International Journal of Farming and Allied Sciences
Available online at www.ijfas.com
©2017 IJFAS Journal-2017-6-5/120-125/29 Oct, 2017
ISSN 2322-4134 ©2017 IJFAS

Effect of the application of composted peanut shells on soil growing media on growth and nutrient elements of (*viola* spp.)

J. Omidi[1]*, S. Abdolmohammadi[1], A. Hatamzadeh[1] and A. Mahboub khomami[2]

1. Horticultural Department, Faculty of Agriculture, University of Guilan, Rasht, Iran.
2. Faculty Member of Soil and Water Research Department, Gilan Agricultural and Natural Resources Research and Education Center, AREEO, Rasht, Iran

Corresponding author: J. Omidi

ABSTRACT: Peanut shells as waste left from peanut growing, is a considerable amount of compost can be used for correcting soil properties for cultivation of ornamental plants. In this experiment, five treatments in a completely randomized design with three replications were conductedin outdoor in Lahijan ornamental plants Research Station. Treatments were included: 100% soil + 0% compost peanut shells (control), 75% of the soil + 25% compost peanut shells, 50% soil + 50% compost peanut shells, 25% of the soil + 75% compost peanut shells, 0% soil + 100% compost peanut shells. In this experiment growth index of violets is included, plant height, fresh and dry weight of the canopy, root fresh and dry weight, root length and plant nutrient concentration in the growth media and plant were measured. The results showed that increased levels of compost peanut shells significant effect on plant height, fresh and dry weight of the canopy, root fresh and dry weight, root length and nitrogen in comparison to control. While other treatments do not have significant difference with the control.

***Keywords*:** Growth media, Growth indices, Plant nutrient, Fresh weight, Dry weight

INTRODUCTION

The genus Viola belongs to the family Violaceae and contains about 500 species (Tamas, 1999). Violets have become the most popular annual for mid-fall to late-spring color in the Southeast. In the past 50 years new violet colors such as shades of pink, rose, and orange has become available. Intensive breeding programs that have selected for unique flower colors, large flower size, greater flower number, and temperature tolerance have led to many new and exciting cultivars to select from for use in the landscape. Modern violet breeding is largely concentrated in Germany, the United States, and Japan (Derthicket al., 1990).

Composting is an old developed technique which used to reapply organic residue (Anonymous, 1978). Composting means to analysis organic matter by means of micro-organism in a warm, damp and aerobic environment (Dalzell et al., 1987). Or biologic analysis of mass organic residue in a controlled condition (Hartmann et al., 1997).

The smaller the particle size of the raw material for much of the action of microorganisms will provide a greater level. However, if the particles are too small to prevent air movement in and out of the mass of organic matter and carbon dioxide produced by the activity of anaerobic microorganisms to bring. If the particle size is very large surface area available to microorganisms, organic matter decline and the composting process was slow or even stop.

All organisms need water to live. If the humidity less than 30% by weight to achieve biological activity in the mass composting organic materials are reduced to the minimum possible and if humidity is high and spaces are filled with water is prevented from moving air mass. Composting under aerobic conditions led and will continue to be true (Dalzell et al., 1987). Under stirring and the organic materials in order to composting microorganisms and decomposition of distribution is uniform (Garcia et al, 1990). The application of composts in agriculture and horticulture results in a positive effect on field crops (e.g., maize, sorghum) and vegetables (e.g., lettuce, cabbage) and restores the ecological and economic functions of the soil (Shalipour et al., 1992). The beneficial effects on crop production and soil properties are directly related to the physical, chemical and biological properties of the composts used (He et al., 1995). Compost by having physical and chemical properties similar to peat could be properly substituted for peat (Sanchez-Monedero et al., 2004). Application organic manures (sewage sludge, compost, manure) in a heavy soil aggregation, porosity, permeability, and improve air and in sandy soil to hold water and nutrients help (Abusharer, 1996).

According to the above contest's goals of this research are:

Investigate the feasibility peanut shells compost instead soil in the media. Effects of compost peanut shells in soil substrates on the growth and nutrient violets.

MATERIAL AND METHODS

To determine the quantities of peanut shells compost on indexes of growth and nutrition in violet peanut shells Preparation and during the process was compost. Peanut Shells litter compost as a soil substitute for growing plants, violets are based on a completely randomized design with five treatments and three replications in Flower and Ornamental Plant Research Station of Lahijan with geographicalspecifications (37 , 11 , 44 North , 50 , 1 , 3 and south), from September 2012 to April 2013. Peanut shells required of factory prepared peanut in Astaneh ashrafieh city and was transferred to Flowers and Ornamental Plants Research Station of lahijan. Peanut shells in a wooden box with a pore and dimensions of 1 × 1 × 1 m for providing aerobic conditions microorganism activity was being shed during the composting be processed. For this purpose it has been the mass production of aerated compost lasted four months. Violets seedling plant (viola spp) provided from Mr. Ali Keyvani,s greenhouse located in Roudsar. These seeds In terms of height and number of leaves were similar. Violets plants growth media, soil was prepared and considered. Peanut shells compost after passing through a sieve of 20 mm width of certain proportions (0%, 25%, 50%, 75% and 100%) rather than in the medium soil was replaced.

To establish plants, transplant in to pots of box of length, width and height of 40 cm were transferred. This way, after preparing the first , transplant out of the box, and roots were washed with water until it is completely separate from their previous. For each pot with a new growth medium, four violets plants were cultivated during the violets plants growing period is five months old. After ending five month period of violet plant characters such as plant height, fresh and dry weight of canopy, root length, root fresh and dry weight and composition of macro and micro nutrients in plants and substrates were measured. Nutrient element extract, 0.3 g of oven-dried samples were ground and then digested with 2.3 ml of mixed acid (sulfuric acid and salicylic acid) were extracted. For measurement of calcium, iron and zinc by atomic absorption was used. Preparation of the extract was used to measure potassium by flame emission photometer or Flame photometer jenway Model was measured. Plant phosphorus by a spectrophotometer at a wavelength of 480 nm model Apel-PD-303UV read (kalra, 1998). Total nitrogen titration method after the distillation plant was Kjldal system. To measure total nitrogen in the growing media Kjldal method and apparatus using a single Kjltak (Goss, 1995). For growth media phosphorus measuring method of (Page et al., 1982) was used. Then phosphorus by spectrophotometer at a

wavelength of 880 nm model Apel-PD-303UV was read. Potassium photometer jenway films were read by the device. Iron and zinc were measured by atomic absorption. Measuring organic carbon by Walky and Black method (Paye et al., 1984) were used.
Data was subjected to ANOVA in SAS (ver. 9.1, SAS Institute, Inc., Cary, NC). Means were separated using the Duncan's test.

Table 1. Characteristics of treatments used in the experiment

Treatment	% of Compost peanut shells	Characteristics
1	0%	100% soil + 0% compost peanut shells (control)
2	25%	75% of the soil + 25% compost peanut shells
3	50%	50% soil + 50% compost peanut shells
4	75%	25% of the soil + 75% compost peanut shells
5	100%	0% soil + 100% compost peanut shells

RESULTS AND DISCUSSION

Peanut shell chemical analysis showed that after composting soil nitrogen and potassium levels increased after composting. But the amounts of phosphorus, organic carbon and the C/N ratio of the compost declined after peanut shells. Peanut shells pH decreased after composting was part of the EC peanut shell of composting showed a significant increase (4.30 dS/m). If the peanut shells compost in large quantities can be used to limit growth (Table 2).

Table 2. Chemical characteristic peanut shells before and after composting

Peanut shells before the composting	Peanut shells After the composting	Chemical Characteristics
0.7	2.76	Total nitrogen (%)
1.87	0.67	Total phosphorus (%)
1.19	1.48	Total Potassium (%)
30.00	27.1	Total Organic carbon (%)
34.5	9.8	C/N ratio
5.89	5.06	pH
1.38	4.30	EC (dS/m)

Analysis of variance indicated significant indices on the fresh and dry weight of the canopy, Root fresh weight and root length at a level 1% and also plant height, Root dry weight a level 5% (Table3).

Table 3. ANOVA table indices for violet plant growth

Source of Variation	Mean square						
	df	Plant height	Fresh weight of canopy	Dry weight of canopy	Root length	Root fresh weight	Root dry weight
Treatment	4	9.05*	46.71**	5.39**	12.96**	5.60**	0.07*
Error	10	2.26	2.05	0.73	0.22	0.76	0.02
CV (%)		9.28	6.49	18.59	4. 80	17.84	17.59

ns, **,*: non-significant or significant at P < 0.01 and P < 0.05, respectively.

According to the average comparison table, peanut shells compost application levels have significant effects on Plant height, the fresh and dry weight, Root length, Root fresh and dry weight than the control. Replacing 75% composted peanut shells highest plant height (18.44 cm), fresh weight of the canopy (28.22 g), dry weight of the canopy (6.95 g), root length (13.52 cm), Root fresh weight (7.00 g) and root dry weight (1.02 g) was found (Table 4).

Table 4. Growth indices of violet plant under different composting levels

Treatment	Plant Height (cm)	Fresh weight of canopy (g)	Dry weight of canopy (g)	Root Length (cm)	Root fresh Weight (g)	Root dry weight (g)
1	14.16 b	19.93 c	3.90 b	9.00 b	3.81 b	0.59 b
2	16.16 ab	23.71 b	4.55 b	8.66 b	5.24 ab	0.74 ab
3	14.58 b	19.74 c	3.84 b	9.71 b	3.57 b	0.77 ab
4	18.44 a	28.22 a	6.95 a	13.52 a	7.00 a	1.02 a
5	16.83 ab	18.64 c	3.81 b	8.56 b	4.81 ab	0.79 ab

Values in columns followed by the same letter are not significantly different from Duncan's test at P < 0.05

(Gayasinghe *et al*., 2010) used synthetic compounds of manure fertilizers compost as an alternative of peat for breeding ornamental plant of Tagetes which caused to increase plant height, number of flowers per plant, weight of wet & dry canopy, root length, fresh weight and dry root, synthetic compound of manure fertilizer showed 60 and 40 percent increase in treatment.

Analysis of Variance Concentrations of nutrients in plant nitrogen and zinc concentration showed a significant on the 5% level (Table 5).

Table 5 . ANOVA table nutrient concentration in violet plant

Source of variation	Mean square						
	df	Zn	Fe	Ca	K	P	N
Treatment	4	66.08 *	870.50 ns	0.13 ns	0.09 ns	0.00010 ns	0.08 *
Error	10	22.49	237.71	0.11	0.04	0.00013	0.01
C. V. (%)		14.81	5.33	20.22	7.27	4.48	8.32

ns, **, *: non-significant or significant at P < 0.01 and P < 0.05, respectively.

Comparison of the data means, peanut shells compost instead of replacing 25% soil, the maximum amount of nitrogen (1.78%) to that of controls (1.36%) and the difference is significant. Whereas 50% of zinc element in the application of the highest zinc element Peanut shells compost (38.76 mg/kg) indicate that, compared with control (25.63 mg/kg), no significant differences (Table 6).

Table 6. Nutrient concentrations in violet plant

Treatment	Zn (Mg/kg)	Fe (Mg/kg)	Ca (%)	K (%)	P (%)	N (%)
1	25.63 a	311.28 a	1.42 a	3.01 a	0.080 a	1.36 b
2	32.33 a	301.69 ab	1.57 a	3.20 a	0.083 a	1.78 a
3	38.76 a	284.18 ab	1.71 a	2.91 a	0.080 a	1.48 b
4	30.80 a	275.17 b	1.98 a	3.10 a	0.080 a	1.59 ab
5	32.49 a	272.00 b	1.54 a	2.73 a	0.083 a	1.43 b

Values in columns followed by the same letter are not significantly different from Duncan's test at P < 0.05

CONCLUSION

Replacing of Peanut Shells compost instead of soil in growth media, led to improved in plant growth indices of Violet in comparing with control, all growth indices measured, using 75% of the Peanut shells compost had the greatest effect. It seems that Peanut Shells cellulose tissue and size of compost particle, creating high porosity caused to decrease in bulk density and then caused by increasing of total porosity which these would improved growth indices in comparing with control. Considering that the horticulture industry looking foran alternative to the expensive organic material to be used in growth media. The results showed that providing compost from peanut Shells waste is an appropriate method and in accordance with environmental standards, and recommended that peanut shells compost as a recycled materialis suitable in growth media. However, It seems necessary to study further on peanut shells compost processing to achieve the best compost particle size for better activity of microorganisms in plant media.

REFERENCES

ABUSHARER, T.M. (1996). Modification of hydraulic properties of a semiarid soil in relation to seasonal application of sewage sludge and electrolyte producing compounds. *Soil Technology*, 9, 1-13.

ANONYMOUS. (1978). Soil Management: organic Recycling in Asia. *FAO Soil Bulletin*, No. 36.

DALZELL, H.W., BIDLESTONE, A.J., GRAY, K.R. and THURAIRRAJAN, K.(1987). Soil Management, Compost Production and Use in Tropical and Subtropical Environments. *FAO Soil Bulletin*. No.56.

DERTHICK, S., CARLSON, W.H., EWART, L. (1990). Producing violets for profit. *Michigan State University Extension Service, Bulletin.* E-2239.

GARCIA, C., HERNANDEZ, A. and COSTA, F. (1990). The influence of composting and maturation processes on the heavy- metal extractability for some organic wastes. *Biological Wastes*, 31, 291-301.

GAYASINGHE, G.Y., LIYANA, I.D., and ARACHCHITOKASHIKI, Y. (2010). Evaluation of containerized substrates developed from cattle manure compost and synthetic aggregates for ornamental plant production as a peat alternative. *Resources Conservation and Recycling*, 54: 1412–1418.

GOOS, R.J. (1995). A laboratory exercise to demonstrate nitrogen mineralization and immobilization*, Journal Natural Resours.* Life Science Education, 24, 68-70.

GRIGATTI, M., GIORGONI, M.E., CAVANI, L. and CIAVATTA, C. (2007). Vector analysis in the study of the nutritional status of philodendron cultivated in compost-based media. *Scientia Horticulturae*, 112, 448-455.

HARTMANN, H. T., KESTER, D.E., DAVIES, F.T. and GENEVE, R.L. (1997). *Plant propagation Principles and practices*. 6th Prentice, Hall, Incorporated. USA. 710 pp.

HE, X.T., LOGAN, T. and TRAINA, S.J. (1995). Physical and chemical characteristics of selected municipal solid waste composts. *Journal Environmental Quality*, 24, 543-552.

KALRA, Y.P. (1998). *Handbook of Reference Methods for Plant Analysis*. CRC press. 219 pp.

NYAMANGARA, J. and MZEZEWA, J. (2001). Effect of long-term application of sewage sludge to a grazed pasture on organic carbon and nutrients if clay soil in Zimbabwe. *Nutrion Cycling Agroecosyst*, 59, 13–18.

PAGE, A.L., MILLER, R.H. and KEENEY, D.R. (1982) Methods of soill Analysis, Part II, *Chemical and microbiological properties*. American Society of Agronomy, Incorporated . Soil Science of America, Inc. Madison, Wisconsin, USA.

PAYE, A.L., MILLER, R.H. and KEENY, D.R. (1984).

Method of soil analysis. Part II. SSSA Inc . Madison WI.,

SANCHEZ-MONEDERO, M., ROIG, A., CEGARRA, J., BERNAL, M.P., NOGUERA, P. and ABAD, M. (2004). Composts as media constituents for vegetable transplant production. *Compost Science utilization*, 12, 161–168.

SHALIPOUR, A., MCCONNELL, D.B. and SMITH, W.H. (1992). Uses and benefits of MSW compost: a review a an assessment. *Biomass and Bioenergy*, 3, 267-279.

TAMAS, M. (1999). *Botanica farmaceutica* . Vol III. Sistematica-Cormobionta, Edition. Medicala Universitara “Iuliu Hatieganu”, Cluj-Napoca. 137–138.