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Parthenium Weed as a Resource for Organic Compost: A Circular Economy Perspective

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Parthenium weed, an invasive species introduced to India during the 1950s, has become a significant ecological and agricultural threat. Categorized as a noxious weed, its effective management is vital. Composting Parthenium presents a sustainable solution, transforming this invasive weed into nutrient-rich organic fertilizer. The process involves layering Parthenium biomass with cow dung, soil, urea or rock phosphate, and Trichoderma fungi, producing compost within 4–5 months. The resulting compost, rich in nitrogen, phosphorus, potassium, and micronutrients, enhances soil fertility, improves structure, and reduces dependence on chemical fertilizers. This low-cost, eco-friendly approach not only mitigates the weed's negative impacts but also supports sustainable agriculture by increasing productivity and preserving environmental health.

Keywords: Parthenium, weed control, composting, sustainable agriculture.

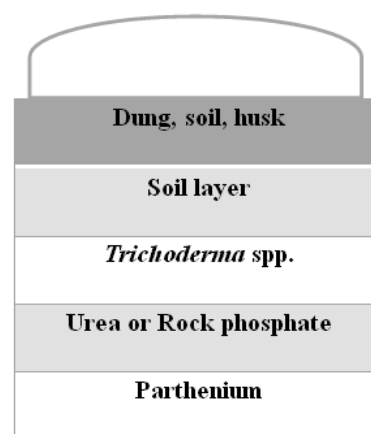
Introduction

The story began at 1950s, after the independence, India was facing a food shortage. To mitigate this crisis, the ruling Congress government at that time decided to import wheat from the USA. The Public Law 480 (PL 480), also known as the Food for Peace program, was initiated by the United States to provide food assistance to countries in need. However, there were instances where the wheat shipped to India under this program was of inferior quality and contaminated with seeds of the parthenium weed. Thus, the non-native weed spread in India called parthenium. First it was observed in Pune and now it can be found almost everywhere in India. It is an annual herb having tendency to behave like perennial with creamy white flower on top and pale green leaves. It causes yield losses i.e. If left unmanaged for the entire season, sorghum grain yield losses can range from 40% to as high as 97%. It is toxic to animals causing dermatitis, mouth ulcers with excessive salivation. Significant amount (10–50%) of this weed in the diet can kill cattle. (T. R. Narasimhan. *et.al.*, 1977). Parthenium pollen can cause asthma (allergic bronchitis), especially in children playing outdoors and in adults and old-age persons. Contact of plant with the body causes dermatitis (M. Wiesner. *et.al.*, 2007). For these parthenium is kept in noxious weed category. To control parthenium, there are several weed control methods. As no single weed control method suitable for controlling parthenium, composting is sustainable way to manage it. This idea justifies the quote says, “Weeds create challenges, but they also push us to innovate.” By converting parthenium weeds into nutrient-rich compost, we can not only address the ecological and economic issues associated with this invasive species but also generate a valuable resource for soil improvement.

Process of making parthenium compost

1. Make a pit of 3 × 6 × 10 feet (Depth × Width × Length). Cover the surface of surface wall with stone chips which will prevent nutrient losses through soil layers

2. Arrange 100 kg dung, 10 kg urea or rock phosphate, soil (200 kg) and one drum of water near the pit.
3. Make a base layer of parthenium @100kg.
4. Over this, sprinkle 500 grams urea or 3 kg rock phosphate. If possible, add *Trichoderma viridis* or *Trichoderma harziana* (kind of fungi cultured powder) in the amount of 50 g/layer. All the above constituents will make one layer.
5. Like first layer, make several layers till the pit is filled up to 1 ft high from the ground surface.
6. Fill the pit with Parthenium biomass in dome shape.
7. If there is no soil with uprooted Parthenium, then add 10-12 kg of loamy soil on each layer.
8. When pit is full with above layers, then cover it with mixture of cow dung, soil and husk.
9. After 4-5 months, we can get 37-45 Kg of compost from 100 Kg of green Parthenium biomass.



Layering of parthenium compost

Sieving of compost

After removal of compost from pit, we may find some stems, seems it is not decomposed. Spread this compost in the shady place to dry it. Coming in contact with air, soon the wet compost becomes dry and crumpled. Next make a heap of this dry compost. If still thick pieces of Parthenium stems are seen in the compost, beat them with the sticks. Sieve the compost with 2x2 cm size mesh. For selling purpose, make packets of 1, 2, 3 and 5 kg for kitchen garden and 25- 50 kg for crops and horticulture.

Precautions

- Pit should be in open and shady upland
- Cover the pit with the mixture of soil, dung and husk.
- If you find fresh germination of Parthenium near the pit where weed was collected to fill the pit, destroy them otherwise they may contaminate the compost after flowering.
- Check the moisture level in compost. If there is dryness in the pit, make a few holes and pour water to the pit and close the holes.
- During the process, the temperature rises up to 60-70°C due to which seeds are killed. While it may take about three to four months to prepare the compost in a warm climate, in cold regions, it can take more time.

Amount for use

During a basal dressing of a field apply 2.5- 3 t/ha. In vegetable crop apply 4- 5 t/ha.

Conclusion

The novelty of this work is that compost formed from a combination of Parthenium weed and cow dung along with rock phosphate and *Trichoderma viride* fungi has better nutrient value. It can be prepared at a low cost and it is also easy to prepare. It is a balanced biofertilizer, which has more nitrogen, potassium and phosphorus than farmyard manures (FYM) and micronutrients are also available. Composting effectively destroys the preponderance of parthenium weed seeds, curbing their spread and reducing their long-term impact on ecosystems. Parthenium weed compost enhances soil fertility and improves soil texture. It provides us multiple benefits by increasing productivity, reducing the use of chemical fertilizers, improving soil structure and at last, the most important thing is that it is eco-friendly. As it does not have any harmful impact on the environment, humans and any other crops. Therefore, it is beneficial for achieving the goal of sustainable agriculture.

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