



Effect of chemical and biofertilizer application on morphological and biochemical parameters of *Vigna radiata*

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Abstract

Agricultural practices are one of the most significant driving factors to support the economic development of the nation. As fertilizers account for a small portion of the overall cost of output in many developing countries, farmers frequently add fertilizers above the required rate to ensure high crop yield. By supplying plants with nutrients they serve as catalysts for their optimal growth and production but gradually, chemical fertilizers begin to show their ill impacts on the environment. With raising perception of the ill impacts of indiscriminate chemical use, the tendency of farmers toward environmentally sustainable technology is rising. Biofertilizer, on the other hand, refer to articles containing live or latent microbes which helps boost fertility of soil by either solubilizing phosphorus, fixing atmospheric nitrogen, decomposing organic waste or stimulating growth of plant through the synthesis of growth-promoting substances. A poly pot experiment was carried out to study the effect of chemical and biofertilizer application on morphological and biochemical parameters of *Vigna radiata* and found that the combined application of both fertilizers significantly enhanced the value of experimental parameters as compared to the control as well as their single treatments. Therefore, it could be reduce the dependency on chemical fertilizers to improve the crop growth and productivity for sustainable agricultural practices.

Keywords: Biofertilizer, chemical fertilizer, *Vigna radiata*

Introduction

Agricultural practices are one of the most important sources for livelihood in India. In order to feed the growing population and consummate the demand of the nation, it has to increase its productivity. Due to this, the present time agricultural system is totally depend on the chemical fertilizers. The use of nitrogen, phosphorus and potassium based chemical fertilizers enhance the growth and productivity of crops in agricultural fields to some extent but, gradually chemical fertilizers begin to show their ill impacts such as polluting water basins and leaching out, killing microorganisms and helpful insects, rendering the crop more perceptible to disease invasions and decreasing soil fertility [1]. Today, biofertilizers are important in agricultural practices because of their role in maintenance of soil health, environmental pollution reduction and also minimize the use of chemicals [2]. Biofertilizer includes microorganisms that encourage the adequate nutrient supply to the host plants and make sure their proper growth, production, and physiological control. These are important components of sustainable farming which play a crucial role in maintaining long-lasting soil fertility and crop production sustainability [2, 3]. BNF (Biological nitrogen fixation) is the most sustainable and lowest cost source of nitrogen [4]. Their eco-friendly, simple to spread, non-toxic and cost-effective existence, biofertilizers have emerged today as a highly efficient alternative to chemical fertilizers. An experimental study was carried out to examine the effect of chemical and biofertilizer application on morphological and biochemical parameters of *Vigna* crop. The experimental *Vigna* species was green gram (*Vigna radiata* L. Wilczek; var. sweta) also locally named as mung bean. It is an annual herbaceous self-fertilized crop. Plants are rising to a height of 30 to 100 cm containing trifoliate leaves,

along with yellow colored flowers formed in axillary racemes. It is an important source of quickly digestible protein to the vegetarian population of the nation.

Biofertilizers improve the potency of chemical fertilizers utilizing a carrier material on which microbes are placed [5]. Vikram *et al* [6] proposed the potential usage of effective PSB strains as a biofertilizer to improve crop production. There are many studies that showed the combined application of chemical fertilizers and biofertilizers significantly influenced the growth and yield of many crops and improve the crop productivity thus, reduced the dependency on chemical fertilizers to increase their yield. Biofertilizers with reduced amount of chemical fertilizers recommended for better yield of chickpea [7].

The present study was undertaken to identify specific level of fertilizers with reduced or minimized dose of chemical fertilizer to obtain maximum value for morphological and biochemical parameters of *Vigna radiata*. The main purpose of the present study was looking for the best fertilizer level either single or in combination of chemical and biofertilizer, to obtain enhanced plant growth in addition to keep sustainable and safe environment due to the minimize the use of chemical fertilizer.

Materials and Methods

To study the effect of chemical (DAP) and biofertilizer (PSB) application on morphological and biochemical parameters of *Vigna radiata*, a poly pot experiment, based on randomized complete block design (RCBD) with three replicates of 10 plants per treatment was carried out during kharif season (2017) at department of Botany, D. V. College, Orai (Jalaun) in Bundelkhand region of Uttar Pradesh, India. Bundelkhand region lies in south-west corner of Uttar Pradesh (India) and is predominantly