

Effect of green manures on weeds, crop yields and soil properties in Estonia

Berit Tein, Viacheslav Eremeev, Endla Reintam, Liina Talgre, Diego Sánchez de Cima, Anne Luik

Estonian University of Life Sciences (EULS), Tartu, Estonia. Contact e-mail: anne.luik@emu.ee



Description

5-years crop rotation (**winter wheat, pea, potato, barley us. red clover, red clover**) experiment in 3 cropping systems (started in 2008, modified in 2011). Block scheme.

- **Org. 0** → follows crop rotation (CR);
- **Org. I** → CR+ green manure (GM) catch crops;
- **Org. II** → CR+GM+composted cattle manure – winter wheat 10 t/ha, potato 20 t/ha, barley 10 t/ha (in spring).

Green manures: ryegrass after winter wheat, winter oilseed rape after pea, winter rye after potato, red clover

Each system in 4 replications = 60 plots

Each plot = 60 m²

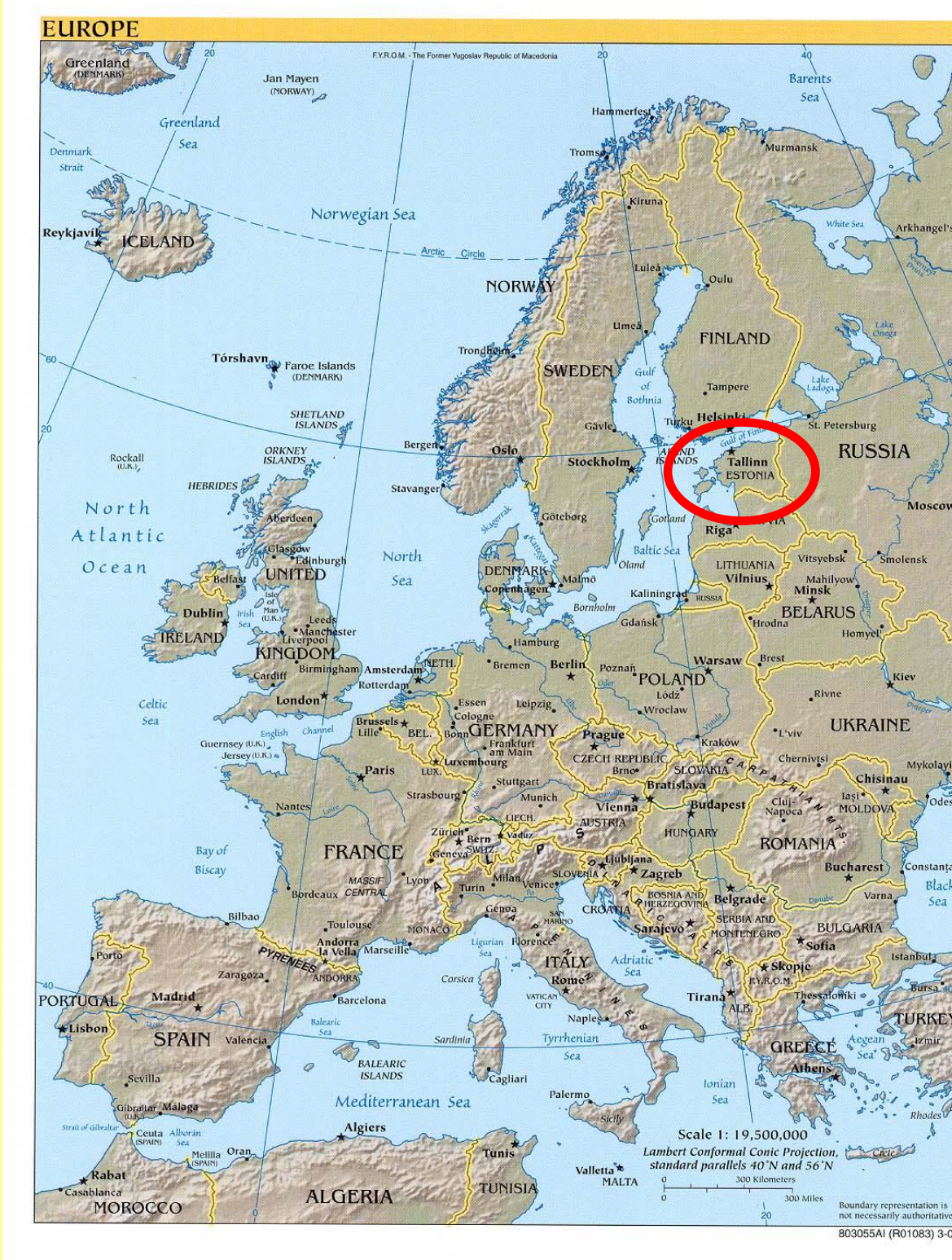
Site: Eerika experimental field (58 22'N, 26 40'E) near to Tartu, Estonia

Climate: Precipitation 591 mm/y

Mean annual temperature 4.4 (+30...-30) C

Soil: sandy loam *Albic Stagnic Luvisol*

Experimental place and design

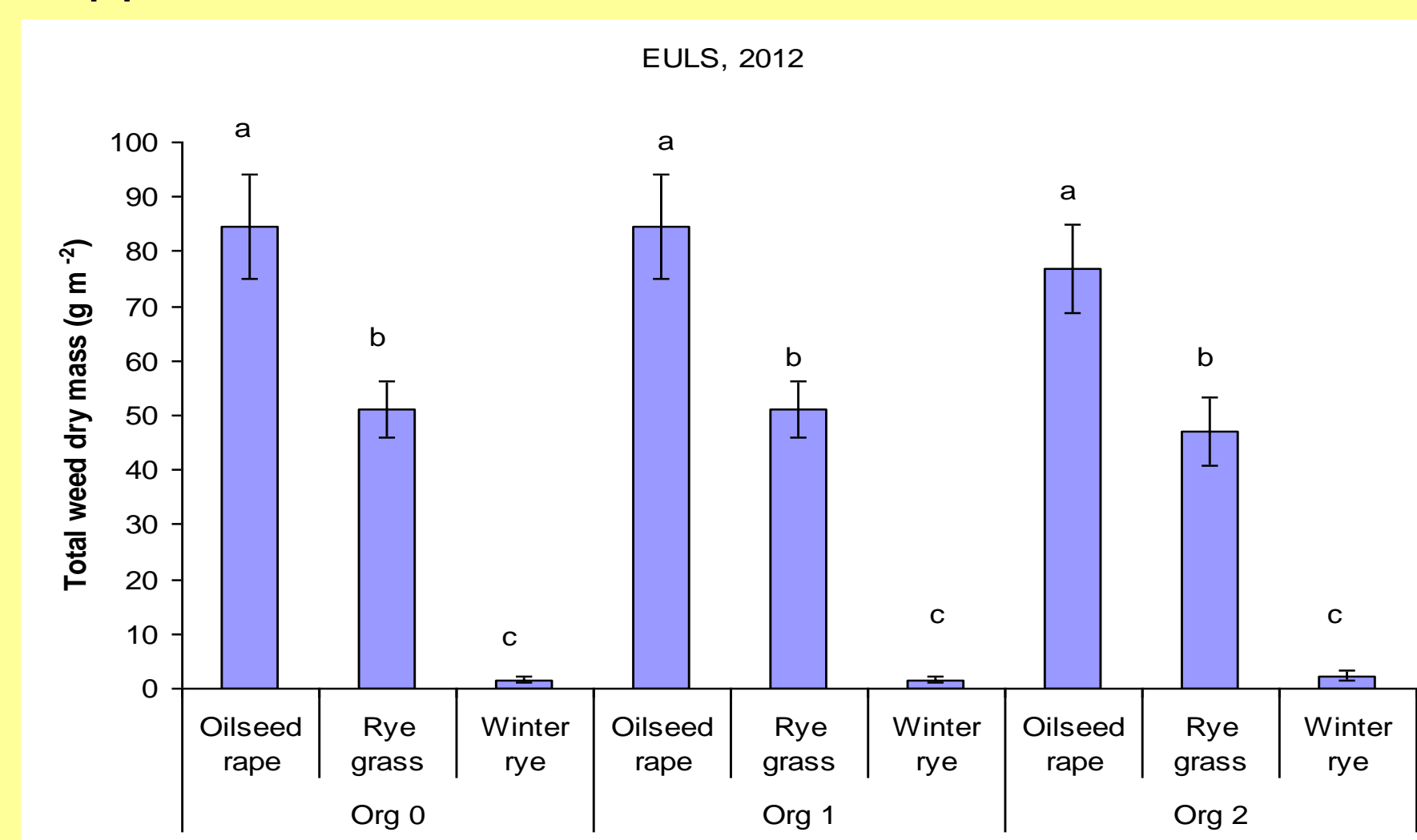


Study aims:

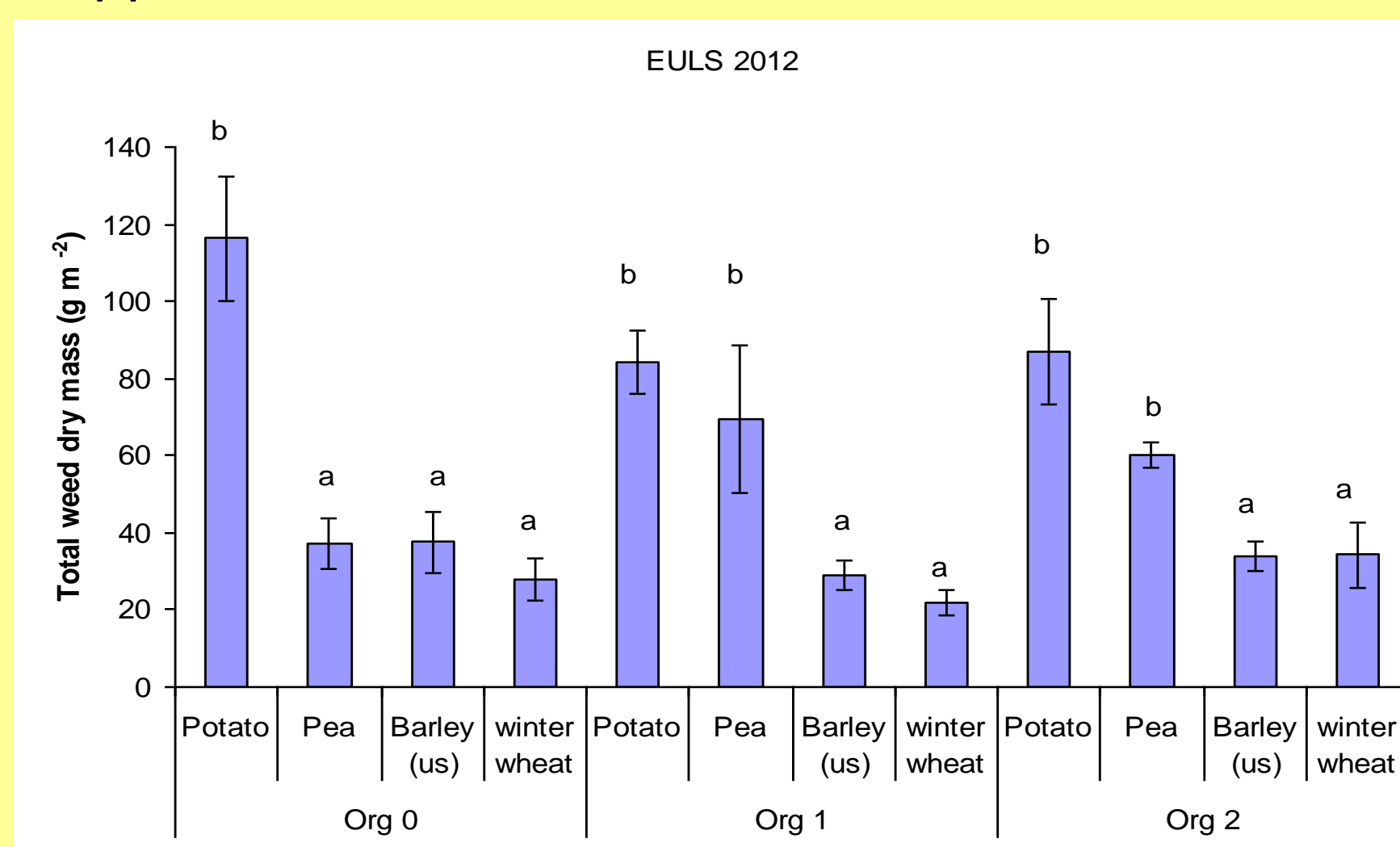
The aim of this research was to investigate the effect of different green manures and their combination with cattle manure on weeds, crop yields and soil properties in five-field crop rotation experiment of three different organic cropping systems.

Results of 2012

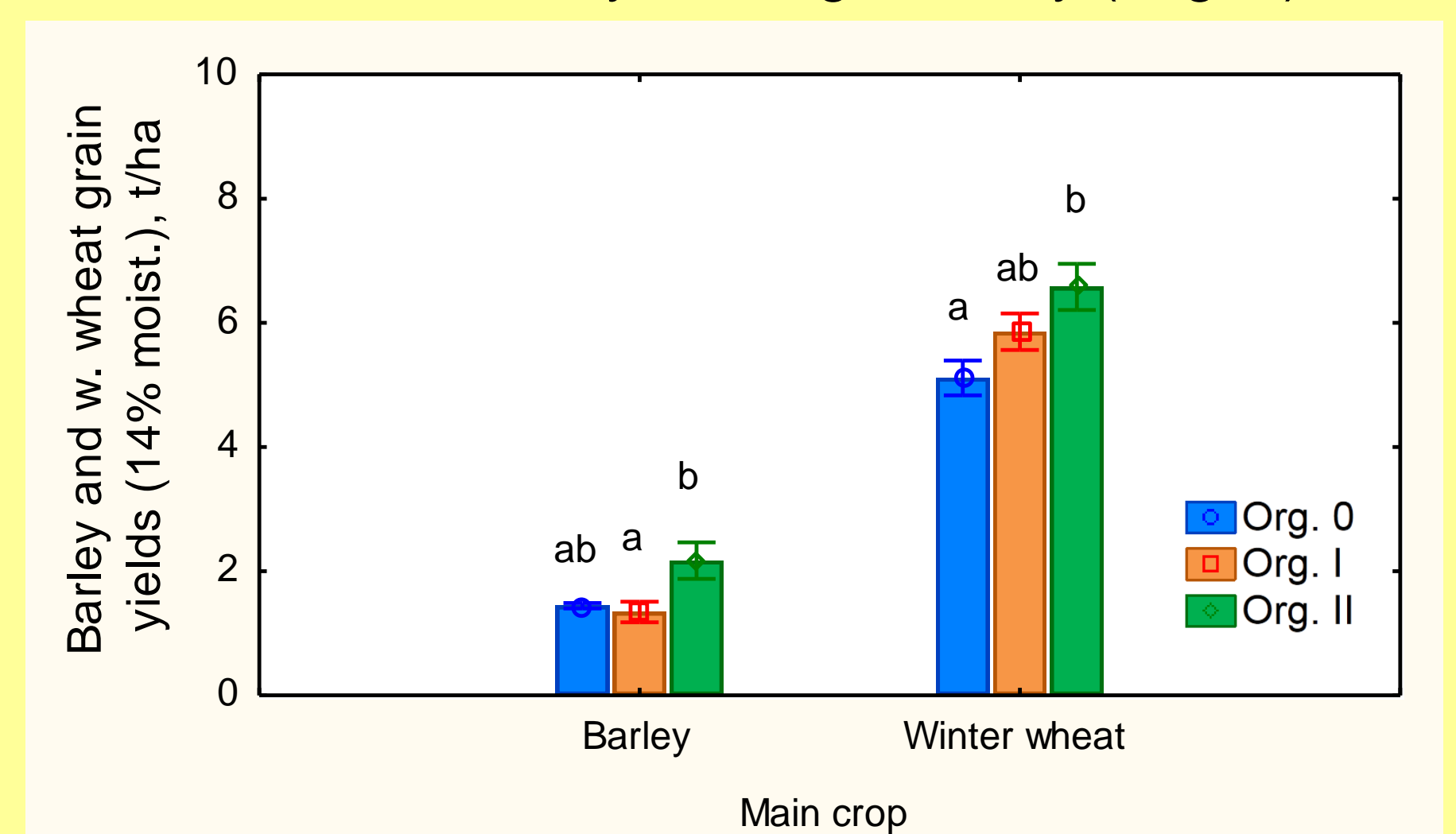
Winter rye as a green manure was the best weed suppressor.



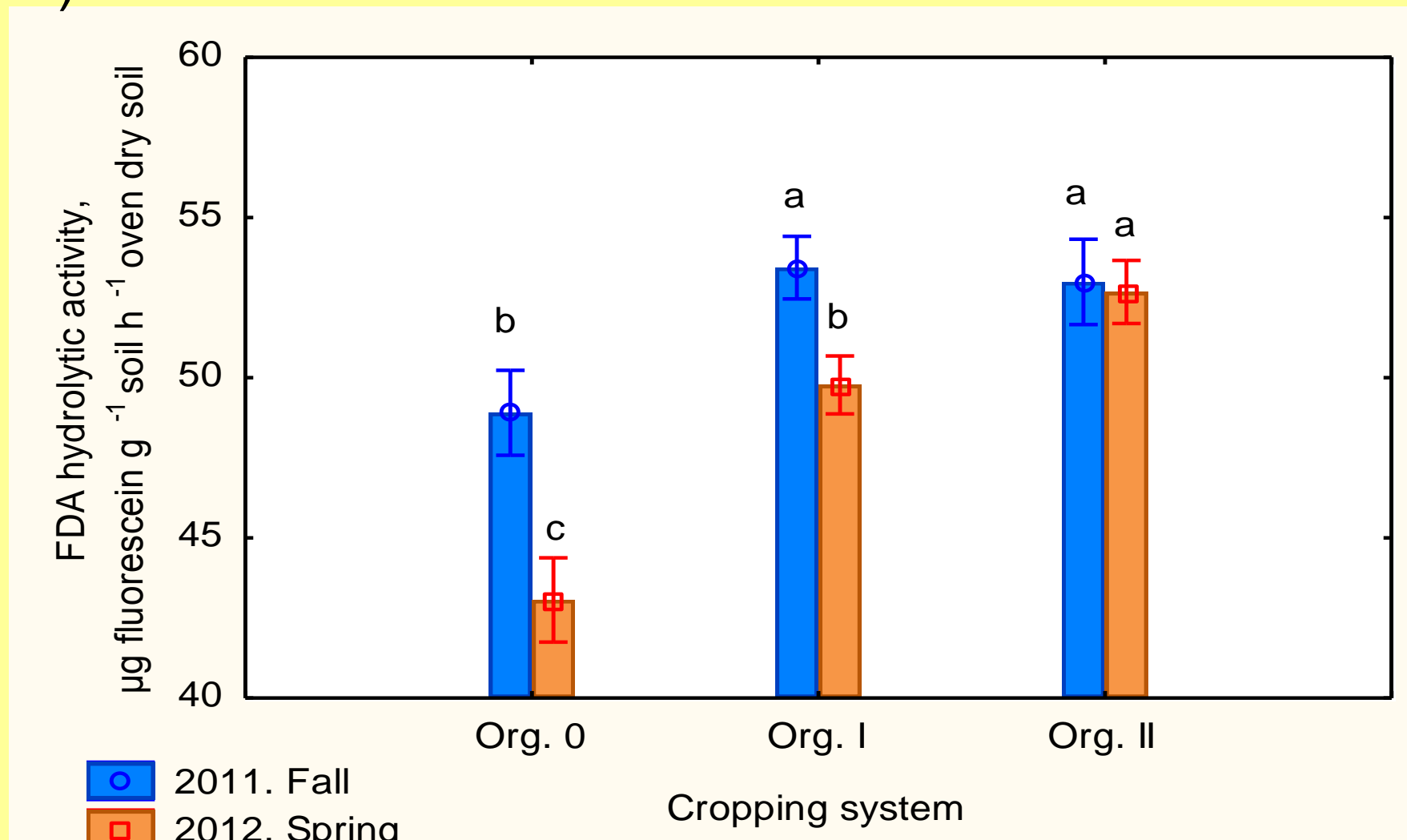
Cereals as main crops were the best weed suppressors.



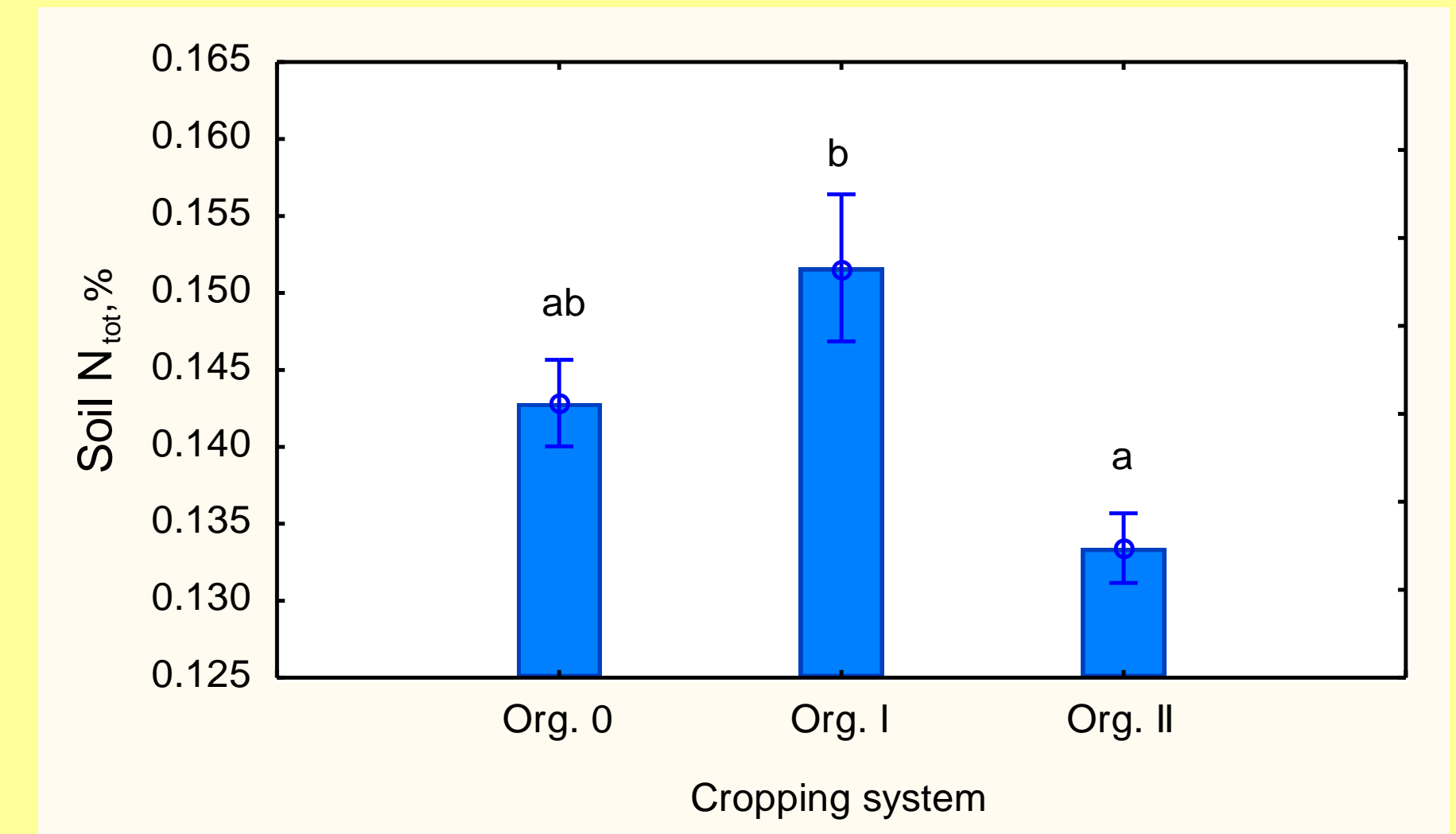
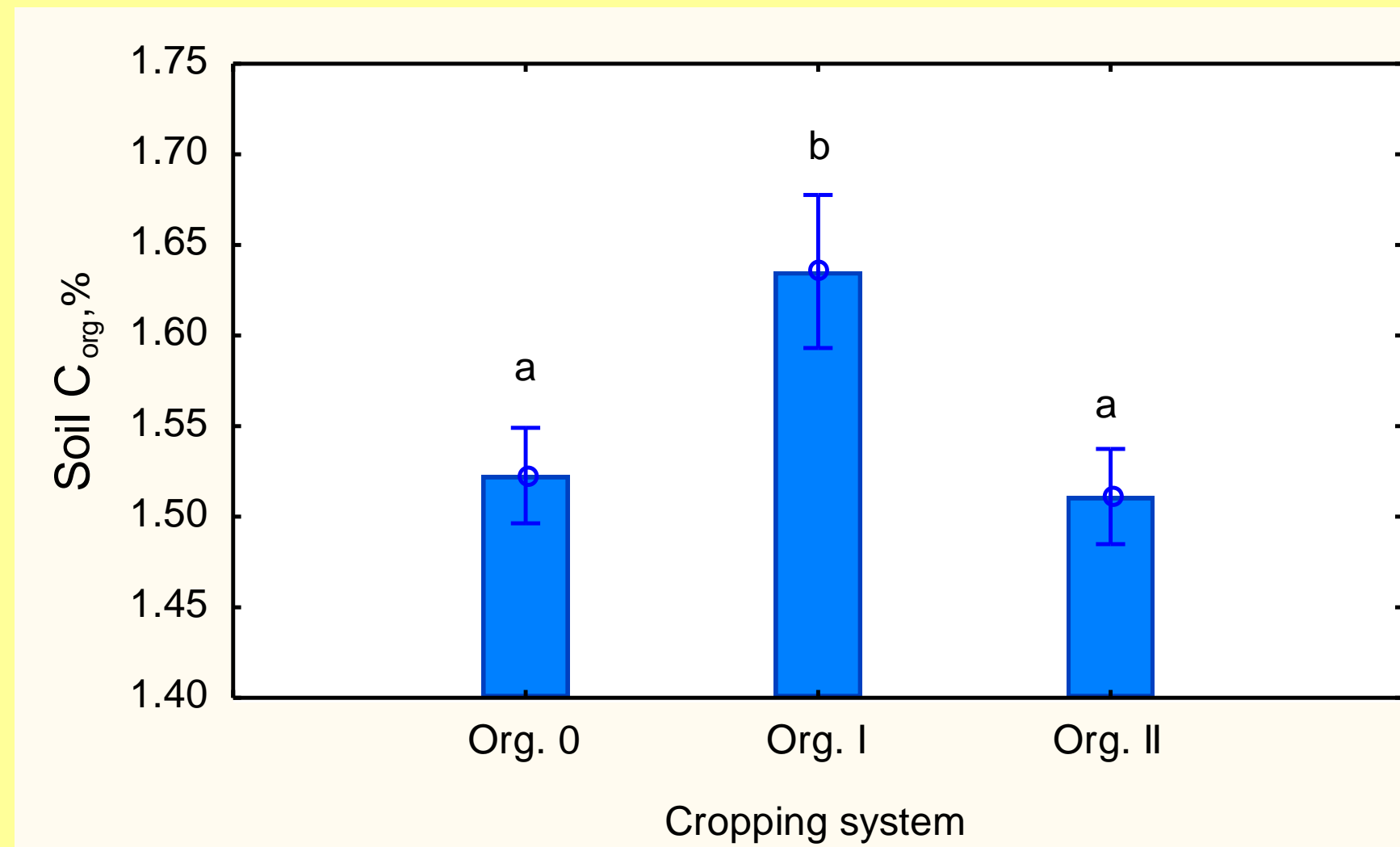
Cattle manure in combination with green manure red clover increased yields significantly (Org. II).



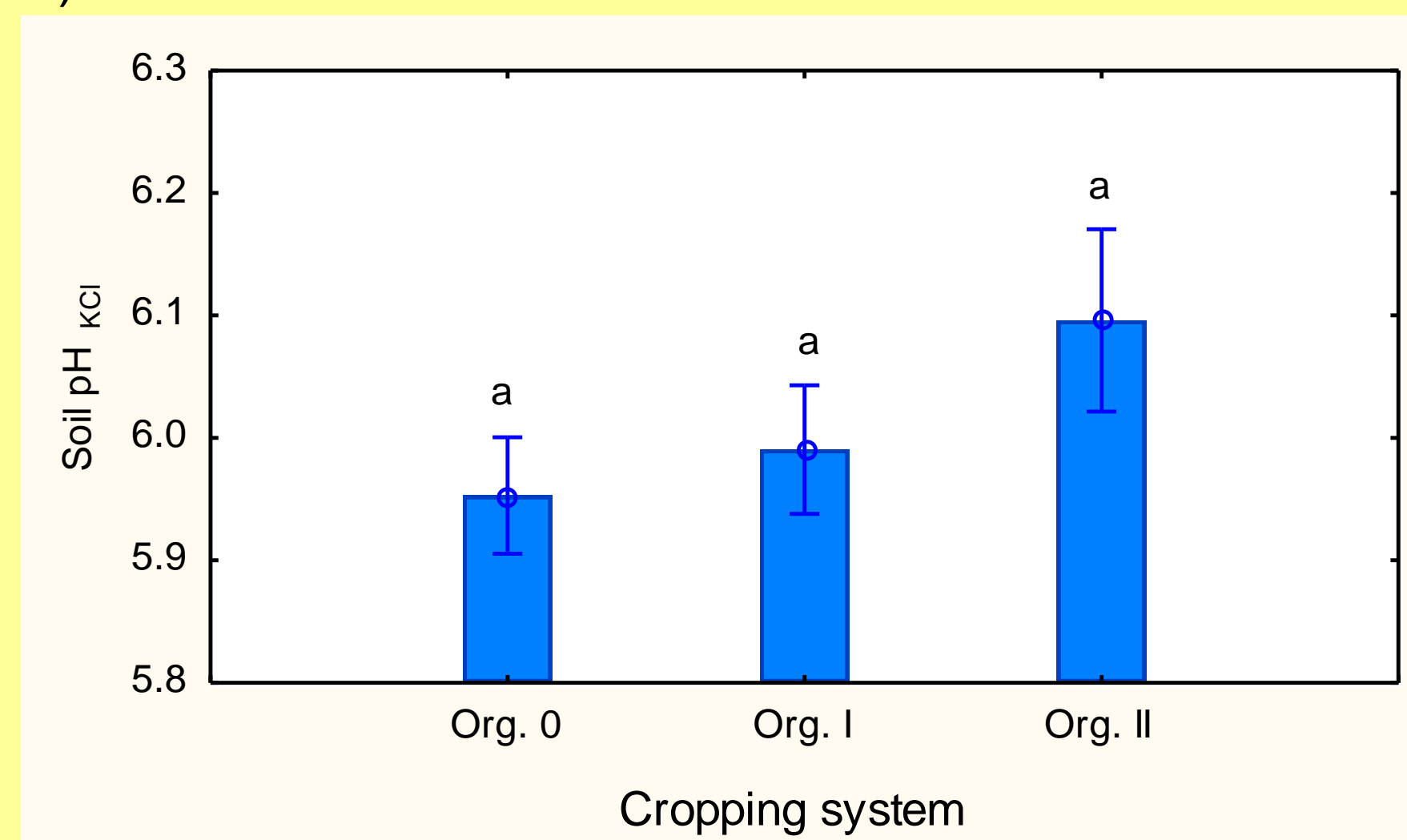
Green manures and their combination with cattle manure increased the soil microbial activity (Org. I, II).



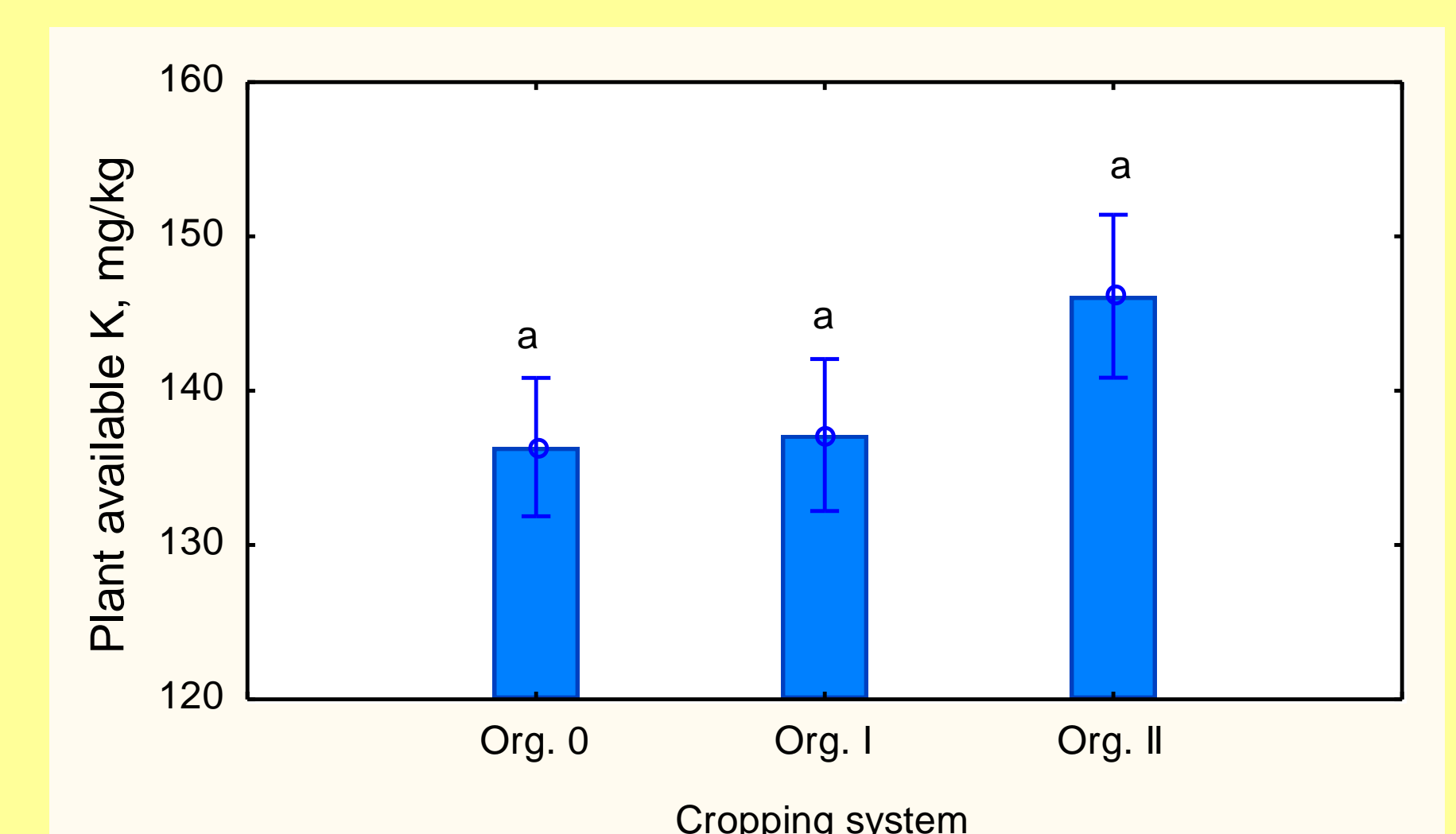
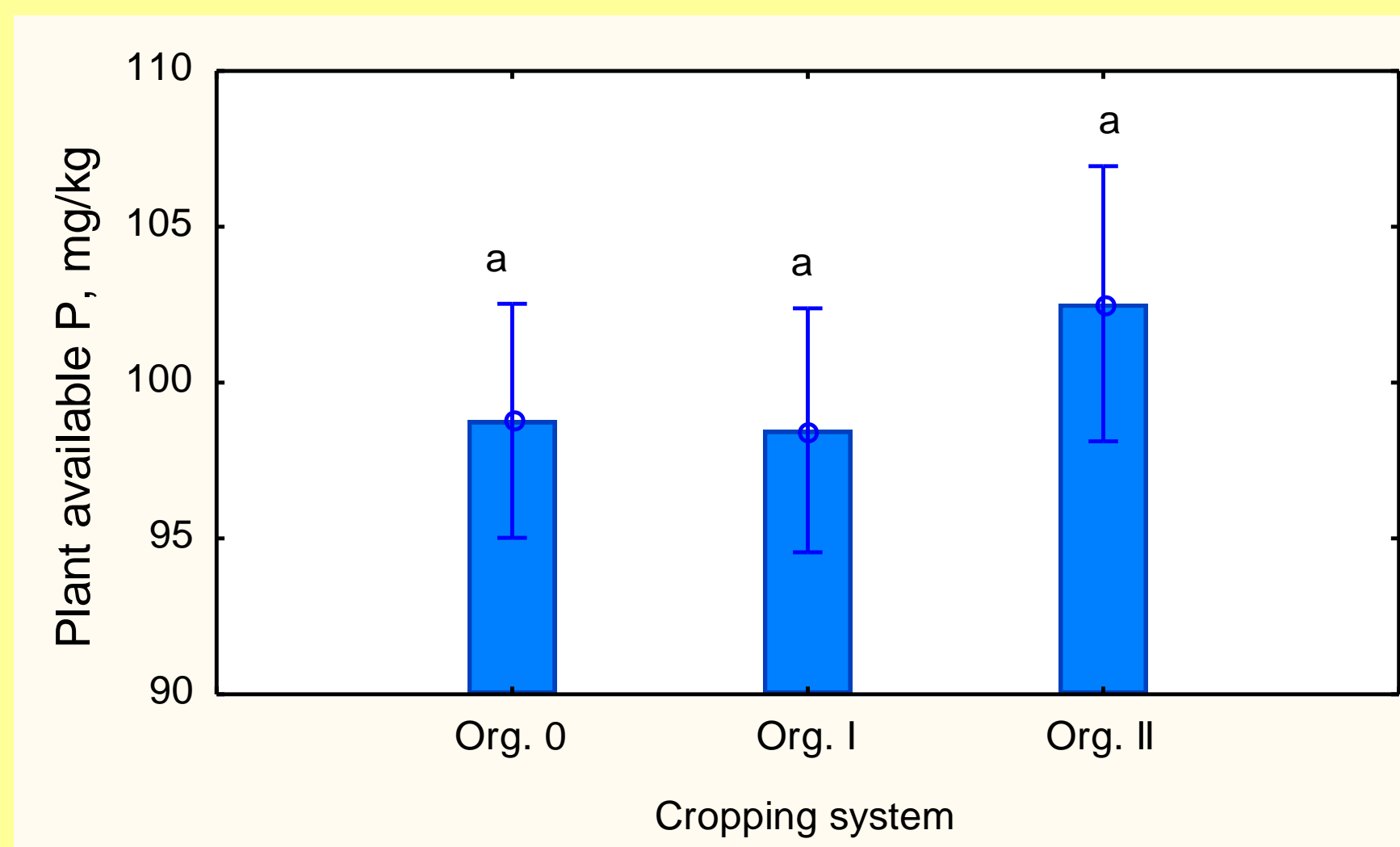
Green manures increased soil organic carbon and total nitrogen contents (Org. I).



Green manures and their combination with cattle manure had a tendency to increase soil pH (Org. I, II).



Cattle manure with green manure had a tendency to increase the plant available P and K in soil (Org. II).



NB! Different letters indicate significant differences (Tukey HSD test ($P < 0.05$)). Vertical bars denote +/- standard errors.

Conclusions

- Green manures influenced weeds. Winter rye was the best suppressor. Cereals from main crops were also effective in weed suppressing.
- Red clover as green manure in combination with cattle manure helped to gain significantly higher yields in winter wheat and barley.

- The use of green manures brought tendencies to improve soil quality: increased soil microbial activity, pH, content of nitrogen, organic carbon. Soil water holding capacity and plant available P and K contents also increased in conditions of green manures combined with cattle manure (Org II).