NATIONAL AGRICULTURAL AND FOOD CENTRE

SOIL SCIENCE AND CONSERVATION RESEARCH INSTITUTE

Good agricultural practices help to restore sustainable biodiversity

Beata Houšková, Rastislav Bušo, Jarmila Makovníková

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At present time when climate change has negative effect on soil moisture content and can decrease significantly the productivity have good agricultural practises high importance via their direct influence on soil properties and biodiversity. **Objectives of our study** have been focused on assessment of **good agricultural practises** like minimum till, mulch, no-till and organic farm type of soil cultivation. **Our study** shows positive effect of these practises on soil moisture content, biodiversity and soil structure stability. These findings can be used for further studies determining the ways of soil use in sustainable way.

Organic farm

AgroKruh system. Photo, Anetta Vaculíková

Ján Šlinský (patent holder) and AgroKruh. Photo Richard Medal

Assessment of soil structure

- Soil structure – stability of soil aggregates in water (Bakshajev method)
  - Agronomically valuable soil structure (aggregates 0.5 – 3mm, in %)
  - Coefficient of soil structure:

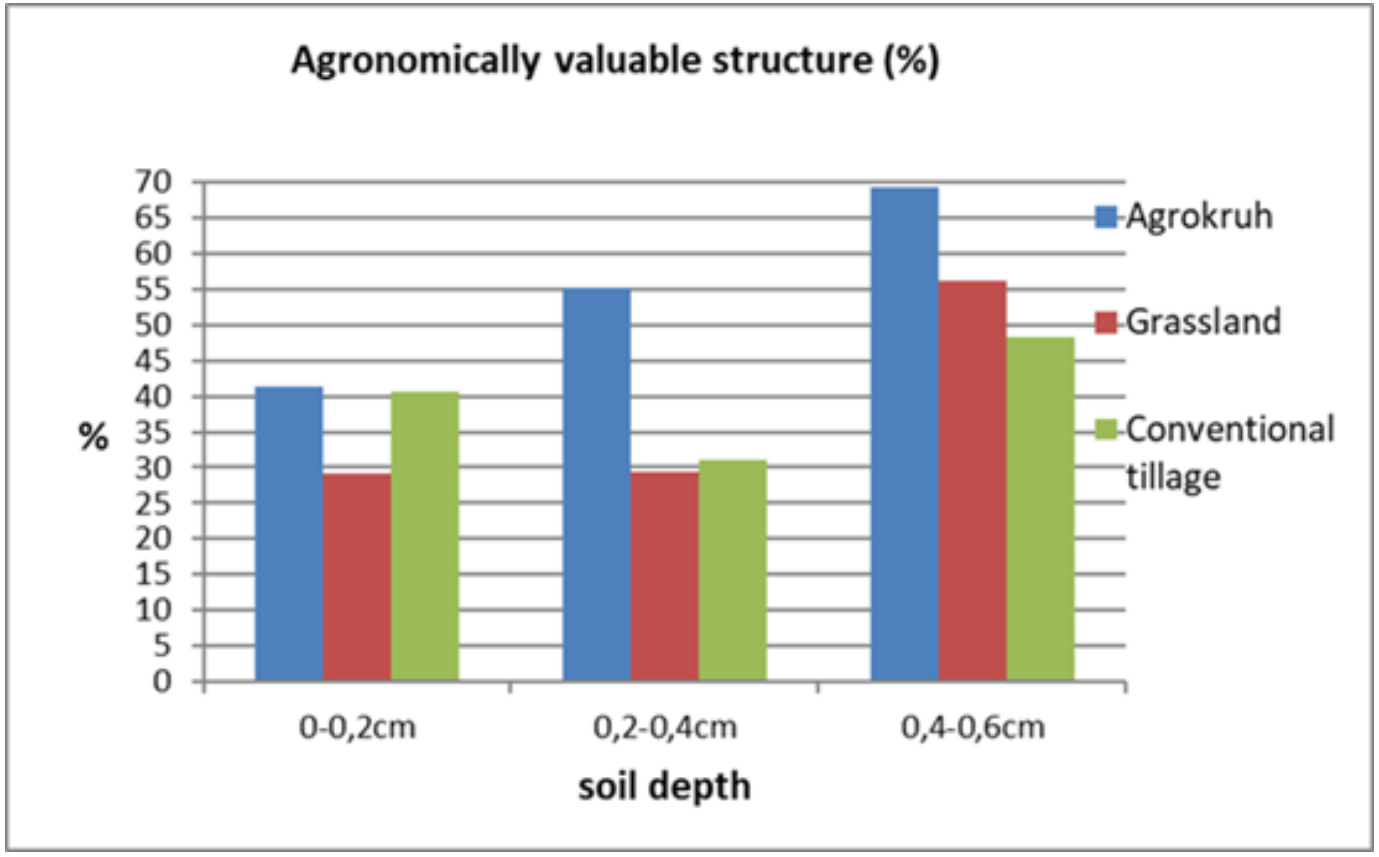
$$Cst = a/(b+c)$$

a – aggregates between 0,25–7mm

b - aggregates >7mm

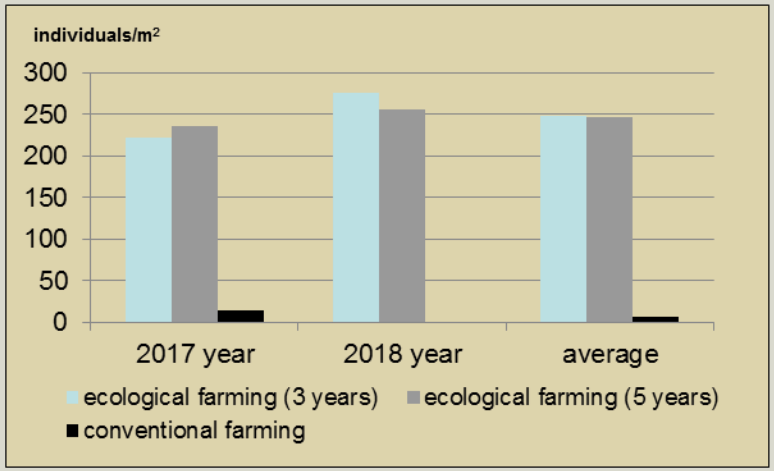
c – aggregates <0,25mm

Improvement of soil properties



The earthworms density in soil monoliths

The earthworms density in soil monoliths from ecological farm recalculated per square meter shows that the amount of individuals was (average 2017- 2018 year) 249 – 246 - 7 for 5 years ecological farming, 3 years ecological farming and conventional farming respectively.

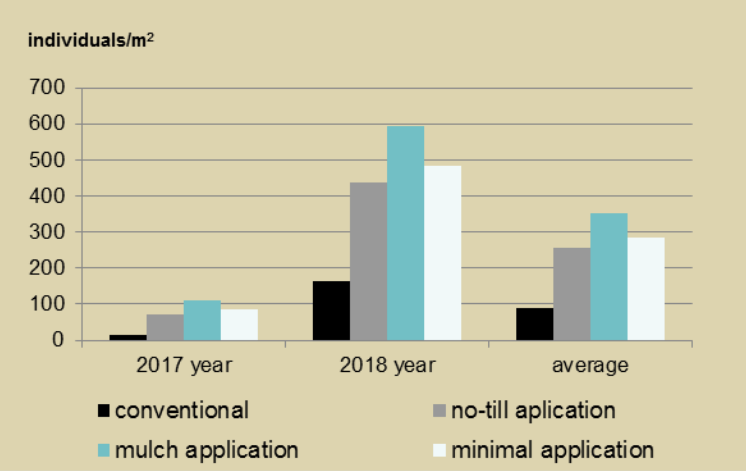


Earthworms biomass in g.m^{-2}	2017 year	2018 year	average
ecological farming (5 years)	44,69	66,59	55,64
ecological farming (3 years)	37,34	102,68	70,01
conventional farming	10,61	0	5,305

Concerning biomass, these results show significant positive effect of ecological farming on the amount of earthworms in comparison to conventional cultivation. The biomass was the highest in 3 years ecological farming comparing with 5 years. It can be also the effect of the type of crop. The biomass in conventional cultivation field was again significantly lower in comparison to the ecological fields.

The earthworms density in soil monoliths

The earthworms density in soil monoliths from fields with conventional cultivation, minimal cultivation recalculated per square meter



mulch application

conventional cultivation

Earthworms biomass in g.m^{-2}	2017 year	2018 year	average
conventional cultivation	20,3	93,75	57,03
no-till application	22,95	225,44	124,19
mulch application	49,62	429,68	239,65
minimal application	45,85	311,01	178,43

Concerning biomass, these results show significant positive effect of ecological farming on the amount of earthworms in comparison to conventional cultivation. The biomass was the highest in mulch application compared to the other practices. The biomass in conventional cultivation field was again significantly lower in comparison to the ecological fields.

Experimental farm

Experimental farm, Borovce

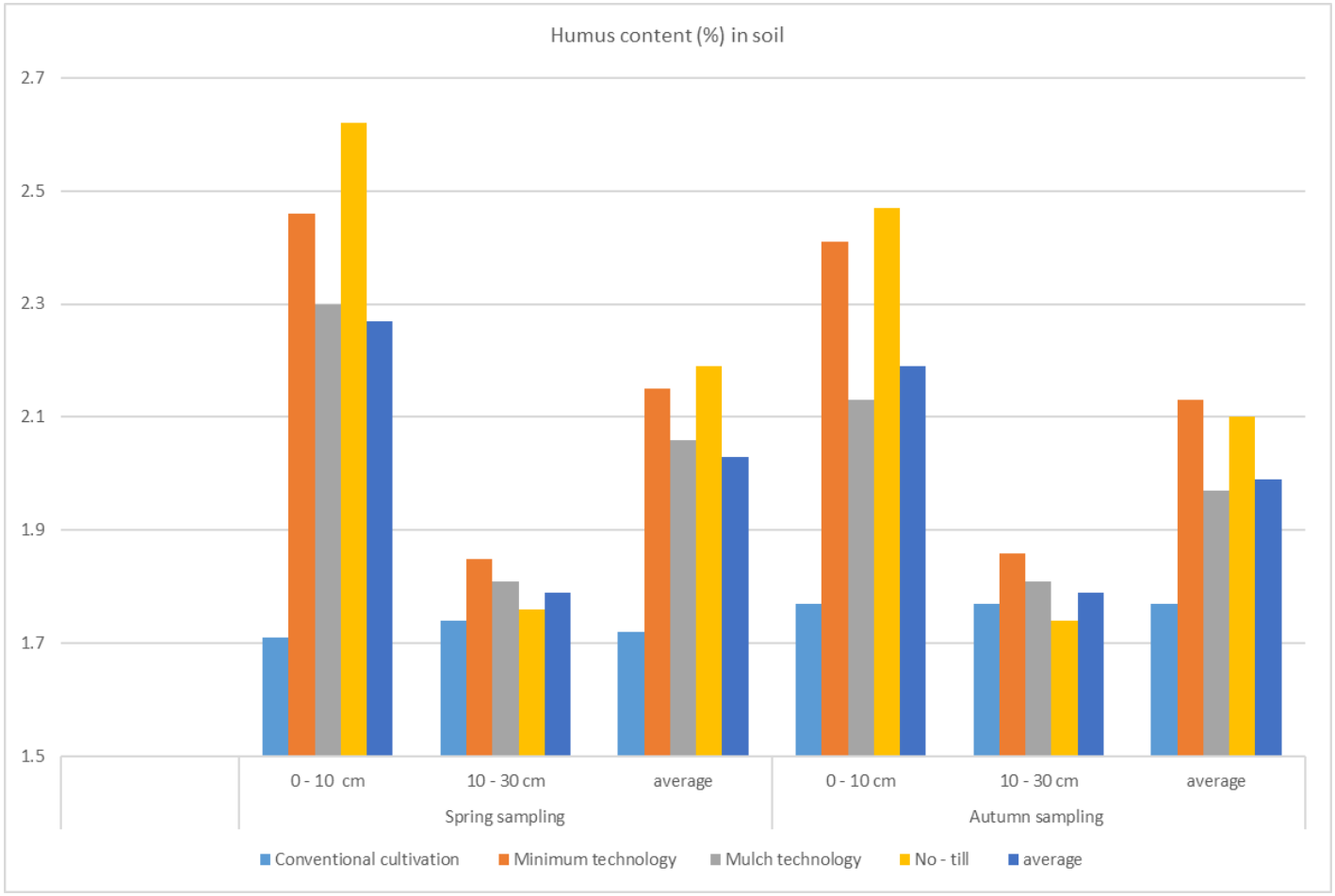
Soil saving technologies

- Minimum till
- Mulch technology
- No-till
- Controll – conventional cultivation

Microbial activity

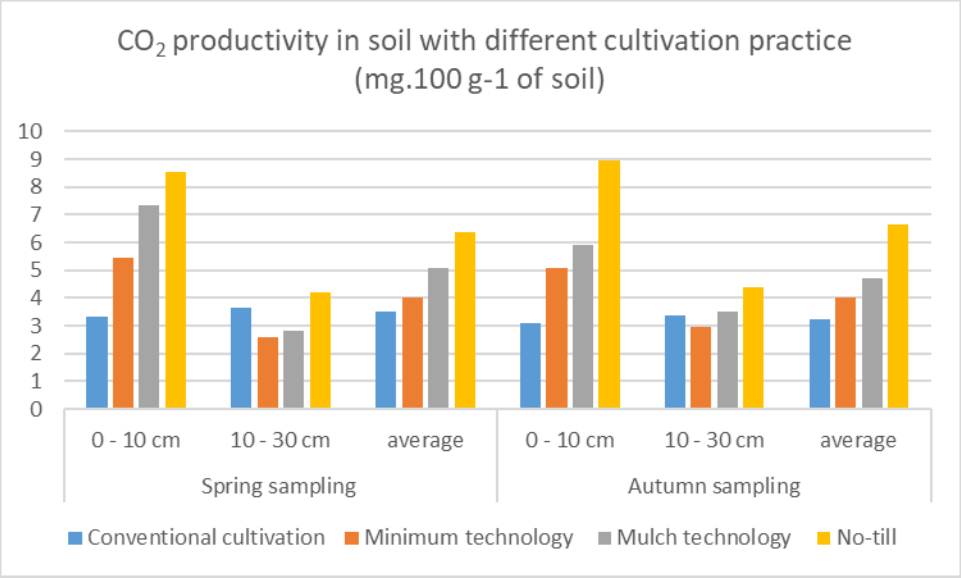
- CO_2 productivity
- Dehydrogenase activity

Humus content and soil saving technologies



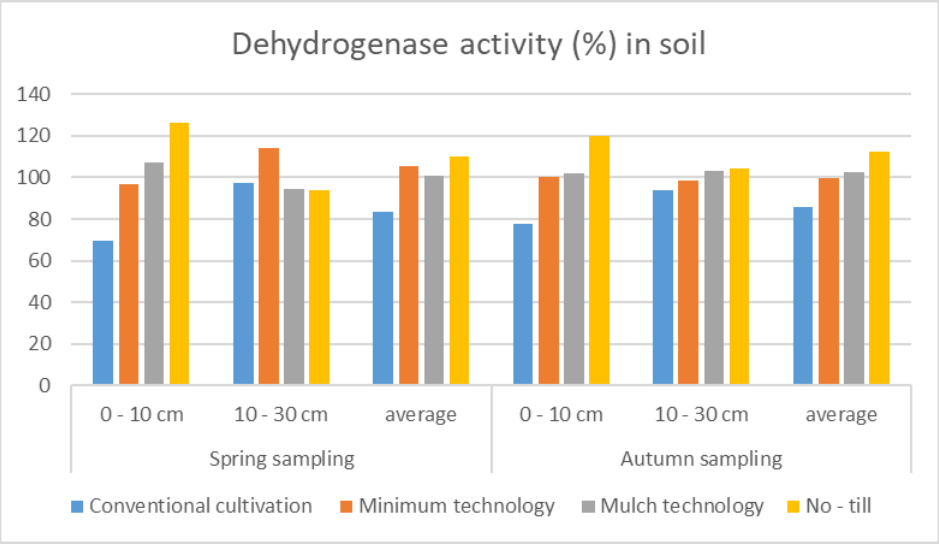
CO_2 productivity in soil with different cultivation practice (mg.100 g^{-1} of soil), Borovce

average 2016 - 2018	Depth (cm)	Conventional cultivation	Minimum technology	Mulch technology	No-till
Spring sampling	0 - 10	3.32	5.44	7.36	8.55
	10- 30	3.67	2.59	2.81	4.21
	average	3.50	4.02	5.09	6.38
Autumn sampling	0 - 10	3.11	5.10	5.92	8.95
	10-30	3.35	2.97	3.49	4.40
	average	3.23	4.04	4.71	6.67

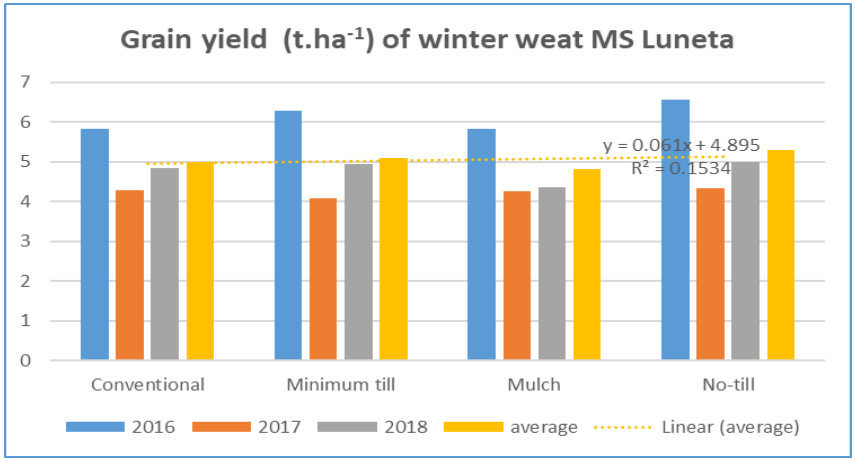


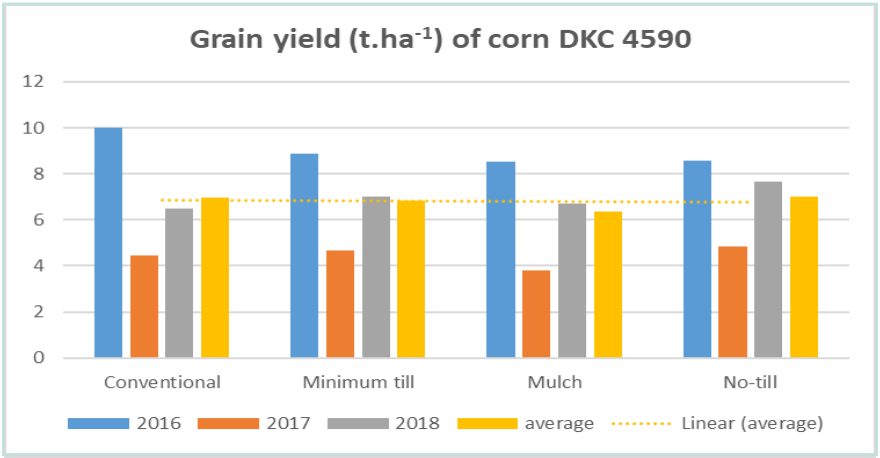
Dehydrogenase activity

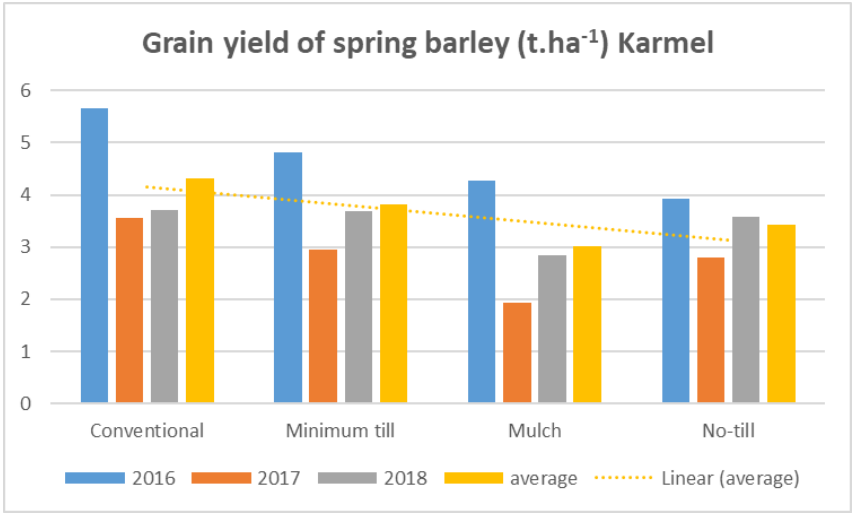
Average 2016 - 2018	Depth (cm)	Conventional cultivation	Minimum technology	Mulch technology	No - till	Average
Spring sampling	0 - 10 cm	69.6	96.9	107	126.5	100
	10 - 30 cm	97.1	114.4	94.6	93.9	100
	average	**83.3**	**105.7**	**100.8**	**110.2**	**100**
Autumn sampling	0 - 10 cm	77.4	100.3	102.2	120.1	100
	10 - 30 cm	94.1	98.5	103.4	104	100
	average	**85.7**	**99.4**	**102.8**	**112.1**	**100**

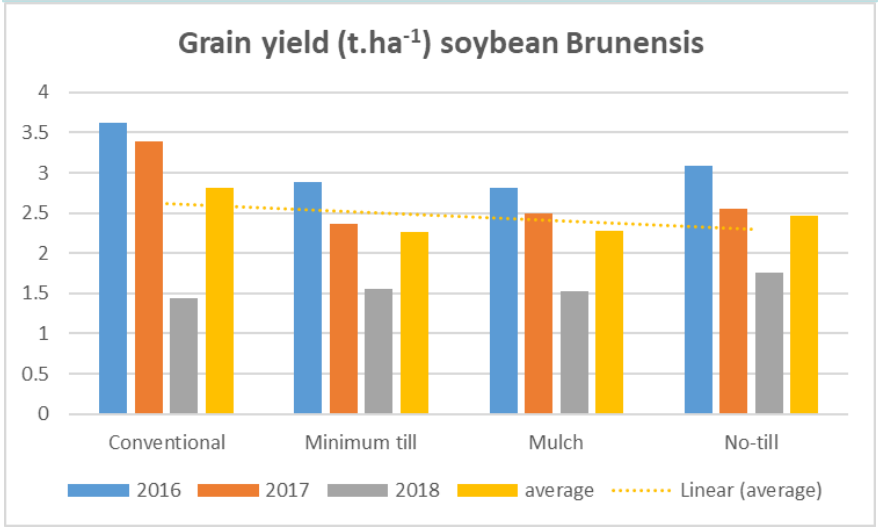


Soil saving technologies and yield









Good agricultural practices: minimum till, mulch, no-till and organic farming conserve and/or restore soil properties. Soil biodiversity is crucial for soil properties improvement and good agricultural practices contribute directly or indirectly to the increase of soil biodiversity. Improvement of soil structure expressed as soil aggregates stability is direct evidence of good agricultural practices on soil sustainability.

Thank you for your attention

Acknowledgements

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