wjpls, 2024, Vol. 10, Issue 5, 58-63 Research Article ISSN 2454-2229

World Journal of Pharmaceutical and Life Sciences
WJPLS
www.wjpls.org
SJIF Impact Factor: 7.409

PERFORMANCE EVALUATION OF RADISH *RAPHANUS SATIVUS* IN PARTIALLY COMPOSED AND UNUSED RESIDUAL OF COW DUNG WASTES

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Article Received on 25/02/2024 **Article Revised on 16/02/2024** **Article Accepted on 05/04/2024**

ABSTRACT
Now-a-days, population exploitation can role in solid waste generation from agricultural, industrial and so on. The management of solid waste is the peculiar task to us. In current scenario, there are many innovative things to be handled by the researchers as well industrialist for out coming from the problem. In this present study was designed and carried out performance evaluation of Radish plant in partially composed and unused residual wastes from vermicompost. The results showed that, plants that are raised in different doses of earthworm unused residual compost showed relatively maximum values of root weight and length than the partly decomposed compost.

KEYWORDS: Radish, Residual waste, Cow dung, Percent Substrate Ratio, Solid waste.

INTRODUCTION
Organic manures are significant for improving soil quality and are beneficial for harmonizing nutrient availability, which promotes plant growth (Gyewali et al., 2021). Vermicomposting systems sustain a complex microbial and invertebrate food web that results in the recycling of organic matter and release of nutrients. Biotic interaction between decomposers (i.e., bacteria and fungi) and the soil fauna include competition, mutualism, predation, and facilitation, and the rapid changes that occur in both functional diversity and substrate quality are the main properties of these systems (Sampedro and Dominguez, 2008). Green revolution technologies involving greater use of synthetic agrochemicals such as inorganic fertilizers and pesticides with adoption of nutrient reproductive, high yield varieties of crops have boosted the production output (Ramesh et al., 2005). The success of industrial agriculture and the green revolution in recent decades has often marked -significant externalities, affecting natural resources itself (Rao, 1999). Soon the increased use of fertilizers pesticides and farm machinery resulted in nitrate enrichment of ground waters, river waters and estuaries and release of ammonia and nitrous oxide to the atmosphere, the former latter led to the reduction of Ozone layer (Prasad, 2005). These all effect of modern agriculture forced people to demand food grown without fertilizers and pesticides. Furthermore the price of chemical fertilizers had raised to alarming level (Jayaraaj and Jayraaj, 2005). This paved the way for use of organic manure as a source of nutrients, plants growth with vericompost had a maximum growth than farmyard manure and inorganic fertilizers treatment, which indicates that the vermicompost were more suitable and efficient for plant growth.

Vermicompost are finely - divided peat like material, with high porosity, drainage, water holding capacity and microbial activity which make them excellent as soil conditioner and as plant growth media (Khede et al., 2019). Several experiments have demonstrated that very composts contain plant growth regulating materials such as humic acid (Senesi al., 1992; Masciandaro al., 1997 and Plant et al., 1992; growth hormones like auxins, gibberellins and cutokins (Krishnamoorthy and vajranabhiah, 1986; Tomati et al., 1990) which are probably responsible for increased germination growth and yield of plants, in responds to verimcompost applications (Atiyeh et al., 2002). The use of organic amendments such as traditional thermophilic composts has been used to increase crop productivity and yields (Bwamiki et al., 1988; Johnston et al., 1995; maynard, 1993) and there used has been associated with improved soil structure, enhanced soil fertility and increased soil microbial population as well as activity and an moisture holding capacity of soil (Zink and Allen, 1988; Barakan et al., 1995).

Organic amendments like vermicompost promote humification, increased microbial activity and enzyme production, and increase the aggregate stability of soil particles, resulting in better aeration (Sharma et al., 2020). Organic matter has a properly of binding mineral particles like calcium, magnesium and potassium in the form of colloids of humus and clay, facilitating stable aggregate of soil particlesfor desired porosity to sustain plant growth (Tisdale and Orders, 1982). Despite the beneficial effects of compost in improving soil fertility and other soil characteristics, high metal concentrations in this material may limit its utilization. Further more, the application high amount of vermicomposting from composed urban wastes might cause significant reduction in the soil fungi activity, which must be taken into account when using these organic amendments in agricultural systems Sainz er al., 1998. The application of a range of humic acids, that had been extracted from vermicompost, with all needed nutrients, increased the overall growth of tomatoes and cucumbers significance in a very similar pattern to the effects of a range of vermicomposts (Arancon et al., 2006; Arancon et al., 2008). However plant growth hormones can become adsorbed in to the complex structure of humic acids that are produced very rapidly in vermicomposts (Canellas et al., 2000) and may have acted in conjunction with them to influence of plant growth. Vermicomposting technology using earthworms as versatile natural bioreaction for effective recycling of organic wastes to the soil is an environmentally acceptable means of converting waste into nutrition's composts for crop production (Graff, 1981; Edward et al; 1985; Bano et al; 1987). Vermicompost is homogenous, with desirable aesthetics, plant growth hormones and high levels of soil enzymes, while enhancing microbial populations and tending to hold more nutrients over longer periods without (Ndegwa and Thompson, 2001). It can also be used as a bioremedial measure to reclaim problem soils, because of the near neutral to alkaline pH of vermicompost and the suppression of aluminium (Mitchell and Alter, 1993).

Agriculture and food systems have changed very much over the last 5 decades (Knudsen et al. 2006). Modern agriculture involving use of high yielding varieties together with synthetic fertilizers and pesticideshas been of great help in alleviating hunger from the world, because the world population more than doubled itself during the last half of the 20th century; it increased from 2.5 billion in 1950 to 6 billion in 2000 (Wilson 2001). A third of the increase in world cereal production in the 1970s and 1980s has been attributed to increased fertilizer use (FAO 2003). Similarly, the global usage of pesticides has increased considerably during the second part of the 20th century. However, this development has led to a growing disparity among agricultural systems and population, where especially developing countries in Africa have seen very few improvements in food security and production. At the same time, agricultural development has contributed to environmental problems such as global warming, reductions in biodiversity and soil degradation. Furthermore, pollution of surface and groundwater with nitrates and pesticides remains a problem of most industrialized countries and become a growing problem of developing countries (Knudsen et al. 2006). After gone through the long literature review, this present investigation was designed and carried the performance evaluation of Radish plant in partially composed waste and unused residual of vermicompost.

MATERIALS AND METHODS

Collection of Organic Wastes

Dry cow dung waste were collected from Agraharam Street, Erukkattur, Thiruvarur District, Tamil Nadu for keeping earthworms stock. The unused residual was collected from vermicompost tank which were kept 90 days for composting. The partially compost was collected during mid period of composting from the tank.

Collection of Soil

Dry soil was taken from Thiru. Vi. Ka. Govt. Arts College, Thiruvarur, Tamil Nadu. After collection the soil it was manually powder using stone mortar.

Procurement of Earthen Pots

Ten earthen pots of equal size (25 cm diameter and 24 cm height) were purchased from Thiruvaikavur near Kumbakonam, Thanjavur District, Tamil Nadu for using plant culture study.

Effect of different organic wastes on the growth of radish plant cultivation study

Five pair circular pots with size, 25 cm diameter and 24 cm height were taken and to each, 7 kg of dry soil and manure was transferred. Five doses (0,25 50,75 and 100) Percent Substrate Ratio (PSR) in each partly decomposed and unused residual compost of cow dung waste were selected and mixed well with the pot soil. Radish seeds were purchased from the local seed farm at Kumbakonam. Three seeds were placed in each pot of equal distance at three different places at 2.5 cm depth and sufficient water was added with poured in all the pots for proper germination of seeds the experimental pots were kept at open terrace for direct sun light. The pots were regularly poured with sufficient water to ensure proper growth until the plants get harvested 43 days. All plants in the pots were counted radish leaf length and width (cm) growing similar counting was also made at 1, 8, 15, 22, 29, 36 and 43 days are regular week. At the end 43 days all the plants were up energy rooted length and weight measured that their result section.

RESULTS AND DISCUSSION

Measurement of leaf length and width (cm) of seven days intervals of radish plant raised through pot culture using the doses (0, 25,50, 75 and 100) were different PSR of partly decomposed compost (not exposed earthworm), and unused residual compost (exposed earthworm) wastes obtained were 43 days culture study. The radish plant that are raised in OPSR (soil alone) substrate (earthworm exposed) dosed a poor growth of 43 day cultured radish leaf length and width (cm) growth 20±0.3, 0.8±0.4 11.3 ±2.7, 5.0 ± 0.8 over than their respective for initial growth (Table 1). Unused residual cow dung waste the radish leaf length and width (cm) of minimum growth in (1.2±0.1, 11.6±2.4, 5.4 +1.7) over than their respective for initial days (Table 2). The plant raised in different PSR of partly decomposed in cow dung waste (DCDW) doses 25,50,75 and 100 PSR values maximum growth of leaf length and width over than their initial days. The 75 PSR of partly decomposed cow dung waste cultured in radish leaf length and width values (3.0 ± 0.9, 1.2±0.215.9 ± 3.2, 6.3 ± 1.7) when compared than unused residual compost (UCDW) waste highly growth of length and width, decrease values 2.5±0.3, 1.3±0.116.9±3.5, 6.5 ± 1.2 over than their initial days respectively. Values showing the root length and width (cm) and total weight (mg) of pots upper middle and lower row values indicate that the radish plants cultivated finally harvested 43 days (Table 3) respectively. The radish root length, width (cm) and total weight (mg) of upper, middle and lower groups of partly decomposed cow dung waste was noted the middle group of radish root length (cm) of values 1.142 ± 0.021 was statically significance growth when compared than their unused cow dung waste (UCDW), upper groups of radish root length (RL) values 1.160 ±0.019 is significant growth respectively. And lower row values partly and unused residual compost of root length, width and total weight ofmostly non significance values of growth cultured in 43 days respectively (Table 3).

Table 1: Leaf lengths, width (cm) of Radish plant raised in different PSR of partly decomposed Cowdung waste were cultured in 43 days (Mean±SD) N=6.

PSR	Radish Plant (Cm)	Days						
		1	8	15	22	29	36	43
0%	LL	-	2.0±0.3	2.4±0.9	3.5±1.2	5.4±0.4	8.9±1.5	11.3±2.7
	LW	-	0.8±0.4	0.9±0.1	1.8±0.5	2.2±0.4	4.1±1.2	5.8±0.8
25%	LL	-	2.3±0.7	2.7±0.9	3.9±1.2	5.6±1.7	9.3±2.3	11.8±2.7
	LW	-	1.2±0.5	1.5±0.7	1.7±0.4	2.3±1.1	5.5±1.4	6.1±1.2
50%	LL	-	2.5±1.0	3.0±0.4	4.1±1.1	6.5±1.3	11.2±2.5	14.8±3.1
	LW	-	1.0±0.2	1.4±0.5	2.2±0.3	2.8±0.9	5.7±1.2	6.4±1.7
75%	LL	-	3.0±0.9	3.6±1.2	4.9±0.5	6.4±1.7	11.8±2.3	15.9±3.4
	LW	-	1.2±0.2	1.7±0.5	2.2±0.7	2.7±0.9	5.6±1.4	6.3±1.7
100%	LL	-	1.5±0.4	2.4±0.7	3.9±1.0	5.3±1.6	10.7±2.1	11.2±2.4
	LW	-	0.3±0.02	0.6±0.04	1.1±0.7	1.8±0.4	4.5±1.1	5.2±1.6

LL- Leaf length; LW- Leaf width

Table 2: Leaf lengths, widths (cm) of Radish plant raised in different PSR of unused residual Cowdung waste were cultured in 43 days (Mean±SD) N=6.

PSR	Radish Plant (Cm)	Days						
		1	8	15	22	29	36	43
0%	LL	-	1.2.0±0.1	2.3±0.3	3.2±0.5	5.5±1.1	9.1±1.3	11.6±2.4
	LW	-	0.3±0.02	0.7±0.1	1.2±0.3	2.8±0.9	4.3±1.2	5.4±1.7
25%	LL	-	2.3±0.8	2.8±0.4	3.6±1.2	6.9±1.7	12.2±2.5	15.3±3.1
	LW	-	0.9±0.3	1.3±0.5	1.8±0.7	3.1±1.1	5.2±1.4	5.6±1.9
50%	LL	-	2.5±0.9	3.1±1.1	4.0±0.1	7.3±2.3	13.1±2.9	16.9±3.2
	LW	-	1.2±0.3	1.5±0.4	1.9±0.3	3.4±1.2	5.2±1.5	5.9±2.1
75%	LL	-	2.8±0.8	3.4±1.1	5.2±1.4	6.8±1.8	13.9±2.4	16.9±3.2
	LW	-	1.7±0.4	2.1±0.5	2.4±0.7	3.1±1.1	5.3±1.4	5.9±2.1
100%	LL	-	2.6±0.5	2.9±0.4	4.2±1.5	5.9±1.5	10.9±2.7	15.2±3.1
	LW	-	1.3±0.3	1.7±0.8	2.7±0.9	2.7±0.9	4.8±1.2	5.0±1.7

LL- Leaf length; LW- Leaf width

Table 3: Root length (RL), Root width (RW) and Total weight (TW) (mg) of Radish plant cultivated using partly and unused residual compost of Cowdung (Mean±SD) N=6.

Groups	DCDW			UCDW		
	RL (cm)	RW (cm)	TW (mg)	RL (cm)	RW (cm)	TW (mg)
Upper	0.348±0.76	0.16±0.91	5.58±0.31	1.16±0.02*	0.26±0.73	10.40±0.02*
Middle	1.14±0.02*	0.16±0.94	2.24±0.89	0.32±0.79	0.24±0.73	2.58±0.34
Lower	0.82±0.12	0.10±0.97	4.82±0.43	0.82±0.12	0.10±0.98	4.32±0.43

The result presented in the revealed a different effect on the length and weight of root of radish plant cultured in the above said media. In the current study, plants that are raised in different doses of earthworm unused residual compost showed relatively maximum values of root width and length than the partly decomposed compost. A perusal of result undoubtedly proved that the application of vermicompost has a positive role on the growth of radish plant. This observation falls in line with many reports already made on these lines in other plants with vermicompost obtained from different sources. There have been numerous experiments in which plants have been growth in pots with earthworms (or) vermicompost, where an increase in plant growth has occurred. There have been numerous experiments in which plants have been growth in pots with earthworms or their 'Cast' or vermicompost, where an increase in plant growth has occurred Kale and Bano (1986) found that vegetative growth of plants was influenced by *Eudrilus eugenia* worm cast in a better way than the chemical fertilizer line (1994) reported that vermicompost mixture of wood waste and seaster waste showed an excellent growth of tomatoes and lettuces Kale (1994) has recorded Excellus effects of verimicompost on the growth and yield of cereals, pulses, oil seeds, cash crops and plantation crops.

Arulmurugan (1996) has studied the effect of vermicompost on growth, yield protein and oil content of soy bean and recorded an increased in plant height root length, not volume number of seeds per plant protein and oil content of seeds increased uptake to N, P and K by plants, Vadiraj et al, (1996) noticed pronounced influence of vermicompost on the growth and yield of turmeric plant. Ramalingam (1997) has studied the different effects of organic manures (Cattle dung, farmyard manure and press mud) and vermicompost obtained from farm waste + press mud, water hyacinth + press mud and waterhyacinth+ pressmud slurry) on the growth parameters of tomato for 60 days from transplantation and found a many fold increase in the growth parameters of vermicomposts over organic manure treated plants. Senapati (1993b) reported that the emergence of tomato seedlings in vermicompost in much better than in the recommended commercial potting compost. Madhukeswara et al. (1996) also reported that the vermicompost increased the germination efficiency and growth of economical suggested that vermicompost can be organic substrate for raising healthy nurseries which is a constraint before transplantation in the field. The mechanism whereby plant growth is stimulated by vermicompost or wormcast is not clear. However, it is believed that the stimulating effect of observed in the plant growth or yield study could be due to synergic action of severed factors, but the major claim goes to microbial metabolites, the growth regulators present in the vermicompost as suggested by Tomati et al, (1987, 1988).

Formers generally on animal dung for making manure (farmyard manure) by dumbing in a pit or a heap near the dwellings on the roadside without proper attention and maintenance. Since the process of composting in not controlled a poor quality farm yard is formed with lower benefits to seed germination (Gaur, 2001). The present study was accordance with Yadav et al, (2000) who reported that rice yields where averaged over period of 12-15 years remained significantly low under substitution of 50% of recommended NPK with organics viz, farmyard manure, crop residues and green manure as compare to those obtained with NPK, fertilization of recommended rates. Vermicompost contains major and minor plant nutrition are an easily available form that plant, that can tastily assimilate for their growth and development. This quality manure also contains some of the secretions of and is associated microbes, which acts as growth promotes along with other nutrients verimcompost also contain VesicularArtuscular Mycorrhiza (VAM) antibiotics, enzymes with higher useful microbe population. Because of all these vital substances, vermicompost has multifarious effects that influence the growth and yields of crops. Vermicompost being available indigenously at lower cost, results in enhanced crop yield by creating and maintaining better physical and chemical environment for sustaining higher productivity (Ranganathan and Christopher, 1994). The presence of vitamins, hormones, enzymes, macro and micronutrients in vermicompost help the efficient growth of plants (Gajalakshmi and Abbasi, 2004). The growth rate was fast due to increased uptake of macro and micronutrients present in the vermicompost which resulted increased germination percentage, roof length, shoot length and number of leaves in vermicompost applied plants. This finding of the present study was in relation with the earlier reports of Agarval et al., (2003).

The effect of vermicompost on cucumber plant growth could be attributed to presence of plant growth regulators and humic acid in vermicompost, which are produced by increased activity of microbes such as fungi, bacteria, yeasts, actinomycetes and algae (Arancon et al., 2004). The microbes are also capable of producing auxins, Cytokinines and gibberellins during vermicomposting. (Brown, 1995; Arancon et al: 2004) which affects plant growth appreciably (Tomati et al., 1990; Arancon et al, 2004), Krishnamoorthy and Vajranabhiah (1986) demonstrated that earthworm activity could dramatically promote the production of cytokinine and auxin's in organic waste. They also showed that there were strong posting correlation between earthworm population and amount of cytokinine and auxines produced in field soil. With the increase in soil aggregation the number of microspores and there by airobiocity and water holding capacity of soil probably increased thus providing the characteristics of a healthy soil which ultimately increased the water use efficiency of the plants. This suggest that the effects of vermicompost post on crop production is not solely nutritional it is portable thatother factors, such as the presence of beneficial microorganisms or biologically active plant growth influencing microorganisms in the vermicompost might be involved (Krishnamoorthy and Vajranabhaiah, 1986; Tomati and Galli, 1995; Subler et al., 1998; Edwards, 1998). Increase in the rates of uptake of nutrients with increase in the symbiotic microbial association in cereal and Ornamental plants with the use vermicompost has been reported (Kale et al., 1987, 1992). Uptake at nutrients in the same concentrations in the mulberry plants growth on vermicompost or with chemical fertilizer was reported by Kale (1998). On these grounds, with growth promoter substances and available nutrients vermicompost can possibly act as a more efficient organic fertilizer to stimulate plant growth.

CONCLUSION

The application of organic manures significantly increased the growth parameters of plant Radish. Among the two sources of organic manures, plants that are raised in different doses of earthworm unused residual compost showed relatively maximum values of root weight and length than the partly decomposed compost.

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