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Influence of tillage systems on soil penetration resistance in organically managed field

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- The use of heavy farm machinery has resulted in widespread soil compaction.

doi.org/10.1111/j.1475-2743.2009.00236.x

- Compacted soil limits the access of crops to soil water and nutrients and is expected to reduce crop productivity

DOI: [10.1080/09064710.2013.789125](https://doi.org/10.1080/09064710.2013.789125)

- Decreased soil permeability increases water / moisture / runoff and increases the risk of soil erosion

DOI: <http://dx.doi.org/10.5772/intechopen.98564>

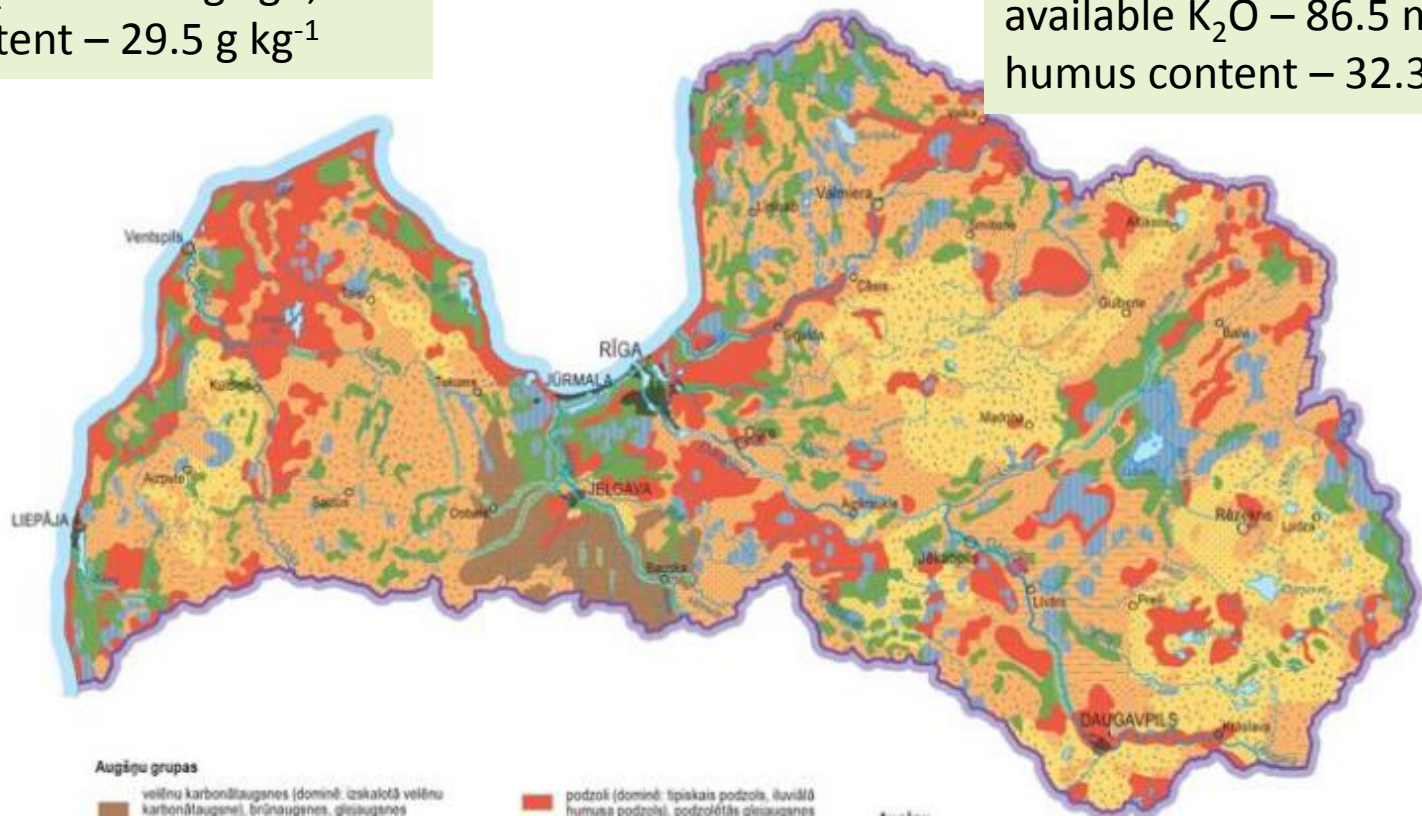
- **The minimal disturbance of the soil surface by tillage is one of the main principles of conservation agriculture**

<https://www.sciencedirect.com/science/article/pii/S2095633915300630>

In our study, **soil penetration resistance** in organically managed fields was determined.

farm (KRI) *Luvisol*, loamy sand
 $\text{pH}_{\text{KCl}} - 6.2$,
available $\text{P}_2\text{O}_5 - 76.2 \text{ mg kg}^{-1}$
available $\text{K}_2\text{O} - 409 \text{ mg kg}^{-1}$,
humus content – 29.5 g kg^{-1}

farm (BUL), *Luvisol*, sandy loam
 $\text{pH}_{\text{KCl}} - 6.3$,
available $\text{P}_2\text{O}_5 - 91.5 \text{ mg kg}^{-1}$
available $\text{K}_2\text{O} - 86.5 \text{ mg kg}^{-1}$,
humus content – 32.3 g kg^{-1} .



European agricultural fund for rural development (EAFRD) project **“Progressive farming system as a basis for environmentally friendly and efficient crop production in Latvia”**

(Progresīva zemkopības sistēma kā pamats vidi saudzējošai un efektīvai Latvijas augkopībai).

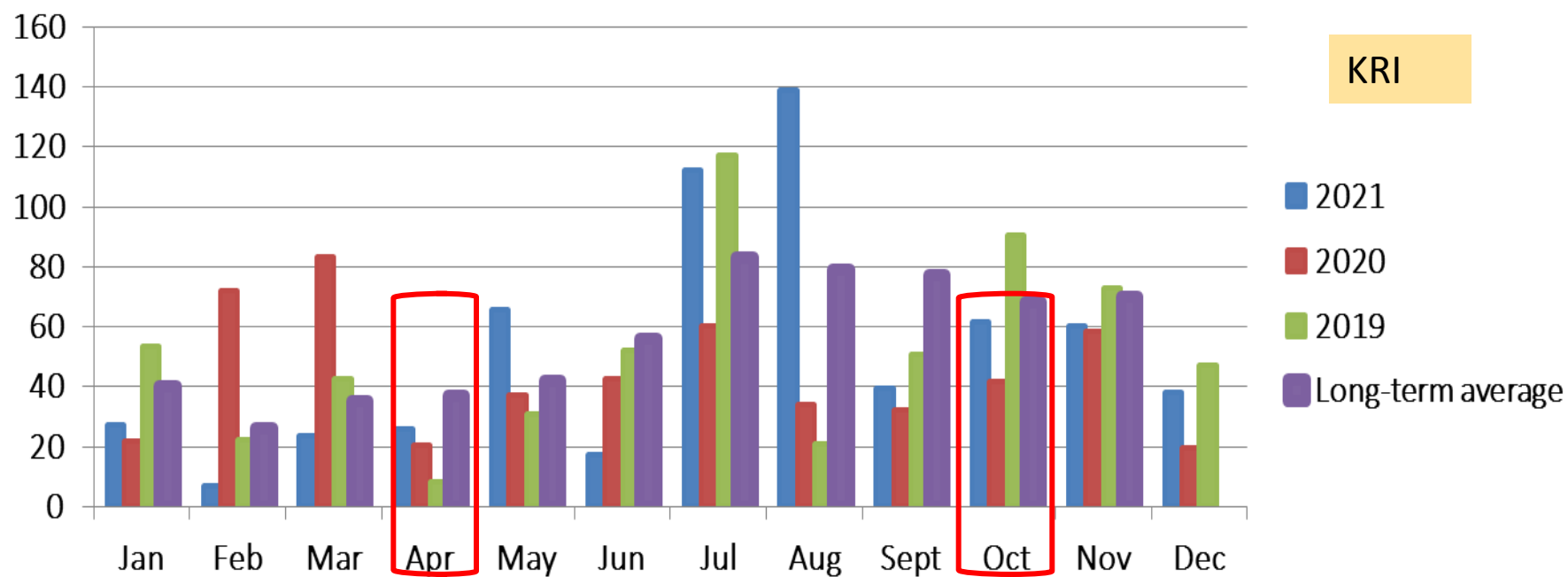
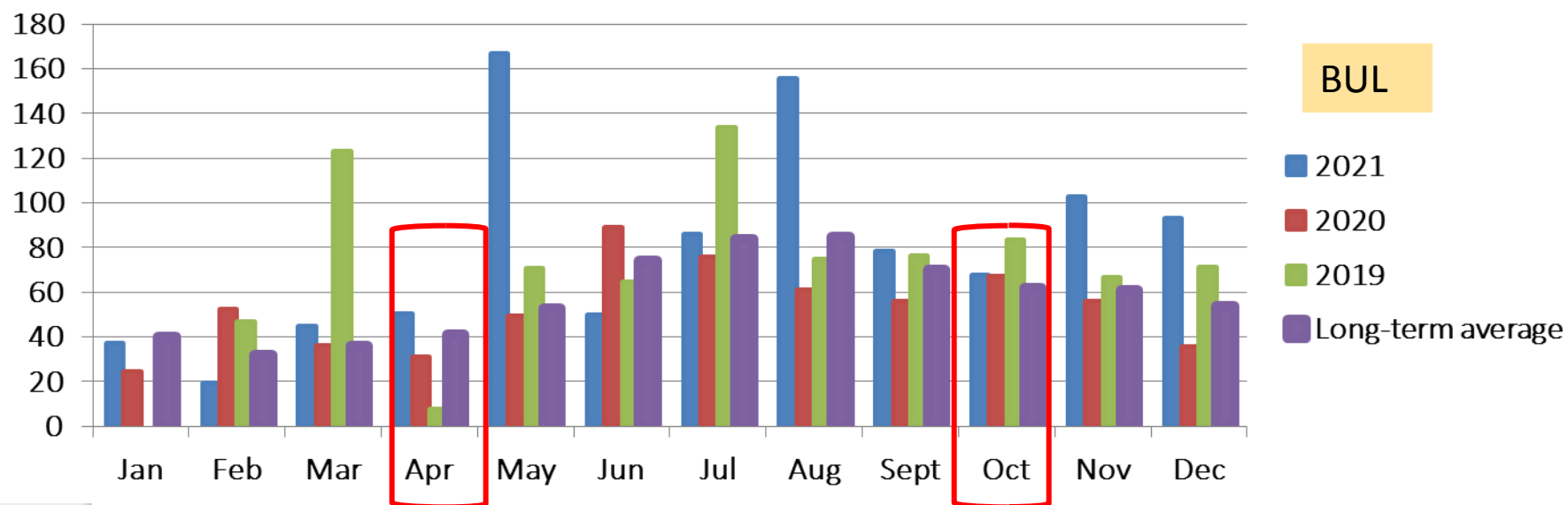
One of the tasks of the project: to determine the most economically advantageous soil treatment of the system, evaluating the dynamic indicators of the soil and the ecological and economic benefit of each specified system.



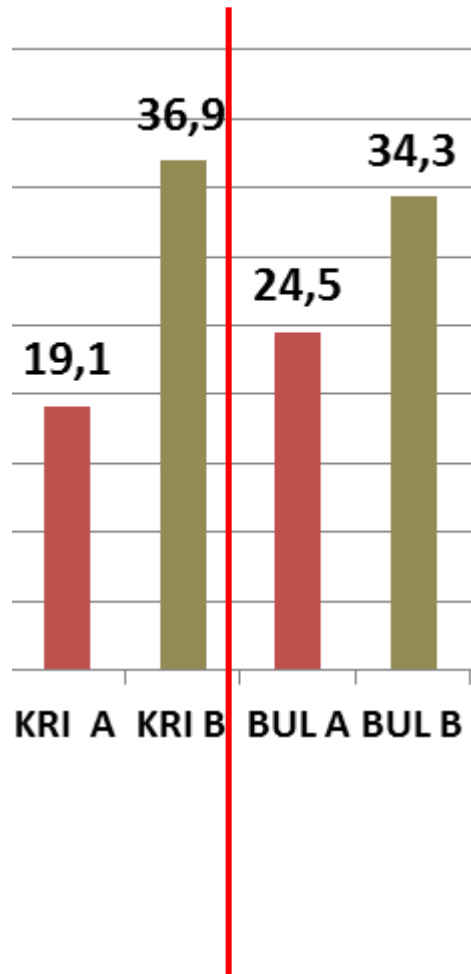
penetrologger „Eijkelkamp”.

Measurements have been
made in spring and in autumn.

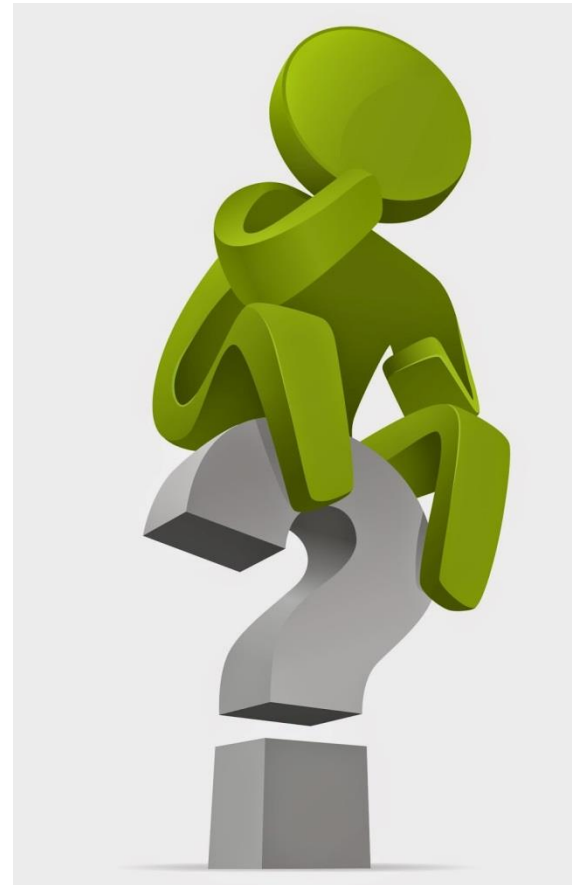
Precipitation, mm 2019, 2020, 2021



Soil moisture, %

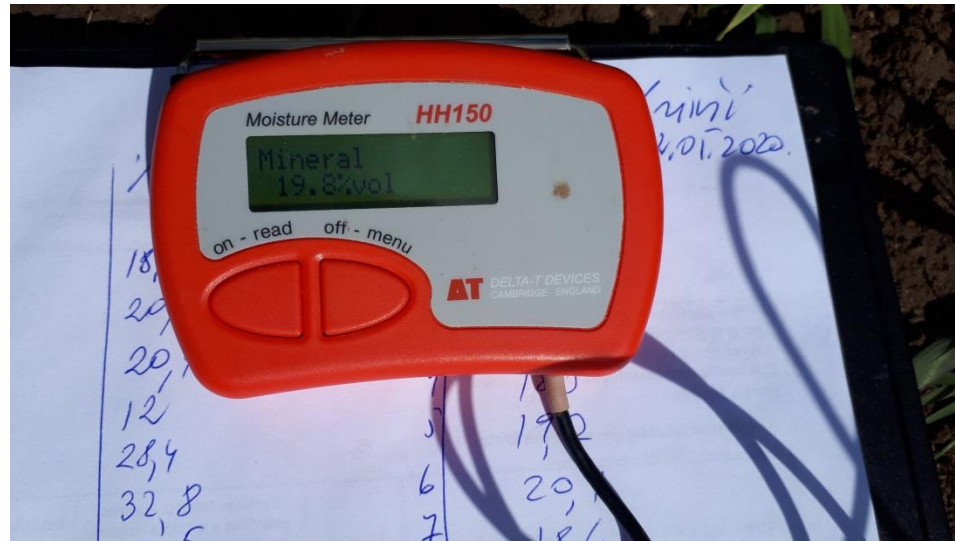


In average depending tilage system



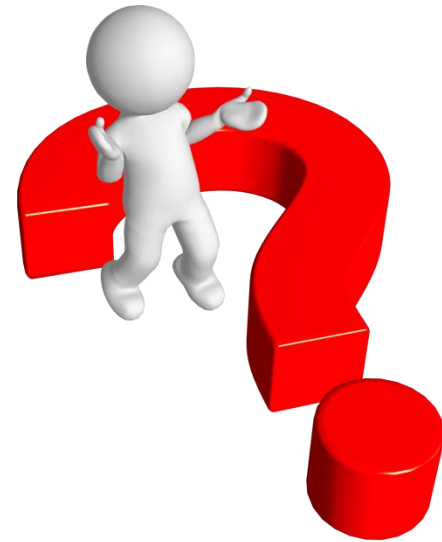
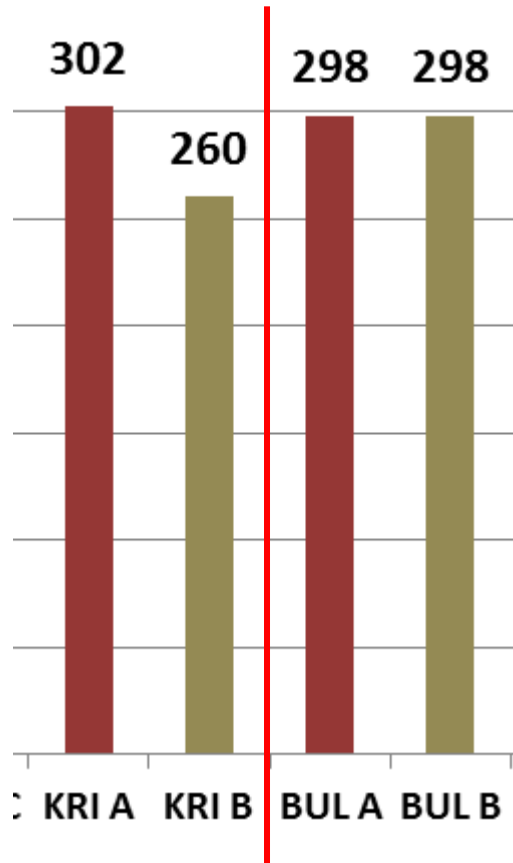
Moisture in the soil,% (10 cm deep)

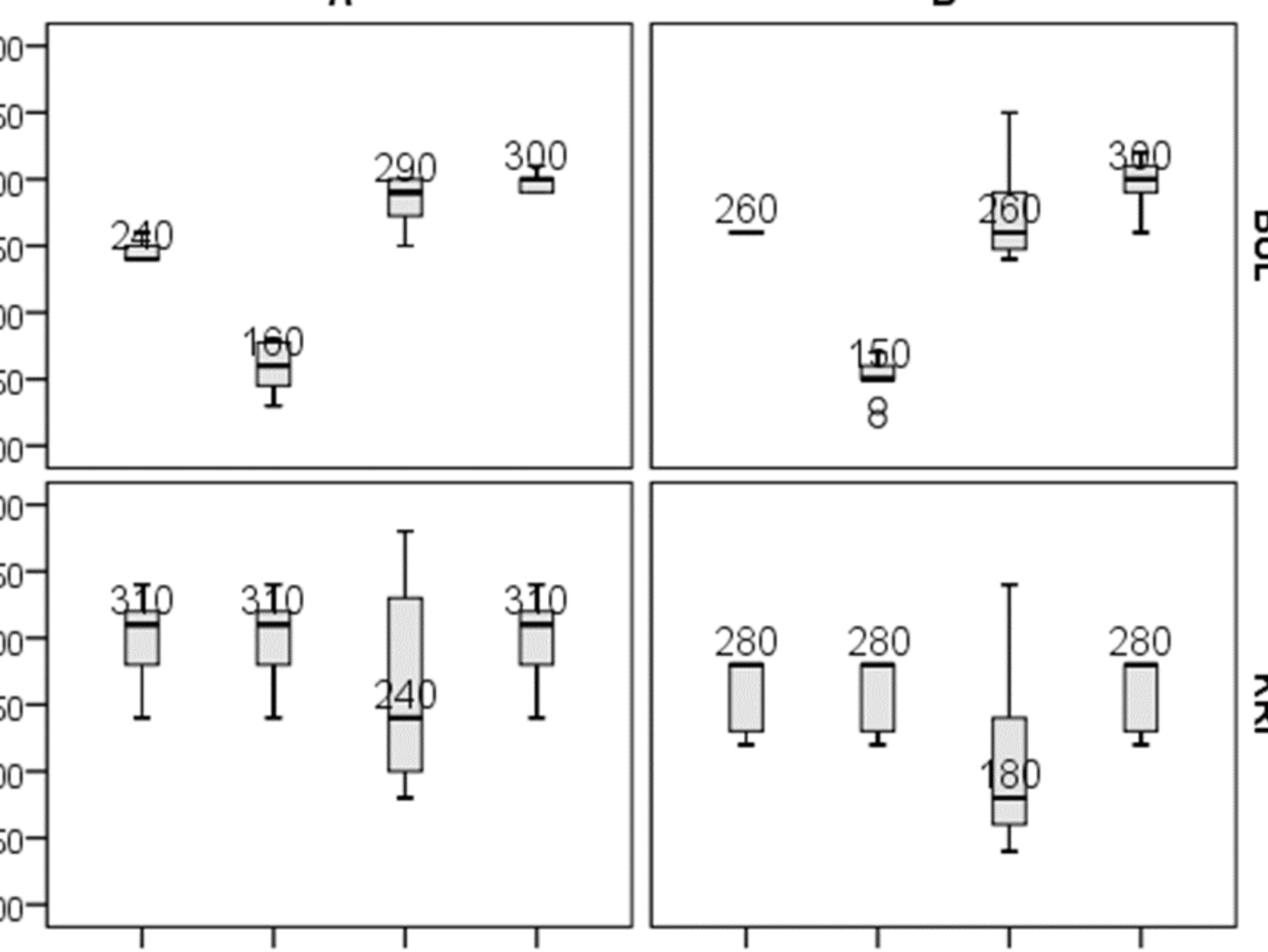
Differences in moisture variation are not significant when comparing fields ($p = 0.169$), however the mean values are significantly different (ANOVA $p < 0.001$).



Penetration resistance, N m²

In average depending tillage system





Summary

According to the data

Penetrometric resistance has changed minimally in both farms due to the tillage system, but there are also years when these differences are significant.

Penetrometric resistance variables vary from farm to farm

Humidity and p-resistance positively correlated in the min tillage variant (Pearson correlation, $r = 0.508$),



05.05. BUL



12.05. KRI

THANK YOU!



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