

Enhancing germination and early seedling growth of Malaysian indica rice (*Oryza sativa* L.) using hormonal priming with gibberellic acid (GA3)

ABSTRACT

A common practice to enhance seed quality for direct seeding of rice is priming under unfavorable designated conditions. This study aims to increase germination performance and early seedling growth of the MR219 rice by determining optimum priming times and ideal concentrations of gibberellic acid (GA3). Seeds were primed with GA3 in concentrations ranging from 20, 40, 60, 80 and 100 mg/L for 12 and 18 hours separately, and unprimed seeds served as control. The germination test was measured using a completely randomized design (CRD); meanwhile, pot cultivation was carried out using a randomized complete block design (RCBD) for four weeks. In germination studies, it was found that seeds primed with GA3 for 12 hours at 60 mg/L significantly enhanced the germination performance, and early seedling growth of MR219 compared to unprimed seeds. The primed seeds had a germination percentage between 90-100%, increased seed vigor and germination indexes 3-fold and 2-fold respectively, and reduced the mean germination time by 24 hours. Correspondingly, in pot cultivation, the establishment and early seedling growth of primed MR219 was significantly increased as the seedling height, and total fresh weight was two times higher than unprimed seedlings. In addition, the biochemical attributes of GA3 primed seedlings, including total soluble sugar, carbohydrate, and total soluble protein, were significantly increased by 2-, 1.6- and 4-folds, respectively, compared to unprimed seedlings. Priming MR219 seeds with GA3 at 60 mg/L for 12 hours was found to significantly enhance the germination performance and early seedling growth in pot cultivation of direct-seeded rice as it promoted vigorous seedling growth of the MR219 rice cultivar.

Keyword: Early seedling growth; Germination; Hormonal priming; Gibberellic acid; *Oryza sativa*