

Effects of Citrus essential oils on weed emergence and on soil microorganisms

Ioppolo, Antonino, Jouini, Amira, Laudicina, Vito A., Palazzolo, Eristanna

Dipartimento di Scienze Agrarie, Alimentari e Forestali, Università degli Studi di Palermo
Viale delle Scienze – edificio 4, 90128 Palermo, Italia

Weed invasion is a major problem for agricultural productivity since causes economic and environmental damages. Weed control can be achieved through chemical, mechanical, biological and cultural means. Although synthetic herbicides are effective for weed control, they have a negative impact on soil and the environment. Therefore, it is important to develop alternative means that are in the meanwhile effective and eco-friendly. EOs are commonly used for bactericidal, virucidal, fungicidal, antiparasitical, insecticidal, medicinal and cosmetic applications.

Citrus EOs are the most widely used in the world for many purposes. Moreover, some studies have recently investigated their potential as herbicides. EOs can be extracted in different ways among which hydro distillation and cold pressing are commonly used. The two methods are based on different procedures. Hydro distillation is carried out with a Clevenger-apparatus that conducts the distillation process by boiling, condensing and decantation to separate the EOs.

The cold pressing consist of crushing and pressing the peels thus leading to the formation of a watery emulsion. Then, the emulsion is centrifuged to separate out the EOs. Since no external substance are needed, this process ensures that the resulting EOs retains all their properties.

The aim of this work was to evaluate the in vivo potential effects of Citrus EOs extracted by hydro distillation and cold pressing on weed emergence and on soil biochemical properties.

The topsoil (5 cm) of an Inceptisol within the campus of University of Palermo was used for the experiment. 500 g of soil, air-dried and sieved at 1 cm, were used to fill each of the 24 aluminium pots (10 x 20 cm). then, soils were brought up to 100% of their water holding capacity (WHC) by adding firstly 150 mL of tap water (2/3 of WHC) followed by 70 mL of tap water (1/3 of WHC), by a manual sprayer, containing 8 mL L⁻¹ of each one of the extracted EOs. Then, the soils were maintained at 50% of their water holding capacity during all the period of the experiment. Fitoil was used as emulsifier at a concentration of 1 ml L⁻¹. Soils without EO, and with or without Fitoil, were considered as control. After one month the soils were moistened, plant biomass and height, and soil chemical and biochemical properties were evaluated. The experiment was carried out in quadruplicate to investigate the soil proprieties. In this work, the results are showed and discussed.