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Enhancing of legumes growing in Europe through sustainable cropping for protein supply for food and feed

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Effectiveness of rhizobial strains on the faba bean development and yield in soddy podzolic soils

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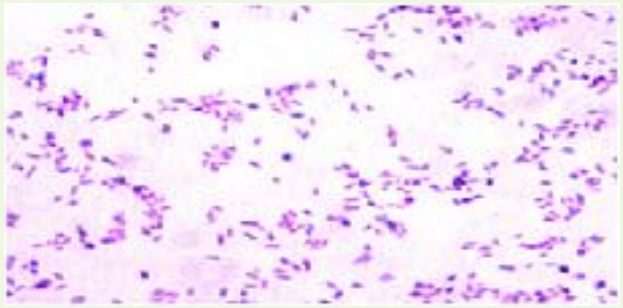


Foto: L.Dubova

Why Rhizobium?

Inoculation can improve crop yields in cases where appropriate rhizobia are not present in the soil or the soil contains a significant proportion of non-nodulating or ineffective nitrogen-fixing strains.

Inoculation of legume seeds with Rhizobium affects soil microbial community and processes, especially in the rhizosphere

The aim of this studies was to test new commercial Rhizobium inoculants effectivity for faba bean cv.‘Lielplatones’.

How work was carried out?

Site, soil, pre-crop

Soil characteristic:	2014	2015	2016
pH_{KCl}	5.9	5.7	5.6
Organic matter, g kg^{-1}	19	24	19
P_2O_5, mg kg^{-1}	142	139	139
K_2O, mg kg^{-1}	148	171	135
N-NO3, mg kg^{-1} (0-20 cm) N-NO3, mg kg^{-1} (20-40 cm)	2.1 3.8	6.1 3.3	2.7 3.5
N-NH4, mg kg^{-1} (0-20 cm)	2.2	2.4	1.9
N-NH4, mg kg^{-1} (20-40 cm)	0.6	0.7	1.4

crop rotation:

spring barley+clover;
red clover;
pring cereals;
winter rye;
potatoes;
grain legumes.

phenology

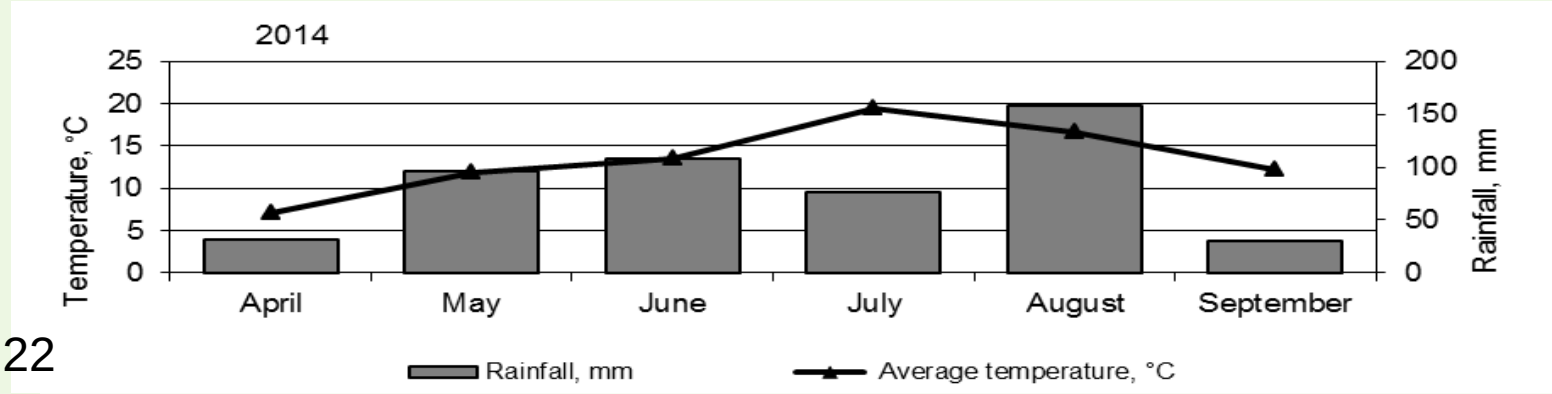
the beginning of emergence (when at least 50% of cotydelons were opened);
beginning of flowering (when at least 50% of flowers were opened);
beginning of maturity.

How work was carried out?

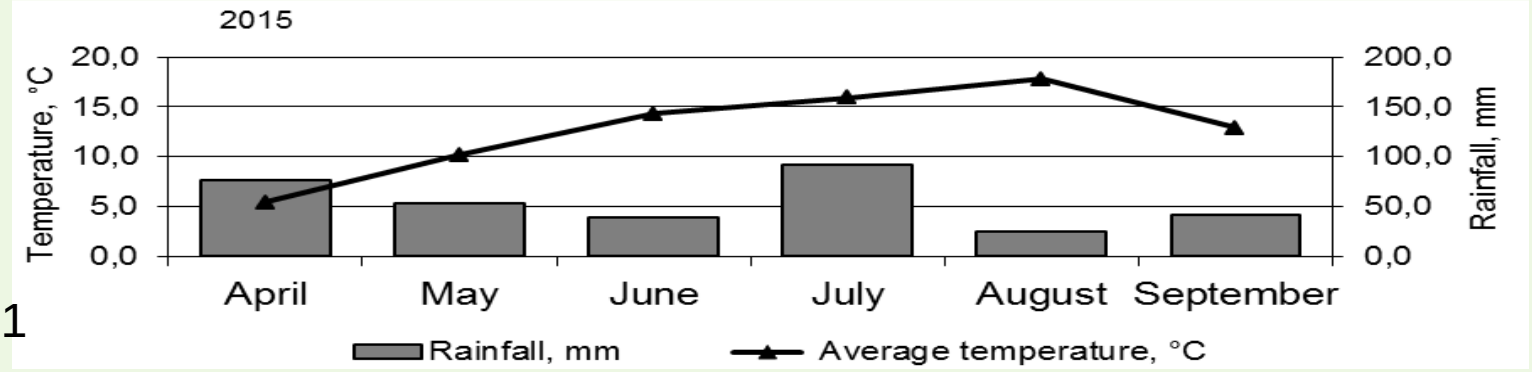
Inoculation, measuring and soil sampling

- Three *Rhizobium leguminosarum* strains– RI, R2, R3 (mixture of R1 and R2)
- The inoculants were mixed with bean's seeds by soaking in bacteria suspension for 30 minutes before sowing.
- A plant high was measured at the beginning of flowering (BBCH 61–64) and at the beginning of forming pods (BBCH 71–75) and at the beginning of maturity (BBCH 81– 85) stages.
- The soil samples were taken from randomly selected points of each treatment from 0–20 cm and 20–40 cm soil layer using an auger with 1 cm diameter.

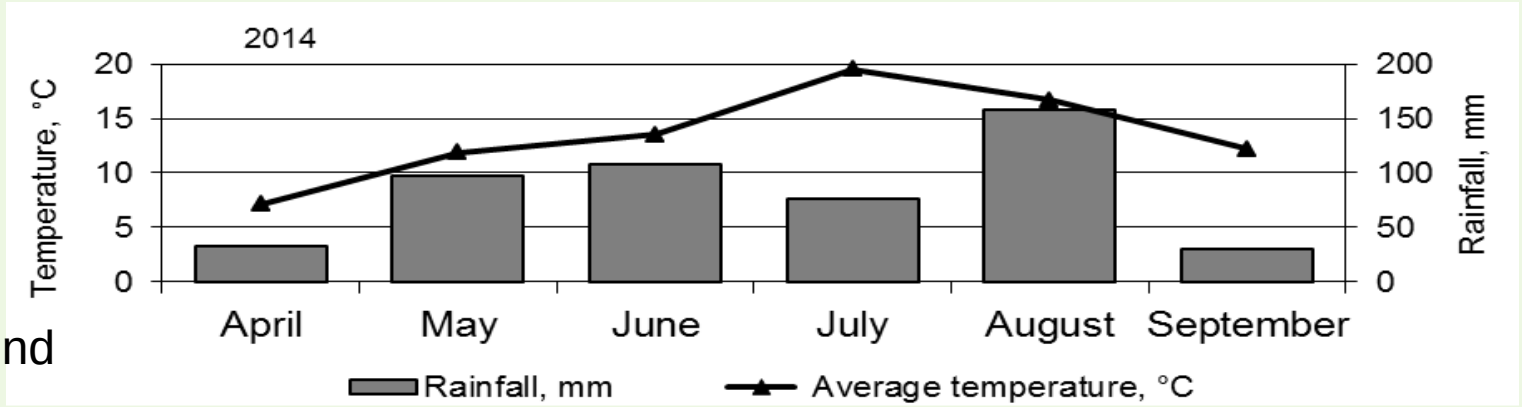
CLIMATE CONDITIONS



2014: April 22

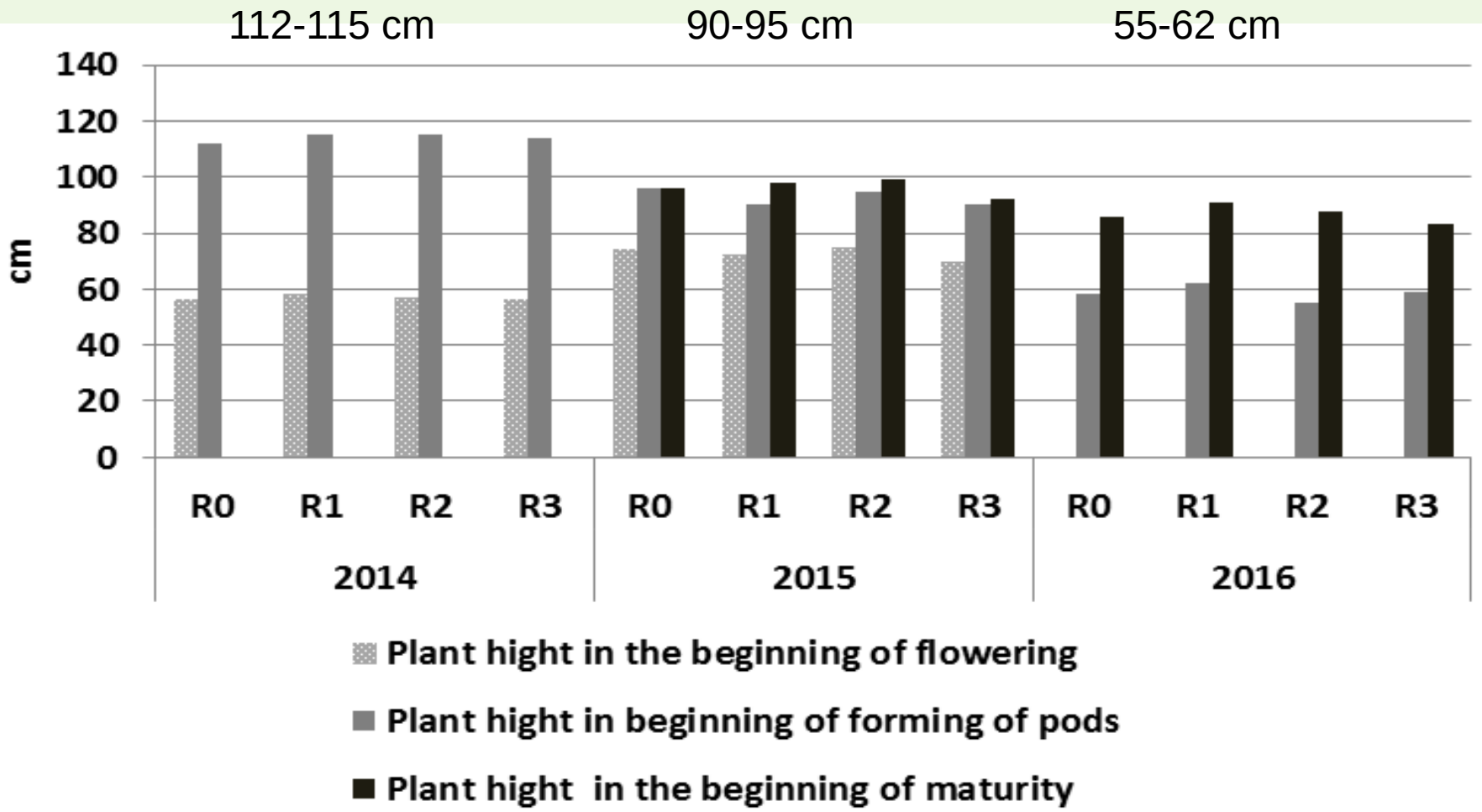


2015: April 21

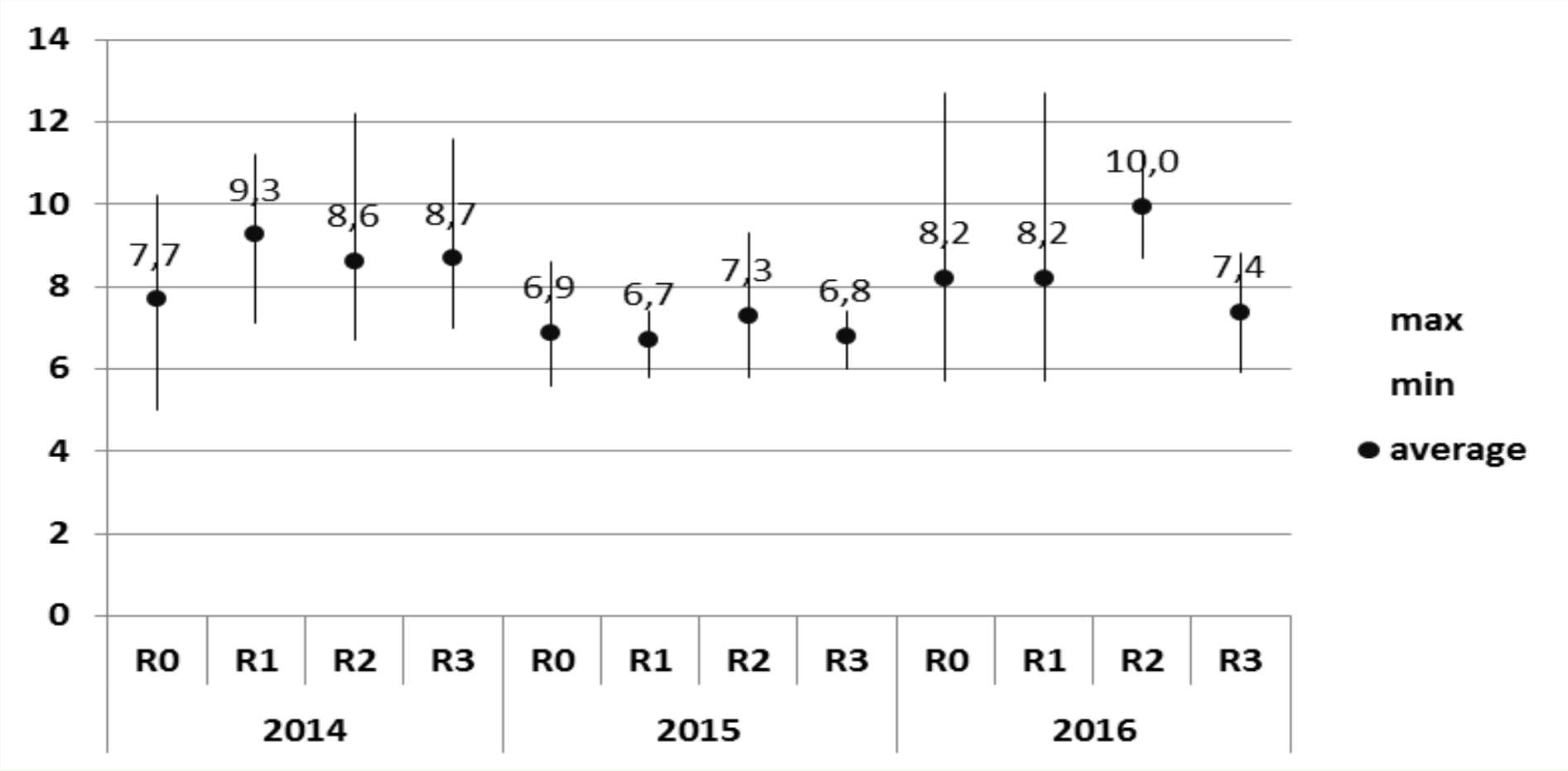


2016: May 2 nd

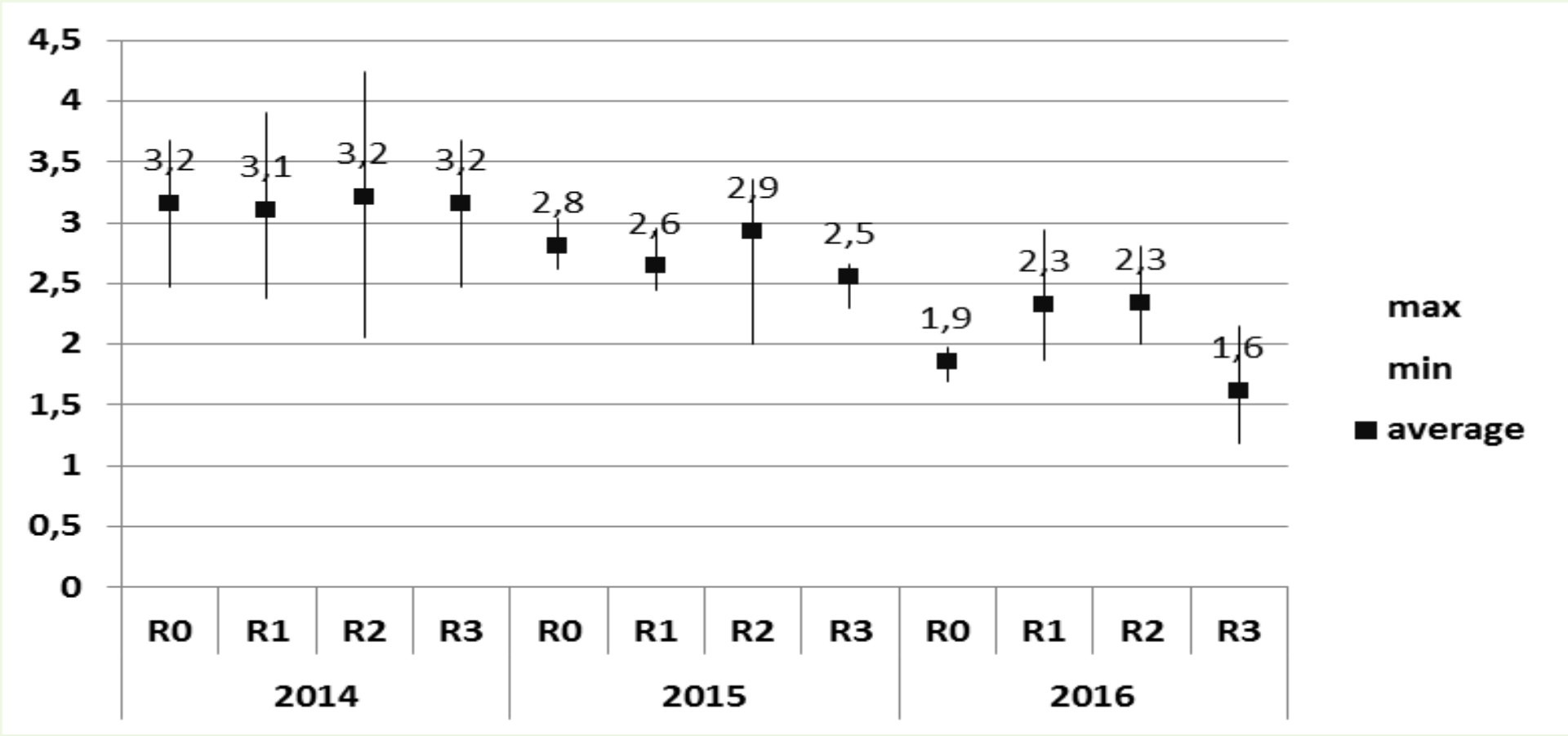
Results & discussions



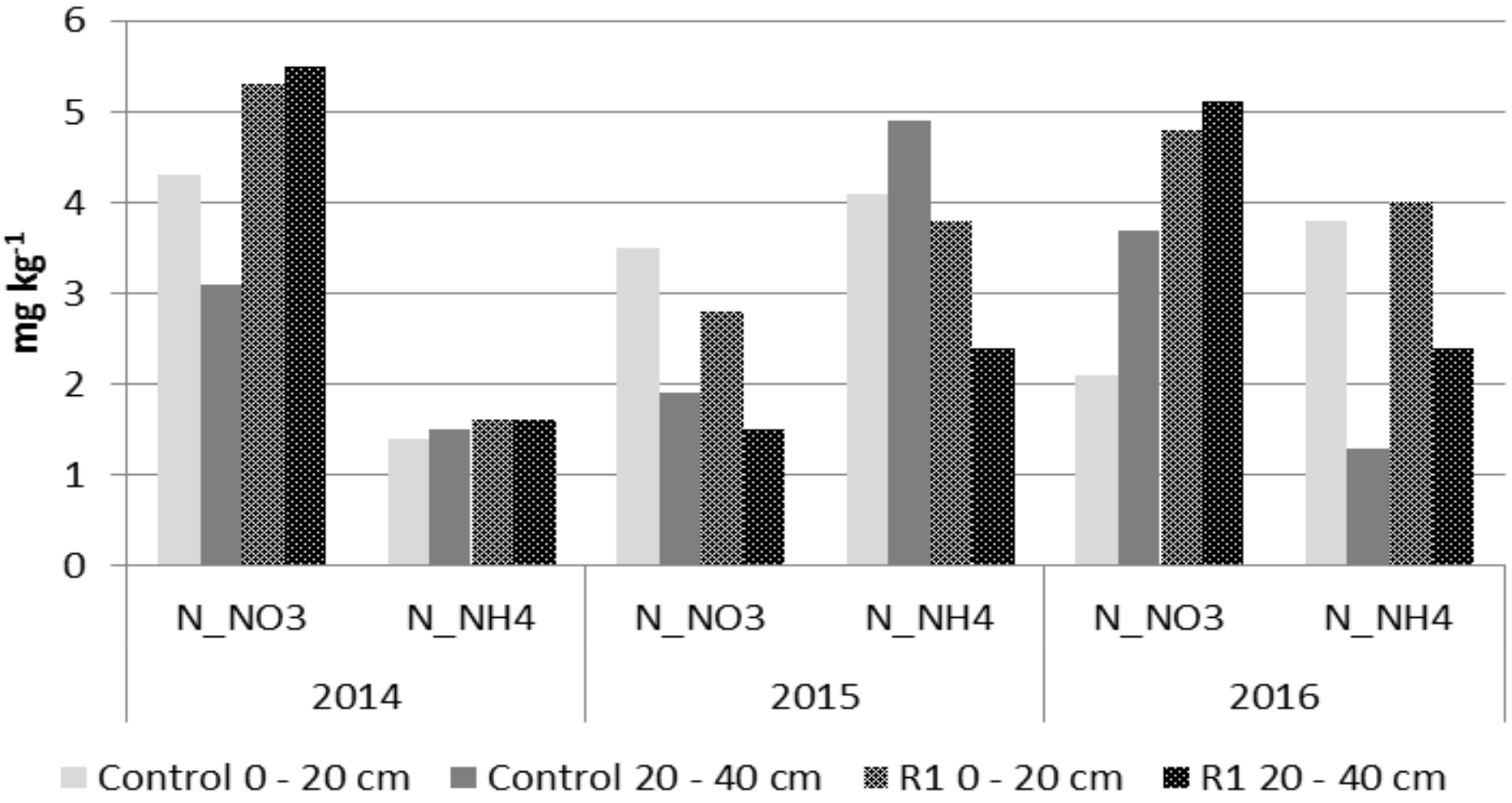
Amount of pods per plant



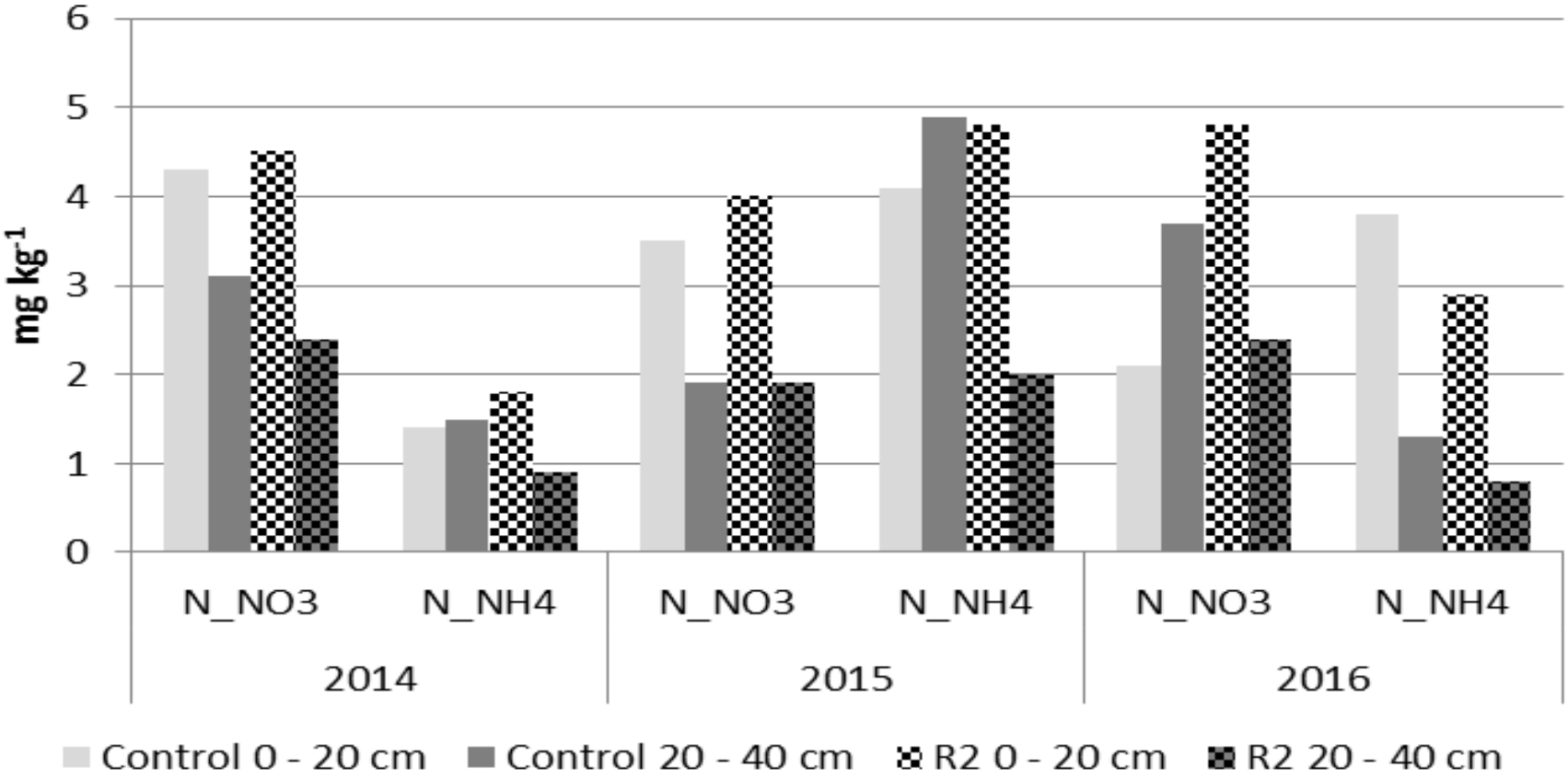
Effectiveness on the yield



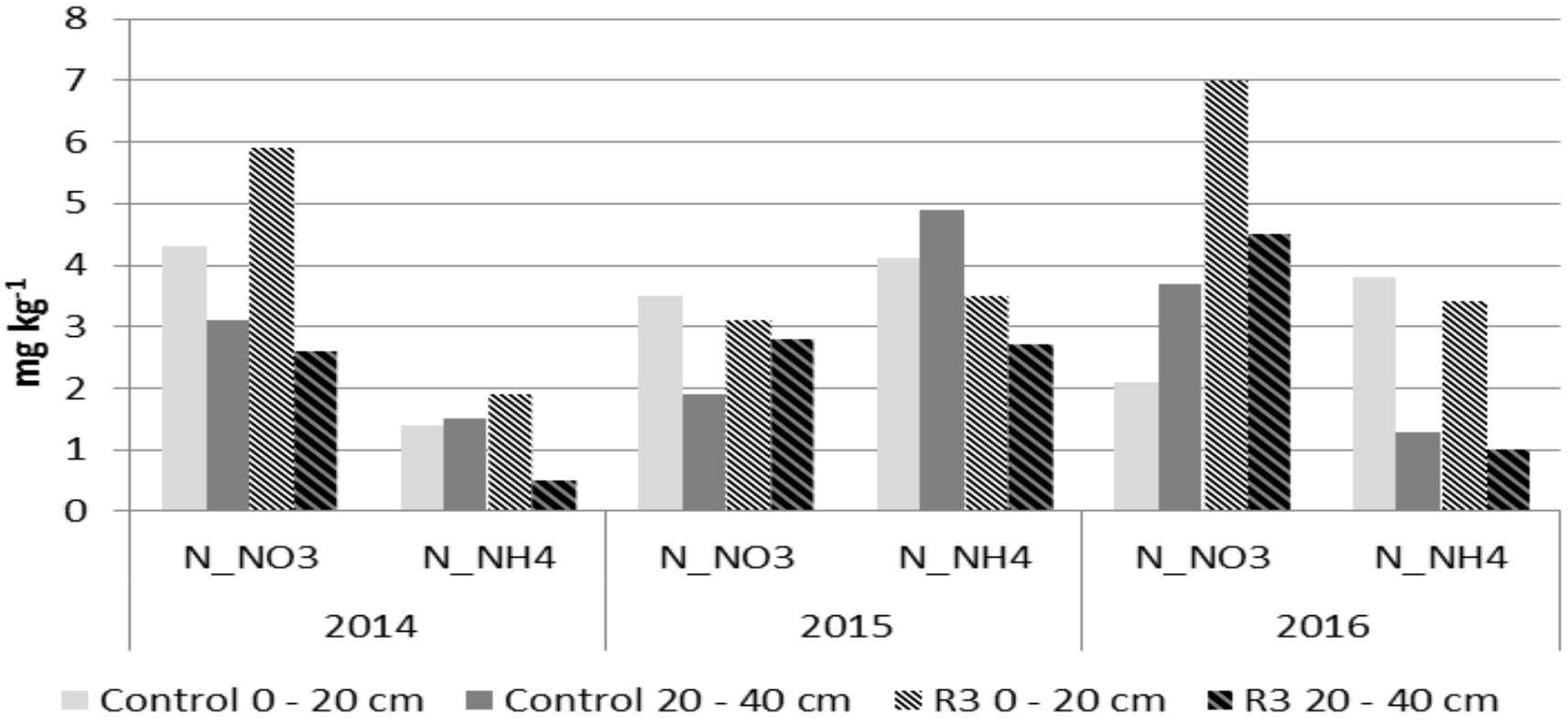
Effectiveness on N content in soil (R1)



Effectiveness on N content in soil (R2)



Effectiveness on N content in soil (R3)



Summary

The results of this investigation indicate that:

rhizobia inoculation is a recommendable management tool for faba beans generally, but effectiveness of rhizobia strains strongly depending on climate conditions.

Summary

- Neither strain R1 and R2, nor mixture of them did not provide a significant yield increase for faba bean cv. ‘Lielplatones’.

- Faba bean ‘Lielplatones’ seed treatment with *Rhizobium leguminosarium* contributed to an increase in the quantity of nitrogen in the soil.

Thak you for attention!