

EFFECT OF PUTRESCINE AND SALICYLIC ACID ON AJWAIN PLANT (*TRACHYSPERMUM AMMI*.) AT VEGETATIVE STAGE UNDER DROUGHT STRESS

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ABSTRACT

This study investigated the effect of putrescine and salicylic acid on growth, physiology and secondary metabolite production in Desi ajwain plant, at the vegetative stage, grown under drought stress. The experiment was designed as a split plots with 27 treatments and three replications. The main treatments were three irrigation treatments (7, 5, 3 times, irrigated every 20, 30, 40 days, respectively) with nine sub-treatments; control- spray with water, putrescine (1 ppm) applied once (P1) and twice (P2), as well as salicylic acid (100 ppm, S1), (150 ppm, S2) and their combinations (P1S1, P1S2, P2S1, P2S2), which were applied at 45 and 60 days from planting (DFP). Results indicated that drought stress significantly reduced all roots and shoot morphological growth characters, as well as shoots: root ratio. While total sugars, total soluble phenols, and free amino acids in shoots and roots were significantly increased. In addition, chlorophyll b was significantly decreased. However, nosignificant differences were found among irrigation treatments on chlorophyll a, total chlorophylls and total carotenoids. In addition, increasing irrigated intervals to 40 days increased the essential oil %, whereas, oil content per plant increased by irrigation every 30 days. Meanwhile, it was found that P1 and S2 application enhanced the all shoot growth characters and root dry weight than P2 and S1, respectively. On the other hand, the application of S1 was enhanced the root length and root fresh weight than S2. The total soluble sugars were increased by P2 and P2S1 in plants irrigated every 40 days. In addition, P1, S2 and P1S2 recorded the highest total soluble phenols in severe drought stressed plants. Furthermore, P1, P2 as well as P2S1 significantly increased free amino acids in severe drought stressed plants. In addition, chlorophyll a and total chlorophyll were significantly increased with putrescine twice application (P2). On the other hand, this treatment decreased the chlorophyll b and total carotenoids, whereas the chlorophyll b and total carotenoids were significantly increased with P1S2 and P2S2 treatments. The oil % and oil content per plant as well as oil yield per Feddan significantly increased by S1 and S2 in those irrigated every 40 days. α -terpiene was found to be the main constituent and followed by p-cymene. They were increased under water stress, whereas P2 increased thymol by 109% than control. In addition, P2S1 and P2S2 recorded the highest oxygenated and non-oxygenated compounds in plants irrigated every 40 days. Furthermore, the herb fresh and dry yields were recorded the highest values in the plants irrigated every 30 and 40 days and treated by S2 and S1, respectively.

KEYWORDS: Ajwain Plant (*Trachyspermum ammi*), Drought Stress, Putrescine, Salicylic Acid, Morphological Characters, Pigments Composition, Yield, Essential Oil, GC-MS