ABSTRACT

Exponential increase in demand and low production of oil seed crop has become a challenge for India's edible oil industry, which necessitates field experimentation for area expansion and productivity enhancement of oil seed. The objectives of this investigation were to study the effect of varying doses and sources of phosphorus and growth hormones on yield and oil quality of niger (*Guizotia abyssinica* (L.f.) Cass.) in lateritic soil with improved soil fertility. Field and pot experiments on niger (*cv.* Birsa niger) to study the effect of phosphorus management and growth hormone application, respectively were conducted during 2014 to 2016 in the experimental farm of Agricultural and Food Engineering Department, IIT Kharagpur. The phosphorus management included three different phosphorus doses (30, 60 and 90 kg ha^{-1}) through chemical fertilizer (CF) alone and in combination with organic sources i.e., Vermicompost (V), Mustard oil cake (O), and Bone meal (B) as integrated nutrients. The growth hormone treatment included application of Indole Acetic Acid (IAA) and Benzyl Aminopurine (BAP) alone at varying concentration (25, 50, 75, 100 mg l^{-1}) and in combination. Increasing the P fertilizer dose from 0 to 60 kg ha^{-1} increased the seed yield (~40%) and oil content significantly, but further increasing the dose to 90 kg ha^{-1} did not bring any significant improvement. Among the sources, CF and O+CF resulted significantly higher seed yield than V+CF and B+CF. However, all integrated nutrients had higher unsaturated fatty acid and lower saturated fatty acid content of niger seed as compared to CF alone. Increasing the P fertilizer dose reflected higher antioxidant activity of niger oil in integrated nutrients, but not in CF. Application of IAA at 50 mg l^{-1} with BAP at 75 or 100 mg l^{-1} was effective in increasing the seed yield as well as oil content and quality. The organic sources, V and O were better effective than B in increasing the soil phosphorus availability, phosphorus solubilizing bacterial population and acid and alkaline enzyme activity. The results suggested the suitability of organic source for balanced nutrient management and growth hormone in improving niger seed yield, oil quality and productivity of lateritic soil.

Keywords. Antioxidant activity, Fatty acid, Growth hormone, Niger seed yield, Nutrient management, Oil content