

Effect of plant growth regulators on chlorophyll and carotenoid content of salinity stressed okra seedlings

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ABSTRACT

Survival of plants in any environment requires an ability to withstand extremes of stress caused by biotic and abiotic factors. Salt stress is one among the factors causing drastic changes in the physiology of plant that threatens cultivation of crops and vegetables around the globe. Okra [*Abelmoschus esculentus* (L.) Monech] is one of the important vegetable grown in central and southern India throughout the year. Salinity is a greatest threat to this crop. The plant growth regulators triadimefon, humic acid and sea weed extract increased the chlorophyll and carotenoid content in the sodium chloride treated okra seedlings which was higher than the control by increasing the synthesis of chlorophyll proteins, the structural component of chloroplast.

Key words : Plant growth regulator, Okra, Chlorophyll and carotenoid.

Salinity is a major factor affecting higher per cent of the world's cultivable land. The ability of the plant to counteract the various effects of salinity enabling it to maintain its growth and yield under these adverse condition can be termed as salt tolerance (Perez-Alfocea *et al.*, 1993). The application of growth regulators has been reported to improve salinity tolerance in some plants (Singh and Jain, 1982). In the present study an attempt was made to understand the effect of growth regulators on the sodium chloride stressed bhendi seedlings, to overcome the salinity stress.

MATERIALS AND METHODS

Seeds of okra (Parbhani kranti) were sown in plastic pots containing usual pot mixture of 1:2:1 ratio. The control was irrigated with distilled water and treatments were irrigated with 100 ml of 40 mM NaCl, 40 mM NaCl + 3 mg L⁻¹ triadimefon, 4 mM NaCl + 3% humic acid, 40 mM NaCl, + 3 ml L⁻¹ sea weed extract solutions regularly after ten days of seedling emergence. Seedlings were randomly harvested at 30 DAS and 40 DAS and leaves were separated for the analysis of chlorophyll and carotenoid content. Extraction and estimation – method of Arnon (1949).

Fresh leaf material of 0.5 gm was ground with 10 ml of 80 per cent acetone using a mortar and pestle. The homogenate was centrifuged at 800 for 10 min. The supernatant was saved. The pellet was reextracted with 5 ml of 80 per cent acetone each time until it becomes

colourless. All the supernatant were pooled and made upto with 80% acetone and utilized for chlorophyll estimation. The absorbance was read at 480 nm, 645 nm and 663 nm in spectrophotometer using 80 per cent acetone as blank and chlorophyll content was calculated using the formula of Arnon (1949) and the carotenoid content was calculated using the formula of Kirk Allens (1965) expressed in milligrams per gram fresh weight.

$$\begin{aligned} \text{Total chlorophyll (mg/ml)} &= (0.0202) \times (4.645) + (0.00802) \times (4.663) \\ \text{Chlorophyll 'a' (mg/ml)} &= (0.0127) \times (4.645) - (0.00438) \times (4.663) \\ \text{Carotenoid} &= \Delta A_{480} + 0.114 \times \Delta A_{663} - 0.638 \times \Delta A_{645} \end{aligned}$$

RESULTS AND DISCUSSION

The total chlorophyll content decreased with the NaCl treatment to a higher extent while triadimefon treatment to the NaCl stressed seedlings increased it to a larger extent than that of control. The chlorophyll content in the control was 58% than the stressed seedlings. In the triadimefon treated plants the leaves has 78 per cent chlorophyll and in humic acid and sea weed extract treated plants were 72 and 69 per cent, respectively. Chlorophyll 'a' content also showed the same trend and it was 52 per cent higher over control. Similar trend was seen in chlorophyll 'b' content also and it was 54 per cent higher than control. The carotenoid content was 23 per cent in NaCl treated plants and it was higher in the plant growth regulators treated plants (48 per cent). Total chlorophyll, chlorophyll 'a' and chlorophyll 'b' and carotenoid content