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Reducing N and P for sustainable soilless cultivation of saffron under controlled conditions

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INTRODUCTION & AIM

- **Saffron spice** is the red dried stigmas of the *Crocus sativus* L. flowers
- **Corm size** affects both spice yield and subsequent corm production → larger corms have greater nutrient reserves
- Saffron is mainly grown in open fields, but there is an increasing interest in growing it under controlled conditions

→ **Precision farming** can increase crop productivity, sustainability and profitability by optimising the use of inputs through precise nutrient dosing

Aim: evaluate the possibility of reducing the content of nitrogen and phosphorus levels in soilless saffron cultivation without affecting production and quality

METHOD

- The experiment was carried out in an unheated greenhouse
- Corms planted at the end of the summer in 4 L pots (one corm per pot) filled with sterile perlite
- Fertigation applied every two weeks until leaf senescence in spring, using two different solutions:
  - a modified Long-Ashton solution containing 600 µM phosphorus (P) and 2 mM nitrogen (N) (**Control**)
  - another Long-Ashton solution with **half the concentrations of P and N (½ N,P)**

- **Evaluated Parameters**
  - **Agronomic:**
    - Spice yield
    - Corm yield
    - Leaf production
  - **Quality:**
    - Spice quality (ISO 3632)
  - **Physiological (measured with IRGA):**
    - Leaf area
    - Leaf transpiration rate (*E*),
    - Net CO_2 assimilation rate (*A*)
    - Stomatal conductance *(gs)*
    - Intercellular CO_2 concentration (*Ci*)

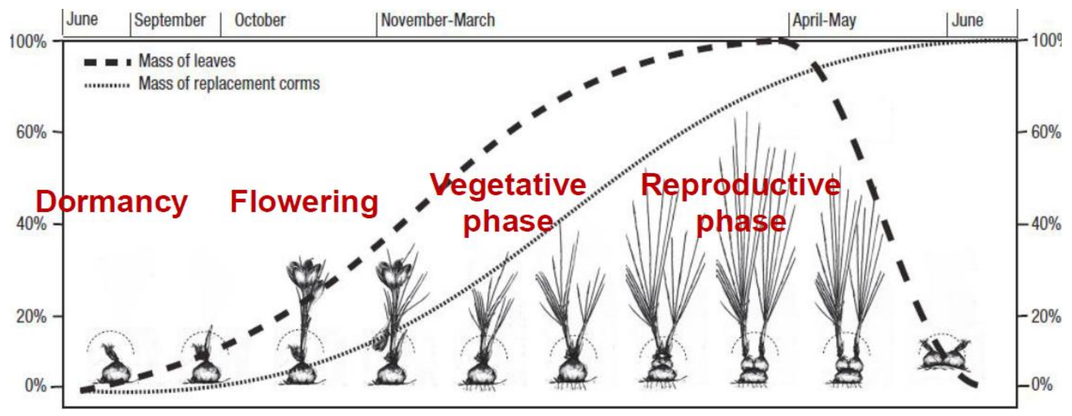
RESULTS & DISCUSSION

	Control	½ N,P	*p*
Yield and quality			
Saffron spice corm^{-1} (mg)	28.7 ± 2.3	29.3 ± 6.4	ns
Corms plant^{-1} (n.)	5.50 ± 1.7	6.5 ± 2.2	ns
Leaves plant^{-1} (n.)	41.6 ± 12.6	43.1 ± 16.7	ns
ISO (3632)	Category I	Category I	-
Physiological parameters			
Leaf area plant^{-1} (cm^2)	330.4 ± 82.2	330.8 ± 95.4	ns
E (mmol m^{-2} s^{-1})	3.4 ± 0.7	3.2 ± 0.4	ns
A (µmol m^{-2} s^{-1})	5.5 ± 0.5	6.7 ± 4.2	ns
gs (mmol m^{-2} s^{-1})	172.2 ± 48.5	174.2 ± 23.5	ns
Ci (ppm)	479.3 ± 4.5	480.5 ± 7.1	ns

- A reduction in phosphorus (P) and nitrogen (N) concentrations did not adversely affect saffron spice and corm yield, spice quality, or physiological parameters related to photosynthesis.

CONCLUSION

Reduced fertiliser inputs can support sustainable saffron production in soilless systems without affecting yield of spice and corms or quality of saffron spice.



From Lopez-Corcoles et al. (2015)

FUTURE WORK / REFERENCES

This approach could be further explored by integrating beneficial microorganisms, aiming to enhance nutrient use efficiency and promote plant resilience under low-input conditions.

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