

Application of wine and olive oil production wastes as substrates for the successful cultivation of *Chrysanthemum indicum* potted flowers

Antonios Chrysargyris*, Georgios Toumazou, Nikolaos Tzortzakis

Department of Agricultural Sciences, Biotechnology and Food Science, Cyprus University of Technology, Limassol, Cyprus

Abstract

Scientists and other environmental leaders have lately been sounding for the serious consequences of the continued harvest of peat for agricultural purposes on the diverse peatland habitats. Towards that direction, there are efforts for a substantial reduction in peat use, without sacrificing plant quality or health, by testing a series of alternative to peat materials. For this study, two waste materials derived from the production of high value products (wine and olive oil) were used, as potential substitutes for peat. Potted *Chrysanthemum indicum*, the second top selling flower after roses, was selected as the plant to be evaluated, after the gradient substitution of peat by wine and olive oil production wastes, in the cultivation substrate mixture. The growing media were made of 5, 10, 20 and 40% (v/v) of either winery or olive oil production wastes in peat, without any addition of fertigation. Uniform chrysanthemum plants were cultivated for 7 weeks. A series of plant growth and physiological parameters were tested during and at the end of the cultivation period. All substrate materials and their mixtures were also tested for their physical, chemical and hydrological properties. Winery wastes appeared quite promising as a peat substitute. Plants grown at the contents of 5% and 10% exhibited higher performance in terms of fresh biomass (49 g per plant, compared to the control plants, averaged at 21.3 g), number of axillary shoots, number of leaves, and in a series of other parameters. Additionally, a tendency for increased number of total flowers was noticed at 5 and 10% levels, while the antioxidant status of the plant was changed, as it was assessed in terms total phenolic content, flavonoids and total antioxidant activity. All the tested mixtures that contained olive oil production wastes, delayed the growth of chrysanthemum, resulting in plants with significantly lower height, fresh biomass and number of flowers (ranging from 1-4, compared to the control treatment where the number of flowers averaged at 10). Based on the results, winery wastes could be a potential candidate as a material in cultivation mixtures, saving at least 10% of peat, doubling the number of branches and the plant fresh biomass, while at the same time reducing the environmental impact of the waste itself.

Keywords: Chrysanthemum, Substrates, Peat alternatives, Olive oil production wastes, winery wastes

***Author of correspondence: Dr Antonios Chrysargyris**

Mailing address: Department of Agricultural Science, Biotechnology and Food Science, Cyprus University of Technology, 3603, Limassol, Cyprus. E-mail: a.chrysargyris@cut.ac.cy

Preferred presentation method: Oral