

Gamma Irradiated Sodium Alginate and Phosphorus Fertilizer Enhances Seed Trigonelline Content, Biochemical Parameters and Yield Attributes of Fenugreek (*Trigonella foenum-graecum* L.)

Authors : Tariq Ahmad Dar, Moinuddin, M. Masroor A. Khan

Abstract : There is considerable need in enhancing the content and yield of active constituents of medicinal plants keeping in view their massive demand worldwide. Different strategies have been employed to enhance the active constituents of medicinal plants and the use of phytohormones has been proved effective in this regard. Gamma-irradiated Sodium alginate (ISA) is known to elicit an array of plant defense responses and biological activities in plants. Considering the medicinal importance, a pot experiment was conducted to explore the effect of ISA and phosphorus on growth, yield and quality of fenugreek (*Trigonella foenum-graecum* L.). ISA spray treatments (0, 40, 80 and 120 mg L⁻¹) were applied alone and in combination with 40 kg P ha⁻¹ (P40). Crop performance was assessed in terms of plant growth characteristics, physiological attributes, seed yield and the content of seed trigonelline. Of the ten-treatments, P40 + 80 mg L⁻¹ of ISA proved the best. The results showed that foliar spray of ISA alone or in combination with P40 augmented the plant vegetative growth, enzymatic activities, trigonelline content, trigonelline yield and economic yield of fenugreek. Application of 80 mg L⁻¹ of ISA applied with P40 gave the best results for almost all the parameters studied compared to control or to 80 mg L⁻¹ of ISA applied alone. This treatment increased the total content of chlorophyll, carotenoids, leaf -N, -P and -K and trigonelline compared to the control by 24.85 and 27.40%, 15 and 23.52%, 18.70 and 16.84%, 15.88 and 18.92%, 12 and 14.44%, at 60 and 90 DAS respectively. The combined application of 80 mg L⁻¹ of ISA along with P40 resulted in the maximum increase in seed yield, trigonelline content and trigonelline yield by 146, 34 and 232.41%, respectively, over the control. Gel permeation chromatography revealed the formation of low molecular weight fractions in ISA samples, containing even less than 20,000 molecular weight oligomers, which might be responsible for plant growth promotion in this study. Trigonelline content was determined by reverse phase high performance liquid chromatography (HPLC) with C-18 column.

Keywords : gamma-irradiated sodium alginate, phosphorus, gel permeation chromatography, HPLC, trigonelline content, yield

Conference Title : ICMAP 2014 : International Conference on Medicinal and Aromatic Plants

Conference Location : Penang, Malaysia

Conference Dates : December 04-05, 2014