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Influence of organic inputs on growth parameters of vegetable crops under terrace farming

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Abstract
A pot experiment was conducted during *kharif*, 2016, to optimize the efficiency of organic inputs in vegetable crops under terrace farming at Kalpetta Muncipality of Wayanad district, Kerala. The experiment consisted of cultivation of vegetables like Cow pea (*Vigna unguiculata*), Tomato (*Lycopersicon esculentum*), Chilli (*Capsicum annum*), Ladies finger (*Abelmoschus esculentus*), and Brinjal (*Solanum melongena*) in grow bags. The experiment was laid out in completely randomized block design with five treatment combinations and in four replications. The treatments comprised of application of Panchagavya, Jeevamruth, Amruthpani, Poultry Manure and Cow dung. The results showed that the plants treated with Panchagavya recorded higher rates of plant height and number of leaves in all the three replications.

Keywords: terrace farming, organic inputs, grow bags, plant height and number of leaves

Introduction

Much of the increase in global agricultural production over the last few decades has come about through the adoption of high input farming system. Chemical crop protection is profit - induced poisoning of the environment. If on one side pesticides have helped India and other countries in achieving self-sufficiency in food production, on the other hand their indiscriminate use has considerably polluted the environment through the extend of persistence in soil, air and water and extend of contamination of environment including food commodities. A weaker soil became more susceptible to disease, giving chance to profiteers, recommending the use of pesticides and fertilizers further weakening the earth's natural capacity to bear healthy crop (Sukamoto and Oba, 1991) [6].

Energy crisis, higher fertilizer cost, sustainability in agri-production system and ecological stability are the important issues which renewed the interest of farmers and research workers to opt for non-chemical sources of plant nutrients like bio-fertilizers, azolla and organic inputs *viz*., panchagavya, jeevamruth farmyard manure, vermi-compost, poultry manure and green manure. Awareness about soil health and crop quality has led to an interest towards eco-friendly farming practices such as organic farming (Sharma *et al.*, 2008) [4].

Wayanad is a district of fertile highland of greenery in Kerala state. It is set high on the Western Ghats with altitudes ranging from 700-2100m. It is noted for its less atmospheric pollution compared to other parts of the state. Most of the people in Wayanad depend on agriculture for their living. However, recently the unscientific and increased use of harmful pesticides in plantation crops, spices, vegetables, fruit crops etc are noted in the district in connection with efforts of the farmers to enhance the productivity. This resulted in the boosted production but also in the tragic increase in the number of cancer patients according to recent survey. Now hundreds of farmers learn the bitter lessons of chemical farming are making a comeback to organic farming.

There is an urgent need to develop farming techniques, which are sustainable from environmental production and socioeconomic points of view. The agricultural community is setting its hopes on sustainable agriculture.

Methods of organic farming vary. A Terrace garden is a garden of vegetables on the roof of buildings. Besides the decorative benefit, roof plantings may provide food, temperature control, hydrological benefits, architectural enhancement, habitats for wildlife, recreational opportunities and in large scale it may even have ecological benefits. The practice of cultivating food on the rooftop of buildings is sometimes referred to as Terrace farming.

Home needs can be fulfilled by the terrace garden by growing vegetables and greens. So balanced diet will be maintained.

Terrace gardening can become a fruitful habit for young and old if attempts are deliberately made in the beginning. Terrace gardening is a healthy hobby, not only to keep one engaged for a couple of hours in a week but it gives pleasure of being in the midst of a growing garden. It gives an opportunity particularly for housewives to take a breath from the routine of running the affairs of house and smiling with flowers and fruits of their own creation. It also provides some compensation of recreating the agricultural land lost for building houses, for growing immediate household needs. Terrace gardening is the blessing to the modern world for sustainable subsistence.

Organic farming is the only solution to feed the growing population with a healthy nutrition, and pesticide free food. The urban agriculture focuses on terrace gardening or roof top gardening. With this above background, the current study has been undertaken to study the effect of organic inputs in growth parameters of vegetable under terrace farming.

Materials and methods

Study Area

The study area selected was Kalpetta. Kalpetta is s town and a municipality in the Wayanad district, state of Kerala. Kalpetta is the headquarters of Wayanad district as well as the headquarters of Vythiri thaluk. Wayanad district of Kerala can be aptly called the abode of Kerala's tribal population. The district which forms an edge of the Deccan plateau of South India has a luxuriant forest cover and receives the maximum amount of annual rainfall compared to other regions of the state. The district is perhaps one of the biggest foreign exchange earners of the state, with its production of cash crops like cardamom, Pepper, Coffee, Tea, Spices and other condiments.

Survey

Survey was conducted in Kalpetta locality, to study the organic inputs which are suitable in this locality and popular among organic farmers. They are Panchagavya, Jeevamruth, Amruthpani, Cow dung and Poultry manure. The details of the dosage, ingredients and method of preparation details were collected from the faculties of MSSRF, RARS Ambalavayal and organic farmers and these preparations are used for the research work.

The experiment consists of five treatments as follows T_1: Panchagavya (3 % spray on 45 and 60 DAS), T_2: Amruthpani (2 % spray on 45 and 60 DAS), T_3: Jeevamruth (3 % spray), T_4: Poultry manure (2 % spray on 45 and 60 DAS) and T_5: Cow dung (2 % spray on 45 and 60 DAS). The grow bags of thickness 15-20 gauge were filled with soil, sand, and farm yard manure in the ratio of 1:1:1. All plants in each treatment in the grow bag were selected and tagged. Selected vegetable crops like Cow pea (*Vigna unguiculata*), Tomato (*Lycopersicon esculentum*), Chilli (*Capsicum annum*), Ladies finger (*Abelmoschus esculentus*), and Brinjal (*Solanum melongena*) for comparative study. Vegetable seeds were sown in the germination trays, the trays were filled with vermicompost. The seeds were sown at shallow depth in the tray. After then these seedlings are placed in a grow bag fr experiment purpose. First irrigation was given immediately after sowing and life irrigation on third day after sowing. Subsequent irrigations were given at two days interval.

All the biometric observations were recorded from those tagged plants at 45 and 60 DAS and at harvest. The data were analyzed statistically following the procedure given by Gomez and Gomez (2010) [1].

Results and discussion

Plant height

The data on plant height (cm) recorded at different growth stages of vegetables during *kharif* 2016 are presented in Table 1. The data on plant height of vegetables treated with Panchagavya showed significantly higher variations. In general, there was a steady increase in plant height up to harvest stage; the increment was sharp till 60DAS and mild thereafter.

On 45 DAS, among the various input treatments, significantly higher plant height of (52cm in Brinjal, 68cm in Bhendi, 123 cm in Tomato, 79 cm in Chilli and 88 cm in Cowpea respectively) was recorded in Pachagavya treated plants. Significantly taller plants (62 cm in Brinjal, 73 cm in Bhendi, 134 cm in Tomato, 94 cm in Chilli, and 103 cm in Cowpea) were observed in Panchagavya treated bags on 60 DAS.

Plant heights referred as an index of plant growth was higher under T_1 treatment. Increase in plant height of vegetables was due to the presence of higher amounts of major nutrients in Panchagvya. This may be due to the positive influence of growth promoting hormones which accelerated the mobility of photosynthates. Similar trends were also reported by Natarajan (2002) [2], Padmapriya (2008) [3] in coleus and phyllanthus,

Increased, plant height and plant weight of different vegetables was observed in the treatment T_1. The nutrients in the available form, presence of nutrients near the root zone and easy transfer of nutrients to plants are contributing for the increase in plant height and weight.

Number of leaves

The mean data on number of leaves per plant recorded at two stages (45, 60 DAS) are showed in Table 2. Crop growth observed at all the stages showed that, Panchagavya treated plants recorded comparatively more number of leaves per plant (at 45 and 60 DAS) than other organic input treated plants. On 60DAS the number of leaves in brinjal, T_1 was on par with T_3. The highest number of leaves was found in treatment T_1. These results are in line with Somasundaram (2003) [5], that stem girth and root length of sunflower, maize and green gram was increased due to the application of biogas slurry + panchagavya as nutrient source.

Table 1: Influence of organic inputs on the Plant height (cm) at 45 and 60 DAS of different vegetable crops.

Treatments	45 DAS					60 DAS				
	Brinjal	Bhendi	Tomato	Chilli	Cowpea	Brinjal	Bhendi	Tomato	Chilli	Cowpea
T_1	52	68	123	79	88	62	73	134	94	103
T_2	44	60	111	76	82	58	73	129	85	95
T_3	48	61	119	77	85	62	68	130	86	96
T_4	45	58	112	73	78	52	67	122	82	87
T_5	43	59	108	68	79	49	67	113	81	93
SEd	0.85	0.89	1.32	0.90	1.00	0.34	1.19	1.69	0.93	1.81
CD (P=0.05)	1.81	1.91	2.82	1.92	2.14	0.72	2.53	3.62	1.99	3.87

Table 2: Influence of organic inputs on the number of leaves at 45 and 60 DAS of different vegetable crops.

Treatments	45 DAS					60 DAS				
	Brinjal	Bhendi	Tomato	Chilli	Cowpea	Brinjal	Bhendi	Tomato	Chilli	Cowpea
T_1	9	8	19	7	29	15	15	36	16	42
T_2	6	7	15	5	21	12	13	27	14	57
T_3	7	7	15	7	25	15	14	30	14	46
T_4	6	5	14	5	17	13	13	29	11	29
T_5	5	5	13	5	14	11	11	25	11	28
SEd	0.14	0.06	0.09	0.07	0.18	0.11	0.16	0.28	0.17	0.65
CD (P=0.05)	0.29	0.13	0.20	0.16	0.39	0.24	0.34	0.60	0.37	1.38

First flowering

The plants applied with Panchagavya shown early flowering than other plants. Number of days taken to first flowering was calculated from the date of sowing. Application of panchagavya has growth regulating effect along with insecticidal properties which must have triggered the formation of florigen resulting in early flowering. Application of panchagavya at frequent interval had increased flowers in vegetables which might be due to high amount of amino acid proline present in milk, an important constituent of panchagavya. Higher amounts of endogenous proline increases contents of cytokinin and auxin which in turn contributes towards production of more number of flowers. The present finding is in conformity with the findings of Vivekanandan (1999) [7] in paddy.

Table 3: Appearing of 1st flowering in the different vegetable crops (in DAS)

	Vegetable crops				
Treatments	Brinjal	Bhendi	Tomato	Chilli	Cowpea
T_1	59	58	60	60	59
T_2	64	62	64	65	64
T_3	63	64	64	65	65
T_4	63	62	65	66	65
T_5	64	64	64	64	64
SEd	0.82	1.13	0.42	1.04	0.64
CD (P=0.05)	1.75	2.40	0.89	2.23	1.37

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