

Effects of Phosphorus on *In-vitro* Seed Germination and Seedling Growth of *Brassica rapa* L. in Arsenic Condition

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ABSTRACT

Arsenic (As) is a toxic metalloid widely distributed in the environment posing threat to human health. Enriching the soil with phosphorus (P) in As condition is believed to reduce the uptake of As in plants. But, it is not clear whether this uptake changes affect the growth behaviors of plant or not. Therefore, this study was conducted to determine the efficacy of P in balancing the negative effects of As on Brassica rapa. Seeds of B. rapa were treated with different concentrations of As, with or without addition of P. As exposure hindered seed germination and seedling growth at different magnitudes depending on the level of concentrations. However, addition of P in As solution culture improved the seed germination and seedling growth significantly. Germination were 87% in T2 (2 ppm As + 10 ppm P), 78% in T4 (5 ppm As + 10 ppm P) and 68% in T6 (10 ppm As + 10 ppm P) compared to 82% in T1 (2 ppm As), 73% in T3 (5 ppm As) and 61% in T5 (10 ppm As). In treatments T1, T3 and T5, seedling dry biomasses were 26 mg, 15 mg and 12 mg respectively, which were enhanced to 31 mg, 21 mg and 16 mg respectively in T2, T4 and T6. Similar trend was also recorded for plumule and radical growth, seedling vigor, sturdiness etc. Therefore, this study recommended the application of P to reduce the negative effects of As on B. rapa in As solution culture and maintains that the results may hold good in the field.

Keywords: *Brassica rapa*, Arsenic, Phosphorus, Germination, Seedling vigor, Sturdiness.