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# KLIIMA-NUTIKAS PÕLLUMAJANDUS

*Climate-Smart Agriculture (CSA)*

**Margus Ameerikas**

**2018**

*Cultivating Value*

**Baltic Agro** 



**Meil pole  
planeeti B**

**Baltic Agro**

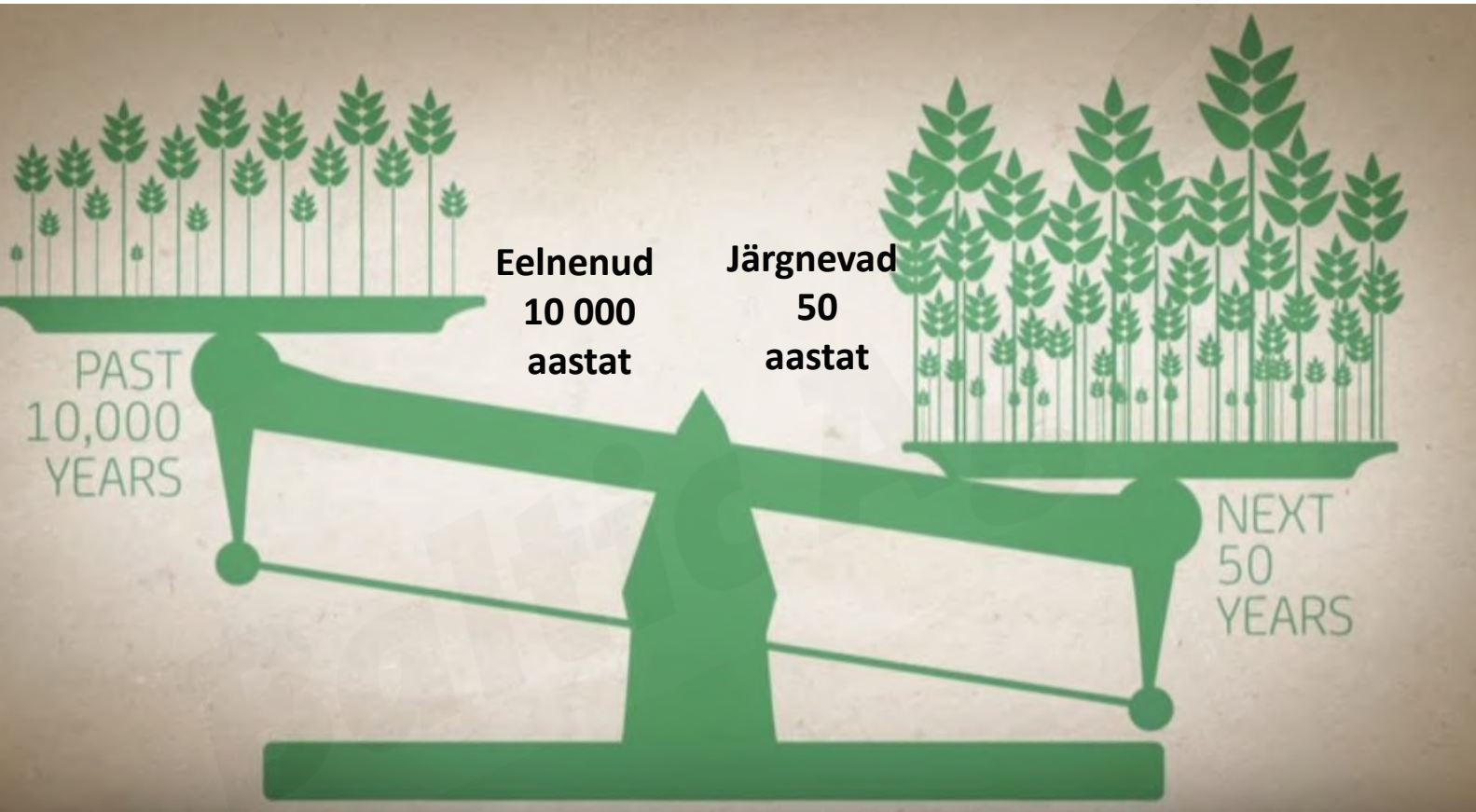
# Põllumajanduse 100 aastat



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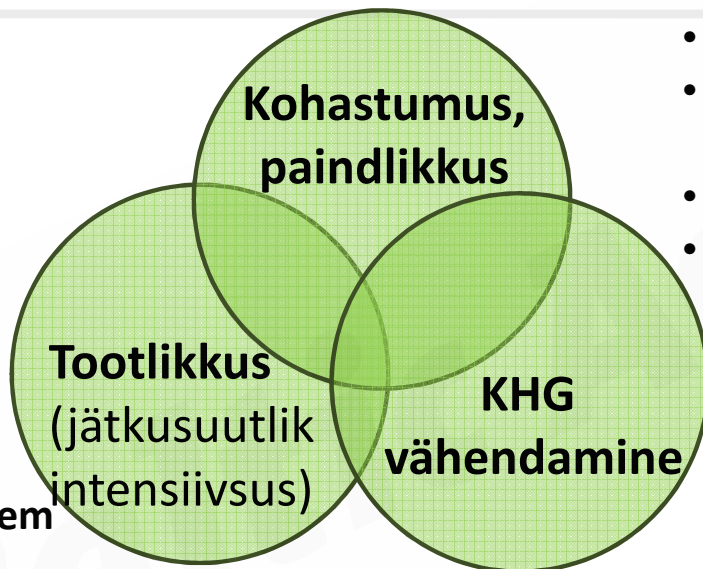
**Baltic Agro**





# Kliima-Nutikas Põllumajandus

- Toit
- Sööt
- Energia
- Kiud
- Ökosüsteem



- Taimede ja loomade vastupidavus
- Muutlik ilmastik
- Keskkonna mõjude vähendamine
- Vee kasutamise efektiivsus
- Kaitse kahjustajate ja võõrliikide eest
- Süsiniku sidumine
- Puhtad kütused
- Metaani kinnipüüdmine



There are 6.6 billion people on the planet today. With organic farming we could only feed four billion of them. Which two billion would volunteer to die?

— *Norman Borlaug* —

Agronom (1914-2009), Nobeli preemia 1970, roheline revolutsioon

AZ QUOTES

**Meie planeedil elab 6,6 miljardit inimest. Maheviljelusega suudaksime ära toita 4 miljardit. Kes on need vabatahtlikud 2 miljardit, kes oleksid valmis surema?**

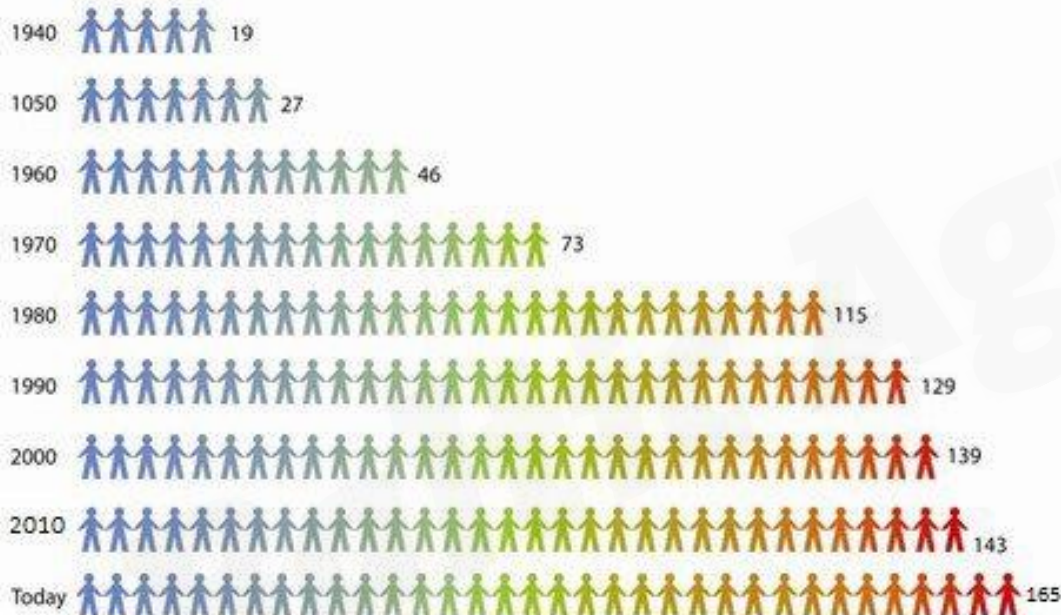


**“Me peame kahekordistama  
‘rohelist revolutsiooni’  
suurendades madala  
keskkonnamõjuga  
põllumajanduse tootlikkust.”**

**“Mõni miljard  
inimest peaks  
surema, kui me  
ei kasutaks  
väetiseid.”**

**Bill Gates**

# People Fed Annually by One Farmer



Mitu inimest  
toidab  
üks põllumees?



Number of people fed per hectare of planted land

## Mitu inimest toidab 1 hektar?

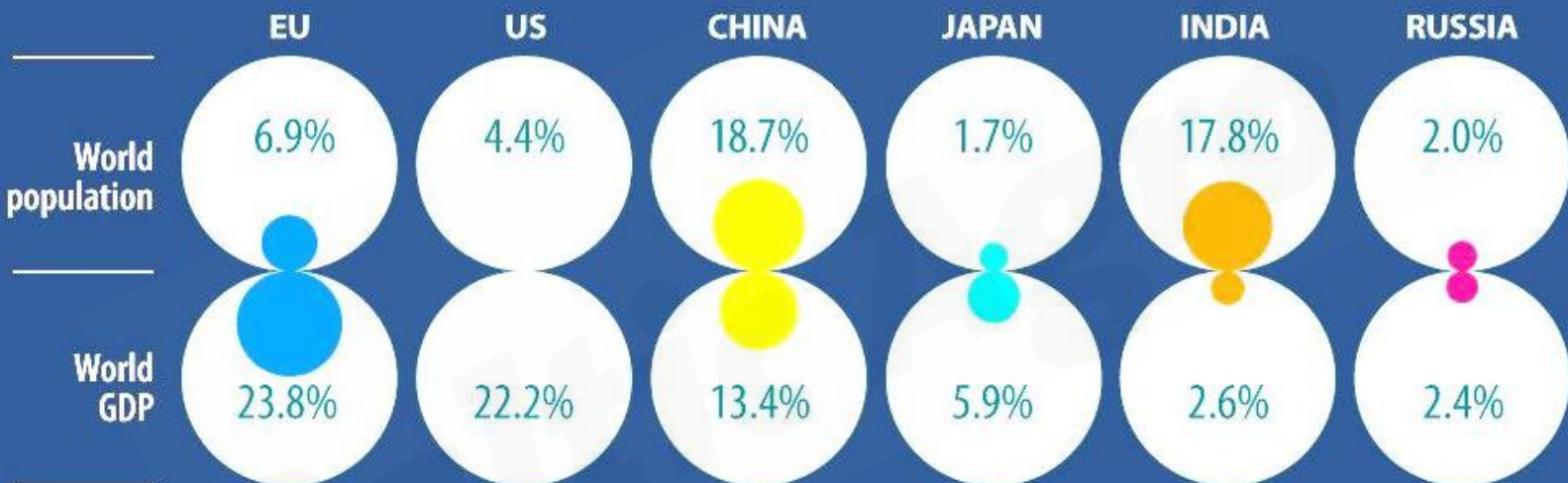


Source: FAOSTAT



Kui palju oma  
sissetulekutest  
me kulutame  
toidule?

# The EU in the World



## ALATOITLUSE ALL KANNATAJAD

**815**  
MILLION  
PEOPLE  
are **FOOD**  
**INSECURE**

**25%**

of the world's children  
are **STUNTED**



**66**

million children go  
to school hungry **EVERYDAY**

**1/6**

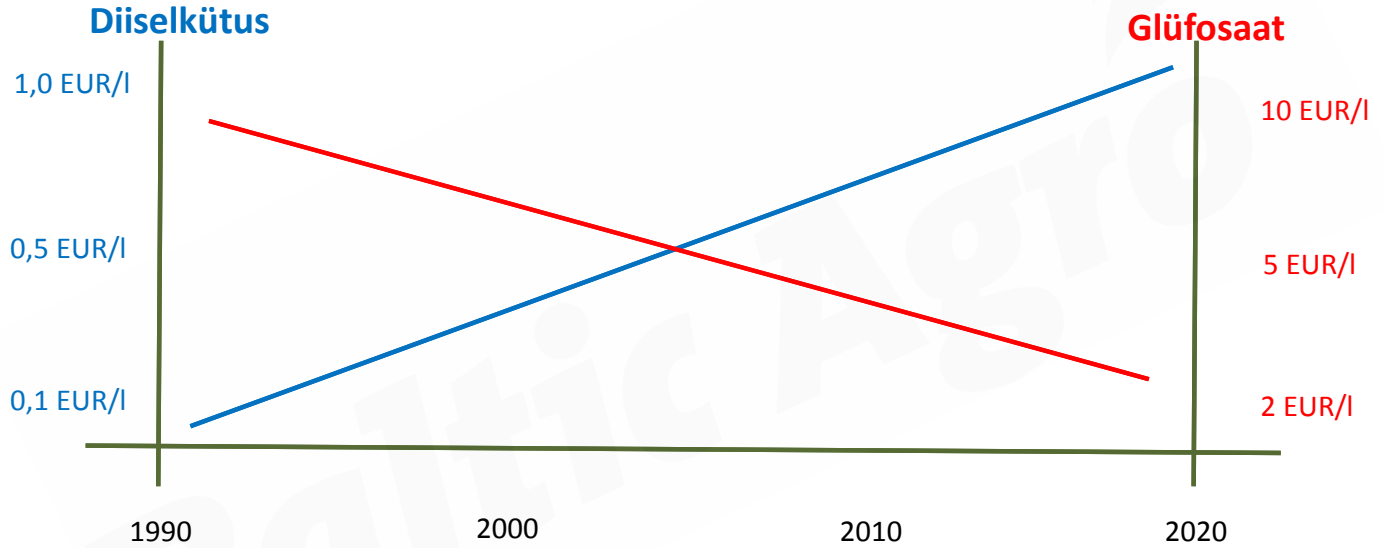


children in developing countries  
is **UNDERWEIGHT**

**HUNGER**  
**FACTS**



## Hinnatrendid turul 1990-2020



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## FARMING WITH GLYPHOSATE

Reduces the need for **ploughing**, which helps the environment through

**Minimaalse mullaharimisega:**



REDUCING  
CO<sub>2</sub> EMISSIONS



MINIMISING  
SOIL EROSION



IMPROVING  
SOIL QUALITY

- **Väheneb C emissioon**
- **Väheneb mulla erosioon**
- **Paraneb mulla kvaliteet**

APPROXIMATELY

**44%**

OF TOTAL ARABLE LAND

in the **UK** and **Germany** is now under farming systems with reduced ploughing.



Minimum tillage saves more than  
**170 MILLION LITRES OF FUEL**  
from being burned in Canada annually.



Source: *The Real Dirt on Farming*, 2014

  
**Agriculture**  
*more than ever*

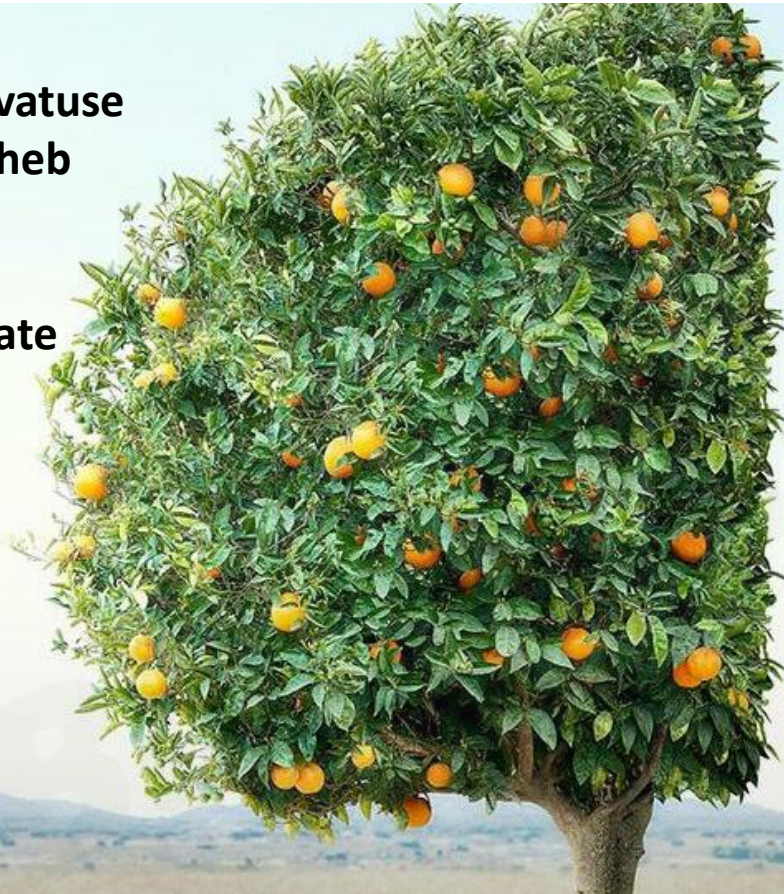
**Mullaharimistöõdele põllu  
1 hektaril kulub ligikaudu  
40 l diiselkütust**

**40 l diiselkütust ≈ 4 l Roundup**

**Kui Eestis kasutatakse aastas  
0,5 mln l glüfosaate, siis sellega  
säästetakse kuni 5 mln l  
diiselkütust**

**Baltic Agro** 

**Kuni 40%**  
**taimekasvatuse**  
**saagist läheb**  
**kaduma**  
**taime-**  
**kahjustajate**  
**tõttu igal**  
**aastal.**



Up to

**40%**

of global crop yields  
are lost to pests and  
diseases every year.









These losses could  
double without  
pesticides.





## Leitud taimekaitsevahendite jäägid proovidest (alla lubatud piirmäära)

	%		%
Hispaania	57,2	Lõuna-Aafrika	75,9
Belgia	57,1	Tsiili	73,8
Saksamaa	51,8	Kolumbia	71,7
Holland	48,3	Brasiilia	71,2
EL keskmine	42,1	Venemaa	14,5
Taani	19,7	Moldaavia	11,4
Eesti	18,0	Sri Lanka	11,0
Soome	10,8	Ukraina	8,3
EL mahe kesk.	13,5		

EFSA aruanne 7.aprill 2017. <http://onlinelibrary.wiley.com/doi/10.2903/j.efsa.2017.4791/pdf>

	Material	What the heck is it?	LD50 (mg/kg)*	toxic category**
vesi	water 	You know this one.	90000	practically non-toxic
sahharoos	sucrose 	...and this one. Refined from sugar cane or sugar beets	30000	practically non-toxic
sidrunhape	citric acid 	A chemical in citrus fruits (lemons, oranges, etc)	12000	slightly toxic
etanool	ethanol (component in many bevies)	 Hic!	7000	slightly toxic
glüfosaat	glyphosate	A broad-spectrum systemic herbicide used to kill weeds brought to market under tradename RoundUp	5600	slightly toxic
söögisooda	sodium bicarbonate (baking soda)	One word: Biscuits 	4220	moderately toxic
lauasool	sodium chloride (table salt)	 Not too much now...	3000	moderately toxic
paracetamol	acetaminophen	Whoa...I'm getting a headache	1944	moderately toxic
vesinikperoksiid	hydrogen peroxide	Common household product often used industrially for drinking water and waste water treatment	 1580	moderately toxic
theobromine	theobromine	Is a bitter alkaloid of the cacao plant in CHOCOLATE ( <i>What the heck is this doing on this list?</i> )	1265	moderately toxic
rotenone	Rotenone	A broad-spectrum insecticide and pesticide approved for use in organic production	132-1500	very toxic
vasksulfaat	copper sulfate	A compound approved for use in organic production as a fungicide	300	very toxic
kofeiin	caffeine 	Gasp. See <i>italicized</i> comment on chocolate^	192	very toxic

DDT	DDT	poorly understood chemical known for its insecticidal properties. Was used in WWII to control malaria and typhus.	113-800	very toxic
nikotiin	Nicotine	A potent alkaloid found in the nightshade family of plants (Solanaceae) and a stimulant drug and a major contributing factor to the dependence-forming properties of tobacco smoking.	50	 extremely toxic
cyaniid	cyanide	Cyanides are produced by certain bacteria, fungi, and algae and are found in a number of plants - used in mining, industrial organic chemistry and for pest control.	10	extremely toxic
vitamiin D	vitamin D	Vitamin D toxicity can occur when you have excessive amounts of vitamin D in your body by megadoses of of vitamin D supplements (not by diet or exposure to the sun).	10	 extremely toxic
strychnine	Strychnine	Is a highly toxic, colorless, bitter crystalline alkaloid used as a pesticide, particularly for killing small vertebrates such as birds and rodents.	1-2	super toxic
alfatoksiin	aflatoxin	Naturally occurring mycotoxins produced by species of fungi. 14 different types of aflatoxin are produced in nature. They can colonize and contaminate grain before harvest or during storage.	0.003	super toxic
botulin	botulin	A protein and neurotoxin produced by a bacterium. In its pure form, it is the most acutely toxic substance known. Preparations of the toxin can be effectively used for therapeutic or cosmetic purposes.	0.00001	super toxic

**Efektiivne taimekasvatus on majandusharu, kus energiat toodetakse 10 x enam kui kulutatakse.**

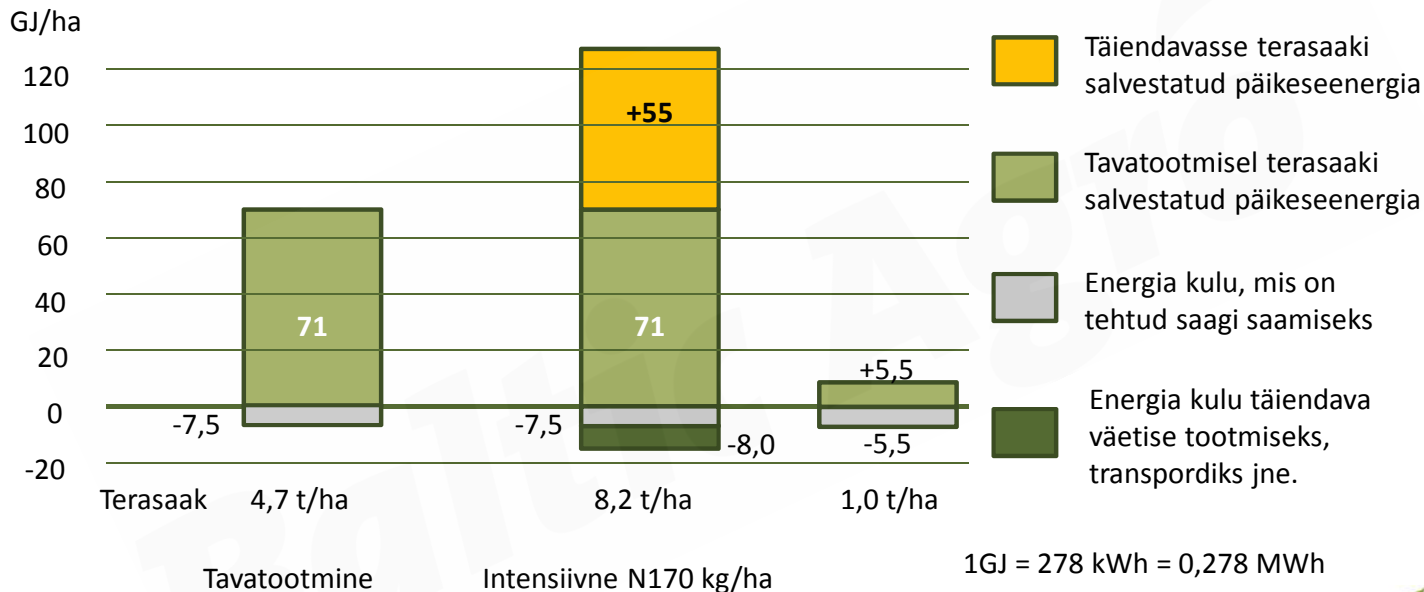


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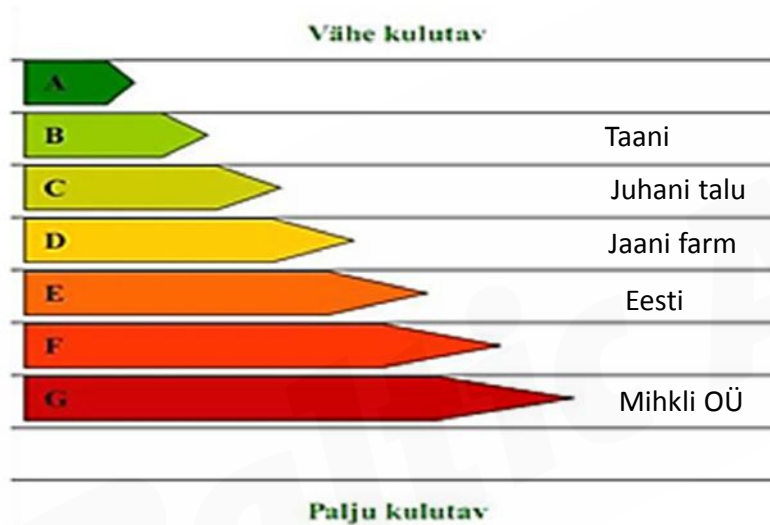
# ENERGIABILANSS 1 HA NISUPÕLLUL

Allikas: Küsters, Lammel 1999



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## ENERGIATÄHIS



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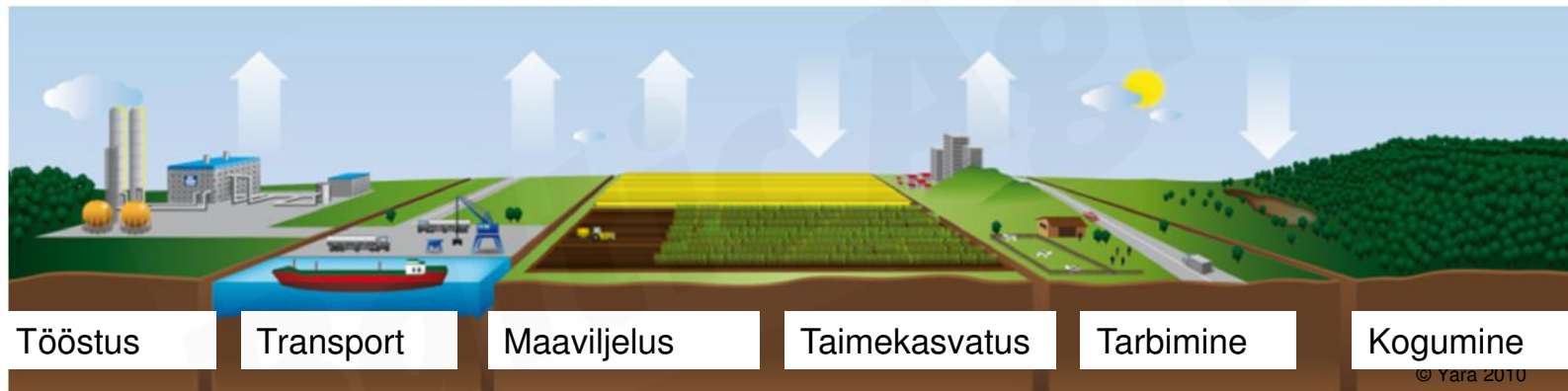
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Täna toodavad  
põllumehed **262%**  
enam toitu  
**2%** väiksema  
kuluga võrreldes  
**1950. aastaga**

## Süsiniku elutsükkel

- Süsiniku elutsükli analüüs annab meile ülevaate kasvuhoonegaaside tekkest, selle mõjust kliimamuutustele ning võimalusi selle leevendamiseks.



© Yara 2010

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# Soils and the carbon cycle

There is more organic carbon in our soil than there is in our atmosphere and our organic vegetation combined



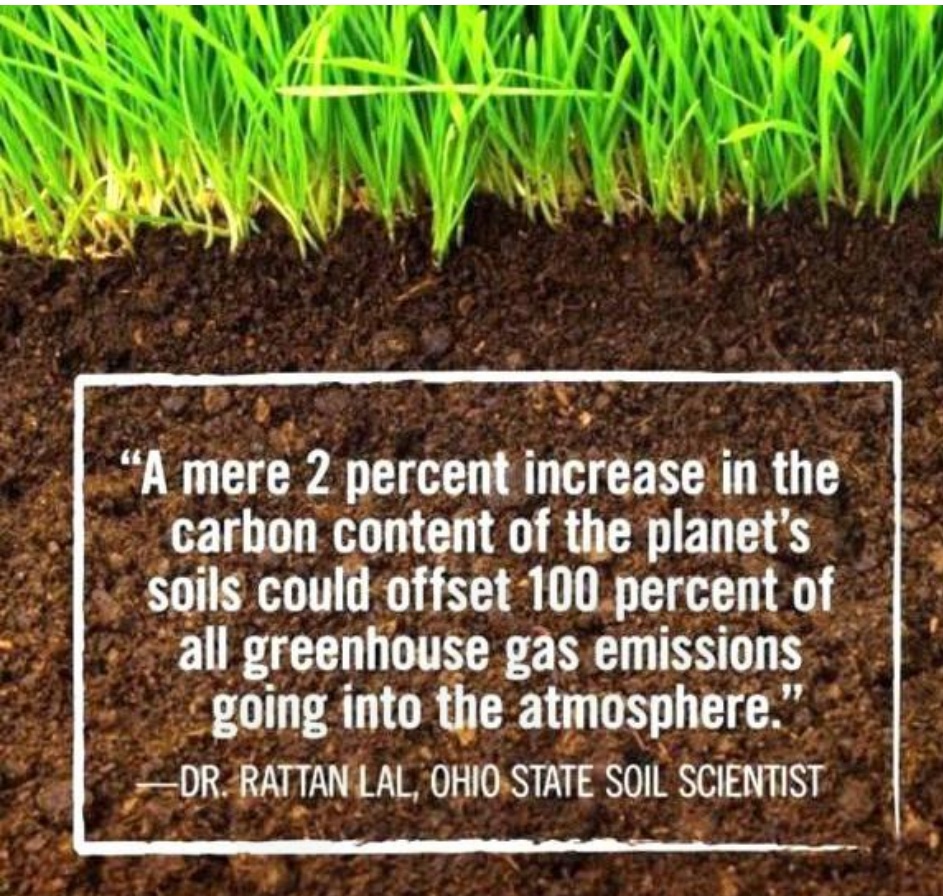
**Mullas on enam süsinikku kui atmosfääris ja eluslooduses kokku.**

## MULLAS TOIMUNUD MUUTUSED JÕGEVAL 1997-2014 PIKAAJALISES VÄETUSKATSES

Foon	pH	P mg/kg	K mg/kg	Ca mg/kg	Mg mg/kg	Cu mg/kg	B mg/kg	Mn mg/kg	C org %
N0	6,13	163	171	1482	73	1,30	0,46	48	1,80
N60	6,17	170	160	1539	68	1,23	0,66	44	1,80
N100	6,13	181	176	1603	70	1,33	0,85	43	1,83
N140	6,07	195	214	1639	71	1,47	0,90	42	1,97

### YaraMila 18-9-9

- Kõige enam vaesustatakse muldasid väikeste väetisannuste kasutamisega!
- Mulla huumusesisaldus jääb madalaks väetamata või vähest väetist kasutatud põldudel
- **Tasakaalustatud väetamisega mullaviljakus kasvab!**



**“A mere 2 percent increase in the carbon content of the planet’s soils could offset 100 percent of all greenhouse gas emissions going into the atmosphere.”**

**—DR. RATTAN LAL, OHIO STATE SOIL SCIENTIST**

**Suurendades planeedi mullastiku orgaanilise aine sisaldust 2 % võrra, oleks võimalik siduda 100% atmosfääri paisatavaid kasvuhoonegaase.**

**DID YOU KNOW?** unlock the SECRETS OF THE SOIL

**FOR EACH 1% INCREASE IN *organic matter* U.S. CROPLAND COULD STORE THE AMOUNT OF *water* THAT FLOWS OVER NIAGARA FALLS IN 150 DAYS**

Like a "water savings account," healthy soils capture and store more water for plants to use when they need it.

Earthworms, arthropods, and decaying roots create "macro-pores" into which water can flow to then be stored in the soil. Bacteria, fungi, and other soil life build and stabilize smaller "micro-pores" that further increase the soil's capacity to hold water.

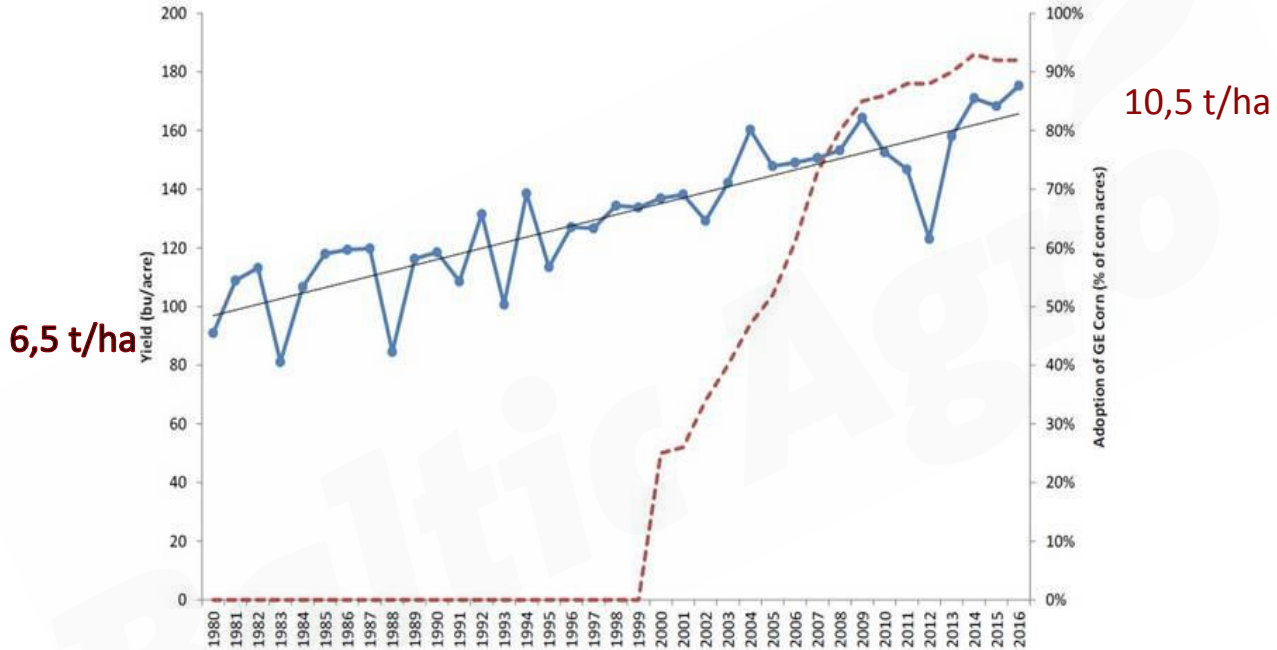
Calculation based on approximate averages for diverse soils as follows:  
U.S. Cropland = 400 million acres  
ADDITIONAL water holding capacity per acre per 1% organic matter increase = 25,000 gallons  
400 million acres x 25,000 gallons = 10 trillion gallons  
Average water over Niagara Falls per day = 65 billion gallons  
65 billion gallons per second x 60 seconds x 60 minutes x 24 hours  
The math: 10 trillion gallons / 65 billion gallons = 152

Natural Resources Conservation Service  
[www.nrcs.usda.gov](http://www.nrcs.usda.gov)

**USDA** United States Department of Agriculture  
USDA is an equal opportunity provider and employer.

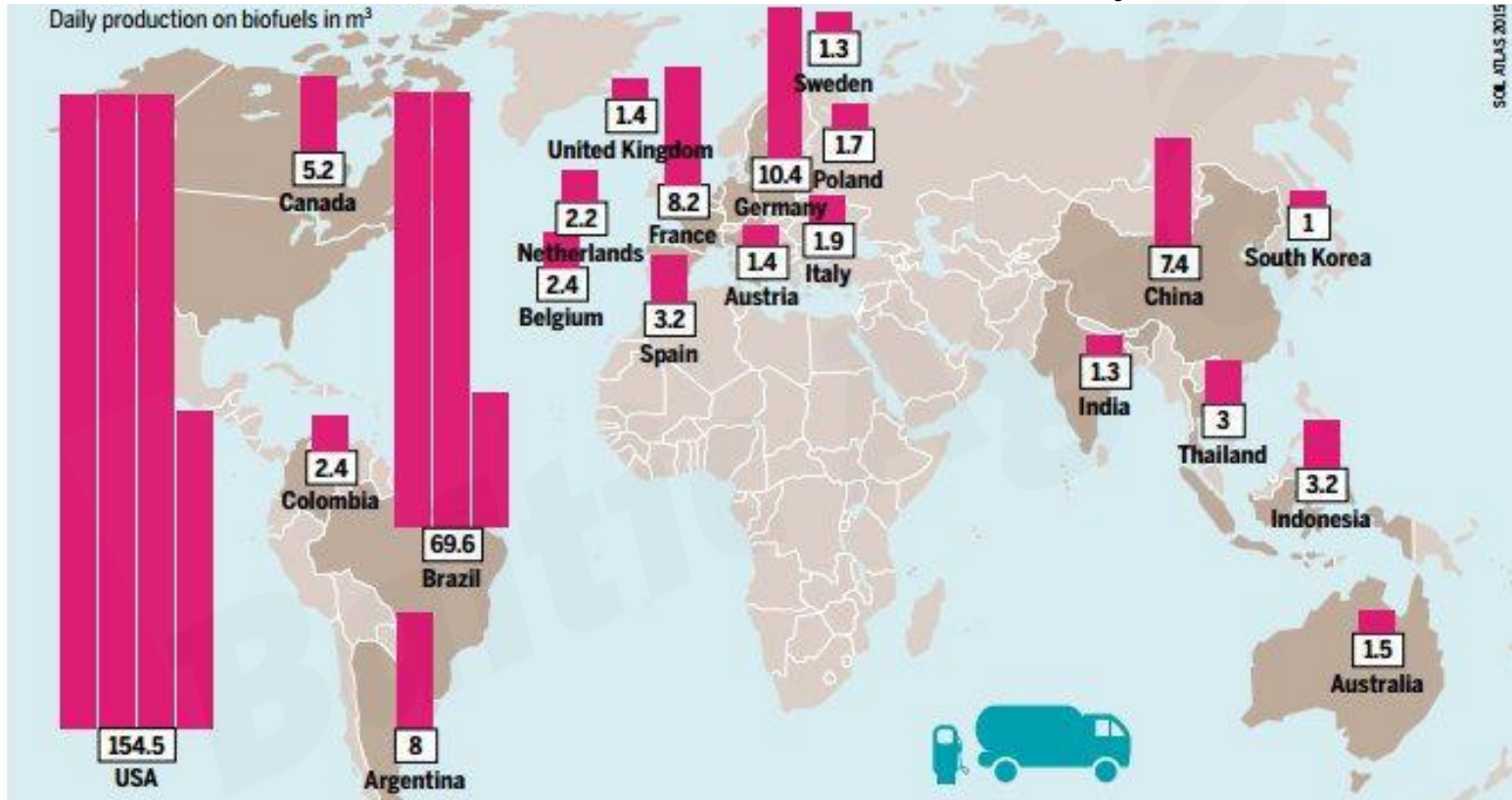
Mulla orgaanilise aine sisalduse tõus 1% võrra suurendaks selle veesiduvust koguses, mis voolab Niagara kosest alla 150 päeva jooksul.

## Maisi terasaagikuse (sinine) ja GMO sortide (punane) areng USA-s



**Figure 1.** Trend in National U.S. Corn Yield and Adoption of GE Corn from 1980 to 2016. Blue circles represent observed yields, solid black line is linear yield trend, and dashed red line is percent of corn acres planted with GE corn; data are from USDA National Agricultural Statistics Service.

## “Roheline kütus” maisist ja õlikultuuridest



# TAASTUVKÜTUSTE OSATÄHTSUS TRANSPORDIS

(in % of gross final energy consumption)



Europe 2020 target

eurostat

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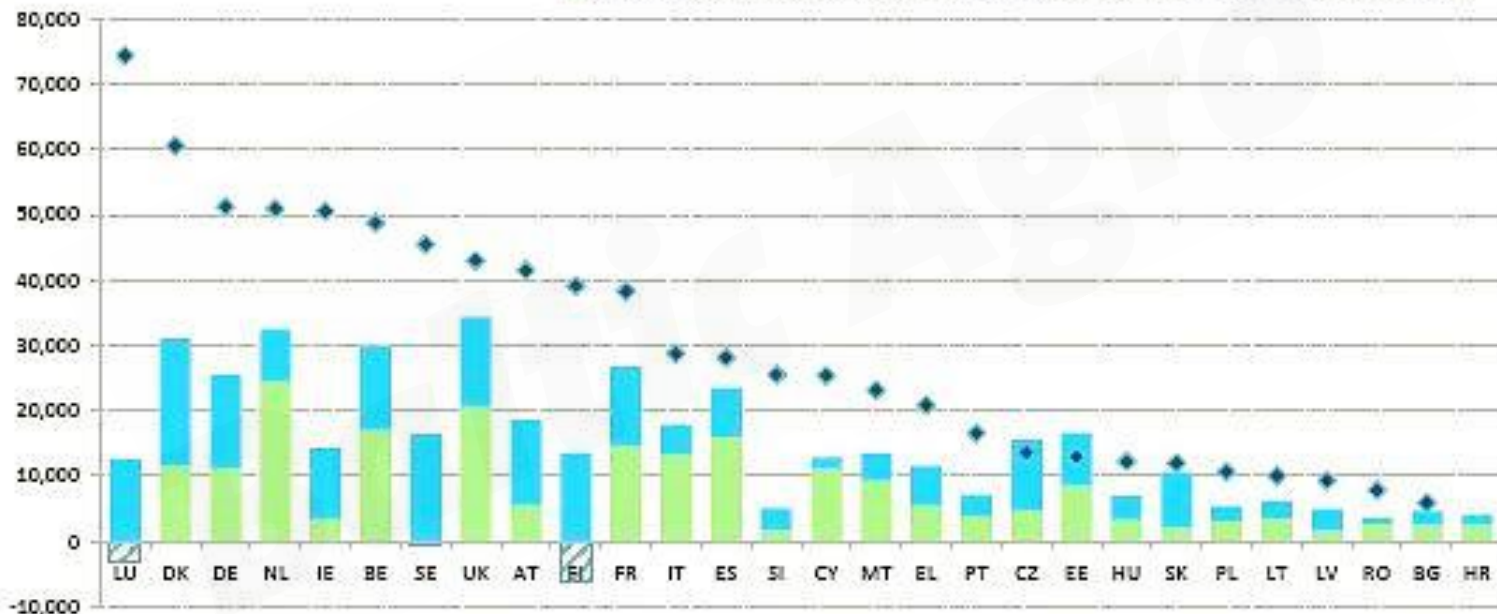


## EL põllumajanduse sissetulekud töötaja kohta ja riigi keskmised töötasud

EUR/täiskohaga töötaja

EUR/ Full time worker

- Average CAP support
- Average farmer income (without CAP support)
- Average gross wages and salaries in the total economy (in current prices)



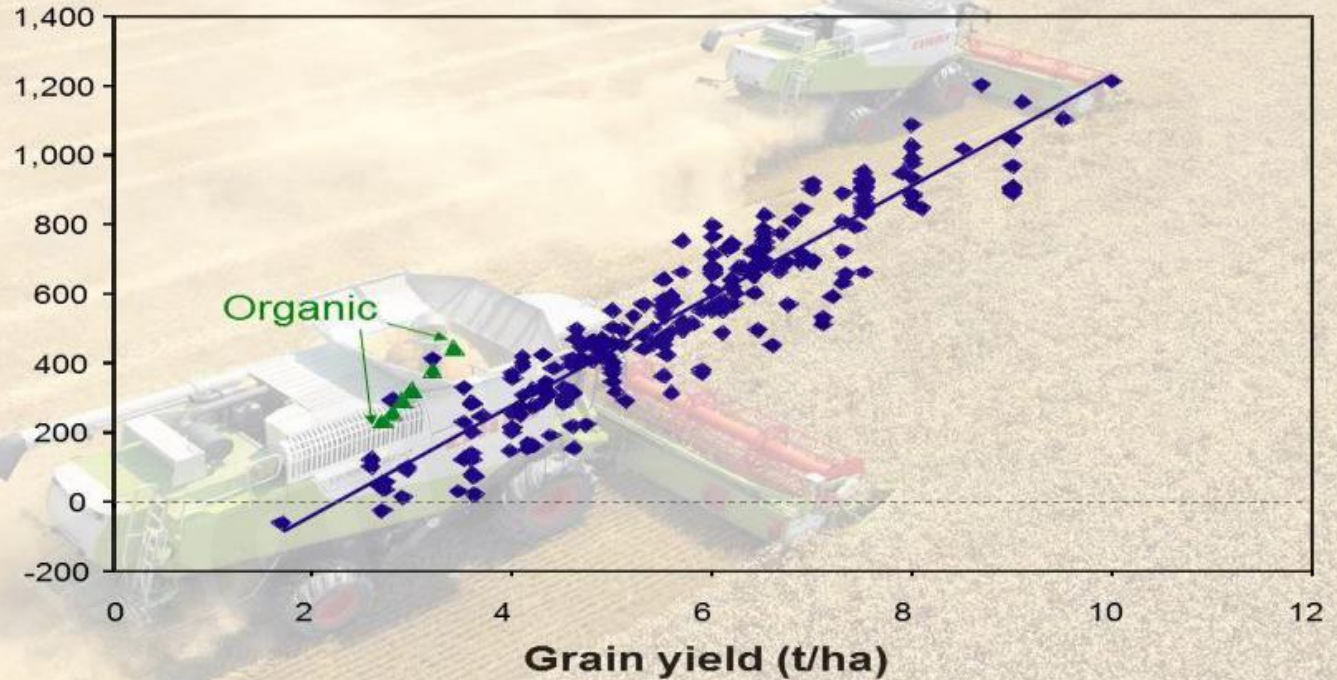


# Saagikus tagab tulukuse

265 farms in France

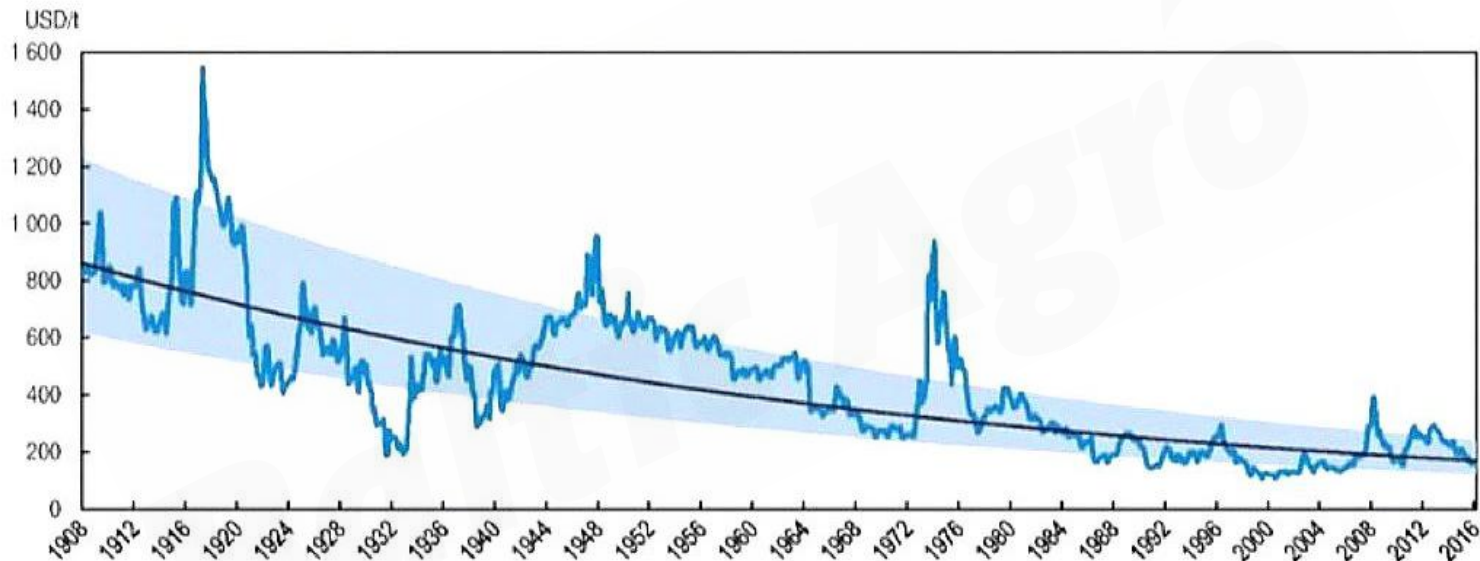
Soft wheat in 2012

Gross margin, € / ha



# Pikaajalised teravilja hinnagraafikud

Deviation Real price Long term trend



Note: Deviation refers to 1 standard deviation above and below the trend line. Assuming the distribution of error terms is normal then 68% of visualisations should occur within this range.

Source: Monthly "Wheat price received" from USDA quickstats. Deflated using monthly CPI data from [www.bls.gov/data/](http://www.bls.gov/data/).

# Toidutootmise tulevik: toota rohkem samal pinnal



AgriFoodAid - Future of food: growing more with the same land.

<https://t.co/1XHu7RVjx2> #foodsecurity <https://t.co/vLxwFZDt6B>

# Tänu kuulamast!



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