The effects of nitrogen and phosphorus fertilization on seed germination capacity and applicability of the controlled deterioration of smooth bromegrass

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Seed quality is vital to seedling growth and establishment, especially before photosynthetic capacity is recovered. Many factors can affect seed quality, among which management of nitrogen and phosphorous fertilizers maybe one of the most important and can be brought under artificial control factor. In order to investigate the optimum nitrogen and phosphorous fertilization on seed quality, a field experiment was conducted in 2013 at the grassland research station of China Agricultural University located in Yuershan, Hebei province, northern China. The experiment was performed with two levels of nitrogen (0,100 kg ha-1) and four levels of phosphorous (0, 60, 90, 120 kg ha-1) fertilization to evaluate nitrogen and phosphorous effect on smooth bromegrass (bromus inermis) seed germination capacity and applicability of the controlled deterioration. Application of nitrogen improved seed nitrogen content and reduced phosphorous percentage, while phosphorous fertilization increased seed phosphorous content and decreased nitrogen content. Seed obtained from nitrogen treated plots showed significantly delayed germination (higher mean germination time and lower germination index). Low level or excessive level of phosphorous fertilization would also delay the start of germination. Controlled deterioration results showed that seeds treated with nitrogen fertilization possessed low relatively loss of germination, further studies on antioxidant enzymes and acid phosphoesterase activities, hydrogen peroxide and malondialdehyde (MDA) contents and electrical conductivity of deteriorated smooth bromegrass seeds showed that 100 kg ha-1 nitrogen and 60 kg ha-1 phosphorous treatment could reduce seed vigor loss and increase seeds applicability of controlled deterioration.