Sustainable Solution for Vegetable Waste Generated at Navsari District - A Case Study

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ABSTRACT

The purpose of writing this script to know the current practices related to the various waste management initiatives taken in Gujarat, India by the farmers for their socio-economic development.In Navsari,especiallyAgriculture Produce Marketing Committees (APMC) yard tonnes of vegetable wastes produced every day. It adds to waste for market. These wastes are useless and produce unhygienic conditions in and around the city. But by processing in systematic way in an eco-friendly manner these vegetable waste materials can be converted to commercial viable products. Two youths in Navsari district left their job and started thinking about the agriculture especially, soil health and organic farming. Later they started collecting vegetable wastes and started bio-processing it and standardized their own decomposing procedure. In a month (30days) they ended with the compost product. Surprisingly the end product didn't have foul smell which is not a problematic for labourer to grade/sieve it.Physico-chemical characterization of the final product was analyzed at Navsari Agricultural University laboratory. It stands better then the available product in the market. Product having PH: 7.95, EC-6.0,N-6.01, P-3.08,K-2.47, Moisture -26.70% and Organic Matter 44.80. The young farmer in the village "Sarpore-pardi"has set confidence among the rural youths to take up an innovative venture as well as they protected the environment and food chain which is necessary.

Keywords: *Agriculture; Compost-like-output; Food; Recycling; Waste*

INTRODUCTION

India ranks first in the world in production of fruits and second in vegetables accounting roughly 10 and 15 per cent respectively, of total global production. However, one third of horticultural produce is wasted, mainly an account of poor cold storage and other storage facilities. Data reveal India is short by 10 million tonnes of cold storage capacity due to which over 30 percent of agricultural produce goes waste every year and more than 20% of produce from fields is lost to poor post-harvesting facilities and lack of cold chain infrastructure. Government of India have taken several steps towards attaining double the farmers' income by 2022. Investments in warehousing and cold chains to prevent post-harvest crop losses are one among them. The large amount of the agro waste generated from the Agriculture Produce Marketing Committees (APMC) yard area has created major environmental problems. Compost like product is the best way to disposal of biodegradable agro waste.Recycling of fruit and agricultural waste is one of the most important means of utilizing it in a number of innovative ways yielding new products and meeting the requirements of essential products required in human and plant nutrition. Farmers' indigenous technology is available for recycling and processing of fruit and vegetables waste and compost like products can be made out of the different processes. In the light of the above, the present study is an attempt to study the existing infrastructure for waste management and to suggest measures to utilize the bio-waste in appropriate manner.

METHODOLOGY

In the present study, the area chosen was Agriculture Produce Marketing Committee (APMC), Navsari, Dist: Navsari, Gujarat. In market yard, large amount of biodegradable vegetable wastes are available such as- Brinjal, Potato, Chilli, Tomato, Cauliflower, Cabbage, Okra, Little gourd, Pointed gourd, Bitter gourd, Bottle gourd, Spine gourd, Cucumber and Ridge gourd depending upon the season. These agro wastes are collected by two rural youths (Dist: Navsari) from APMC with

the help of labours and transported at compost project site by local vehicle (Tractor).

Compost project site selection: Suitable site in the village "Sarpore-pardi" (Nearby Navsari)is selected to ease regular supply of agro wastes with the convenient utilities like roads for transport, availability of labours, communication facilities etc with sloped land for drainage purpose. While selecting a site, all necessary precautions have taken care.

Equipments required: Tractor, Waste Shredder, Rotavator, Spray pump and Separator.

Shredding of vegetable waste are get shredded for reducing the size of bulky and leafy vegetables with the help of shredder. Rotavator: to rotate decomposed material for proper aeration. Separator: use of separator to separate the compost from pebbles and soil amendments(Photo plate 1).

Procedure followed for manure production:

Materials required for manure production are; APMC waste 1500 kg, cow dung 1500 kg and cow urine 200 liters. First, take 500 kg cow dung and uniform spreading on the ground in a height about 1ft. Next step: spread shredded vegetables 500 kg on the cow dung layer and repeat it for three times. Afterwards spray cow urine 200 liters on a prepared agriculture vegetable waste bed. Sprinkle the water regularly in order to maintain 750C. During 30 days process rotate the vegetable waste with the help of rotavator three times in ten days interval. Subsequently in one month it turns into blackcolour. Later use the separator to separate the compost from pebbles and soil amendments. This compost is rich in nutrients used as organic fertilizer and soil amendment in farm.

Physico-chemical analysis of compost: matured compost samples were collected about 500 gm and kept in the polythene bag which is free from adventitious contaminations. Sample bag was labelled and sealed air tightly. The Physicochemical analysis of compost was conducted in laboratory of Navsari Agricultural University, Soil Science Department Laborotary, Navsari, Gujarat.

Physical parameters of compost: Particle size-particle size of sample which passed through the4.0 mm IS sieve. Colour- The colour of compost sampleisnoted. Odour- The foul odour were observed in compost sample. Bulk density(g/cm3) – The bulk density wasworked out and Moisture, percent by weight was recorded.

Chemical parameters of vermicompost total Nitrogen (as-N): The standard method of analysis of total nitrogen used as per fertilizer control order 1985. We estimated the amount of nitrogen in sample by using Kjeldahl"s assembly. ***pH:*** The pH meter was used to determine pH.

Moisture: 5 gm sample was taken in a weighed clean, dry petri dish. Then allowed to heat in an oven for about 5 hours at 650 ±10C to constant weight and cool in desiccators and weigh. Percentage loss in weigh indicated as moisture content.

Conductivity: The conductivity was measured with the help of conductivity meter which calibrated by using 0.01 M potassium chloride solution.

Phosphorus (P2O5)– The amount of phosphorus was analysed by gravimetric Quinoline molybdate method as described under Schedule- II, Part B, and 4(ii) of fertilizer (control) order 1985.

RESULTS AND DISCUSSION

Physico-chemical characteristics of compost produced form the agro waste generated at APMC of Navsari presented in Table 1.

Colour : Dark black colour of compost indicated that the decomposition of agro waste successfully. Particle size- **Particle size** of sample was 93.78% which passed through the4.0 mm IS sieve. **Odour:** Absence of foul odour indicated that all parameters required for composting process were present in optimum condition. **Bulk density:** The bulk density of ready made compost is 0.8.Vasanthi and Kumaraswamy (1999) reported that bulk density of the soil increases when the compost supplemented with NPK. Compost increased the porosity and bulk

density of soil and improves the avaibility of nutrients to crop growth. Bhattacharjeeet al (2001) reported that application of vermicompost reduces the loss of nutrients through leaching from the soil by changing the soil's physico-chemical properties. **Moisture content:** Moisture, percent by weight is 26.70. Compost addition caused a significant increase of moisture content due to the moreporosity addition to the soil. **Particle size/porosity:** The total porosity was improved by the use of compost. **pH and Conductivity:** Chemical parameters like pH and electrical conductivity (EC) were determined by ISI Bulletin (1982) by using digital pH and conductivity meters. Compost improves the pH of soil and makes available the nutrient for the crop yield. **Nitrogen:** Atiyeh (1998) reported that the conventional compost was higher ammonium, while the vermicompost tended to be higher in nitrates, which is the more available form of nitrogen. **Total Phosphorus (as P2O5):** The compost product comprises of NPKin the ratio as N-6.01, P-3.08,K-2.47Kale and Bano (2001)reported that the vermicompost shows the high values of NPK.

ADVANTAGES

1. Cost saving comparably than the traditional methods
2. Volume of waste reduced in size
3. Transformation of Waste into usable energy
4. Economically feasible process

CONCLUSION

It is concluded that this is revolutionary technique for value added products with environmental protection through decentralized waste management. Composting, as sustainable transformation of potential wastes in organic fertilizers, tunes up with sustainable agriculture, and must be optimized and encouraged. Compost produced from the farm wastes is not only having beneficial effects on soil health and growth, quality and yield of crop but also playing vital role in eradication of pollution hazards. It helped to reduce volume of agro waste and to generate additional revenue for farmers. The Problem of disposing the agro waste may be solved by doing such the composting production units. The agro waste converted into compost like product which will earneconomic benefits. No hazardous effluents are generated from a compost production unit using agro wastes. This compost like product can be used for all agricultural, horticultural, and ornamental and vegetables crops at any stage of the crop. It helps to create better environments, thus reduce ecological risk. In short, it is Wealth from Waste.

Table 1
Physico-chemical Characteristics of compost

Sl. No	Parameters	Results/value
PHYSICAL CHARACTERISTICS		
1	Colour	Black
2	Odour	No odour
3	Particle size	93.78
4	Moisture	26.70
5	Bulk density (g/cm^3)	0.88
CHEMICAL CHARACTERICS		
1	pH	7.95
2	Electric conductivity (ms cm^{-1})	6.0
3	Total nitrogen	6.01
4	Total phosphorus (as P_2o5)	3.08
5	Potassium (K_2o)	2.47
6	Organic matter	44.80

All the parameter values are presented in percentage (%), except the electrical conductivity, pH and Bulk density.

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