



Role of Biofertilizer for Quality Improvement in Medicinal and Aromatic Plants

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Abstract

Medicinal plants hold a prime place in modern era in order to obtain natural active substances, known as secondary metabolites. They play an essential role in the progress of human civilizations, as medicinal plants are a great resource for traditional medicines. The key factors influencing the growth of medicinal plants and their active components, both quantitatively and qualitatively are conditions such climatic and nutrient parameters suited for plant growth. However, in order to meet the growing demand for raw materials, medicinal plant growers heavily rely on chemicals. Maintaining the quality of medicinal and aromatic plant's output is crucial because it is typically used in raw form. According to numerous academics in the past, the use of biofertilizers in this situation shows considerable potential for resolving the aforementioned issue.

Key Words: Medicinal Plants. Biofertilizer, Secondary metabolites

Introduction

Medicinal and aromatic plants have been used by 80% of global population for their medicinal therapeutic effects as reported by world health organization (WHO). Around 50,000 to 80,000 flowering plants are used medicinally by people worldwide. Many of these plants produce substances (secondary metabolites) important for maintaining human and animal health. Nutritional management is an important component in the success of agriculture affecting crop growth and secondary metabolites production. Nutrients must be balanced and sufficient for optimum plant growth. Continuous usage of inorganic fertilizer affects soil structure. The use of mineral fertilizers over a long period of time has resulted in the pollution of the environment, especially in water and soil, which poses a threat to human life. An efficient approach to resolve these issues is to practice sustainable agriculture that relies on biological fertilizers. Bio-fertilizers containing different microbial strains reduces the need for chemical fertilisers delivering high quality products, free from agro-chemicals and safe for human health. Phosphate solubilising bacteria is an example which is known to improve biological function and absorption of nutrient elements in crops. Incorporating bioinoculants improves yield, shields plants from various biotic and abiotic challenges, and improves the content of pharmaceutically important secondary metabolites.

Bio-fertilizers are considered as an important part of environment friendly and sustainable agricultural practice which reduce the application of chemical fertilizers by 50% without any reduction in growth and yield of plants. The application of elicitors and bio-fertilizers has been well thought-out measure to improve the synthesis of secondary metabolites in medicinal plants. Production of secondary metabolites is influenced by different abiotic factors (temperature, UV radiation, salt conditions, metals, salinity, drought,

flood and oxidative factors), biotic factors (pathogens, herbivores), soil conditions, soil nitrogen and antioxidants. When applied to seeds, plant surfaces, or soil, bio-fertilizers, which contain living microorganisms, colonise the rhizosphere or inside of the plant and encourage development by boosting the supply or availability of primary nutrients to the host plant. Bio-fertilizers add nutrients to the soil through the process of nitrogen fixation, solubilizing phosphorus, and also helps to promote plant growth by synthesizing growth-stimulating substances through the action of microorganisms. The microorganisms in bio-fertilizers restore the soil's natural nutrient cycle and build soil organic matter. Use of bio-fertilizers ensures healthy plants growth, while enhancing the sustainability and the vigour of the soil.

The use of organic manure in combination with bio-fertilizers offers a great opportunity to increase the crop production with less cost. Most of the bio-fertilizers contain microorganisms like Rhizobium, Azotobacter, Azospirillum and blue green algae (BGA). Bio-fertilizers are naturally occurring organic fertilizers which includes manure, slurry, worm castings, peat, seaweed, compost, humic acid, and guano etc. and also bio extracts such as Rhizobacteria, Azotobacter, Azospirillum, phosphate solubilizing bacteria, castor and Trichoderma.

Effects of Bio Fertilizers on MAP

Combination of the arbuscular mycorrhizal fungus, *Bacillus polymyxa* and *Azospirillum brasilense* maximized biomass and phosphorus content of the aromatic grass palmarosa (*Cymbopogon martini*) when grown with an insoluble source of inorganic phosphate, Ratti *et al.*, (2001).

It was observed that *Ocimum basilicum* roots with plant growth-promoting rhizobacteria (PGPR) improved growth and accumulation of essential oils. In comparison to the control treatment, all factors were increased by PGPR treatments. The maximum root fresh weight (3.96 g/plant), N content (4.72%) and essential oil yield (0.82%) were observed in the *Pseudomonas* + *Azotobacter* + *Azospirillum* treatment. All factors were higher in the *Pseudomonas* + *Azotobacter* + *Azospirillum* and *Azotobacter* + *Azospirillum* treatments, (Ordookhani *et al.*, 2011).

An experiment with application of saline water in addition to bio and organic fertilization on geranium plant revealed that peanut compost slightly increased plant fresh and dry weights. The oil percentage decreased at high salinity level of 6000 ppm but at 3000 ppm the oil percentage reached 0.4 when treated with (half dose of compost+Bio) and 0.6% when plants were supplied with full dose of peanut compost compared to the control (Leithy *et al.*, 2009).

The use of combined treatment of bio-fertilizers gave better results for all studied traits in marjoram (*Majorana hortensis* L.). Yield and oil percentage was almost two-fold higher on fresh weight basis as a result of aqueous extracts of compost at low level + biofertilizers compared with control, (Gharib *et al.*, 2008).

Conclusion

Medicinal plants are very important in modern civilization in order to obtain natural active substances, known as secondary metabolites. Genotype and environmental factors have an impact on a plant's ability to produce natural chemicals. There is a huge potential for the use of bio-fertilizers in a wide variety of crop plants. Application of bio-fertilizers promoted healthy growth of plants while enhancing sustainability of soil.

References

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