

Effects of salinity stress on physiological characteristics and absorption quality of sodium and potassium in aerial parts and tubers of three radish cultivars

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Abstract

Salinity is a limiting factor in agricultural production that inflicts great damages on agricultural products. In order to decrease or stop salinity stress, numerous methods are proposed by different researchers. One of the methods to reduce the damages of salinity stress is cultivating tolerant plants to salinity. In this research, resistance of three radish cultivars to salinity stress was investigated, from physiological points of view, and the best resistant cultivar was introduced. This factorial experiment was carried out in Research Greenhouse of Ferdowsi University of Mashhad, Iran, based on complete randomized design, with three replications. Treatments included three commercial cultivars of radish (Cherry belle, Sparkler and Scarlett Cincinnati) as the first factor and four levels of salinity (control, 33, 66 and 99 mM NaCl) as the second factor. Salinity levels, as soluble form in irrigation water, were applied at the four-leaf stage of the plants. Results showed that salinity decreased the amount of soluble sugars and potassium content of aerial parts and tubers, and also increased stomatal conductance, anthocyanin content of tubers and sodium content of aerial parts and tubers. The highest tolerance of different radish cultivars to salinity stress was observed at 66 mM salinity level and the 33 mM salinity level had no significant difference, compared to control, in most physiological characteristics. Under salinity stress conditions, sodium accumulation in aerial parts was more than tubers. The highest amount of tuber anthocyanin was measured at 66 mM salinity level in Scarlett Cincinnati cultivar. Among the radish cultivars, the highest salinity tolerance and salt accumulation was obtained from Scarlett Cincinnati cultivar. Considering that the apparent shape of this cultivar (stretched appearance with red color) is very different from Cherry belle and Sparkler cultivars, and more water is stored in its tissues, thus, this trait has caused high resistance to salinity stress.

Keywords: Anthocyanin, Salinity resistance, Sodium accumulation.

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