Tropentag, September 11-13, 2024, hybrid conference

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Effects of *Tithonia diversifolia* on seed germination, growth parameters and the nutrient content of soybean

Joseph Blaise Dongmo Lekagne[1], Edouard Nantia Akono[2], Angeline Ngamassi Konchipe[1], Philippe Stephane Kamgang Kiage[2], Ruth Ngum Che[2], Julienne Nguefack[1]

[1] *University of Yaoundé 1, Dept. of Biochemistry, Cameroon*
[2] *University of Bamenda, Dept. of Biochemistry, Cameroon*

Abstract

Conventional farming relies heavily on chemical inputs such as synthetic fertilisers. Yet, their negative impacts on human and environment health have been well documented. *Tithonia diversifolia* is a plant that could be used as an organic fertiliser due to its high content of nitrogen. This study investigated the effect of *T. diversifolia* extract at different concentrations and incubation time on the germination of soybean seeds and the effect of *T. diversifolia* leaves applied in powder form or composted on soybean growth and nutrient content. We employed a split plot design with three replicates made up of four blocks. Each block was amended (main factor) either with *T. diversifolia* compost (150 g plant^{-1}), powder (40 g plant^{-1}) or the synthetic fertiliser NPK (10 g plant^{-1}) respectively, followed by spraying (second factor) with same fertiliser at 20 g l^{-1}, 20 g l^{-1} and 2 g l^{-1} or water every two weeks after one-time amendment. The control block received no amendment and was sprayed with water. The top of paper method was used to evaluate the effect of *T. diversifolia* extracts on soybean seed germination at different incubation times. Growth parameters including plant height (cm), number of pods per plants, seed weight per m^2 (g) and grain yield (t ha^{-1}) were recorded. The soybeans were harvested four months after sowing and analysed for crude protein, lipids, and fiber contents using the Kjeldahl, Bourely, and Weende methods respectively. *T. diversifolia* extract at 1 g l^{-1} and three hours incubation time produced the highest percentage seed germination (72 %). *T. diversifolia* compost produced the best growth ($p < 0.05$) in terms of plant height (63.3±3.1), number of pods per pant (83.7±5.1), seed weight per m^2 (357.7±45.5), grain yield (3.6±0.5) as compared to the others treatments. The highest crude protein content (31.2 %) in the soybeans was observed in the *T. diversifolia* compost treatment *T. diversifolia* powder yielded higher lipid (31.4 %) and fiber (5.9 %) contents as compared to other treatments. Thus, *T. diversifolia* extract can be used as a bio-stimulant to optimise the germination of seeds like soybean while its leaves whether powdered or composted are a promising organic fertiliser for promoting organic crop production in Africa.

Keywords: Growth parameters, nutrient content, organic fertiliser, soybean, *Tithonia diversifolia*

Contact Address: Joseph Blaise Dongmo Lekagne, University of Yaoundé 1, Dept. of Biochemistry, Ngoa-Ekele 812, Yaoundé, Cameroon, e-mail: blaiselekagne@yahoo.fr