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The effects of spraying with onion and garlic extracts on the growth of the plant *Anethum graveolens* L. and its antioxidant effectiveness

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SUMMARY

This experiment was conducted during the 2022–2023 agricultural season in a mixed clay soil at one of the fields of the Faculty of Agriculture, Basra University. The aim of the experiment was to investigate the effect of spraying dill plants (Anethum graveolens L) with aqueous extracts of onion and garlic on their growth. The plants were sprayed with garlic aqueous extract at three concentrations (0, 20, 30 g L^{-1}) and onion aqueous extract at three concentrations (0, 15, 25 g L^{-1}), with three applications at a 15-day interval between each spray. The experiment was designed using a Randomized Complete Block Design (RCBD).

The obtained results showed that the plants sprayed with garlic aqueous extract exhibited significant improvements in most characteristics, except for the fruit content of total dissolved carbohydrates and the yield of fruits from volatile oil. Specifically, the plants sprayed with a concentration of 30 g L^{-1} outperformed the other two concentrations in terms of plant height (cm), number of branches per plant, and 1000-seed weight for each experimental unit. On the other hand, the plants sprayed with a concentration of 20 g L^{-1} significantly outperformed in terms of floral inflorescence number per plant and seed yield. Additionally, the plants sprayed with a concentration of 30 g L^{-1} had the highest chlorophyll content and antioxidant effectiveness of dill leaves (%). However, spraying with garlic extract did not have a significant effect on the fruit content of total dissolved carbohydrates and the yield of fruits from volatile oil.

Regarding the plants sprayed with onion extract, they showed overall superiority in most traits, except for the chlorophyll content of the leaves. Specifically, the plants sprayed with a concentration of 15 g L^{-1} significantly excelled in plant height, while the plants sprayed with a concentration of 25 g L^{-1} outperformed in terms of floral inflorescence number per plant and seed yield. The plants sprayed with a concentration of 25 g L^{-1} also had the highest content of total dissolved carbohydrates in fruits and the highest antioxidant effectiveness of dill leaves and seeds (%). However, the plants sprayed with a concentration of 15 g L^{-1} had the highest yield of volatile oil. The interaction between the two factors (garlic and onion extracts) had a significant effect on all studied traits, except for the chlorophyll content of the leaves.

Keywords: *Dill; mixed clay soil; Aqueous extracts; onion; garlic*

INTRODUCTION

Dill, belonging to the Apiaceae family, encompasses over 250 species and holds significant importance as a culinary and medicinal plant (Ihsan, 1999). The plant is considered one of the most important leafy greens as its leaves contain a dry substance between 7.7–10.5 consisting of carbohydrates, proteins and fiber as well as being rich in vitamins (Boras, 2006). The seeds of the current plant contain approximately 3–4% of the weight of the fruits (Jana and Shekhawat, 2010). Dill is grown in many European, Asian and American countries where it is used as a medicinal herb (Singh et al., 2005). Its green leaves, whether fresh or dry in daily meals, are used as taste enhancers or flavor, and used as a seasoning and entire industries such as perfumery and cosmetics, and the decoction of seeds is used as a gas repellent and nerve sedative and is used to improve the work of the heart and lungs (Dajawi, 1996). The plant herb contains many different antioxidants that have a role in eliminating harmful free radicals (Sun et al., 2002; Liu, 2003). It also contains flavonoids, phenolic compounds, and essential oils (Delaquis et al., 2002) and contains alpha-feldrin, carfone and limonene compounds (Shehat, 2000). The reason for the growing interest in the cultivation and study of medicinal plants is due to the large number of collateral damage and high prices for these drugs and the World Health Organization's projections that the volume of trade in medicinal and aromatic plants will rise to more than $5 trillion in 2050 (Noorhusseini, 2011). Due to the medicinal and nutritional importance of the plant, it is therefore necessary to look for agricultural means and coefficients to increase the plant's yield of grass and improve the production of it. The plant is made from petroleum and using natural materials that respect the environment to reduce pollution, which has. Increased its rates in recent times, as the use of fertilizers and industrial growth regulators is one of the important factors in plant production and due to their negative effects on human health and the environment. The trend has been made at present to use natural plant extracts to increase plant growth and productivity of oil and seeds to contain these extracts mineral elements, growth regulators and many vitamins important for plant growth (Ibrahim, 2012). Moursi et al. (1981) found that the aqueous extract of garlic is characterized by a twisting of 31% carbohydrates as well as contains high levels of phosphorus, iron, magnesium, potassium, and many vitamins such as thiamine, riboflavin, niacin, vitamin C and many volatile oils. Significant in all studied qualities represented by plant height, number of branches, percent dry matter, deciduous zone, and total chlorophyll. (Omran, 2004) found that there is a significant increase in the height of the plant and the number of leaves of the cucumber plant when sprayed with garlic extract at a concentration of 50 ml per liter.