ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(6): 1170-1171
www.allresearchjournal.com
Received: 14-04-2017
Accepted: 15-05-2017

Dr. Deepshikha Sharma
Department of Environmental Science, Govt. Degree College, Kathua, J&K, India

Correspondence
Dr. Deepshikha Sharma
Department of Environmental Science, Govt. Degree College, Kathua, J&K, India

Parthenium weed management by vermicomposting using local earthworm species of Jammu

Dr. Deepshikha Sharma

Abstract
Parthenium hysterophorus L. is one of the most troublesome and an obnoxious weed of waste land and is now spreading rapidly its tentacles in forests, pastures and agricultural lands. Since the time this plant was introduced in India, it has not only naturalized itself but has spread at an alarming rate and has been reportedly found almost from all over India. In the present study an attempt has been made to produce vermicompost from *Parthenium* weed using local species of earthworms from Jammu and the physico chemical analysis of various vermicomposts and soil was carried out and compared with each other and with that of original soil sample.

Keywords: *Parthenium*, vermicomposting, earthworms, physico-chemical

1. Introduction
Parthenium hysterophorus L., popularly known as congress grass or gajar ghas is a defamed plant due to its toxic and allergic properties this annual herb belongs to the family *Asteraceae*. It is a native of America and Mexico (Raizada, 1976) [9]. This plant was introduced in seed form as a contaminant of wheat, received from Mexico. Since then this weed has been spreading across India at an alarming rate and has been found almost all over India (Aneja *et al*., 1991) [1]. This weed has a wide adaptability to the climatic conditions, it has affected the growth of endemic species by destroying their natural habitat. Major weed invasions change the natural diversity and balance of ecological communities. It also causes problems to man and domestic animals. Several attempts have been made for prevention, eradication and control of this weed like manual uprooting, chemical methods etc. but so far no single method is considered to be satisfactory due to high cost, impracticality, environmental safety and mechanical eradication. The control of this toxic weed is most necessary for healthy environment. Of various methods, vermitechnology is one of the promising technologies for the management of organic waste. Vermitechnology is the process by which biological degradation of organic waste takes place in control conditions due to earthworm feeding on the materials. This technology can also be used for the management of *Parthenium* weed. In the present study an attempt has been made to produce vermicompost from *Parthenium* weed using local species of earthworms from Jammu and the physico chemical analysis of various vermicomposts and soil was carried out and compared with each other and with that of original soil sample.

2. Materials and methods
Three epigeic species of earthworms *Amynthus Diffr*, *Metaphire houlleti* and *Octolasion tyrtaeum* were collected form moist soils at the depth of 3 to 10 cm from the different locations of Jammu which were identified from Zoological Survey of India (ZSI), Calcutta by sending specimens. For specific earthworm species, specific vermibeds were prepared in the wooden boxes of size 0.40m x 0.30m x 0.26m. Vermibeds were prepared by placing a layer of paddy straw and saw dust at the base followed by a layer of sand and garden soil. Each vermibed was inoculated with 50 gms of medium size earthworms of specific species. Replicas of three sets for each species were prepared. Then, 1.5 kg of Parthenium plants were chopped into small pieces and soaked into water for 24 hrs prior to its transfer into vermibeds in a period of 2 to 3 days.

After transferring the Parthenium weed, boxes were covered with gunny bags and sprinkling of water was done at regular intervals to maintain desired moisture in the vermibeds till the vermicompost formation takes place. Also the temperature was monitored regularly in the vermibeds.

After the formation of vermicompost, the vermicompost was harvested, oven dried, crushed and sieved. Then the physico-chemical analysis of all types of vermicomposts produced by specific earthworm species on Parthenium weed was carried out using various methods like Kjeldahl method for nitrogen (Piper, 1944) [8], Walkley and Black's rapid titration technique (Piper, 1944 and Jackson, 1958) [8, 5] for organic carbon, Olsen method (Gupta and Jalali, 1998) [4] for phosphorus, Flame photometric method (Piper, 1944) [8] for potassium and EDTA Titrimetric method (Gupta and Jalali, 1998) [4] while the pH and electrical conductivity was analysed on pH meter and conductivity meter. The data was then compiled and average value of nutrient status of specific vermicompost was calculated. The physico-chemical analysis of various vermicompost were compared with one another and with that of original soil sample that has been added in vermibed prior to earthworm inoculation and addition of Parthenium weed. Also the carbon-nitrogen of each vermicompost was calculated.

3. Results and discussions

The three locally collected epegeic species of earthworms were identified as *Amynthus diffringens* (Baird, 1869), *Metaphire houlleti* (Perrier) and *Octolasion tyrtaeum* (Savigny, 1826). The physico-chemical characteristics of Parthenium weed vermicompost produced by specific earthworm species was compared with each other and with that of original soil sample. The study revealed that the average pH value was least in case of Parthenium weed vermicompost produced by *Octolasion tyrtaeum* while the maximum value of pH was observed in original soil sample. The average electrical conductivity was observed to increase two fold in all vermicomposts as compared to that of original soil sample. Jadhav *et al*. (1997) [6] also observed higher values of electrical conductivity of the soil treated with vermicompost in comparison to the treatments without vermicompost. The average value of other macro nutrients like organic carbon, nitrogen, phosphorous, potassium, calcium and magnesium were also observed to increase significantly in vermicomposts produced by specific species on Parthenium weed as compared to that of soil sample, while the maximum percentage of macro nutrients were observed in Parthenium weed vermicomposts produced by *Octolasion tyrtaeum* among the three species. The present observation is supported by the work of earlier workers like Graff (1970) [3], Dussere (1902) [2], Nijhawan (1952) [7], Gaur (1982) who reported more macro and micro nutrients in vermicomposts. The carbon: nitrogen ratio was observed to decrease in Parthenium weed vermicomposts as compared with that of original soil sample. Although the minimum C: N ratio was observed in case of *Octolasion tyrtaeum* among the vermicomposts produced by three species of earthworms. Decrease in C: N ratio from 20: 1 makes vermicomposts more fit for agriculture purpose.

4. Conclusion

In the light of the above results, it was concluded that *Parthenium* weed vermicompost i.e VPA, VPM and VPO exhibited better nutrient value as compared with that of soil sample. Therefore, these vermicomposts produced by different local species of earthworms can be used as biofertilizers in the agricultural fields. The unutilised noxious *Parthenium* weed can be properly managed with production of vermicompost using local species of earthworms and use of these biofertilizers in the agricultural fields can give a better plant growth without degrading the environment. Therefore, it is recommended that recycling of this weed as composted manure should be done to reduce its toxic and poisonous effects and resource generation.

Table 1: Physicochemical characteristics of *Parthenium* Weed vermicomposts produced by different earthworm species

Type of vermicompost	Average pH	Average Electrical Conductivity (mho)	Average Organic Carbon (%)	Average Nitrogen (N) (%)	Average Phosphorus (P) (%)	Average Potassium (K) (%)	Average Calcium (Ca) (%)	Average Magnesium (Mg) (%)	C : N Ratio
VPA	7.33 ± 0.24 (7.03 - 7.63)	3.36 ± 0.61 (2.39 - 3.85)	11.03 ± 0.20 (10.82 - 11.32)	1.00 ± 0.07 (0.91 - 1.12)	2.57 ± 0.23 (2.20 - 2.84)	1.02 ± 0.04 (0.98 - 1.09)	0.21 ± 0.04 (0.17 - 0.27)	0.13 ± 0.02 (0.11 - 0.17)	11.59 ± 1.25 (9.66 - 12.92)
VPM	7.42 ± 0.23 (7.11 - 7.66)	3.03 ± 0.34 (2.56 - 3.49)	11.13 ± 0.29 (10.74 - 11.47)	1.00 ± 0.21 (0.77 - 1.33)	2.42 ± 0.15 (2.20 - 2.61)	1.00 ± 0.13 (0.84 - 1.19)	0.20 ± 0.01 (0.19 - 0.21)	0.12 ± 0.01 (0.10 - 0.14)	11.62 ± 2.31 (8.23 - 14.76)
VPO	7.32 ± 0.20 (7.01 - 7.52)	3.49 ± 0.62 (2.67 - 4.26)	11.19 ± 0.36 (10.94 - 11.82)	1.02 ± 0.13 (0.84 - 1.19)	2.64 ± 0.19 (2.33 - 2.79)	1.10 ± 0.12 (0.96 - 1.28)	0.23 ± 0.04 (0.19 - 0.29)	0.13 ± 0.04 (0.09 - 0.19)	10.88 ± 1.57 (8.68 - 13.06)
Original Soil Sample	7.98	1.35	7.96	0.38	1.23	0.11	0.09	0.05	20.94 : 1

VPA = *Parthenium* weed vermicompost produced by *Amynthus diffringens*
VPM = *Parthenium* weed vermicompost produced by *Metaphire houlleti*
VPO = *Parthenium* weed vermicompost produced by *Octolasion tyrtaeum*

References

1. Aneja KR, Dhawan SR, Sharma AB. Deadly weed *Parthenium hysterophorus* L. and its distribution. Indian J. Weed Sci. 1991; 23(3-4):14-18.
2. Dussere C. On the effect of earthworm on the chemical conditions of soils. *Lands Jb Schwiew*. 1902; 16:75-78.
3. Graff O. Phosphorus content of earthworm costs. Land Farsch Volkennodu. 1970; 20:33-36.
4. Gupta JP, Jalali VK. Manual for Soil, Plant and Irrigation Water Analysis. Soil Science Section, SKUAST, Jammu. 1998.
5. Jackson ML. Soil Chemical Analysis. Prentice Hall of India Pvt. Ltd., New Delhi. 1958, 498.
6. Jadhav AD, Talashilkar SC, Powar AG. Influence of the conjective use of FYM, vermicompost and urea on growth and nutrient uptake in rice. J. Maharashtra Agric. Univ. 1997; 22(2):249-250.
7. Nijhawan SD. Physico-chemical properties of earthworm castings and their effects on productivity of soil. Indian J. Agric. Sci. 1952; 22:357-373.
8. Piper CS. Soil and Plant Analysis. Interscience Publishers Inc., New York. 1944, 368.
9. Raizada MB. Supplement to the Flora of Upper Gangetic Plains and of the Adjacent Siwalik and Sub-Himalayan Tracts. Bishen Singh Mahendra Pal Singh, Dehradun. 1976, 1-335.