

Study of the effect of pulsed electromagnetic fields on the gas exchange rate in selected plant species

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TA ČR, FW03010433: "System for improving the efficiency of crop production and microbiological processes" (2021–2023)).



From an analytical study by CZU

Hypotheses

The effect of an
electromagnetic
pulse on the physiological
characteristics of plants.

There is a difference in the
physiological
parameters of
selected plants.

Methodology

- The study involved these plants: camelina, sunflower and pea.
- The experiment was set up in a greenhouse.
- The treated variant was exposed using an EMF generator (electromagnetic field — ProEMgen technology)



Measurements

- Measurements were taken every 14 days.
- Measurements began at the 4-true-leaf stage and ended at the budding stage.
- Photosynthesis and transpiration: key processes for plant growth.
- Chlorophyll and carotenoids: pigments essential for photosynthesis.
- F_v/F_0 and F_v/F_m : indicators of photosynthetic efficiency.
- Root growth and aboveground biomass were measured.

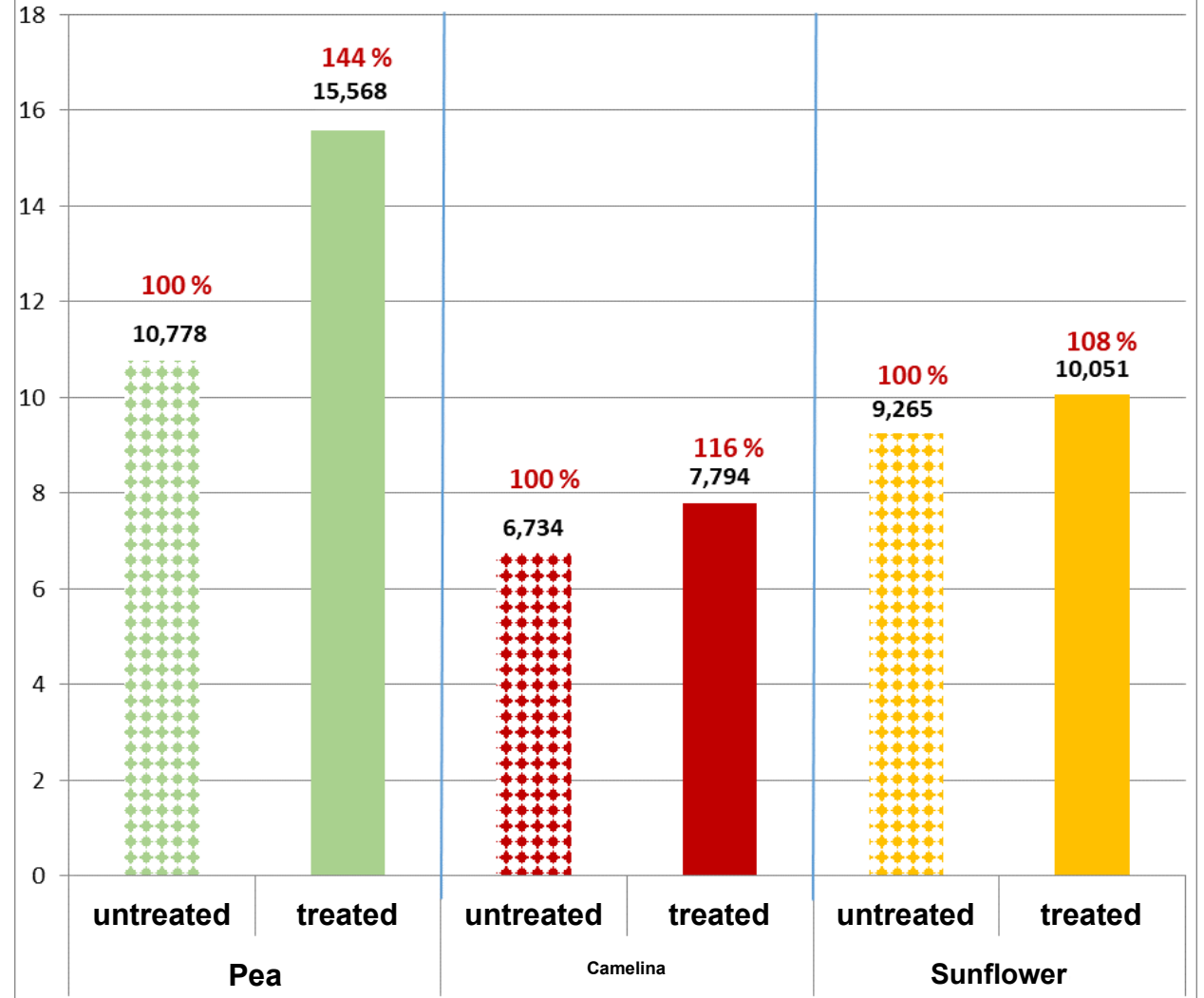


Results

- Average photosynthesis rate ($\text{mmol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$) of the monitored plants

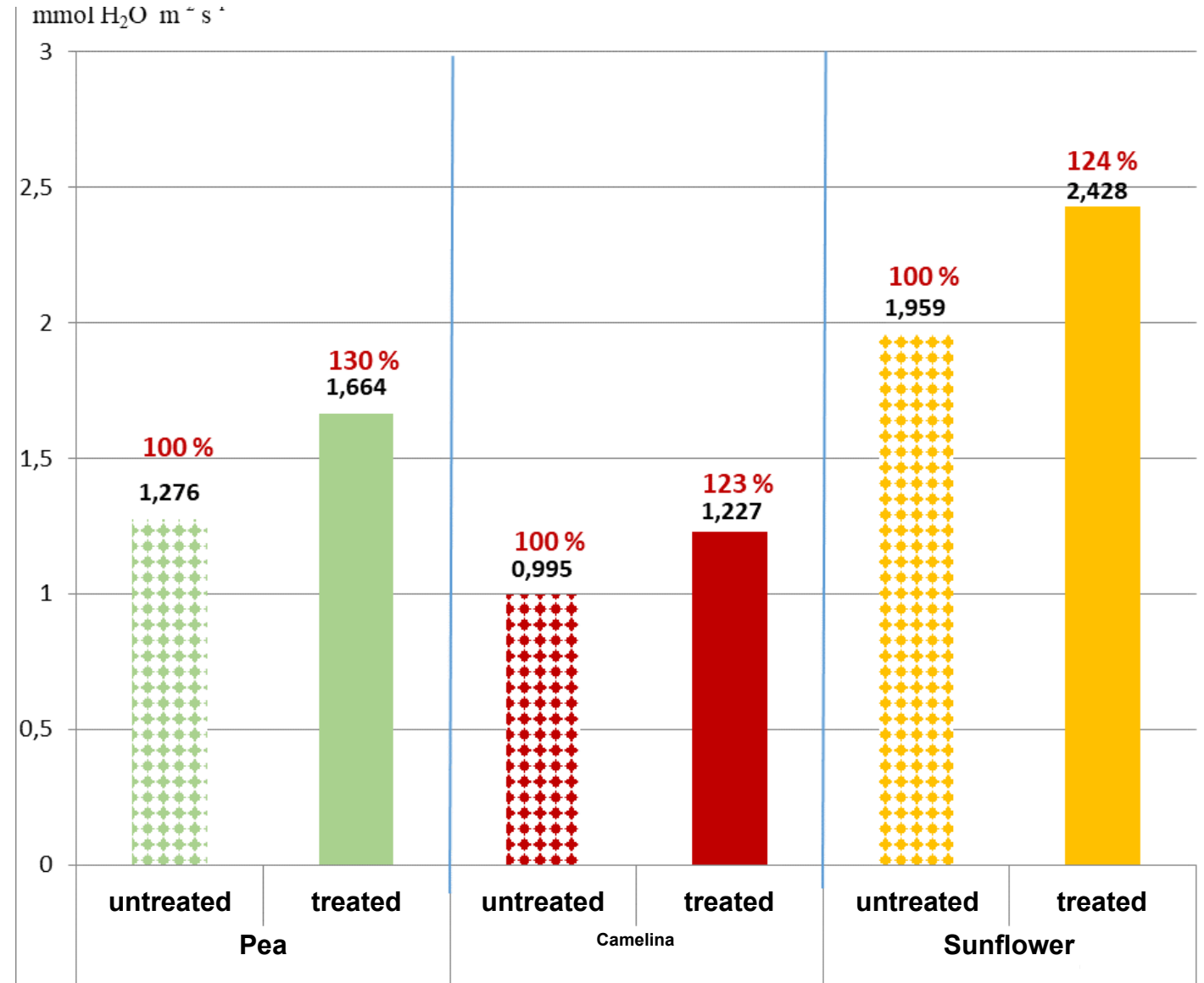
Photosynthesis

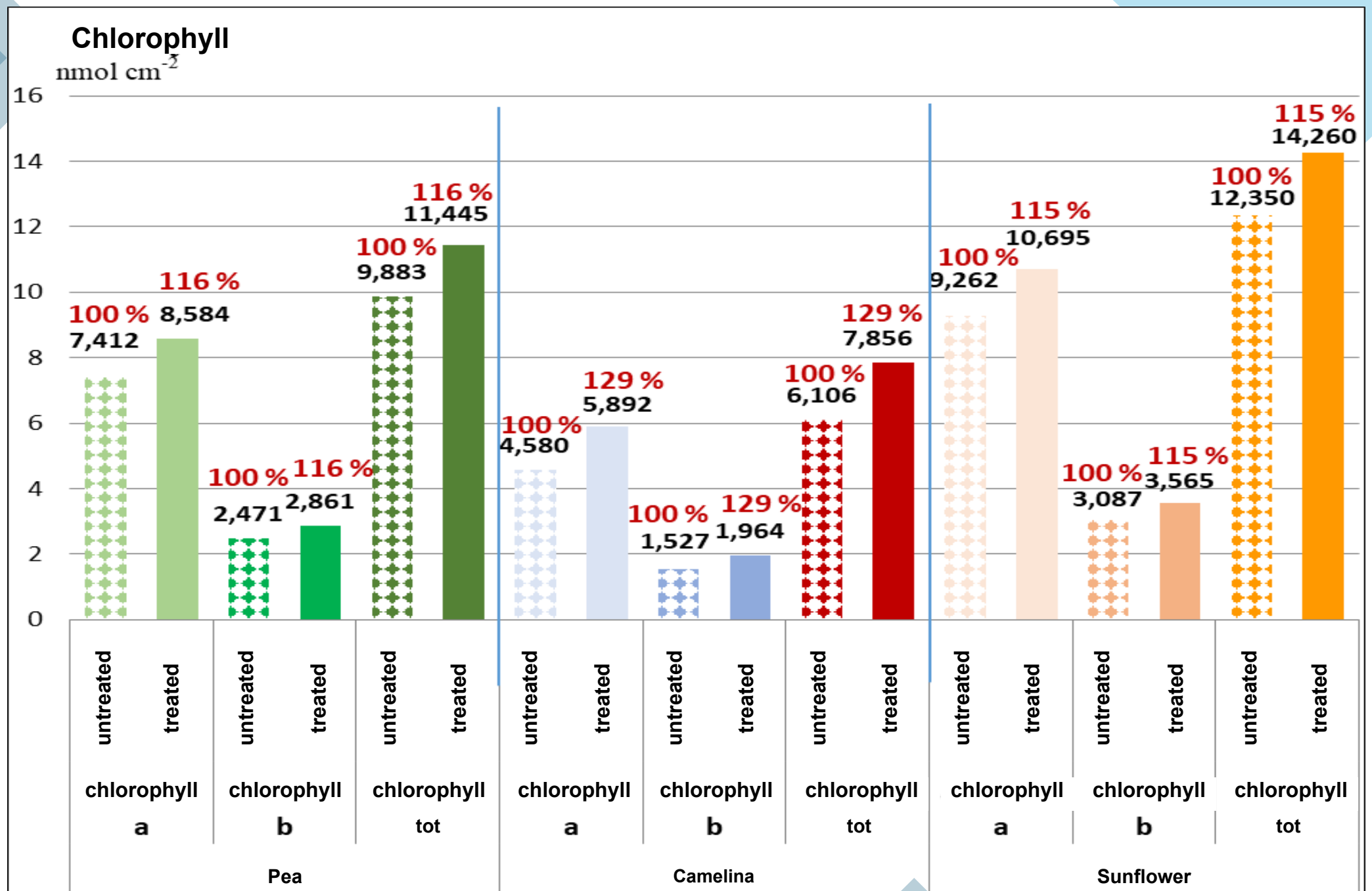
$\text{mmol CO}_2 \text{ m}^{-2} \text{ s}^{-1}$



Transpiration

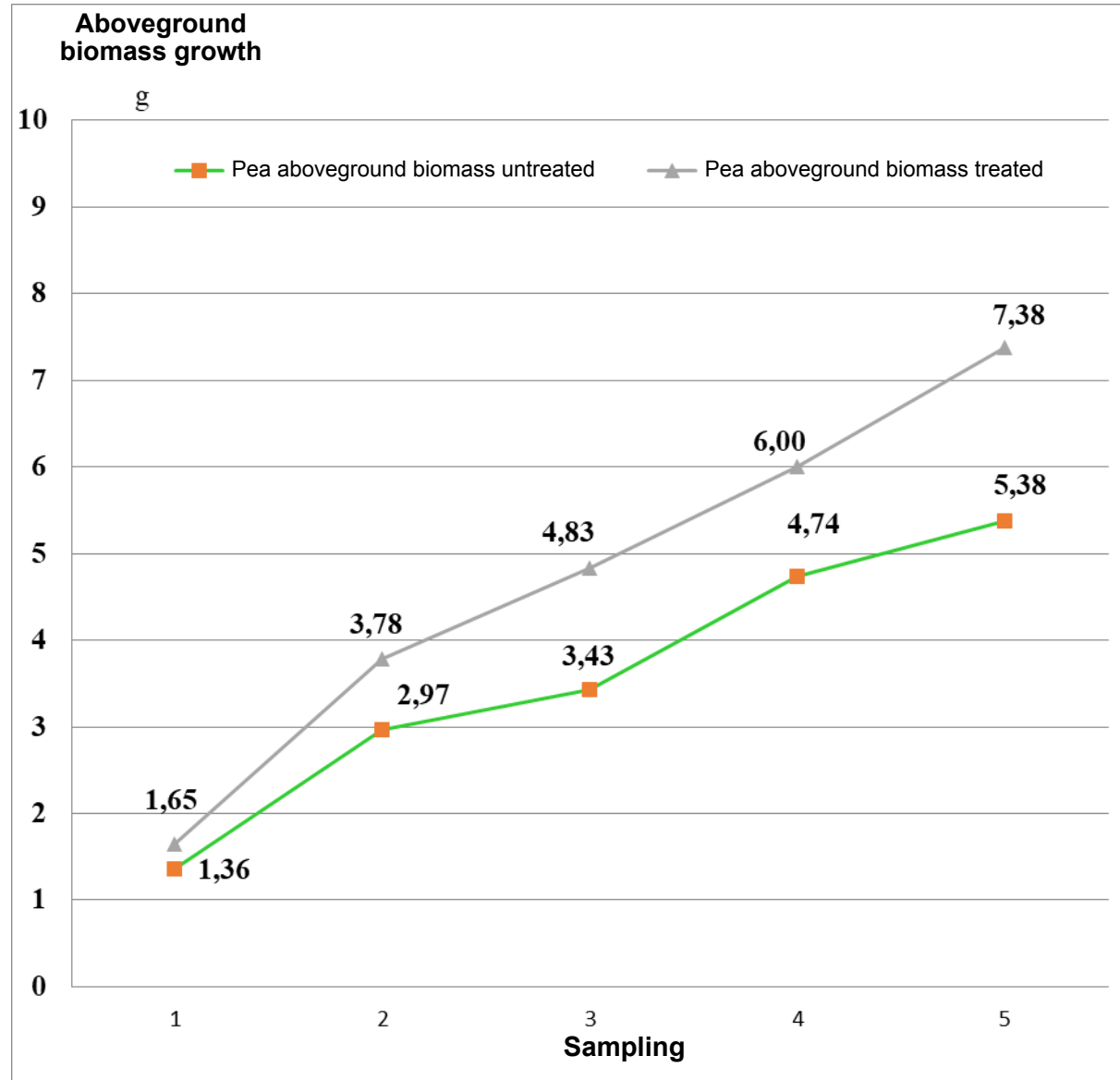
- Increased transpiration after treatment may result from improved photosynthetic processes and increased plant activity.
- This can lead to more efficient use of water and nutrients by plants, potentially increasing growth and yield.





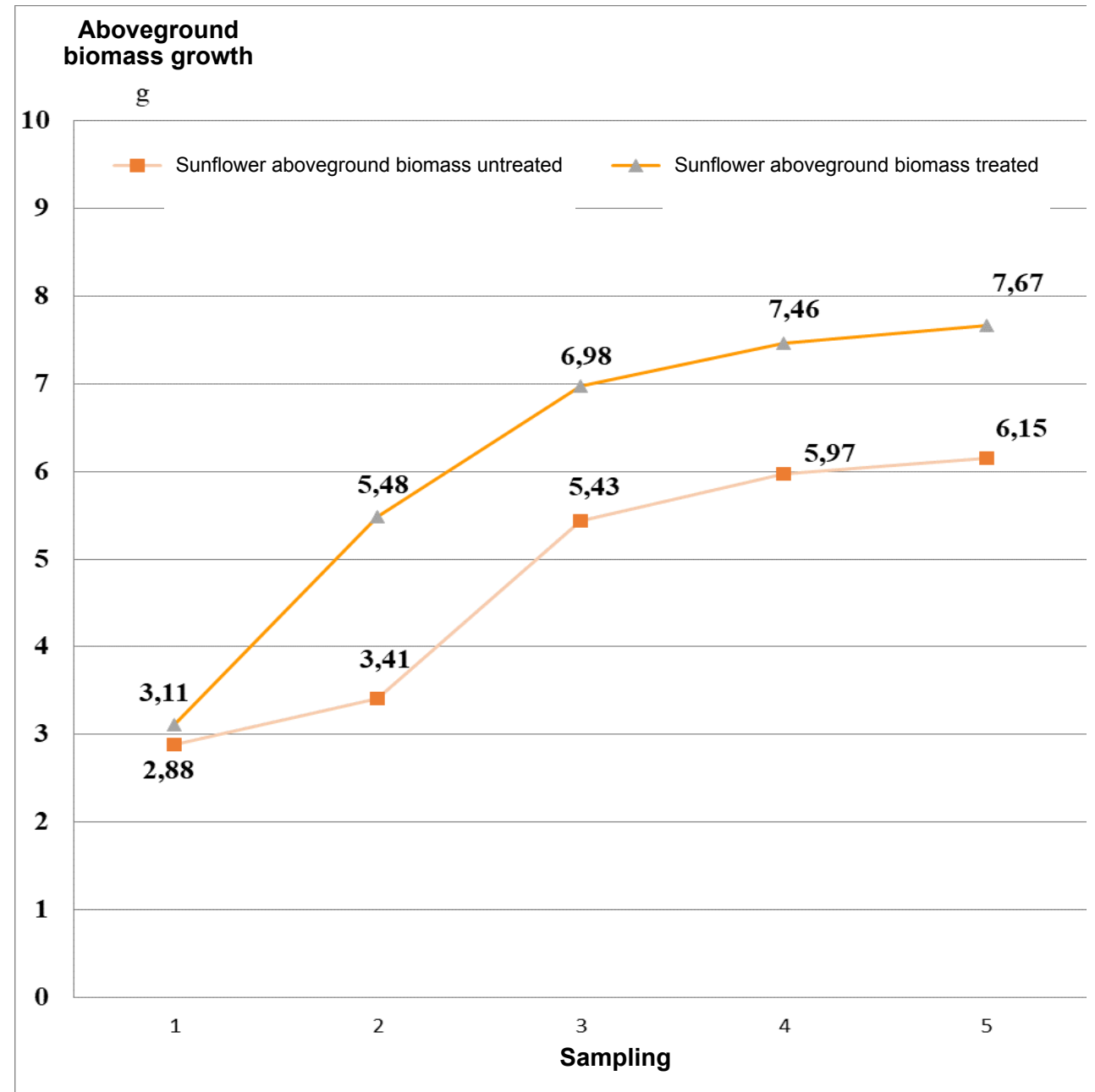
Increase in aboveground biomass of pea over time

- The difference between variants was 2.00 g in favour of the treated pea plants.



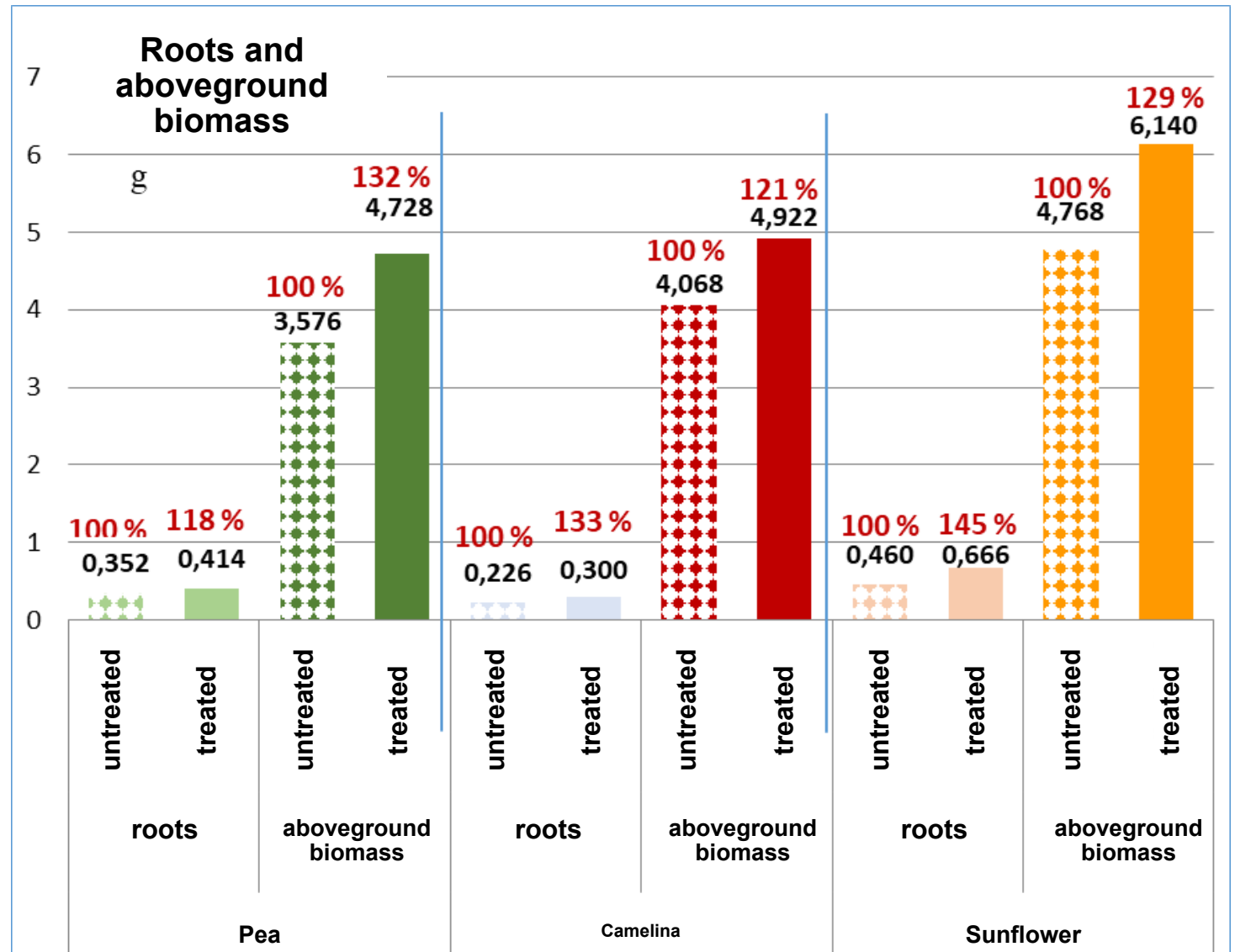
Aboveground biomass weight of sunflower during measurements

- The treated sunflower variant reached a biomass weight 1.52 g higher.



Increase in roots and aboveground biomass

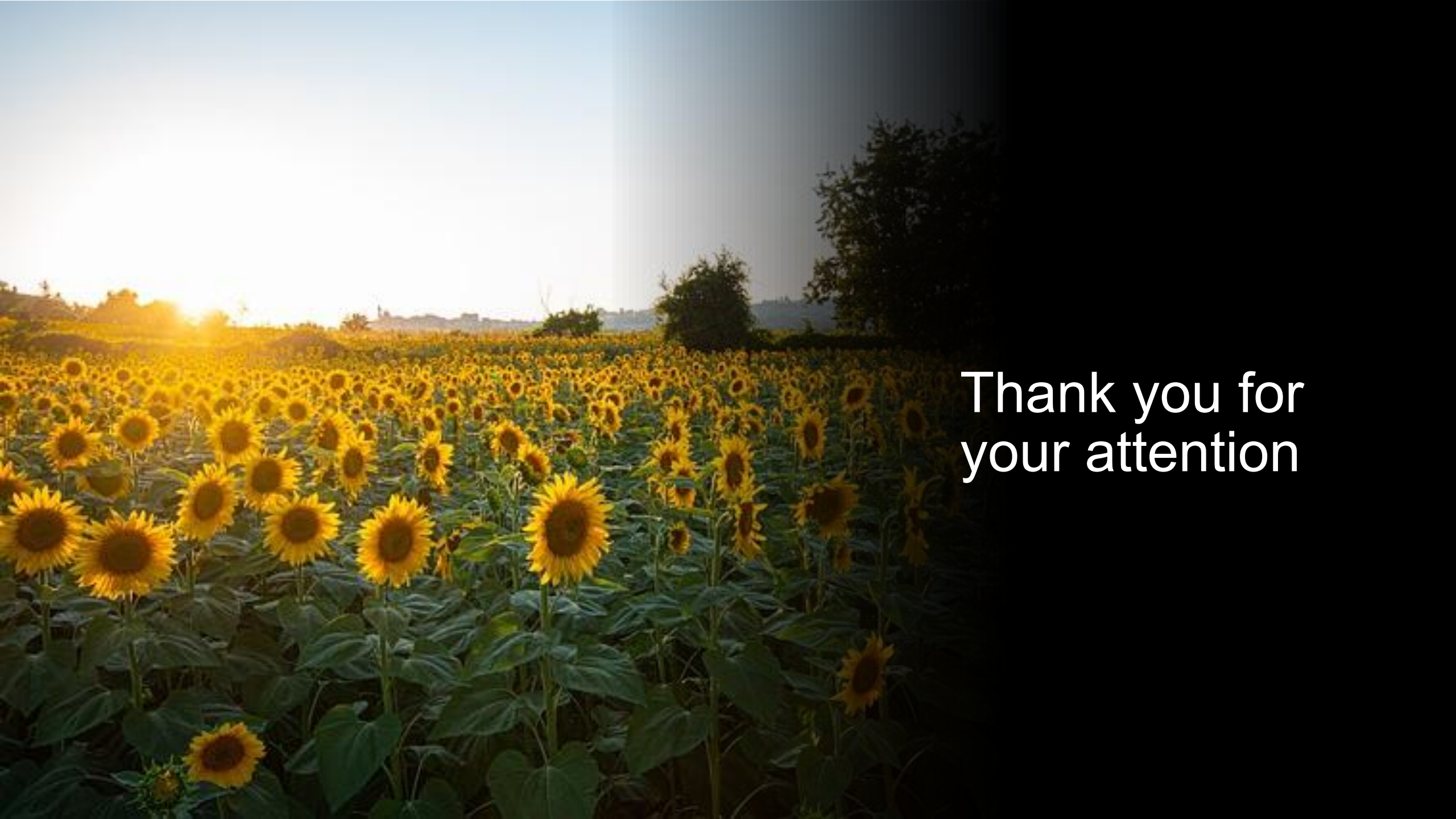
- Increased aboveground biomass and root growth after treatment suggests that the electromagnetic field may stimulate plant growth and development.





Conclusion

- An effect was found in all monitored variants and species. A significant effect of the electromagnetic field was also found on the formation of both root and aboveground biomass.
- Sunflower responded best to the electromagnetic field compared with the other species, followed by pea and then camelina.

A wide-angle photograph of a vast field of sunflowers in full bloom. The sun is low on the horizon to the left, creating a strong golden glow and lens flare that illuminates the scene. In the distance, a city skyline is visible against the bright sky. The right side of the image is darkened with a gradient overlay, providing a space for text.

Thank you for
your attention