

Research Article

Effect of some heat stress protectants on vegetative, floral, and anatomical traits of shrub rose plant

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Abstract: The study was carried out under the fabric shade of the Medicinal and Aromatic Plants Unit, which is part of the College of Agriculture at the University of Basrah, on the one-year-old shrub rose plant *Rosa hybrida* L. Sultani variety. The plants were exposed to low temperatures in winter and high temperatures in summer. Two variables were included in the study: the first was heat stress (summer temperature at an average of 49 °C and winter temperature at an average of 20 °C), and the second one was treatment with amino acid glutathione at 0, 150, and 250 mg L⁻¹. The study's results showed effect heat stress and stress protectants on the number of lateral branches in the shrub rose plant. The highest rate was recorded in the winter growth season, reaching 8.83 lateral branches, while the lowest rate was recorded in the summer, reaching 6.53 lateral branches. The treatment with glutathione also significantly affected the number of lateral branches in the plant. A concentration of 250 mg L⁻¹ had the best results, with a maximum of 9.72 lateral branches, compared to the other treatments. There were 5.2 lateral branches at their lowest in the control group. The interaction between the winter growth season. Additionally, the treatment with 250 mg L⁻¹ of glutathione resulted in the highest rates of plant height and flower number, reaching 86.34 cm and 11.19 flowers, respectively. The lowest rates were observed when the summer growth season was combined with a glutathione concentration of 0 mg L⁻¹, reaching 59.65 cm and 6.66 flowers, respectively. Heat stress and stress protectants also affected anatomical leaves of shrub rose plant. The highest rate of cuticle layer thickness and tannin layer thickness was recorded in the summer growth season, reaching 20.75 and 35.96 (µm), respectively, while lowest rates were recorded in winter growth season, reaching 15.51 and 28.27 (µm), respectively. The treatment with glutathione also significantly affected the rate of cuticle layer thickness and tannin layer thickness. The treatment at 0 mg L⁻¹ significantly outperformed the other treatments and recorded highest value of 22.39 and 40.29 (µm), respectively. In comparison, the treatment at a concentration of 250 mg L⁻¹ recorded the lowest value of 14.2 and 25.23 (µm), respectively.

Keywords: Stress protectants; Stress; Environmental stress; Heat stress; Vegetative; Floral; Anatomical; Shrub rose.

INTRODUCTION

Shrub rose (*Rosa sp.*) belongs to the Rosaceae family, which contains 20 species and many varieties, especially hybrids from cultivated varieties. The rose is considered one of the most commercially grown plants and one of the world's most important cut flower plants. Its flowers are used in the worship rituals of many religions and socially in exchanging different emotions between people. It is also used in producing perfumes and flavors for human use and in the pharmaceutical industries. The rose is grown in gardens to add beautiful colors and scents to the garden. It is also grown in pots; in many cases, garden roses are used as a source of cut flowers. (Wahba, 1996).

It was planted in botanical gardens, and awareness of ornamental plants and roses grew, becoming an economic phenomenon and a profitable commercial activity, which witnessed a boom at the local and international levels. The rose is considered one of the most important ornamental plants, as it provides color, shape, texture, and fragrance, all adding joy and pleasure to the soul. Seeds, softwood cuttings, layering, and grafting propagate the rose. Plants grown from seeds show significant differences and may extend to flower colors. While varieties produced by other methods express homogeneous traits of a single lineage, the rose is generally successful with terminal cutting. It is in plants that tolerate dependence on their roots, such as old rose varieties and shrub roses. Other varieties cannot withstand, especially modern hybrids, as they are grafted on rose rootstocks such as Banksia, Natal briar, Rosa damascene, and other rootstocks. (Katzer, 2006).

Agricultural and environmental variables, including temperature extremes and light levels, impact plant growth (Viji *et al.*, 2013; Letchamo, 1995; Vishwanath *et al.*, 2010;). When it comes to stresses that affect plant development and growth, drought is among the most significant. Protein transformations and nucleic acid synthesis in plant tissues

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