

Effect of aluminum concentration on secondary metabolites production in three chemotypes of *Cunila galioides* medicinal plant.

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Introduction

Medicine plants play an important role in public health, especially in developing countries, and among them *Cunila galioides* Benth. is a naturally occurring medicinal and aromatic plant native from south Brazil¹. The flavonoids, present in significant amounts in some species of *Cunila* sp., possess several properties and its content maybe affected by the aluminum stress. In this context, the aim of this work was to assess the influence of different levels of aluminum in nutrient solution on the content of essential oils and flavonoids in three chemotypes of *Cunila galioides*.

Results and Discussion

The treatment with aluminum did not influence the extraction yield as well as the content of major components in the oils and it was not observed any interaction between Al concentration and population. Six major components were identified in the three poejo populations: citral (neral + geranial) in André da Rocha (86 %), trans- β -ocimene and ledene in Bom Jardim da Serra (79 %) and 1,3,8-menthatriene, 1,5,8-p-menthatriene and trans-p-2,8-manthatriene-1-ol in Santa Lúcia (83 %).

Regarding the flavonoid content, it was observed the interaction between population and aluminum concentration (Table 1). For André da Rocha and Santa Lúcia populations, the amount of flavonoids increases with increasing Al concentration in the nutrient solution, with significant amounts produced for the highest Al concentration value.

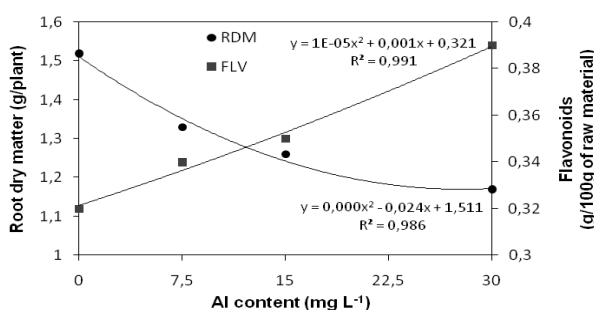
Figure 1 shows that the production of flavonoids is inversely related to the root biomass production. Together with a reduction in the dry root matter, an increase in the flavonoids production is also observed in response to a stress situation.

Table 1. Average content of flavonoids (grams of rutin /100 g of dried vegetable material) in the three populations of poejo (*Cunila galioides*) submitted to different levels of aluminum concentration.

Cunila [†]	Concentration of Al in the nutrient solution (mg L ⁻¹)				Mean
	0	7.5	15.0	30.0	
AR	0.35 ^{ab}	0.37 ^{aAB}	0.37 ^{aAB}	0.40 ^{aA}	0.37 ^a
BJ	0.32 ^{abA}	0.33 ^{bA}	0.36 ^{aA}	0.35 ^{bA}	0.34 ^b
SL	0.30 ^{bC}	0.31 ^{bBC}	0.34 ^{aB}	0.40 ^{aA}	0.34 ^b
	0.32 ^C	0.34 ^{BC}	0.35 ^B	0.39 ^A	-

*Different letters mean significant difference at 95% (Tukey test), comparison being made between lower case letters in columns with capital letters in rows. [†]AR - André da Rocha; BJ - Bom Jardim da Serra; SL - Santa Lúcia.

Figure 1. Relationship between average content of flavonoids (FLV) and dry root matter (RDM) in the three populations of poejo submitted to different levels aluminum concentration.



Conclusions

The concentration of flavonoids increased significantly for the populations tolerant to aluminum concentration in the nutrient solution, thus showing a relationship between tolerance and flavonoids production, which may be an interesting characteristic from the medicinal point of view.

Acknowledgments

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¹ Bordignon, S.A.L.; Montanha, J.A.; Schenkel, E.P. *Biochem. Syst. Ecol.* **2003**, *31*, 785.