

Phytotoxic potential of Citrus essential oils on weed species


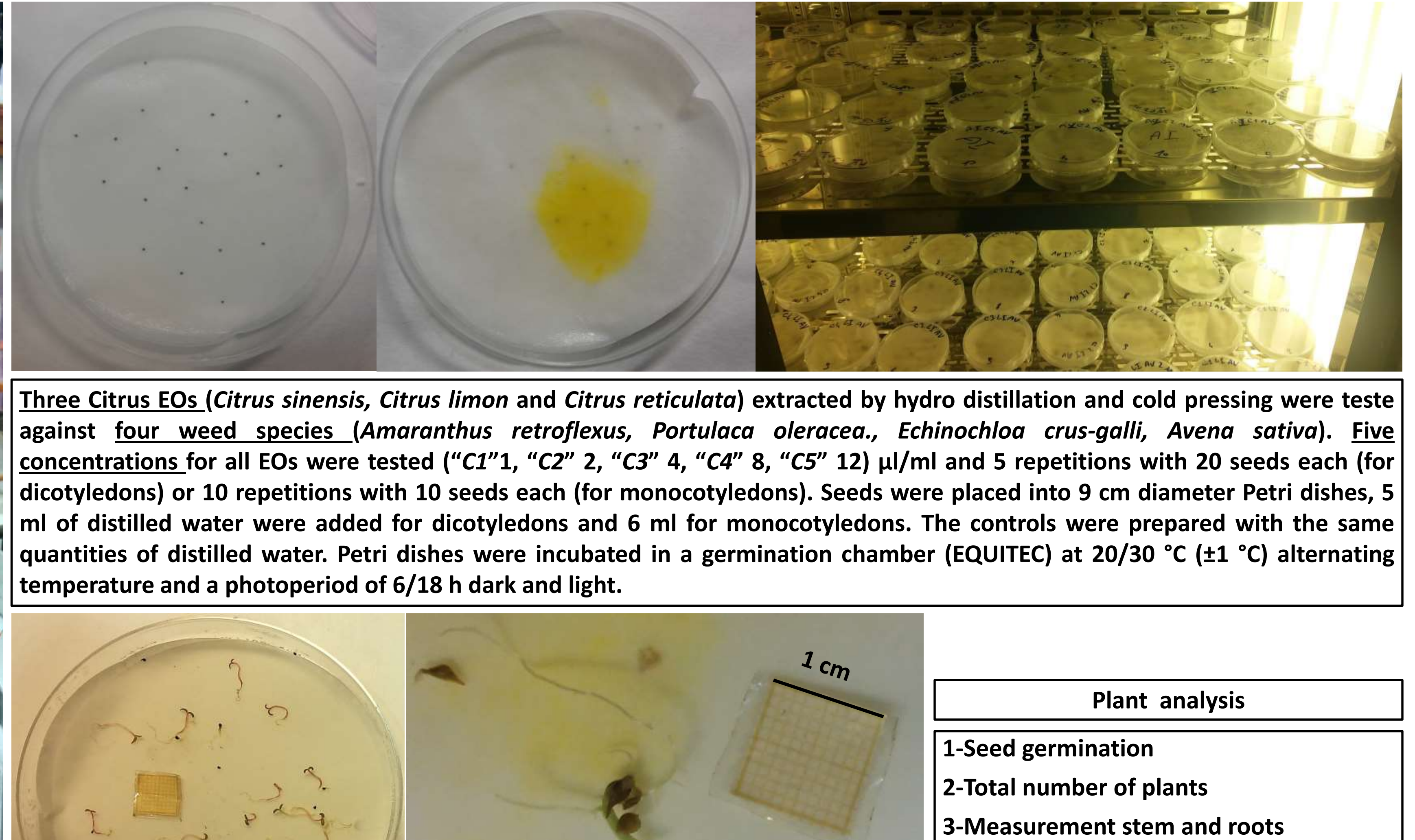

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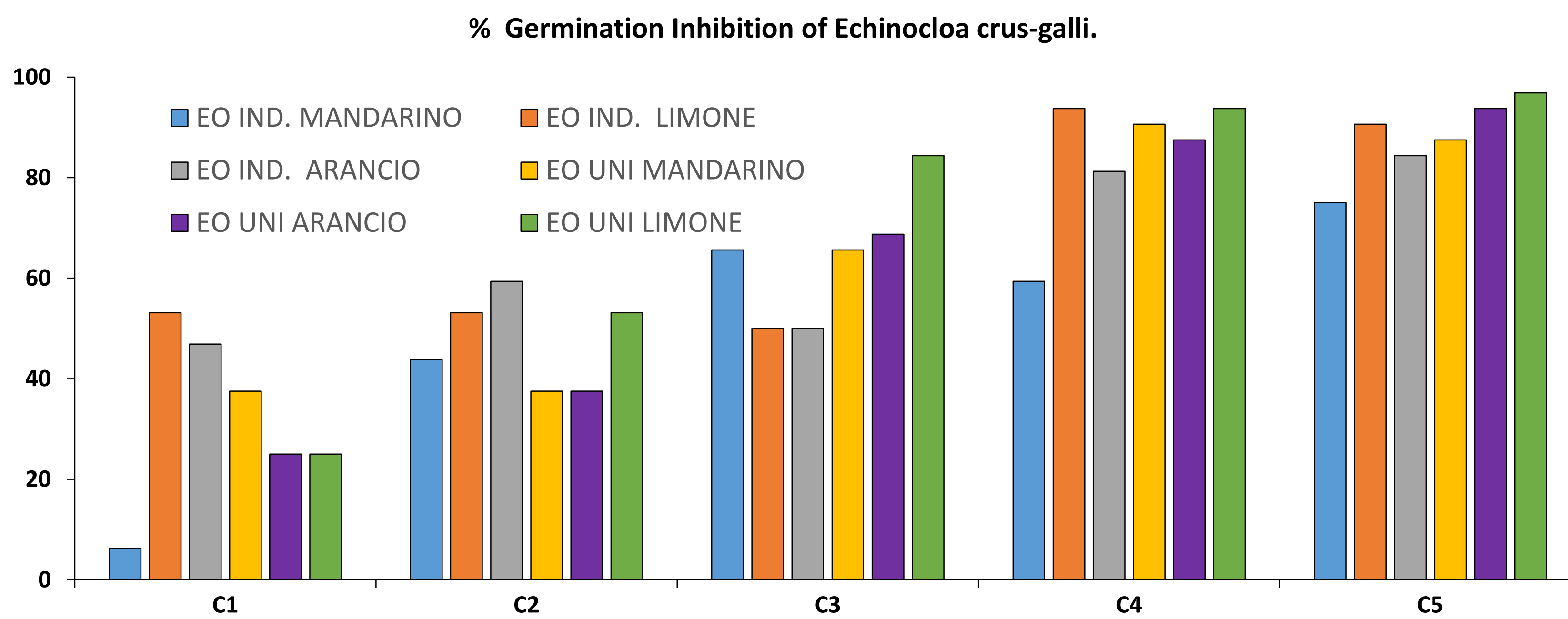
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Objective: To evaluate in vitro phytotoxic effects of Citrus EOs extracted by hydro distillation and cold pressing on weed species.

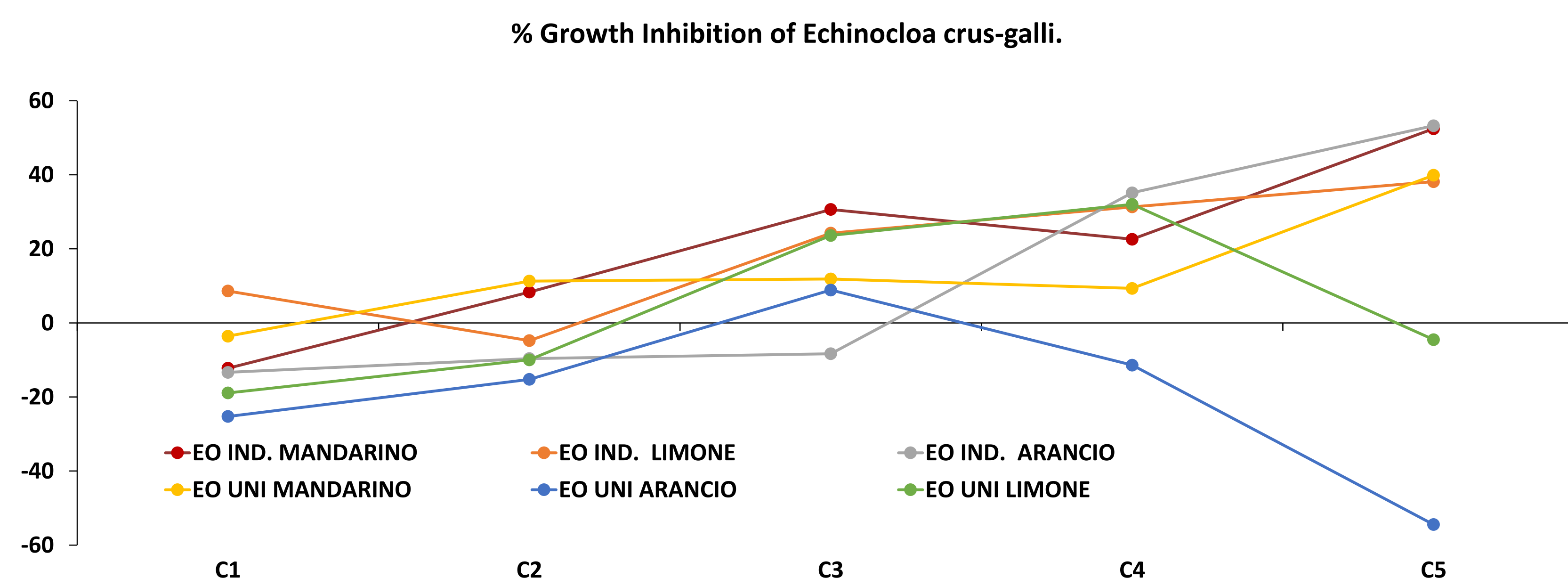
Materials and methods

EOs Extraction	Experimental design					
						
<p>Three Citrus EOs (<i>Citrus sinensis</i>, <i>Citrus limon</i> and <i>Citrus reticulata</i>) extracted by hydro distillation and cold pressing were tested against four weed species (<i>Amaranthus retroflexus</i>, <i>Portulaca oleracea</i>, <i>Echinochloa crus-galli</i>, <i>Avena sativa</i>). Five concentrations for all EOs were tested ("C1"1, "C2" 2, "C3" 4, "C4" 8, "C5" 12) µl/ml and 5 repetitions with 20 seeds each (for dicotyledons) or 10 repetitions with 10 seeds each (for monocotyledons). Seeds were placed into 9 cm diameter Petri dishes, 5 ml of distilled water were added for dicotyledons and 6 ml for monocotyledons. The controls were prepared with the same quantities of distilled water. Petri dishes were incubated in a germination chamber (EQUITEC) at 20/30 °C (±1 °C) alternating temperature and a photoperiod of 6/18 h dark and light.</p>						
<p>EOs from <i>Citrus sinensis</i>, <i>Citrus limon</i> and <i>Citrus reticulata</i> were extracted by two methods: Cold pressing and hydro distillation with a Clevenger-type apparatus.</p>	 <table border="1" data-bbox="1554 1261 2034 1469"> <thead> <tr> <th>Plant analysis</th> </tr> </thead> <tbody> <tr> <td>1-Seed germination</td> </tr> <tr> <td>2-Total number of plants</td> </tr> <tr> <td>3-Measurement stem and roots</td> </tr> <tr> <td>4-Fresh weight</td> </tr> </tbody> </table>	Plant analysis	1-Seed germination	2-Total number of plants	3-Measurement stem and roots	4-Fresh weight
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Results and discussion



All the treatments were active inhibiting *E. crus-galli* germination. The most effective was the highest concentration, 12 µl/ml for all EOs tested. EO UNI lemon was the most active at C5-C4-C3 concentrations, at C2 the most effective was EO IND tangerine and at C1 EO IND lemon. Between C4 and C5 concentrations, the differences were minimal for all oils, with the exception of EO IND tangerine.



The essential oils more active reducing *E. crus-galli* seedlings growth were EO IND ARANCIO and EO IND MANDARINO. At the lower and the higher concentrations some oils were stimulatory instead of inhibitory. This effects need to be studied more profoundly.

Conclusion: Citrus EOs have showed phytotoxic activity in vitro against some important weeds, *Amaranthus retroflexus*, *Portulaca oleracea*, *Echinochloa crus-galli* and *Avena sativa* e could be used for development of natural herbicides. In vivo studies are needed to better understand their herbicidal activity and to determine the adequate doses, moment and mode of application.