Effect of Different Gibberellins on Betacyanin Synthesis and Seedling Growth in Celosia

It is well known that gibberellic acid (GA) reverses many of the light-mediated responses, for example, inhibition of hypocotyl elongation¹, nitrogen metabolism², respiratory changes³ and anthocyanin biosynthesis⁴. Betacyanin biosynthesis, a light mediated response, is also inhibited by GA₃, and Laloraya *et al.*⁵ showed that an inverse relationship existed between GA-induced hypocotyl growth and betacyanin even under continuous light exposure in the presence of different concentrations of GA₃. If betacyanin biosynthesis were truly linked to GA action, the specific inhibition of different gibberellins should vary in the same order as the stimulatory effect on hypocotyl growth. We have investigated the effect of eight different gibberellins, that is, GA₁, GA₂, GA₃, GA₄, GA₅, GA₇, GA₈ and GA₉ on betacyanin synthesis and growth in Celosia seedlings.

Celosia (*Celosia argentea* var. Plumosa Cultivar "Fairy Feather") seeds were grown as described elsewhere⁶. Germinated seeds were transferred to light in presence of three concentrations, 0.1, 1 and 10 p.p.m. of eight different gibberellins and a control set was kept in distilled water. The increase in length of hypocotyl and the number of betacyanin units/seedling was measured after 72 h. Betacyanin was estimated following the method of Malaviya and Laloraya⁶ based on the method for measuring anthocyanin.

The results are shown in Fig. 1, and it is clear that different gibberellins produce varying effects on hypocotyl growth and pigment formation. An inverse relationship between growth

increase and pigment formation is observed for all eight gibberellins. GA₄ promoted growth and inhibited betacyanin synthesis to the greatest extent; 0.1 p.p.m. GA₄ produced as large an effect as 10 p.p.m. GA₃. Gibberellic A₈ had the least effect on both growth and inhibition of betacyanin synthesis. The effect of different gibberellins varied in the following order:

$$GA_4 > GA_1 > GA_2 = GA_5 > GA_9 > GA_7 > GA_3 > GA_8$$

This inverse correlation between GA-induced growth and betacyanin synthesis with all eight different gibberellins, showing identical specific activity changes in both the cases, clearly indicates that the two processes are related.

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Fig. 1 Changes in growth, □, of hypocotyl and production of betacyanin, ■, in Celosia seedlings treated with a, 0.1; b, 1 and c, 10 p.p.m. concentration of eight different gibberellins in light.

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