

Chemical and genetic relationship of *Cynara cardunculus* L. (cardo) in southern Portugal



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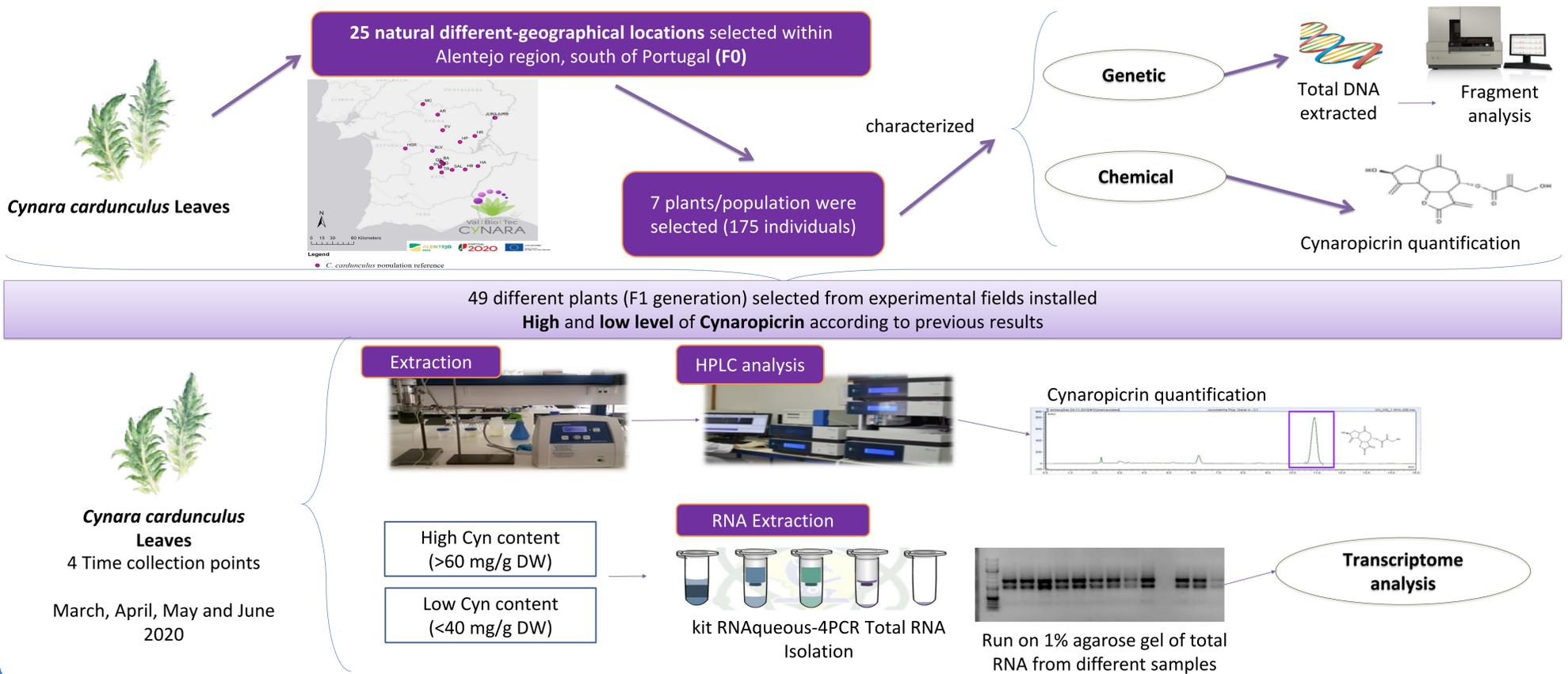
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INTRODUCTION

- ✓ Southern Portugal has a high natural variability of *Cynara cardunculus* L. (Cc) at a biochemical and morphological levels, conducting to the necessity of genetic diversity studies.
- ✓ Cc represents a natural source of sesquiterpene lactones (SL), particularly cinaropicrin.
- ✓ To improve the biotechnological cardoon impact, based on SL chemical profile, a transcriptomic analysis is ongoing to select the best genotypes for cinaropicrin production.

AIM: To obtain molecular markers, related to characteristics of interest, for future cardoon breeding programs

Materials and Methods



Results

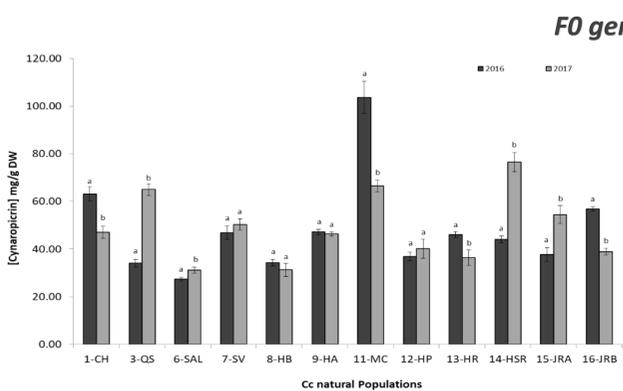


Figure 1. Graphical representation of the results from Cynaropicrin content (mg/g DW) of populations F0 (natural populations of Cc, represented by different letters and numbers: 1-CH; 3-QS; 6-SAL; 7-SV; 8-HB; 9-HA; 11-MC; 12-HP; 13-HR; 14-HSR; 15-JRA and 16-JRB) in two consecutive years (2016 and 2017). Columns with different letters (a, b) represent means significantly different only between populations in the two different years (one-factor ANOVA analysis, Duncan's test, P<0.05).

Cc chemical characterization regarding cinaropicrin contents

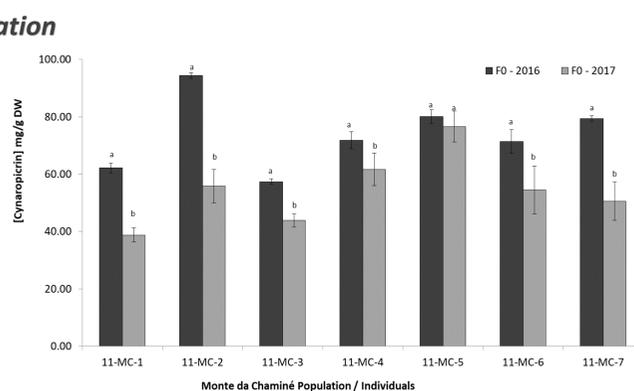


Figure 2. Graphical representation of the results from Cynaropicrin content (mg/g DW) of the population F0 (natural population of Cc - Monte da Chaminé) in two consecutive years. Columns with different letters (a,b) represent means significantly different only between individuals in two different years (one-factor ANOVA analysis, Duncan's test, P<0.05).

F1 generation

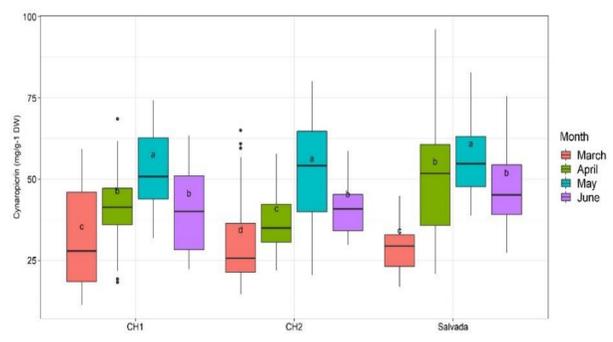


Figure 3. Graphical representation of the results from Cynaropicrin content (mg/g DW) of the population F1 in 4 consecutive months (march, April, May and June 2020). Box plot with different letters represent means significantly different between individuals in the different months sampled and in the different installed fields over the time (ANOVA analysis, Tukey's test, P<0.05).

- ✓ Demonstrate a great variability of chemical profiles within populations and demonstrates a great variability within the same populations, in different years;
- ✓ Cynaropicrin content is different from individual to individual within the same population;
- ✓ Cynaropicrin contents were variable within two consecutive years (F0 2016 vs F0 2017).

- ✓ Different chemical profiles were identified, *Cynara cardunculus* leaves ethanolic extracts presented a remarkable range between 12.7 (low Cyn content) and 80.7 (high Cyn content) mg/g DW of cinaropicrin.

RNA Extraction

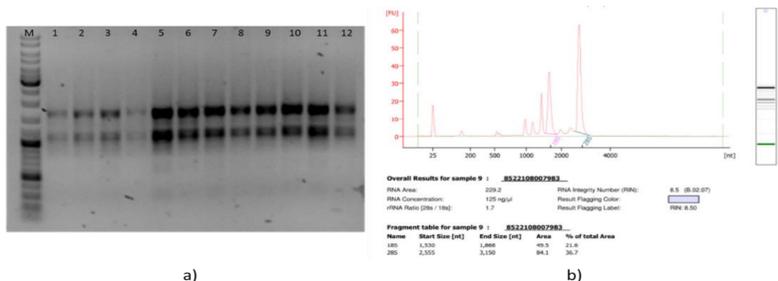


Figure 4. a) Agarose gel electrophoresis (2%) of total RNA from different Cc leaves samples; b) Electropherograms (Agilent technologies) of total RNA from cardoon leaves.

- ✓ Total RNA was extracted from biological samples with high and low level of cinaropicrin content;
- ✓ Total RNA amount of 1µg and RIN (RNA Integrity Number) higher than 8 were confirmed by highly accurate and precise electrophoresis.

Conclusions and Ongoing work

- ✓ The lipophilic extracts of Cc leaves (generation F0) showed a remarkable variation between 27 and 103 mg/g DW of Cyn;
- ✓ The results obtained in the different plants over the 4 months collection (F1 generation) show a great variability in terms of cinaropicrin content, concerning the genotype and collection period;
- ✓ Different chemical profiles were identified, *Cynara cardunculus* leaves ethanolic extracts presented a remarkable range between 12.7 and 80.7 mg/g DW of cinaropicrin;
- ✓ Total RNA amount of 1µg and RIN (RNA Integrity Number) higher than 8 were confirmed by highly accurate and precise electrophoresis;
- ✓ The next step will be the transcriptome analysis.