RESEARCH PAPER:

Effect of vermicompost on the growth and biochemical contents of *Oryza sativa* var. *ponni*

■K.KRISHNAPRIYA AND S.N.PADMADEVI

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SUMMARY

Paddy is the most important food crop of India. An experiment was designed to improve the yield and biochemical contents of rice. Vermicompost was made using waste banana leaf from banana plantations that were left over after the harvest of the plants. The earthworm employed was *Eudrillus eugineae*. The vermicompost thus produced was amended to the soil at a rate of 5 tones/hectare and ploughed well. Paddy seeds of the variety *ponni* were sown in the experimental plots which were 8m of breadth and 39m length. Experiments such as shoot length, root length, number of grains, 1000 grains weight, number of spikelet, height of the plant, paddy grains protein and carbohydrate content were conducted to study the effect of vermicompost on the growth and biochemical contents of the paddy crop. A control plot was maintained in which the soil was not amended with vermicompost.

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Key Words :
Vermicompost, *Oryza sativa* var.*ponni*, Biochemical contents

Author for Correspondence -
K. KRISHNAPRIYA
Department of Botany, P.S.G.R. Krishnammal College for Women, COIMBATORE (T. N.) INDIA

See end of the paper for **Coopted authors**

Throughout the world, human population, industries and domestic animals increasingly are highly producing large amount of organic wastes in addition to naturally falling leaf litter creating economic and environmental problems. The organic residues, by-products and waste materials if not used for other purposes, it should be returned to the soil from which it was derived, thus ensuring availability of adequate amounts of soil organic matter and nutrients. Composting is the natural process of decomposition of organic matter by microorganisms under controlled conditions. Compost improves soil fertility because of the presence of humic substances in the compost (Senesi, 1989). Earthworms are a resource that may be used in agriculture because of their effect on nutrient dynamics and on the physical structure of the soil which significantly enhance plant growth and improves soil quality (Lee, 1985).

EXPERIMENTAL METHODOLOGY

The field experiments were conducted in an agricultural farm at Gobichettipalayam in Tamil nadu. The soil was well ploughed. The soil samples were collected and analyzed for their physio- chemical characters with respect to pH, electrical conductivity, moisture content, bulk density, micronutrients and macronutrients. After 10 days, the shoot length was measured. In another fifteen days the seeds grew into seedlings that were collected and transplanted to the experimental plots. The soils were well ploughed and divided into the equal sized plots of 8x39 feet. Triplicates were maintained for each treatment. About 300 seedlings were sown in each plot. Only one seedling was sown in each pit. Irrigation was done by continuous flooding. Various experiments were conducted to study the effect of vermicompost on the growth and yield parameters, biochemical content. The amount of protein was estimated by modified Folin method of Lowry *et al.* (1951), total soluble carbohydrate was estimated by anthrone method (Dubois *et al.*, 1951).

Preparation of vermicompost:

Banana trash (100kg) was mixed with 10kg of cow dung and heaped to a height of 2 feet in a cement tank that was 5 feet in height.

The bed was covered with coconut leaves and the bed was left undisturbed for 30 days. After 30 days, the coconut leaf used for covering the bed was removed. The half decomposed organic waste was mixed evenly using a spade and again heaped into a bed. The earthworm (1kg of the organism- about 500 organisms) was introduced into the bed and again covered with coconut leaf to prevent destruction of the bed from the birds that pick up the worms. In another 30 days, the bed containing the waste organic material (banana trash) had been converted into vermicompost that was amended to the experimental field where paddy was grown. Vermicompost was amended at the rate of 5t/h^{-1}.

EXPERIMENTAL FINDINGS AND DISCUSSION

The results of the present study as well as relevant discussions have been presented under following sub heads:

Physico-chemical characteristics of the soil:

The soil type was black soil:

The results of Table 1 showed that the vermicompost treated soil showed an increased value in all the parameters studied.

Table 1 : Physio-chemical properties of soil

Sr. No.	Parameters	Initial analysis of soil before cultivation	Control soil	Soil amended with vermicompost
1.	pH	6.03	6.05	6.17
2.	Electrical conductivity	35	36	38.8
3.	Moisture content	2.89	2.94	3.01
4.	Bulk density	1311	1319	1347
5.	Nitrogen (mg/kg)	753	765	783
6.	Phosphorus (mg/kg)	413	419	430
7.	Potassium (mg/kg)	123	131	148
8.	Cadmium (mg/kg)	1.1	1.2	1.6
9.	Zinc (mg/kg)	12.5	12.9	13.5
10.	Copper (m)	11.1	11.4	12.1

Growth and yield attributes:

The results of Table 2 showed that in all the parameters studied, vermicompost significantly improved the growth and yield of paddy when compared with the control. The reason may be attributed to the better nutrient availability and uptake that would have increased growth and yield parameters. Such a positive influence of vermicompost was also reported by Venkatesh Patil and Giraddi 1998). (1998) in grapes Athani *et al.* (1999) in bananas and Arancon *et al.* (2004) in tomatoes.

Table 2 : Growth and yield attributes

Parameters	Plants grown in vermicompost amended soil	Control
Shoot length (cm)	17.2	16.4
Root length(cm)	2.1	1.6
Number of grains in each spikelet	192	187
Number of spikelet	19	16
Weight of the spikelet (g)	98	75
1000 grains weight(g)	490	357
Height of the plant(cm)	179	117

Biochemical analysis of paddy grains:

The biochemical analysis (protein, carbohydrates) was done in the mature grains of *Oryza sativa* var.*ponni*. In this experiment, vermicompost had a positive impact on the protein and carbohydrates content (Table 3).

Table 3 : Analysis of protein and carbohydrates

Biochemical contents	Plants grown in vermicompost amended soil (mg/g)	Control (mg/g)
Protein	11	9
Carbohydrate	160	155

Soil enzyme activity:

Vermicompost had a positive impact on soil enzyme activity (Table 4). Organic manure application have favoured more microbial population ultimately more enzyme activity. Similar strong relationship between organic manure and enzyme activity has been reported by Garcia *et al.* (1994).

Table 4 : Enzymatic activity in vermicompost soil

Soil enzymes	Vermicompost amended soil	Control
Urease	14.2	11.1
Phosphatase	10.12	8.2
Dehydrogenase	2.8	1.3

Conclusion:

Organic wastes can be converted into inexpensive fertilizers by simple techniques such as vermicomposting. Such an eco-friendly fertilizer completely reduces environmental pollution and health hazards. Thus, vermicomposting which is a safe eco-friendly technique has twin benefits as it solves the problem of waste disposal as well as it converts waste into useful manure.

COOPTED AUTHORS-

S.N. PADMADEVI, Department of Botany, P.S.G.R. Krisnammal College for Women, COIMBATORE (T.N.) INDIA

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