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RESEARCH ARTICLE

STUDIES ON THE EFFECT OF DIFFERENT ORGANIC BIOFERTILIZER ON *PHYLLANTHUS NIRURI*

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ABSTRACT

To study the effect of biofertilizer, chemical fertilizer and vermicompost on the productivity of *Phyllanthus niruri,* the pot experiment was conducted with five treatments, i.e. T_1- C, T_2- AC, T_3- PS, T_4- NPK, T_5- VC. The results indicated the maximum growth. i.e. plant height, number of branches, number of leaves etc of *P.niruri*. From the analysis of result it has concluded the integrated use of biofertilizers, chemical fertilizers and vermicompost treatments significantly increased growth parameters of *P.niruri.*

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INTRODUCTION

Biofertilizers are live formulates of microorganisms (useful bacteria and fungi) that are ready to be used and improve the quality and the health of the soil and plant species by increasing the nutrient availability for the soil and plants. Biofertilizers naturally activate the microorganisms found in the soil restoring the soil's natural fertility and protecting it against drought and soil diseases and therefore stimulate plant growth. Biofertilizers were obtained using natural election of different type of beneficial living organism. Using biofertilizers that contain different microbial strains has led to a decrease in the use of chemical fertilizers and has provided high quality products free of harmful agrochemicals for human safety. Biofertilizers are products containing living cells of different types of microorganisms, which have an ability to convert nutritionally important elements from unavailable to available form through biological processes. Biofertilizer is considered an important factor in reducing the used rates of chemical fertilizers which appear to be safely improving soil fertility and increasing plant productivity. Current trends in agriculture are centred on reducing the use of inorganic fertilizers by organic manure and the application of biofertilizers such as vermicompost and phosphate biofertilizers (Darzi *et al*., 2011). Vermicompost are the products of the degradation of organic matter through interactions between earthworms and microorganisms. Vermicomposts are finely divided peat-like materials with high porosity, aeration, drainage, and water-holding capacity and usually contain most nutrients in the available forms such as nitrates, phosphates, exchangeable calcium and soluble potassium (Arancon *et al*., 2004). Phosphate solubilizing microorganisms such as; bacteria and fungi, are effective in releasing P from inorganic and organic pools of total soil P through solubilization and mineralization (Chen et al., 2006). Although chemical fertilizers are one of the main factor to maintain soil fertility , excessive application of them has negative effect on physical, chemical and biological properties of soil and increase the possibility of soil erosion , meanwhile considering low input farming system and resource management in order to reach the sustainable agriculture purposes are of great interest. Thus biologic fertilizers application such as mycorrhizal fungi, phosphate solubilizing microorganisms and vermicompost in a sustainable agriculture system not only can maintain the health of environment, but also increase the quality and stability of yield especially in medicinal plant production . Nowadays by revealing the side effects of chemical medicines, worldwide attention in medicinal plant production is turned the spotlight onto improving the quality, quantity and health of active ingredients of natural product via ecologic farming. Therefore, it is obvious that using biologic fertilizers has the most conformity with the production purpose of these plants which leads to improve the qualitative and quantitative yield of them. Offering organic matter in soil to eliminate the most important plant requirement is one of the outstanding advantages of the biofertilizers.

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Table 1. Morphometric analysis of *Phyllanthus niruri*

S.NO	Growth parameters	30 DAYS					45 DAYS				
		C	AC	PS	NPK	VC	C	AC	PS	NPK	VC
1	Shoot length (cm)	4.6	5.2	7.1	4.2	7.3	5.3	7.1	8.3	5.9	8.8
2	Root length (cm)	2.3	4.8	5.3	3.3	6.2	3.4	5.3	6.9	4.1	7.5
3	Plant height (cm)	6.9	10	12.4	7.5	13.5	9.2	12.4	15.2	10.0	16.3
4	Leaf length (cm)	0.5	0.8	1.0	0.5	0.9	0.6	1.0	1.3	0.7	1.3
5	Leaf width (cm)	0.3	0.6	0.5	0.4	1.1	0.8	1.2	0.9	0.5	1.2
6	Leaf area (cm^2)	0.1	0.2	0.3	0.1	0.5	0.2	0.6	0.5	0.1	0.7
7	No of leaves	13	27	32	14	39	19	43	61	23	69
8	No of hairy roots	8	12	12	7	16	21	28	44	18	53
9	Shoot girth (cm)	0.01	0.03	0.1	0.01	0.1	0.06	0.09	0.1	0.07	0.1
10	No. of branches	-	1	2	-	3	2	3	4	2	5

C- Control, AC- *Azotobacter chroococcum,* PS- *Pseudomonas* sp, NPK- Chemical fertilizers, VC- Vermi compost

Furthermore, nutrient providing in the form of natural nutrition, developing biodiversity, increasing biological activity, improving quality and maintaining the health of environment are the other advantages of biofertilizers (Khaosaad, 2006). Medicinal and aromatic plants represent an important source of income in agriculture section of national economy in many countries. Medicinal and aromatic plants are an essential oil source of the well known drugs. *Phyllanthus niruri* (Euphorbiaceae) is a small herb distributed throughout the tropical and subtropical regions of both hemispheres. The annual herb is 30-60 cm high, quite glabrous, stem often branched at the base. Its wide variety of phytochemicals and their pharmacological properties. The active phytochemicals such as flavonoids, alkaloids, terpenoids, lignans, polyphenols, tannins, coumarins and saponins, have been identified from various parts of *P. niruri*. Extracts of this herb have been proven to have therapeutic effects in many clinical studies. The plant is of medicinal importance for numerous ailments like dysentery, influenza, vaginitis, tumors, diabetes, diuretics, jaundice, kidney stone, dyspepsia, antihepatotoxic, antihepatitis-B, antihyperglycemic and also as antiviral and antibacterial activities were observed (Paithankar., 2011).

MATERIALS AND METHODS

Normal soil(unsterilized) collected from local area from Thanjavur and the physiochemical parameters of the soil were analyzed in soil testing laboratory, Trichy such as the nutritional load and microbial population (Waksman,1922). The seeds of *phyllanthus niruri* were bought from Anandha exports , Chennai and the biofertilizer (*Azotobacter* and *Phosphobacteria*) from Tamil nadu Agricultural University (TNAU), Coimbatore, the chemical fertilizer (NPK) from local market and the vermicompost were bought from Periyar maniyammai university, Thanjavur. The species of biofertilizer were identified by using the biochemical tests such as Indole, methyl red, Voges proskauer, citrate utilization, catalase and carbohydrate fermentation test to confirm the strains (Bergy's manual of determinative bacteriology, 12th edition)

Pot culture experiments

The experiment were conducted in earthern pots measuring 15x15 cm in diameter, unsterilized soil were filled in each pots (Kuntal *et al*, 2007), and then following treatments were provided for each plants like

T_1- Control
T_2- *Azotobacter chroococcum* (3g/Kg)
T_3- *Phosphobacteria(Pseudomonas sp)* (3g/ Kg)
T_4- Vermicompost (3g/ Kg)
T_5`- Chemical fertilizer (NPK) (50:25:25) .

Each treatment were replicated and all together thirty pots were maintained and was sprayed regularly. The morphometric analysis were taken once in 15 days from the experiments.

RESULTS AND DISCUSSION

In the present research, the maximum yield was obtained in growth parameters such as in shoot length, root length, plant height, leaf length, leaf width, leaf area, number of leaves, number of hairy roots, shoot girth and number of branches were obtained in organic manure applied pot than the untreated pots (VC>PS >AC> CF>control). The same results have been reported by Pal., (2002) in Brahmi; Chand *et al*., (2011) in Geranium; Gupta *et al.,* (2011) in black Henbane; Abbey and Kanton., (2004) in onion; Shashidhar *et al*., (2009) in Mulberry; Prabhu *et al*., (2006) in Cucumber; Davood Habibi (2013) in *Ocimum basilicum L*. Rajasekaran *et al* (2015) has been reported the germination and growth of paddy (*Oryza sativa*. L) using biofertilizers and the effect of phosphate biofertilizer on the growth of Marigold by Zaradost, (2014). Like that the same results were observed by Nimisha patel (2014) on *Cuminium cyminum* and Krishnamoorthy (2012) in *Aloe barbadensis* using Cyanospray fertilizer.

Nutrient management in integrated manner is beneficial for crop productivity. So it can be concluded that organic manure and biofertilizers can replace around 25 to 50 percent of chemical fertilizer. Thus good soil fertility management ensures adequate nutrient availability of the plant and improve their growth. Only inorganic fertilizers can't sustain plant growth under modern farming. Likewise, nutrient supply through organic manures or biofertilizers can hardly fulfil the need of a plant. From the above results it may be stated that the use of bio-fertilizers, chemical fertilizers along with vermicompost in integrated manner is beneficial in improving the growth of *Phyllanthus niruri.*

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