

Comparison of alternative low-volume transplant production systems for lettuce

M. Dombrowsky, F. Besand, K.-U. Katroschan

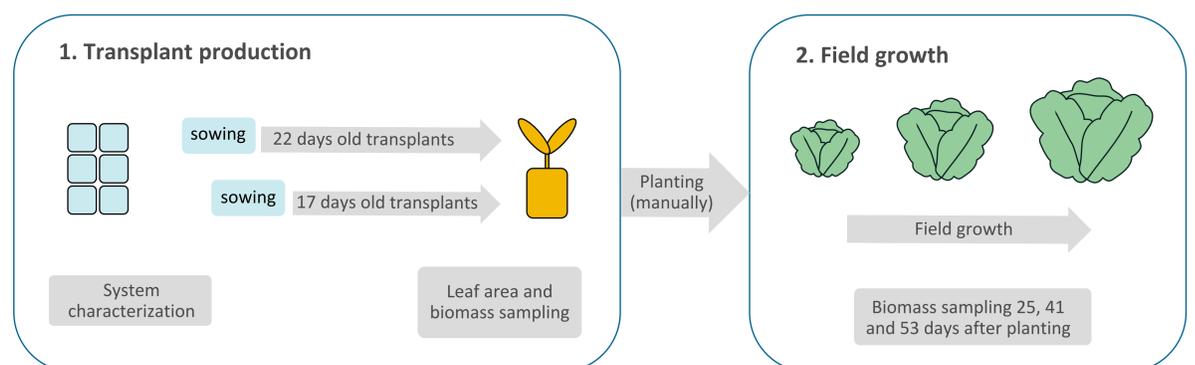
Introduction

One way to make vegetable transplant production more sustainable is to reduce the amount of peat used per plant. In Germany, the most common transplant system for lettuce are press pots, but their peat reduction potential seems limited. Alternative transplant systems offer a higher potential, as they usually have smaller cell volumes, are more space efficient and have less stringent requirements regarding substrate characteristics. However, depending on the system and crop, there is a wide variation in the degree of automation and the impact on plants caused by lower-volume systems.

This study aimed to expand knowledge on how different transplant systems affect transplant quality and yields formation of lettuce under Central European growing conditions.

Methods

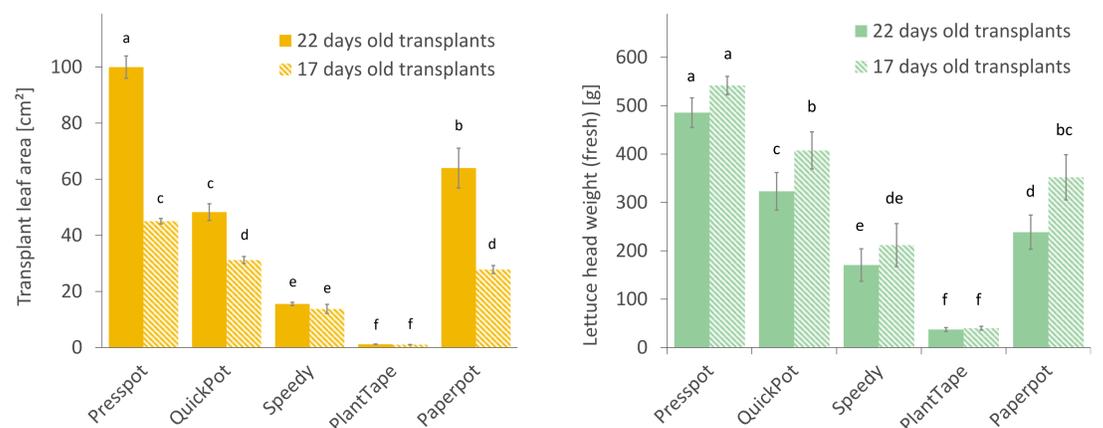
- Field experiments took place in summer 2023 in Gülzow, Northeast Germany using Iceberg lettuce (*Lactuca sativa* var. *capitata*) 'Firstkin' (Nunhems)
- Experimental design was a complete randomized block design with four replications
- Substrate type varied according to origin of the used system; the QuickPot and Paperpot systems were manually filled with presspot substrate



Results



17-day-old transplants from five transplant systems immediately before planting.



Transplant leaf area before planting (left) and lettuce head weight (fresh) at harvest 41 days after planting (right) of used systems with SD and reported significant mean differences using compact letter display (two way ANOVA and Tukey post-hoc test; $p < 0.05$; $n = 4$).

| System characteristics | Presspot | QuickPot® | 'Speedy' | PlantTape® | 'Paperpot' |
|--|----------|-----------|----------|------------|------------|
| Rooting volume (cm ³) | 52 | 17 | 22 | 6 | 14 |
| Substrate dry bulk density (g cm ⁻³) | 0.26 | 0.16 * | 0.15 | 0.09 | 0.17 * |
| Plant density (plants m ⁻²) | 733 | 1355 | 900 | 3000 | 813 |

* Tray cells filled manually

Conclusions

- Alternative transplant systems investigated offer significant substrate savings due to a combination of lower rooting volumes and reduced substrate dry bulk density
- All low volume systems negatively affected lettuce transplant size and showed reduced crop growth, which led to delayed maturity of up to two weeks
- Field crop growth of lettuce did not depend solely on transplant size (leaf area and biomass), it was also affected by transplant age and transplant system itself

ACKNOWLEDGEMENTS

This study was conducted as part of the collaborative project 'Development and Evaluation of Peat-Reduced Production Systems in Horticulture (ToPGa)', grant no. 2220MT006H.



Funded by:

