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The effects of gibberellic acid and kinetin on overcoming the effects of juglone stress on seed germination and seedling growth

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**Abstract:** Juglone (5-hydroxy-1,4-naphthoquinone) is an allelochemical responsible for walnut allelopathy. The effects of gibberellic acid (GA<sub>3</sub>) and kinetin (KIN) on overcoming the effects of juglone stress on seed germination and seedling growth were investigated in barley, wheat, cucumber, alfalfa, and tomato. Seeds pre-treated with plant growth regulators were used to test their effects on the alleviation of juglone stress. It was observed that seed germination in tomato and wheat was inhibited by juglone and that the plant growth regulators alleviated it significantly. Elongation and dry weight of the seedlings of all the species used in the study were reduced significantly by juglone, and the plant growth regulators alleviated them. The most effective treatment was the GA<sub>3</sub>+KIN combination, which was best on seedling growth in tomato and wheat.

**Key words:** Juglone stress, alleviation, gibberellic acid, kinetin, seed germination, seedling growth

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