

Enhancing the levels of sorgoleone in roots of *Sorghum bicolor*

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Summary Sorgoleone is a natural plant product from sorghum that has herbicidal activity at very low concentrations. Sorgoleone production in grain sorghum roots was investigated to determine the factors that enhance root growth and sorgoleone content, which might be applied to develop a bioherbicide. Methanol proved to be the most effective solvent for extracting sorgoleone from grain sorghum roots. Sorgoleone production was high in young developing sorghum plants. The maximum amount of sorgoleone ($\mu\text{g mg}^{-1}$ root weight) was produced in 5-day-old seedlings; beyond this age, sorgoleone production declined. However, considering both root weight and

sorgoleone content, 10-day-old seedlings contained the most sorgoleone. Compared with the control, the sorgoleone content increased 6.1, 8.6 and 14.2 times when sorghum seeds were treated with auxins, Hoagland solution, and a combination of auxins and Hoagland solution, respectively. Among the elicitors, cellulose (an elicitor of plant origin) stimulated higher sorgoleone production than the others, and it produced 6.2 times more sorgoleone than the control. Combined treatment of sorghum seeds with half strength Hoagland solution and $5 \mu\text{g mL}^{-1}$ of IBA significantly increased both root growth and sorgoleone content in sorghum seedlings.

Keywords Sorgoleone, root extract, auxin.