

Pilot Intensive Cultivation of the Mediterranean Native *Urospermum picroides*

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Abstract

The increasing inputs of chemical fertilizers and the worldwide adoption of new cultivation techniques has increased crop production and improved food security (Nerlich and Dannehl, 2021). However, the extensive application of chemical fertilizers in arable lands has long been proven to cause soil degradation, greenhouse gas emissions and water contamination (Chaney, 2012). The last decade, several alternative cultivation practices have been proposed for reducing the use of chemical fertilizers (Chew et al., 2019). On this aspect, the partial replacement of chemical fertilizers by alternative organic fertilizers has been recognized as a prominent solution to the problem (Rojas-Valencia et al., 2011). At the same time, recent research focuses on the domestication of endemic wild edible green species, due to their culinary, medicinal and gastronomic importance (Ansari et al., 2005; Petropoulos et al., 2016; Tsiftoglou et al 2023) and also as part of the agroecosystem's conservation, in urban environments (Christoforidi et al., 2022). *Urospermum picroides* is a typical wild edible plant of the Mediterranean region, which could be considered as a promising candidate for introduction in intensive cropping systems. *U. picroides* consumed in the Cretan Mediterranean dietary pattern as boiled alone or together with other wild edible plants (Psaroudaki et al., 2012, 2015). Even though several scientific reports indicate that the plant is rich in secondary compounds with antimicrobial and antioxidant activity with health promoting properties, literature evaluating the exact cultivation practices that can increase crop yield while

ensuring reduced environmental footprint, is scarce (Alper and Güneş, 2019; Balboul et al., 1997; El-Amier et al., 2016). In this context, we examine the effect of organic and mineral fertilizers in an intensive open field cultivation of *U. picroides*. The field experiment was set up in the Experimental Farm of the Hellenic Mediterranean University in Heraklion, Crete, Greece. A total number of 400 seed plants from *U. picroides* were planted and five fertilization treatments were assessed, i) a control treatment (without any fertilization) (CO), ii) Liquid organic fertilizer (TF), iii) Organic Nitrogen (TR), iv) Conventional 20-20-20 water-soluble fertilizer (CV) and v) combination of the Conventional and Organic fertilizers (CF), arranged in a completely randomized experimental design (four replicates per treatment and 20 plants per experimental unit). Fertilization was applied at intervals of 15 days from transplant until harvest. Photosynthetic parameters of leaf relative chlorophyll fluorescence (Fv/Fm) and relative chlorophyll concentration (SPAD) were assessed at 30, 45, and 60 days after transplant (DAT) and yield characteristics of shoot fresh weight (g) and number of leaves were determined at 70 DAT. Results show that treatment TF significantly increased plant maximum quantum yield efficiency (Fv/Fm) (0.815 ± 0.002), shoot fresh weight (73.50 ± 13.66 g) and number of leaves (38.07 ± 3.65) compared to TR (0.723 ± 0.006 , 46.06 ± 5.33 , and 30.07 ± 4.56 , respectively) and CO treatments (0.707 ± 0.003 , 42.79 ± 9.46 , and 26.93 ± 3.52 , respectively), 70 DAT. However, no significant effect was observed in relative chlorophyll concentration (SPAD) among the tested fertilization treatments, 70 DAT. Consequently, the results indicate that the effect of TF was more pronounced in all of the evaluated physiological and plant growth parameters compared to the control treatment without any significant differences being observed between the different kind of the tested fertilization products. The current findings are encouraging for the commercial production of *U. picroides*, with beneficial health-promoting properties, in open field cultivation systems and for the adoption of alternative fertilization methods such as the organic fertilizers for reduced environmental footprint.

Keywords: Mediterranean native plants, Cretan diet, INM bio-fertilizer, DA Meter, Fluorometer, Spad

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