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The colourful flower of *Crocus sativus* L.: a treasure trove of antioxidants

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Introduction

Crocus sativus L. is cultivated for the expensive **spice** ("red gold"). The violet **tepals**, red stigmas and the delicate scent of saffron of its flower are given by phenolic compounds and terpenes with antioxidant properties. The bloom, spice yield and quality can be affected by horticultural practices, e.g. open field or soilless cultivation and the use of plant biostimulants, such as arbuscular mycorrhizal fungi (AMF) (Regulation EU 2019/1009). The antioxidants concentration of dried saffron tepals can be influenced by the extraction technique.

Materials and Methods

Spice

- A monospecific (*Rhizophagus intraradices*, Ri) and multispecific (*R. intraradices and Funneliformis mosseae*, Ri + Fm) inoculum *vs* uninoculated controls (AMF-) (10 g of inoculum under each corm)
- Experimental tests in **field** (Western Alps, Italy) and in **soilless** (heated greenhouse) conditions

Caser, M.; Demasi, S.; Victorino, Í.M.M.; Donno, D.; Faccio, A.; Lumini, E.; Bianciotto, V.; Scariot, V. Arbuscular Mycorrhizal Fungi Modulate the Crop Performance and Metabolic Profile of Saffron in Soilless Cultivation. *Agronomy* 2019, 9, 232, doi:10.3390/agronomy9050232

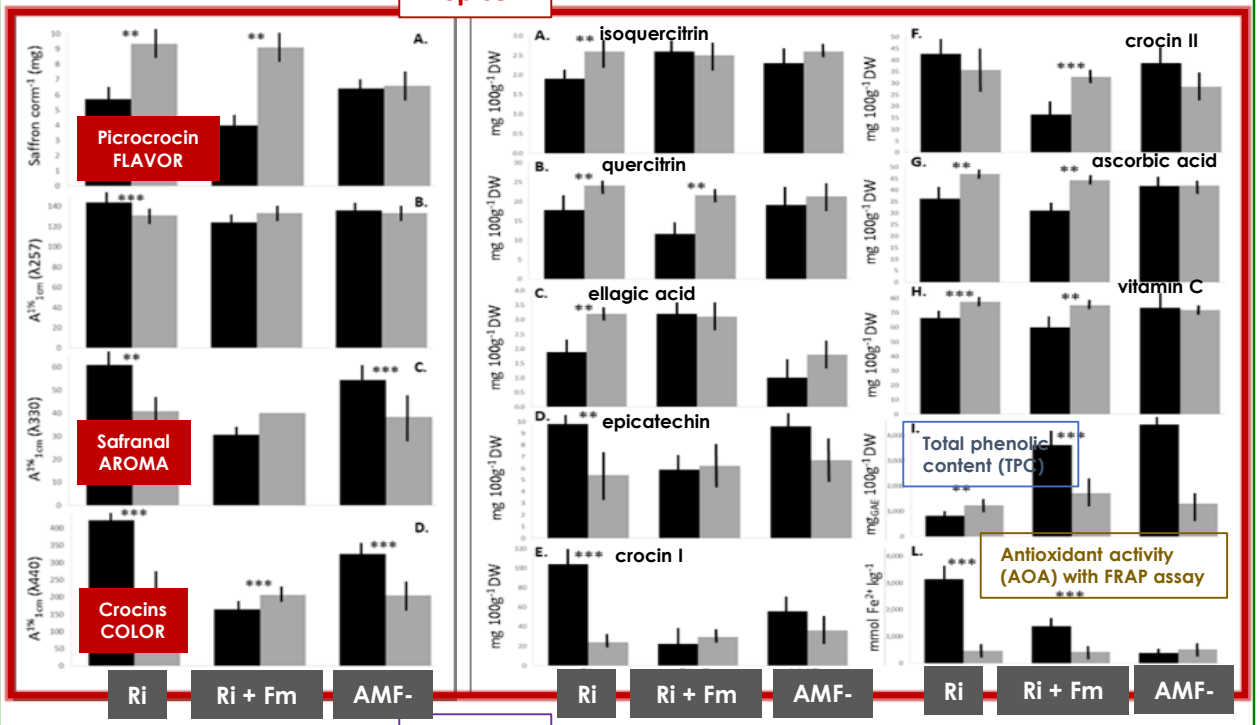
Tepals

- Conventional maceration *vs* Ultrasound Assisted Extraction (UAE)
- Water and three methanol concentrations, i.e., 20%, 50%, and 80%

Stelluti, S.; Caser, M.; Demasi, S.; Scariot, V. Sustainable processing of floral bio-residues of saffron (Crocus sativus l.) for valuable biorefinery products. *Plants* 2021, *10*, 1–15, doi:10.3390/plants10030523

Results

Spice



Tepals

Extraction		TPC (mgGAE 100 g^{-1} DW)	TAC (mgG3G 100 g^{-1} DW)	FRAP (mmolFe^{2+} Kg^{-1} DW)	ABTS (µmolTE g^{-1} DW)	DPPH (µmolTE g^{-1} DW)
M	Water	1142.27 ± 43.52	345.04 ± 132.47 a,b	571.54 ± 3.21 a	13.82 ± 0.72	15.56 ± 2.29
M	Met20	1123.53 ± 59.86	268.13 ± 26.76 a,b	506.73 ± 13.85 b,c	14.20 ± 0.60	17.83 ± 2.46
M	Met50	1106.45 ± 9.17	300.39 ± 15.02 a,b	535.83 ± 10.30 a,b	14.62 ± 0.29	24.52 ± 2.55
M	Met80	1166.96 ± 33.15	249.13 ± 11.97 a,b	511.72 ± 22.49 a,b,c	14.29 ± 0.32	24.17 ± 1.53
UAE	Water	1150.63 ± 11.23	413.30 ± 137.16 a	556.90 ± 11.91 a,b	12.76 ± 0.81	23.55 ± 3.60
UAE	Met20	1113.27 ± 46.11	178.39 ± 34.03 b	460.05 ± 35.55 c	13.39 ± 1.46	19.35 ± 4.83
UAE	Met50	1066.89 ± 26.36	277.09 ± 49.06 a,b	506.68 ± 21.80 b,c	15.10 ± 0.38	24.58 ± 1.46
UAE	Met80	1153.49 ± 22.74	231.70 ± 30.19 a,b	513.67 ± 21.12 a,b,c	14.34 ± 0.81	21.03 ± 1.81
p		ns	0.01413 *	0.0002608 ***	ns	ns

Conclusions

- The cultivation in greenhouse can facilitate the crop management while obtaining saffron of first quality with high amount of phenols.
- Treatments with AMF can improve saffron yield and quality.
- High concentration of Total phenol content was found in tepals.
- UAE showed results of TAC similar to maceration, allowing safer solvents (i.e., water) and a reduction of the time.