VYTAUTAS MAGNUS
UNIVERSITY
AGRICULTURE
ACADEMY

STABILIZATION OF SOIL ORGANIC CARBON IN AGRICULTURAL SOILS: CONTRIBUTION TO A SOIL DEAL

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Photo V. Liakas, 2018

Identification and implementation of land use and soil management practices which create a positive agricultural soil/ecosystem carbon budget and restore soil quality is specific challenge worldwide.

VMU-AA research priority: Sustainability of Agro-, Forest and Water Ecosystems, Impact of Climate Change

- Sustainable Bioresources
- Adaptation and Mitigation of Climate Change Impact on Ecosystems
- Management of Agricultural Pollution
- Sustainable Land, Forest and Water Technologies, Sustainable Resource Management

VMU-AA Field Experimental Station

- **totally contains 120 ha of arable land:**
- **main crops:**
  - **Winter and spring oilseed rape**
  - **Winter wheat**
  - **Spring barley**
  - **Perennial grasses**
  - **Caraway**
  - **Sugar beet**
  - **Other crops: corn, potatoes, fodder beet, fodder galega, etc.**
- **3500 experimental plots in 45 ha land;**
- **plant collections and gene pool in 5 ha land;**
- **Grasses experiments and collection**
- **Pomological garden 10 ha**

VMU-AA Field Experimental Station

Fields of Activity

- **Providing field experimentation facilities for scientists and students of the University;**
- **Practical training for students;**
- **Consultations and research on growing and breeding of agricultural crops, yield potential optimisation, methodology and technologies for organic farming, growing of non-traditional plants;**
- **Organisation of field days, workshops, conferences;**
- **Breeding elite seeds of caraway variety ‘Gintaras’ created in Academy.**

Open Access Joint Research Centre of Agriculture and Forestry

Sustainable use of biological resources of agriculture and forests

R&D Laboratories of :

- Agrobiology
- Lab of Environment
- The research on climate change impact upon forest ecosystems
- Microbiology
- Lab of Agrobiotechnologies
- Timber use, quality and processing technologies
- Plant material quality
- Biological markers

https://www.youtube.com/watch?v=f8ejLXWndxY

https://youtu.be/f8ejLXWndxY

Traditional conferences organized by VMU-AA Department of Agroecosystems and Soil Sciences

1. Biannual international traditional conferences „AgroEco“
2. Annual national scientific conferences “Farmer summer”

VYTAUTAS MAGNUS UNIVERSITY AGRICULTURE ACADEMY

AGRO ECO 2022

4th International Scientific Conference

AgroEco2022: Agroecosystem Sustainability:

Links between Carbon Sequestration in Soils, Food Security and Climate Change

Vytautas Magnus University, Agriculture Academy, Lithuania, 26–27 October, 2022

Important Dates and Deadlines:

- **April 20 – September 10**
  Submission of abstracts
- **June 1 – September 15**
  Acceptance of submitted abstracts
- **June 1 – September 15**
  Early registration
- **September 16 – October 15**
  Late registration
- **October 26–27**
  Opening of the Conference and Sessions

THE MAIN TOPICS OF THE SCIENTIFIC CONFERENCE:

- Soil health and carbon sequestration for sustainability
- Soil and crop management towards a chemical pesticide-free agriculture
- Biodiversity, crop and production diversification
- Precision farming and digital technologies
- Food quality and safety
- Climate change mitigation

The language of the Conference is English.

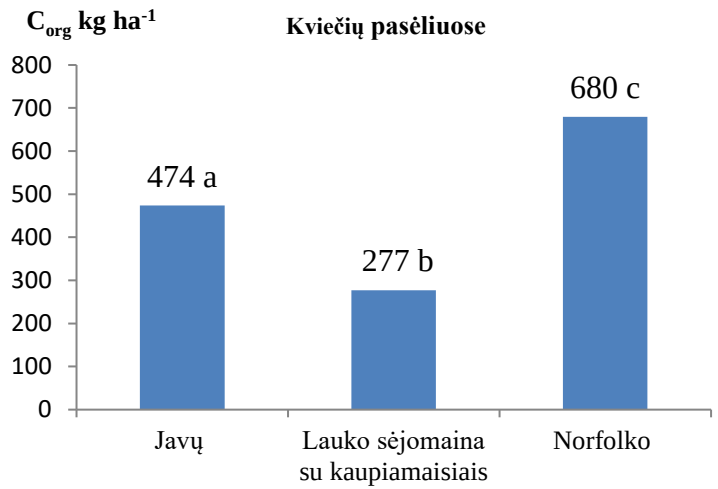
More information:
https://zua.vdu.lt/en/

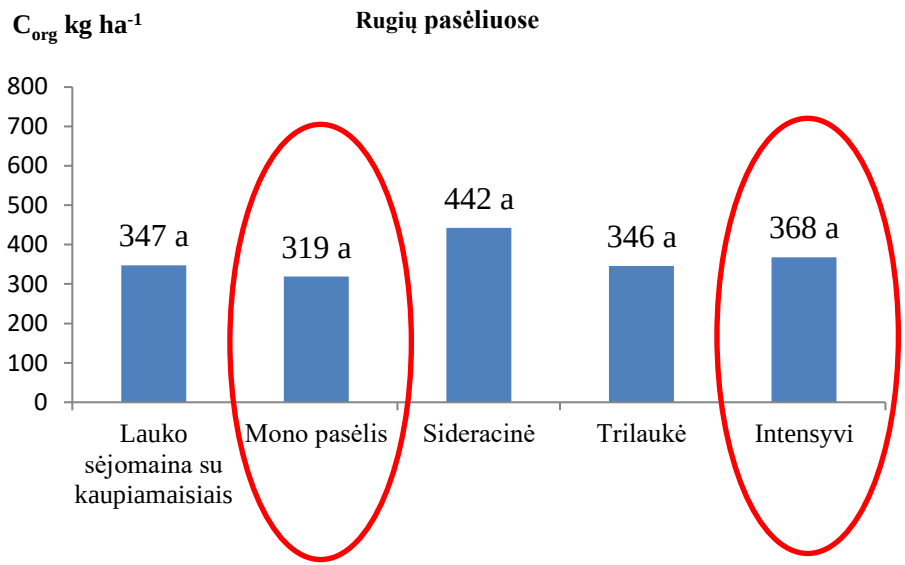
Long-term field experiments in VMU-AA Department of Agroecosystems and Soil Sciences:

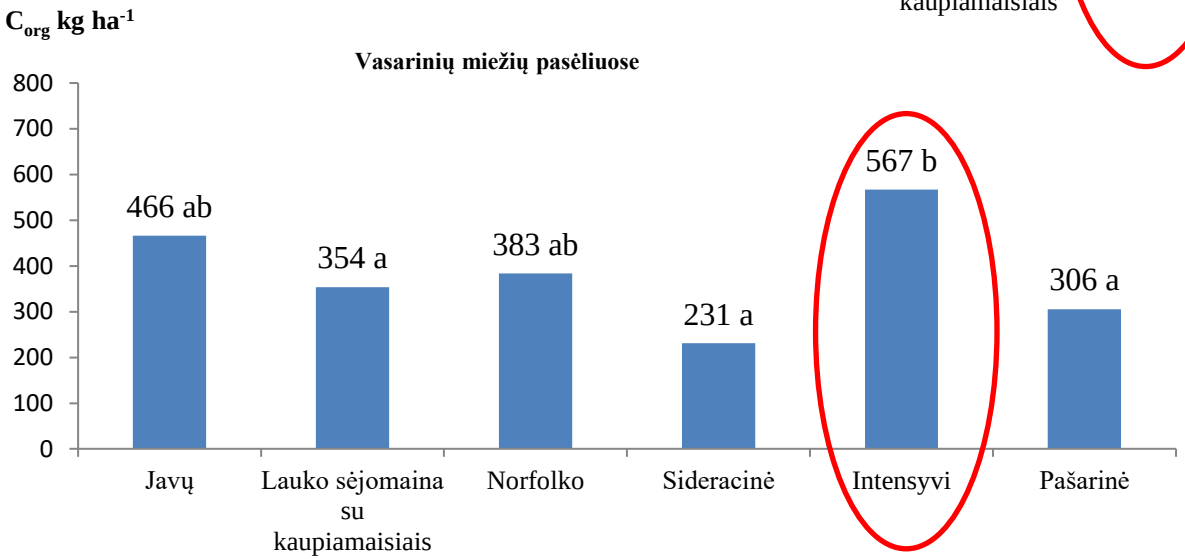
1. Crop rotation intensity, since 1966;
2. Soil quality response to long-term tillage systems, since 1986;
3. Sustainability of intensively used agroecosystems, since 1999.

A stationary field experiment „**Crop rotation intensity“** was established in 1966. The long-term impact of crop rotation on organic carbon stocks and sustainability of agro-ecosystems was investigated in 9 different crop rotations (Intensive, Field, Field rotation with row crops, Norfolk, Fodder, Farm, For green manure, Cereal, Three-course) and in maize and rye monocultures. Continuous bare fallow was used as a control to assess the impact of these different rotations on the physicochemical properties of soil.

During the experiment, the same arable tillage system was implemented, and plant protection products were used as needed.







Carbon sequestration ratio (CSR) kg C ha^{-1} y^{-1} in different crop rotations to compare with continuous bare fallow, on average in 1967-2018.

Pastaba: tarp variantų vidurkių, pažymėtų ne ta pačia raide (a, b, c, d), skirtumai yra esminiai (P<0,05).

Since 1999 a study „**Sustainability of intensively used agroecosystems**“ is being carried out to assess the effects of long-term reduced and no-tillage, combined with the use of crop residues and green manure, on organic carbon stocks and sustainability of agro-ecosystems.

Photo. A.Sinkevičius, 2019

Photo. V. Steponavičienė, 2015

Factor A:

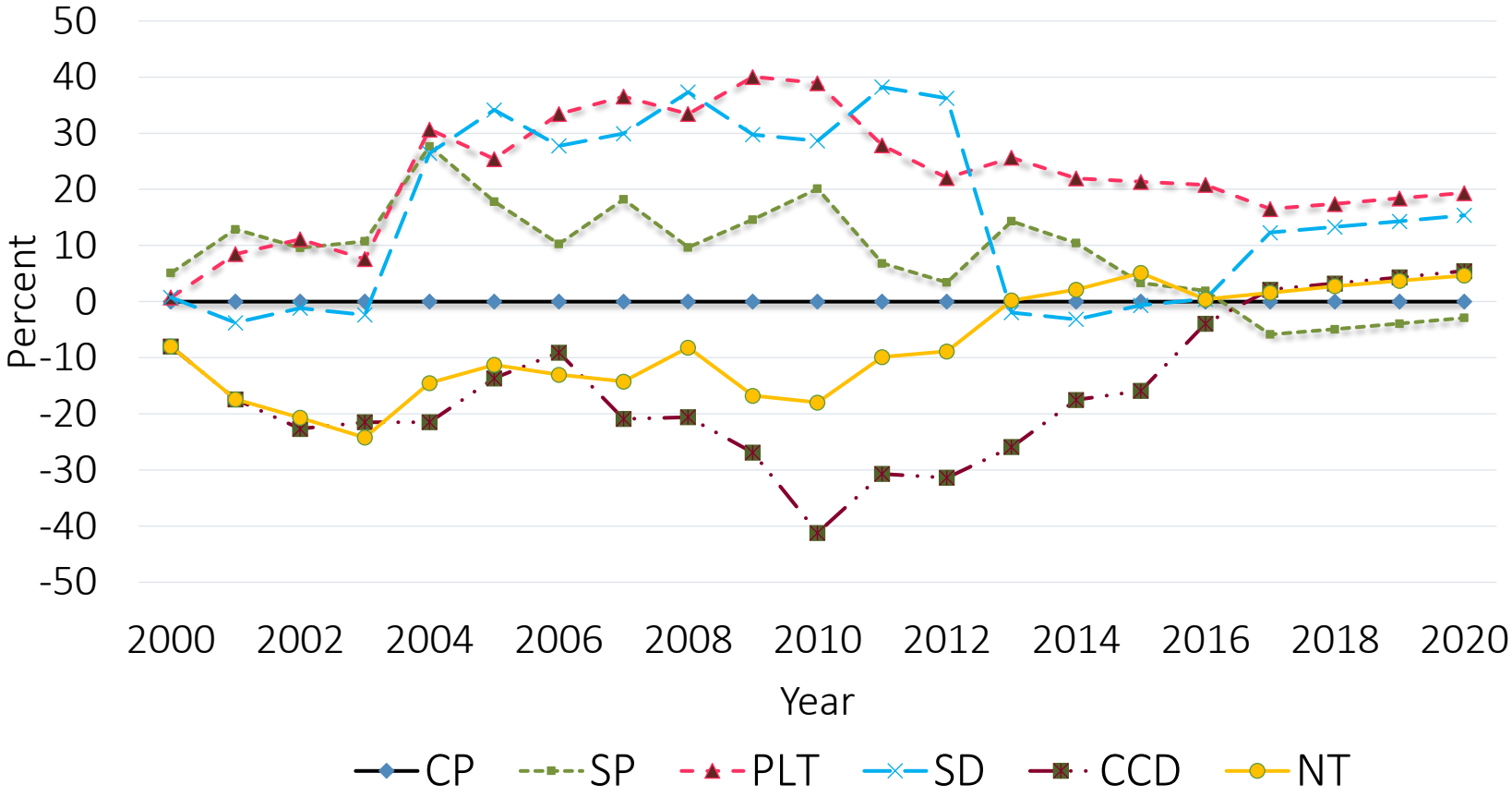
- W – without straw (control),
- S – straw retention

Factor B:

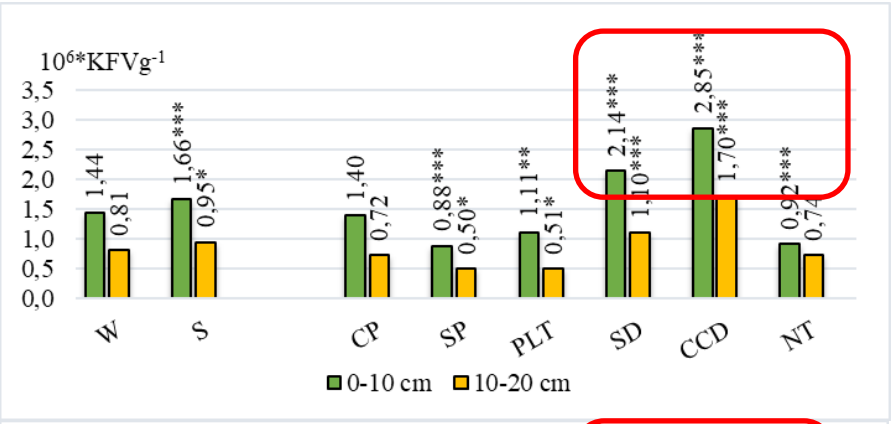
- CP – discing and conventional deep ploughing (control),
- SP – discing and shallow ploughing,
- PLT – ploughless tillage,
- SD – single seedbed discing,
- CCD – no-till + catch crop,
- NT – no-till.

No	Soil tillage systems	Direct drilling of catch crop	Shallow discing after harvest	Primary tillage	Seedbed preparation
1.	Conventional deep ploughing **(control, CP)**	no	yes	ploughing at 23-25 cm depth	cultivation 4-5 cm depth
2.	Shallow ploughing **(SP)**	no	yes	ploughing at 12-15 cm depth	cultivation 4-5 cm depth
3.	Ploughless tillage **(PLT)**	no	yes	discing at 8-10 cm depth	cultivation 4-5 cm depth
4.	Single seedbed discing **(SD)**	no	no	no	discing at 4-5 cm depth
5.	No-till + catch crop **(CCD)**	yes	no	no	no
6.	No-till **(NT)**	no	no	no	no

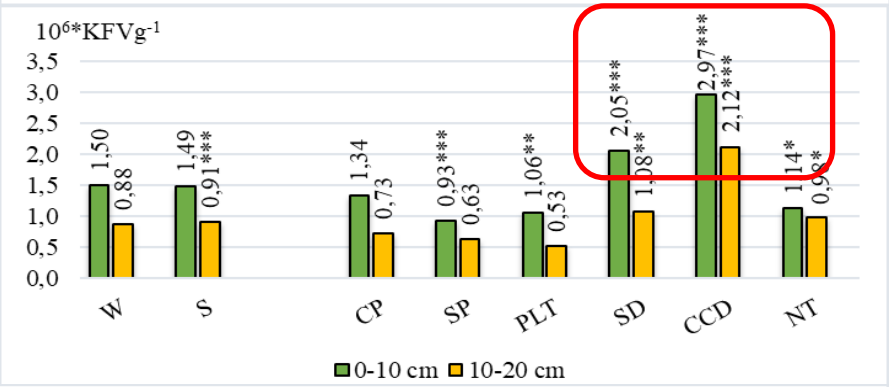
Cumulative crop productivity differences % influenced by long-term reduced intensity and no-tillage systems and green manure combinations compared with CP, 2000-2020



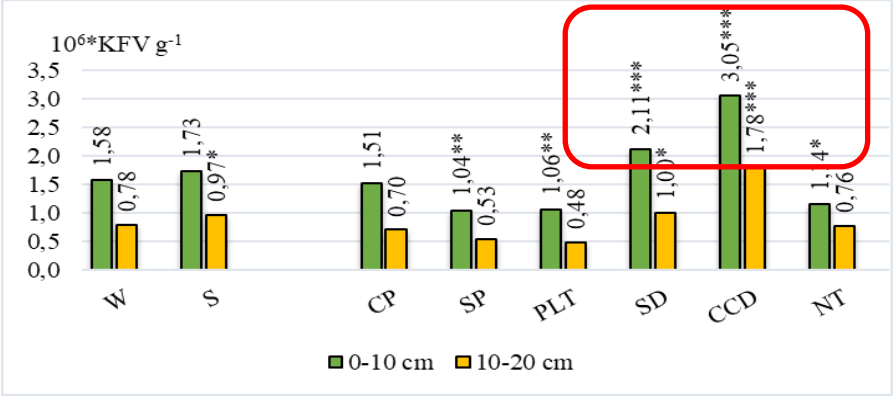
2013



2014



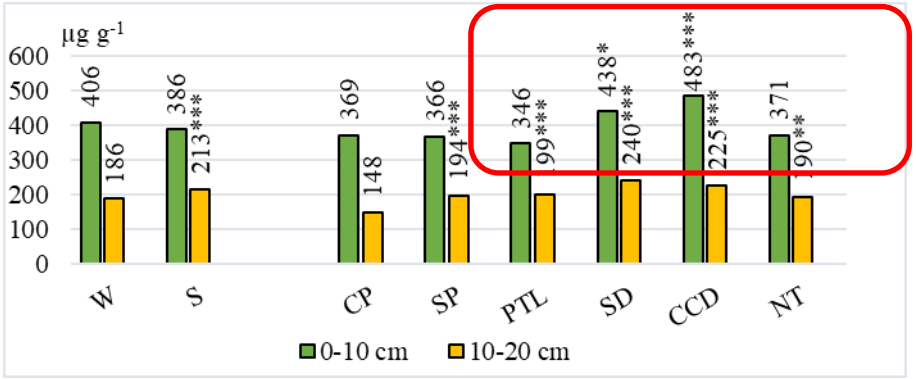
2015



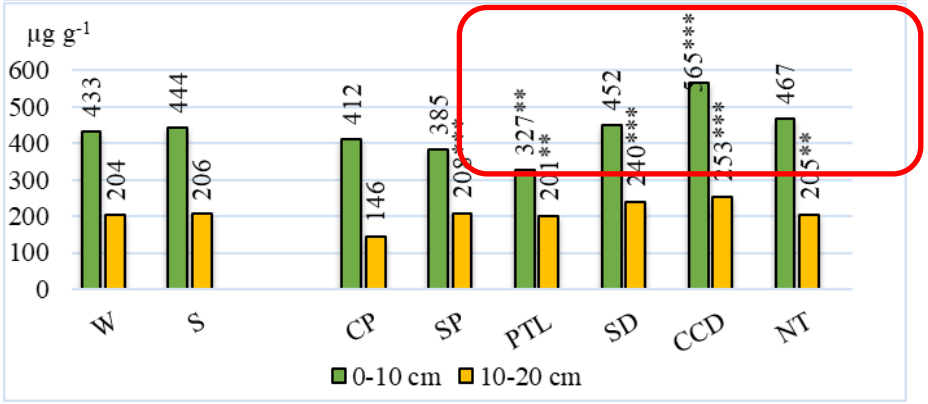
Total abundance of microbiota in the soil, 2013-2015

Notes. Significant differences at *$P \leq 0.05 > 0.01$, ** $P \leq 0.01 > 0.001$, *** $P \leq 0.001$; Fisher LSD test vs. control.

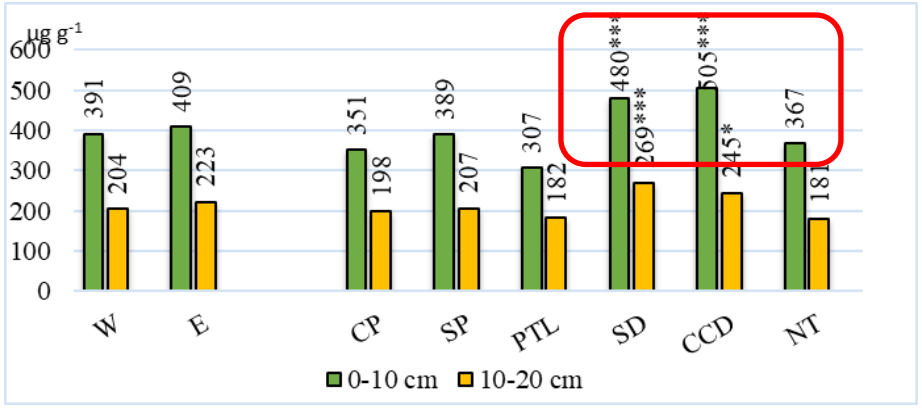
2013



2014

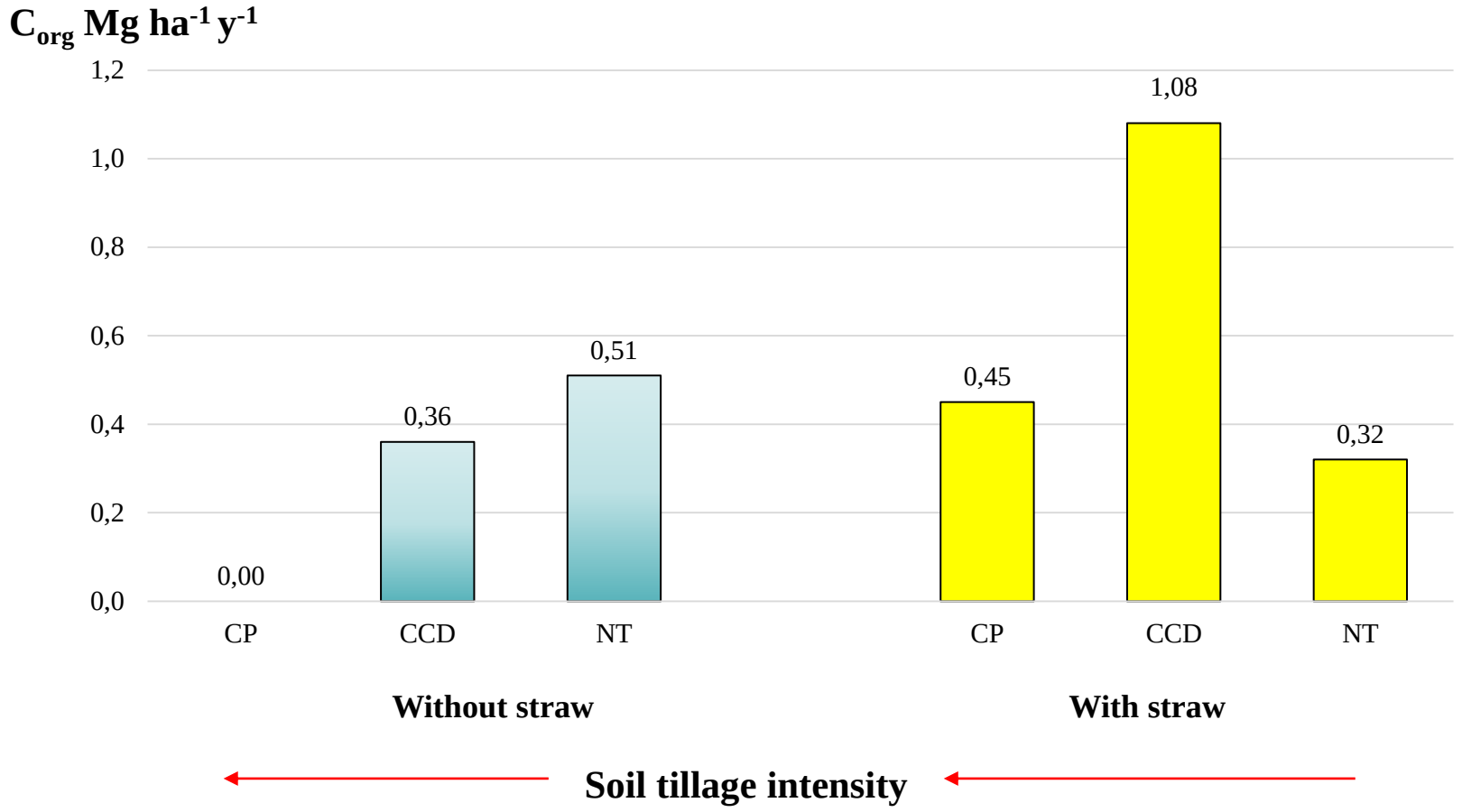


2015



Accumulation of microbiota biomass in the soil, 2013-2015

Notes. Significant differences at *$P \leq 0.05 > 0.01$, ** $P \leq 0.01 > 0.001$, *** $P \leq 0.001$; Fisher LSD test vs. control.



Carbon sequestration ratio (CSR) Mg C ha^{-1} y^{-1} to compare with conventional deep ploughing (CP) without straw in the 0-25 cm layer after different intensity soil tillage, on average in 2000-2020

Notes. Significant differences at *P ≤0.05>0.01, ** P ≤0.01>0.001, *** P ≤0.001; Fisher LSD test vs. control

Mission Board "Soil health and food"

THANK YOU FOR ATTENTION!