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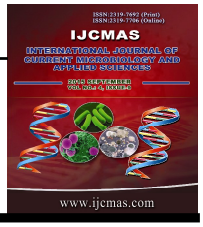

Original Research Article

Organic Farming Acid Lime Plant Fruits *Citrus aurantifolia* at Puliangudi in Nellai District, Tamilnadu State, India

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Keywords

Lime fruits, Vermicompost, Compost, NPK, Organic farming

A B S T R A C T

An attempt has been made to find out the quality and profit of the lime *Citrus aurantifolia* using composts and vermicomposts derived from three wastes such as pressmud waste (PW), agriculture weed waste (AWW) and cotton waste (CW) as an organic fertilizer. In order to prepare vermicompost, these three wastes composted by locally collected earthworms *Lampito mauritii, Perionyx excavatus* and *Eudrilus eugeniae.* As an inorganic fertilizer, recommended dose of NPK was used in the lime field at Puliangudi near Coutallam in Nellai District. A total of 10 yields of lime fruits are examined using vermicompost, compost and N:P:K treated lime trees over 60 days in the study field. The weight, length and width of lemon fruits yield which are grown using recommended dose of vermicomposts andcomposts of organic fertilizers are statistically significant when compared with the lemon plants grown in the recommended dose of N:P:K as an inorganic fertilizer. TheRepeated Measures of ANOVA also state that the vermicompost treated lime plants have given significantly more profit ((54.75±1.71nos/tree; $F=465.25$, $p<0.001$***) compared with lime trees treated with compost (42.94±2.94nos/tree) and NPK (27.89±1.88nos/tree)during study period.

Introduction

Organic farming is one such healthy method that totally deprives the usage of inorganic fertilizer, thereby the quality of the crop, health of the soil, the health of animals which depend the crops and the diversity of various animals in the cultivable fields would be saved (Kale 1998). The usage of inorganic fertilizer, pesticide and insecticide in the cultivable lands deteriorates soil quality and do harmful effects to animals inhabiting in these environment. Realizing the cost and the fatal effects of hazardous inorganic fertilizers to health problem of human races, farmers and researchers have driven to seek alternate forms of fertilizer the compost and vermicompost to nourish plants and practice in cultivable lands(Kale, 1998).The usage of chemical fertilizer not only deteriorate soil quality but also eliminate generalist predator arthropod like

Oriuslaevigatus (Fieber) (Hemiptera: Anthocoridae) from the agriculture fields and natural ecosystem (Biondi*et al* 2012)**.**The ill effect of the usage of pesticides like organochlorine and polychlorinated biphenyls (PCBs) were determined in grains (rye and wheat), vegetables (carrots and beets) and soil collected from the fields and found that these pesticides accumulated in the grains, vegetables and soil and cause side effect on human beings(Witczak and Abdel-Gawad 2012)**.**The usages of chemical fertilizer with herbicides and pesticides have a crucial role in agrotechnology, can adversely affect beneficial soil organisms and thereby contribute to environmental concerns (Stojanović *et al* 2007).

Considering the environmental concern in mind and to make awareness of organic farming, an attempt has been made to utilize the vermicompost and compost as organic fertilizer derived from the three organic wastes such as preemud waste (pw), agriculture weeds waste(aww) and cowdung waste (cw) composted by two locally available earthworm (*Lambito mauritii* and *Perionyx excavatus*) and an exotic species (*Eudrillus eugeniae*)and used as an organic fertilizer in the lime plants. In comparison with the yield of lime fruits, the recommended dosage of chemicalinorganic fertilizer (NPK) used in the lemon field near at Puliangudi near Courtallam is documented in this paper.

Materials and Methods

A four years old acid lime (*Citrus aurantifolia*) crop field at Puliangudi which is located about 35kms northward from Courtallam in Nellai District was selected for this field study. The study field has accommodated with 210 lime plants and the distance between two trees was about 5 to 6 meters (Fig. 1).

A total of nine lime plants were randomly selected for applying recommended dose of vermicompost (19kg/tree for three plants), compost (10kg/tree for three plants) and NPK (400:200:220g/tree for three plants) as fertilizer. The fertilizer (compost, vermicompost and NPK) applied trees were irrigated regular in 7-10 days interval during experiment duration. All the nine trees produced flowers after one month of applying the fertilizer and the flowers became fruits and the fruits were harvested in another 30 days. Total number of fruits and quality of fruits in terms of weight, length and width from each lime tree which are applied with vermicompost, compost and NPK as fertilizer for 10 harvesting in 60 days interval was recorded (Table 1; Fig 1b). The length and width of the fruits were taken with the help of verniercaliper (Fig.2a,b) and the weight of each fruits wastaken with the help of digital weighing machine (Fig.2c). The results were compared using the statistical tool “t” test Repeated Measures of ANOVA (Newman-Keuels Multiple Comparison) test.

Results and Discussion

Consumption of chemical fertilizers (N:P:K) has been increasing in India during the past thirty years at a rate of almost half a million tones on an average a year. It was only 13.13 kg/ha in 1970-71, 31.83 kg/ha in 1980-81 and 74.81 kg/ha in 1995-96. It is increased up to about 96 kg/ha during 1999-2000. The intensity of their use in a few regions and a few crops are causes of serious concern to human health, soil, water, environment and thus to the sustainability of agriculture production in the country (Singh *et al* 2001). Long term continuous use of high doses of chemical fertilizers badly affects the physical, chemical and biological properties of the soil. A study at the University of Agricultural Sciences, Bangalore confirmed the deterioration of

soil health because of the reduction in water holding capacity, soil pH, organic carbon content and the availability of trace elements such as zinc in case of Ragi crop even with the application of normal doses of fertilizer in the long run (Hegde *et al* 1995). In the long run, increasing nitrogenous fertilizer use leads to the accumulation of nitrates in the soil. The application of sulphatic fertilizers leaves sulphates in the soil. Rainfall and excessive use of irrigation water cause these chemicals to change the alkaline or acidic nature of the soil. The nitrates go to the rivers, wells, lakes and also leak into the drainage system which goes into the drinking water contaminating the environment. It also causes depletion of the ozone layer adding to the global warming.

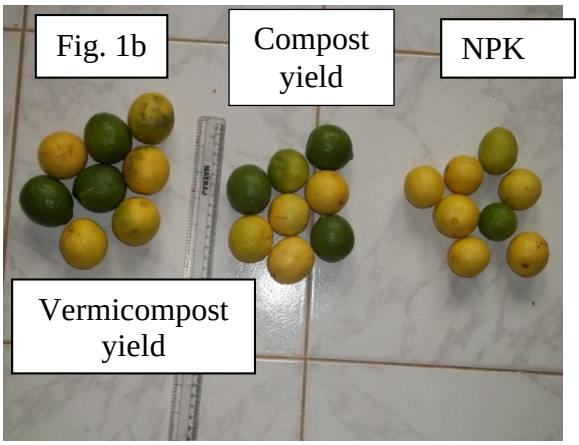
Therefore, it is the urgent for human race to think about the adverse impact on the health of life in this planet. To initiate organic farming practice in and around Courtallam, an acid lime field was selected as an experimental field. Nine plants randomly selected among 210 plants for the purpose of applying vermicompost, compost and NPK as chemical fertilizer. Vermicompost, compost and NPK are applied three plants each respectively and ten yield of vermicompost, compost and NPK applied lime fruits were studied. The result showed that the weight (Vermicompost (49.55±2.75g) vs N:P:K (33.22±5.47g) t=7.89, p<0.001***; conventional compost (40.8±4.04g) vs N:P:K (33.27±5.47) t=6.47, p<0.001***), length (Vermicompost (4.73±0.34cm) vs N:P:K (3.92±0.19cm) t=7.8, p= < 0.001***; conventional compost (4.35±0.31cm) vs N:P:K (3.92±0.19) t= 4.16, p=0.024*), and the width (Vermicompost (4.46±0.14cm) vs N:P:K (3.78±0.16cm) t=16.3, p<0.001***; conventional compost (4.14±0.1cm) vs N:P:K (3.78±0.16) t=4.16, p=0.0024*) of lemon fruits yield which are grown using recommended dose of composts and vermicomposts of organic fertilizers are statistically significant when compared with the lemon plants which are grown in the recommended dose of N:P:K as an inorganic fertilizer. The Repeated Measures of ANOVA state that the vermicompost treated lime plants have given significantly more profit ((54.75±1.71nos/tree; F=465.25, p<0.001***) compared with lime trees treated with compost (42.94±2.94nos/tree) and NPK (27.89±1.88nos/) as fertilizers. This may be due to the presence of increased amount of available nitrogen and organic matter content in vermicompost (Nagavelamma *et al* 2004; Zaller 2007). Further, it may also possibly be due to the presence of plant growth hormones like auxin, giberlins and cytokinins in vermicompost (Ismail 1996).The high percentage of humic acids in vermicompost contributes to plant health, as it promotes the synthesis of phenolic compounds such as anthocyanins and flavonoids which may improve the plant quality and act as a deterrent to pests and diseases and improves the nutrient content of the different plant components such as roots, shoots and the fruits (Theunissen *et al* 2010).

The present finding is in line with the previous reports that the net production rate of *Amaranthus* plant had been considerably improved (4 kgs/8.25 sq.ft/32 days) through vermicompost application over chemical fertilizer (2.5Kgs/8.25 sq.ft/32 days) (Uma and Malathi 2009). Similarly in okra plant, while 270gm has been harvested with vermicompost, only 63 gm with chemical fertilizer and in sugarcane too the higher rate obtained with vermicompost (141.38tonnes) than with chemical fertilizer (121.36 tones) (Ismail, 1983). Recently, one of the farmers Periasamy Solaimalai from Madurai invited to Rashtrapathi Bhavan as a state guest for receiving the 'KrishiKarmn' award from the

Table.1 The table shows the weight, length and width of lemon fruits applied vermicompost, compost (as organic fertilizer) and NPK(as inorganic fertilizer) fertilizer

	Vermicompost applied Lemon Fruits			**Compost applied Lemon Fruits**			**N:P:K applied Lemon Fruits**		
Sl.No	Weight (g)	Length (cm)	Width (cm)	Weight (g)	Length (cm)	Width (cm)	Weight (g)	Length (cm)	Width (cm)
1	52.61	5	4.5	42.12	4.2	4.2	31.11	4.3	3.8
2	52.88	5.2	4.6	45.13	4.9	4.2	39.75	4	4.1
3	51.88	5.1	4.6	42.73	4.6	4.2	32.31	4.1	4
4	46.52	4.5	4.4	42.35	4.4	4.2	29.53	3.8	3.7
5	48.73	4.5	4.4	33.84	3.8	4.1	25.43	3.8	3.7
6	52.35	5.1	4.6	39.99	4.2	4.1	28.17	3.6	3.6
7	50.12	4.7	4.5	34.84	4.1	4	31.22	4	3.8
8	46.41	4.5	4.5	38.08	4.3	4.1	32.98	3.9	3.8
9	47.76	4.4	4.3	43.74	4.4	4.2	39.89	3.8	3.7
10	46.25	4.3	4.2	45.21	4.6	4.1	41.78	3.9	3.6

Fig.1a



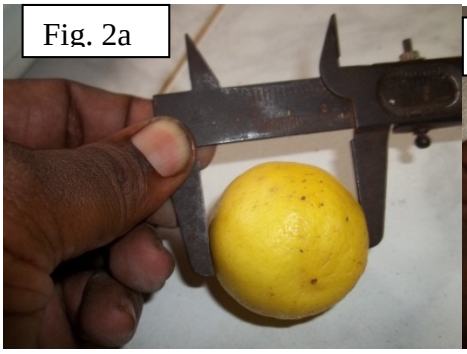


Fig. 2a

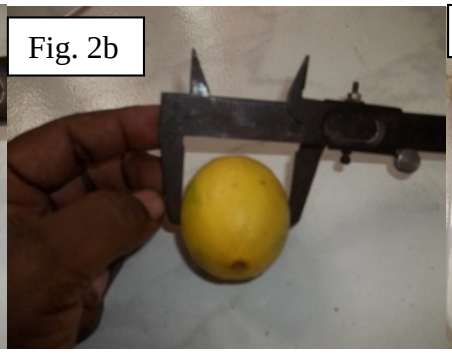


Fig. 2b


Fig. 2c

Rahudkar and Phate (1992) narrate the experiences of organic farming in Maharashtra. Individual farmers growing sugarcane and grapes, after using vermicompost, saw the soil fertility increased,irrigation decreased by 45 per cent and sugarcane quality improved. The authors say that net profits from both the sugarcane and grape crops are high in organic farms. Singh and his co-workers (2001), carried out the experiments on rice-chick pea cropping sequence using organic manure, found the yields substantially higher compared to the control group. Similar results were obtained for rice, ginger, sunflower, soy bean and sesame.

Save (1992) found that after three years of switching over to natural cultivation, the soil was still recovering from the after effects of chemical farming. When the soil regained its health, production increased and the use of inputs decreased. The farm, which was yielding 200 to 250 coconuts per tree, gave 350 to 400 per annum. Veeresh (1999) opines that both high technology and sustainable environment cannot go together. Organic farming is conceived as one of the alternatives to conventional agriculture in order to sustain production without seriously harming the environment and ecology. Sankaram (2001) is of the view that almost all benefits of high yielding varieties based farming accrue mostly in the short term and in the long term they cause adverse effects. There is an urgent need for a corrective action. The author rules out organic farming based on the absolute exclusion of fertilizers and chemicals, not only for the present, but also in the foreseeable future.

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