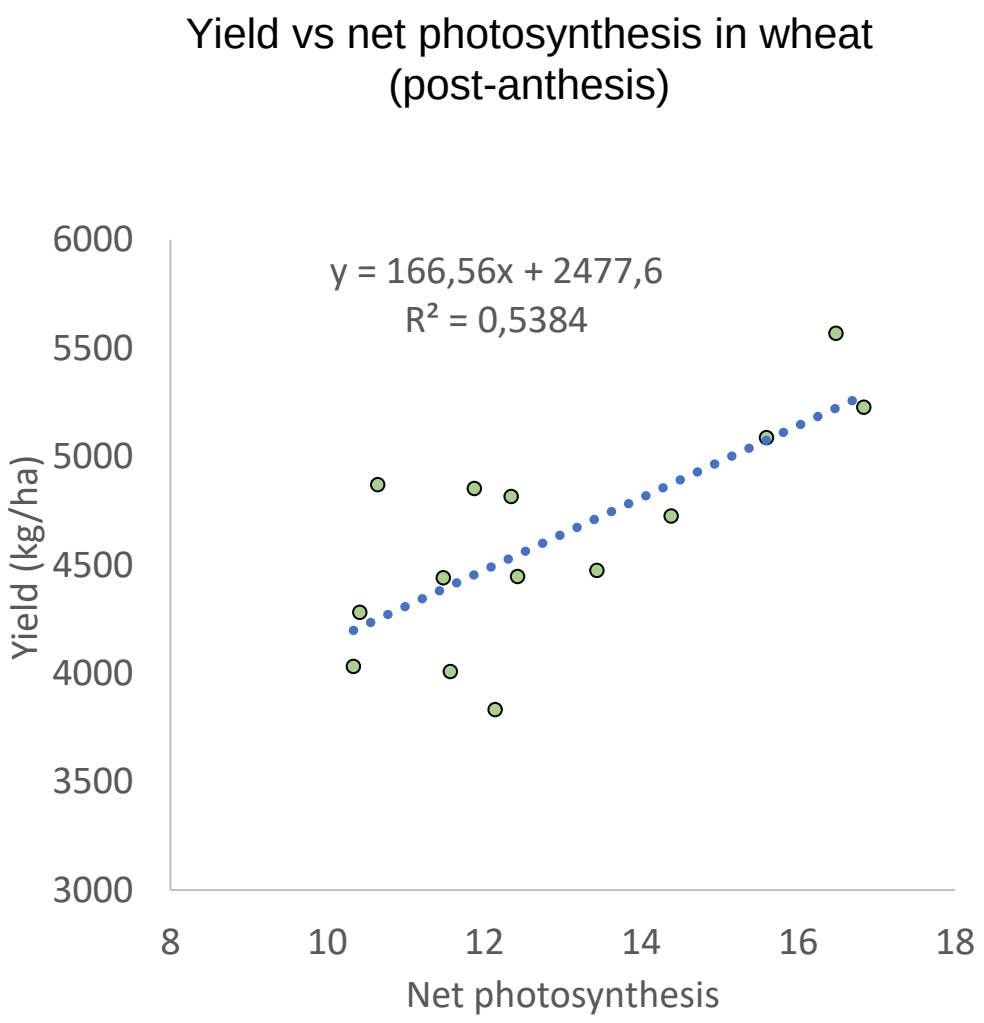


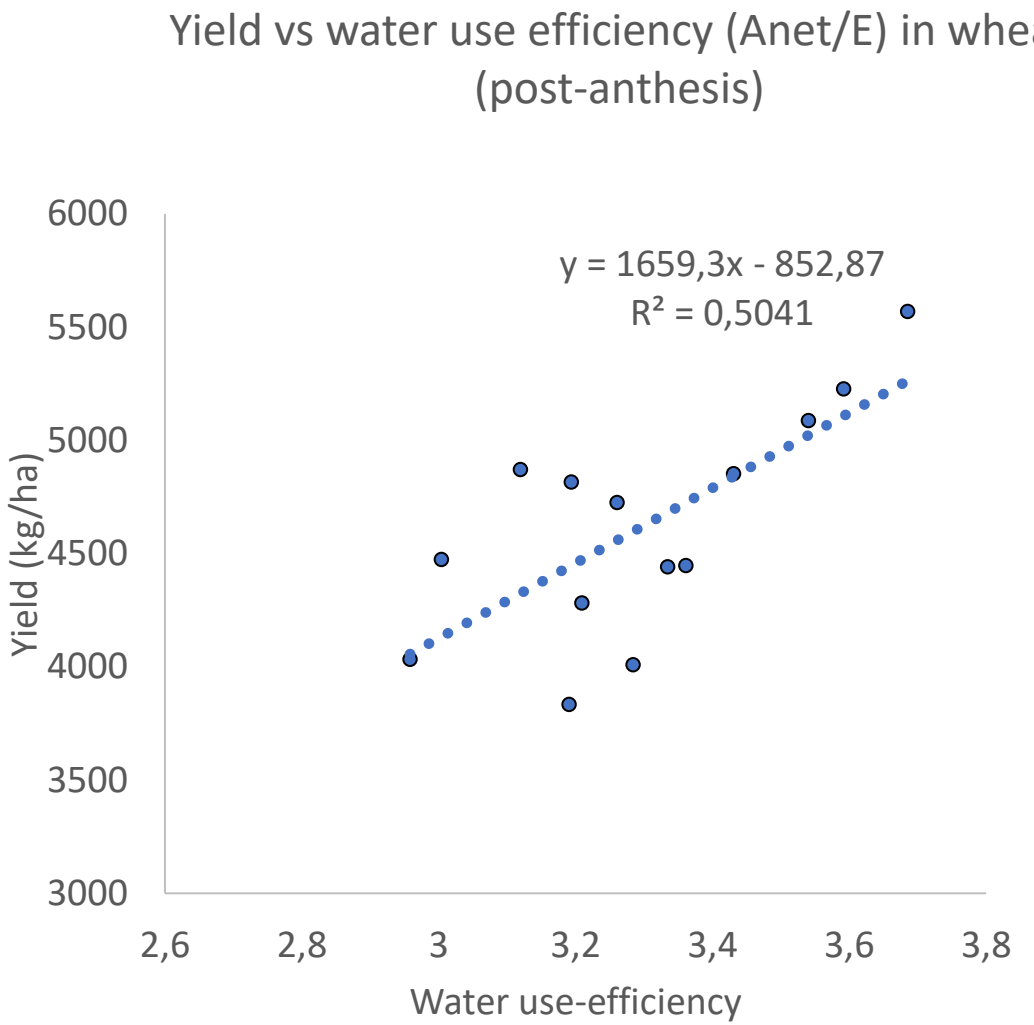
Nisu gaasivahetuse tulemused – peale õitsemist



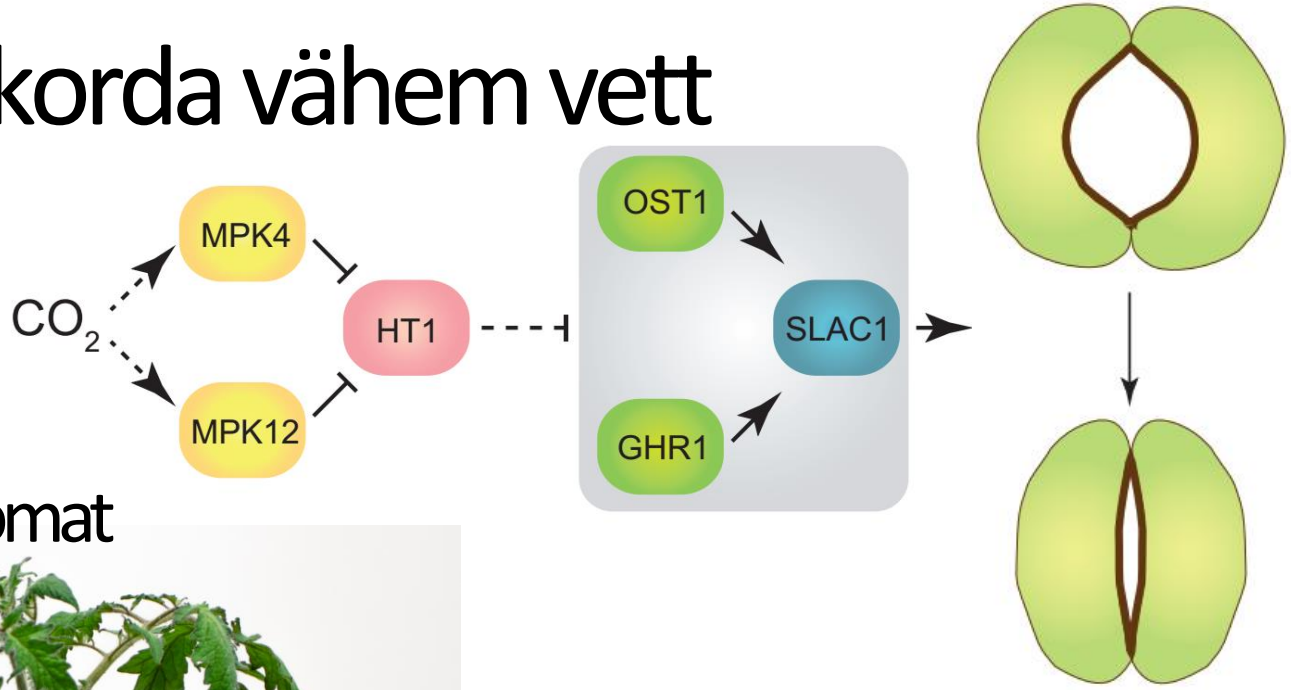


Nisu gaasivahetuse tulemuste korrelatsioon saagiga





Tomatitaimed, mis tarbivad 2 korda vähem vett



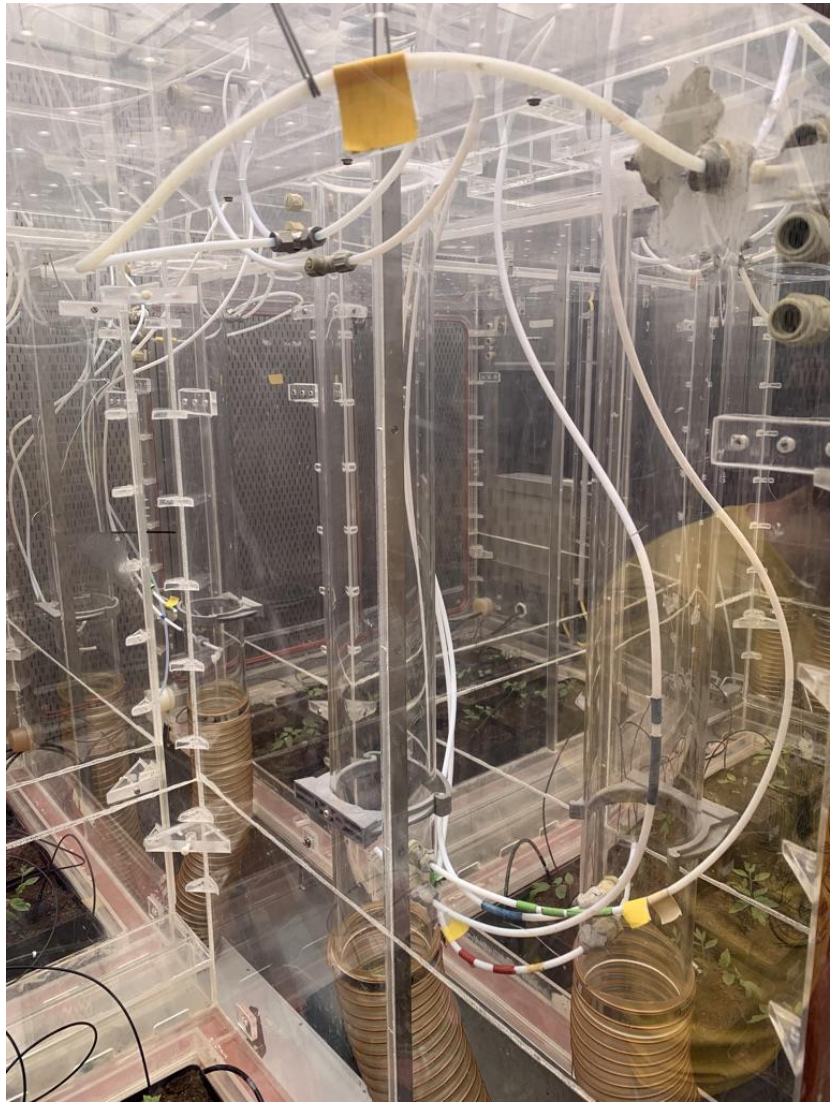
Tavaline tomat

CRISPR tomat

Vahisalu et al. 2008 *Nature*
Jakobson et al. 2016, *PLOS Biology*
Hõrak et al. 2016, *Plant Cell*
Tõldsepp et al. 2018, *Plant Journal*
Merilo et al. 2018 *Plant Phys*
Hsu et al. 2018 *PNAS*
Zhang et al. 2018, *Current Biology*
Sun et al. 2019 *PNAS*
Kollist et al. 2020 *Trends in Plant Science*
Dittrich et al. 2020, *Nature Plants*

Katsed Helmholz keskuses Münhhenis

WT & HT1 tomattitaimed kõrgema juures CO_2 juures



Triinu Arjus, Kaspar Koolmeister & Collaboration with prof Jörg-Peter Schnitzler

tHT1 tomatitaimed kasvavad hästi…

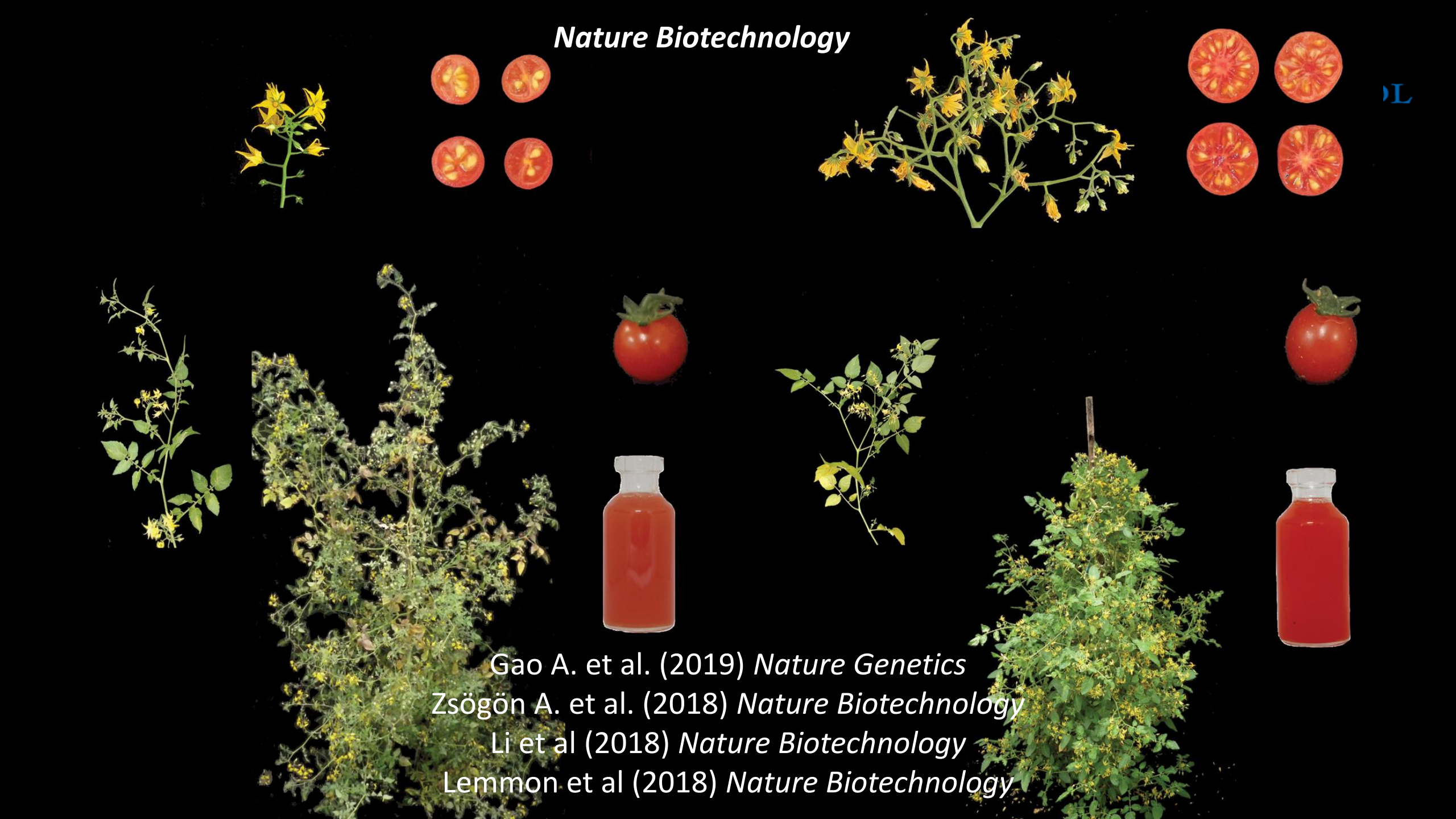
WT ***tHT1*** ***tHT1*** **WT**

Triinu Arjus, Kaspar Koolmeister & Collaboration prof Jörg-Peter Schnitzler

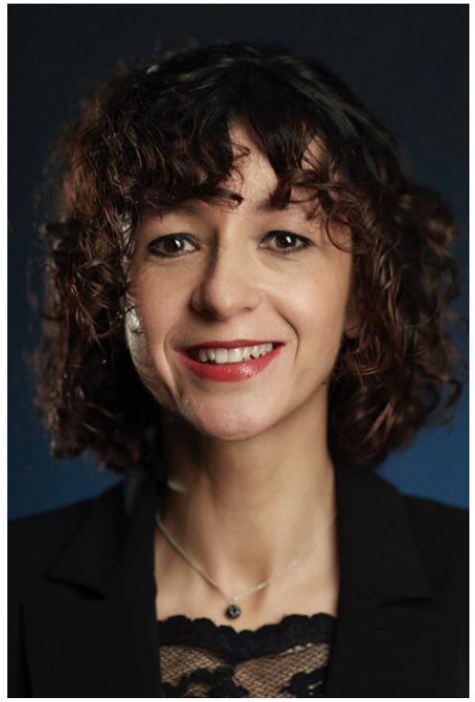
Finally! A way to return flavor to bland tomatoes

Scientists have discovered a rare gene that could help "make tomatoes great again"... or at least taste less bland.

https://www.dw.com/en/finally-a-way-to-return-flavor-to-bland-tomatoes/a-48732899


Nature Biotechnology
Gao A. et al. (2019) Nature Genetics
Zsögön A. et al. (2018) Nature Biotechnology
Li et al (2018) Nature Biotechnology
Lemmon et al (2018) Nature Biotechnology

The Nobel Prize in Chemistry 2020



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Jennifer A. Doudna

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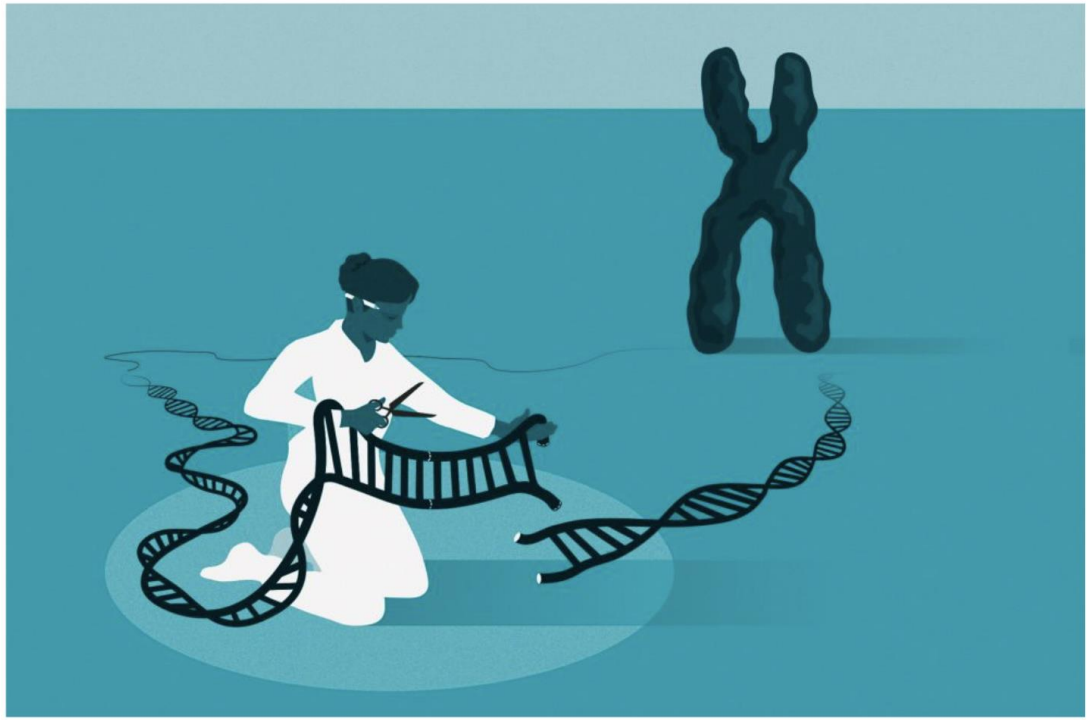
Genetic scissors: a tool for rewriting the code of life



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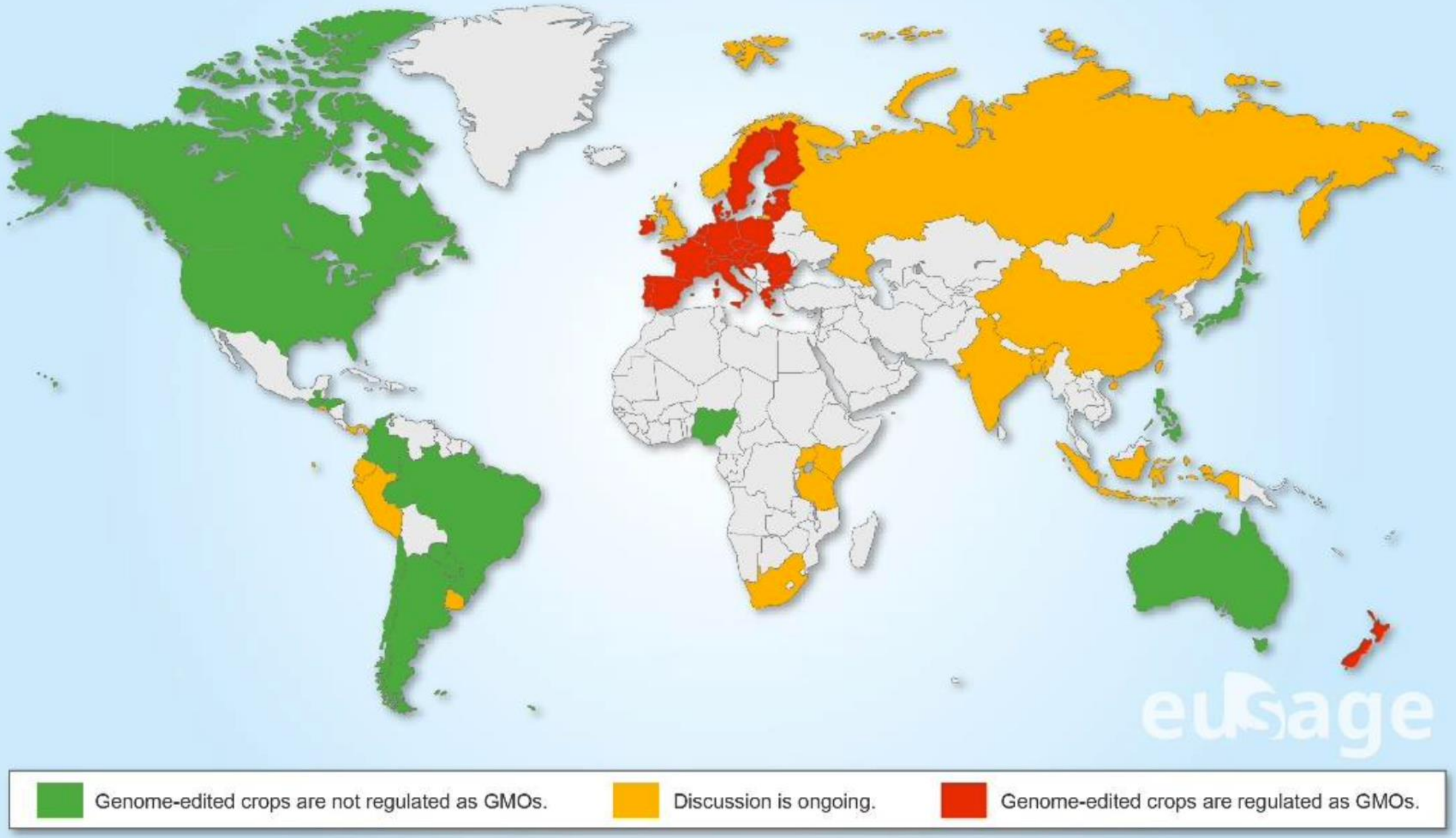
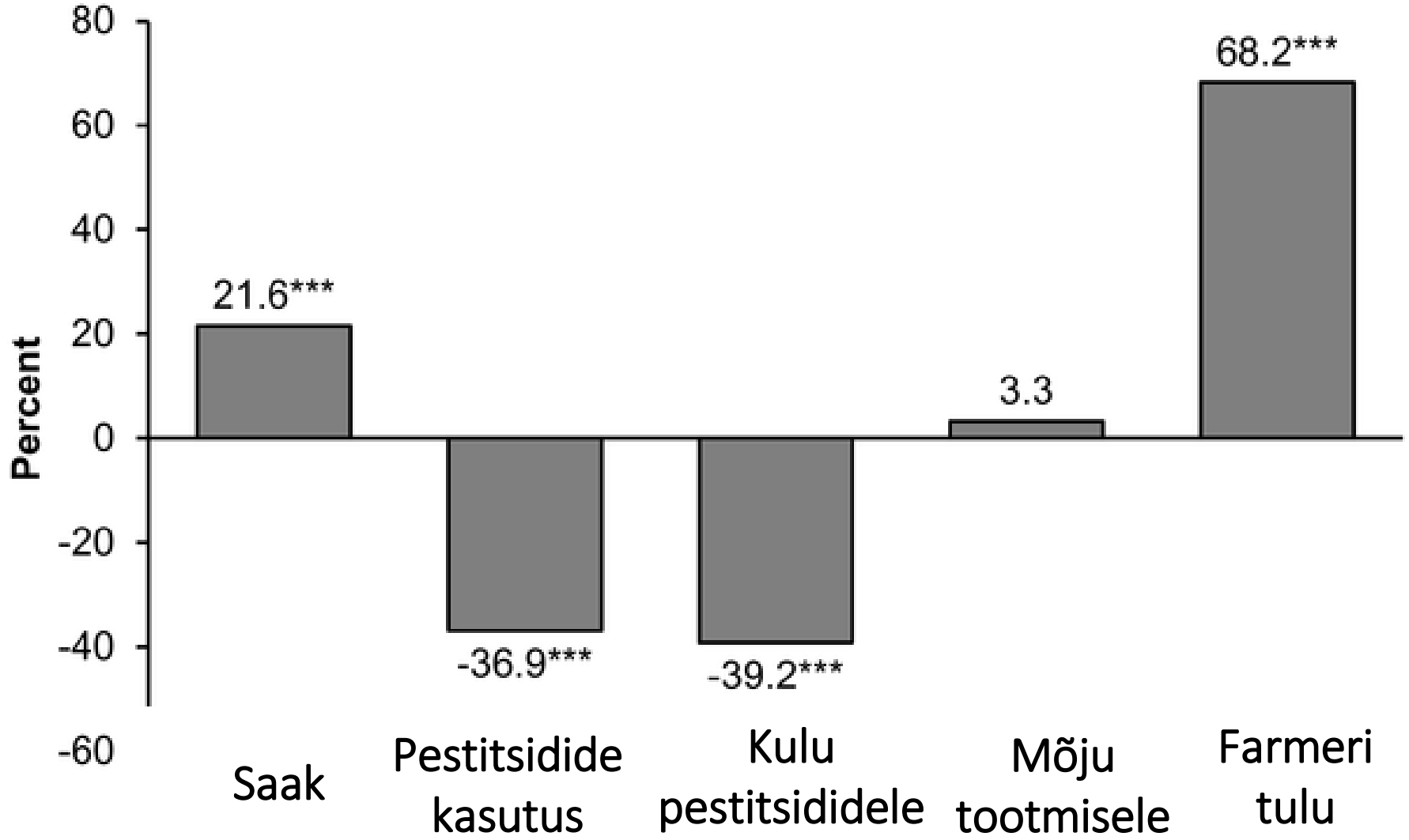
Genoomide editeermine ja geneetiline modifitseerimine



GM-taimede kasutamise mõju – 114 uuringut koondav metaanalüüs



Klümper W, Qaim M (2014) A Meta-Analysis of the Impacts of Genetically Modified Crops. PLOS ONE 9(11): e111629.
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111629

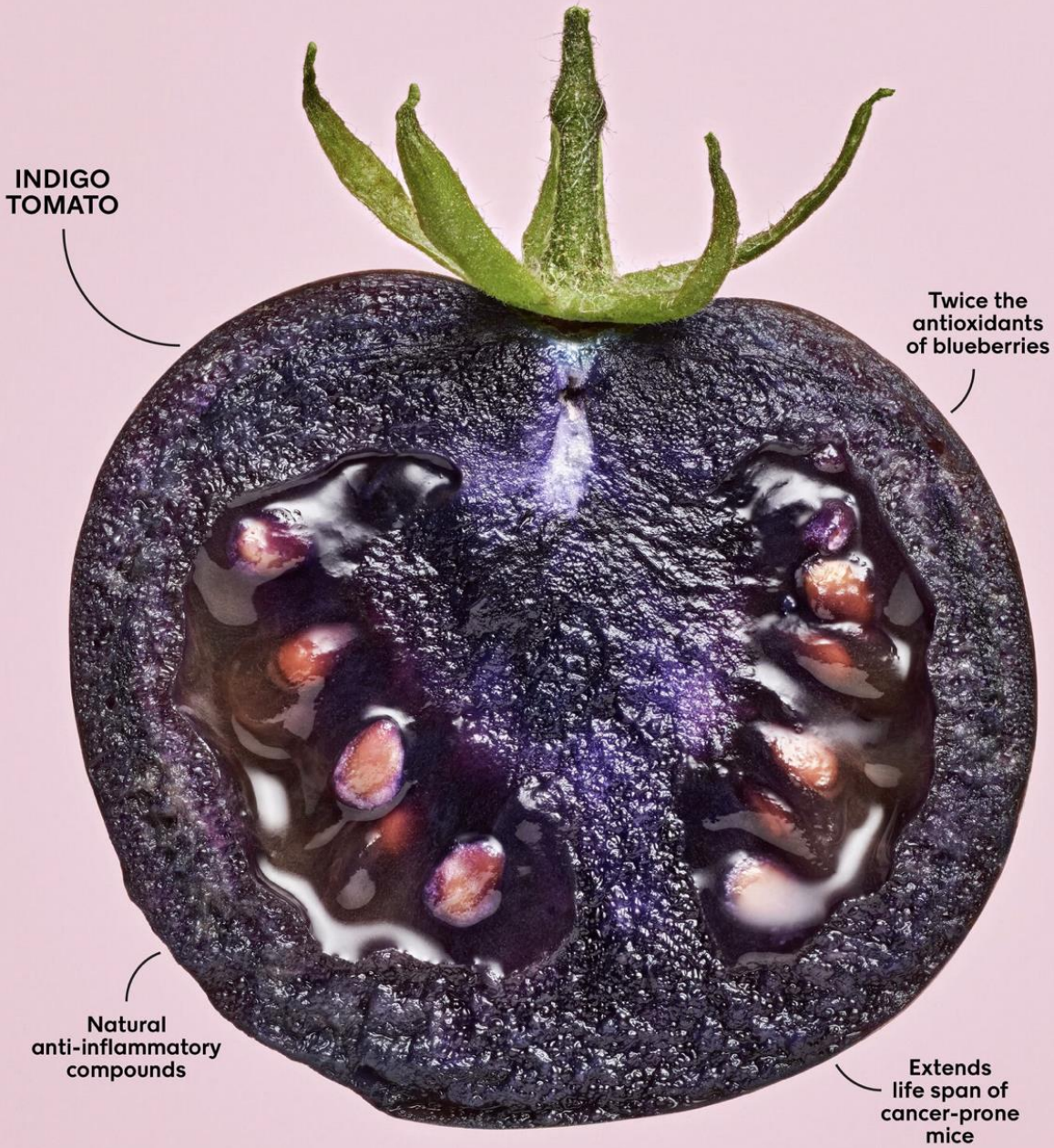
The New York Times Magazine

Account

Learning to Love G.M.O.s

Overblown fears have turned the public against genetically modified food. But the potential benefits have never been greater.

The New York Times 20.07.2021



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