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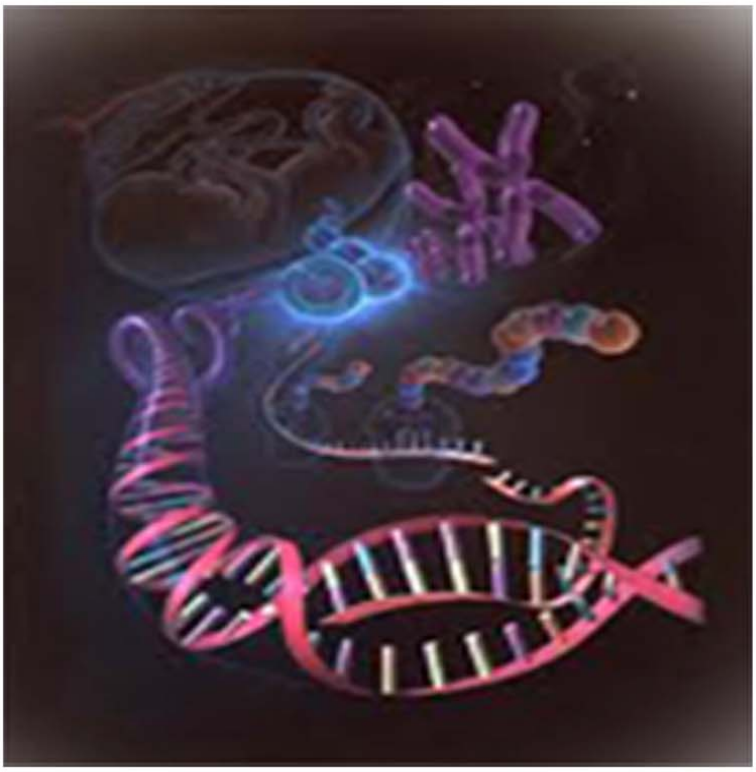

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Research Paper

USE OF VEGETABLE WASTE THROUGH AEROBIC COMPOSTING OF VILLAGE BAMHANI, DISTRICT: -GONDIA (MAHARASHTA STATE), INDIA

Nambhau H Katre[1*]

Corresponding Author:* ***Nambhau H Katre,* ✉ *nhkpdb@gmail.com*

The objective of this paper is to study the recycling of the vegetable waste through aerobic composting by NADEP method is a simple method to process and operate which is nuisance free, environmental friendly, aesthetically good looking, economical in long term and socially acceptable as the final product has good fertilizer value.

Keywords: *Bamhani*, Composting, Rural, Village, Incinerated

INTRODUCTION

Nowadays the population of village Bamhani is also increasing rapidly. The current population of the village is 1200. In this village there is no well organized system of Solid Waste Management due to apathy of the Gram Panchayat and lack of funds. In the recent years, the management of solid waste had become a greater concern. Open dumping of solid waste is creating environment pollution. In this village dry solid waste is burnet (incinerated) on the open land wherever available, which reduces the waste to ash and release potentially hazardous gases into the air causing public health risk. Solid waste which is dumped on the low laying areas and open land emits large amount of methane gas to the atmosphere which boosts up the global warming as it has a potential of about twenty times that of carbon dioxide. In this village the poverty is the major problem and most of the people use wood for cooking as well which is also one of the causes of environmental pollution. The occupation of the people is faming, hence they have the cattle. Cattle waste create menace to the environment and ultimately to the public health. Hence there is an imperative need to manage the solid waste in the engineered way.

The objective of this paper is to study the performance of the aerobic composting of vegetable and fruit wastes in different proportions which may prove to control the environmental pollution and the end product will be useful to the peoples.

[1] Department of Civil Engg., Manoharbhai Patel Institute of Engg. & Tech., Gondia (MS).

MATERIALS AND METHODS

The kitchen waste (i.e., vegetable waste), has been selected as composting material along with the use of fallen tree leaves and dry grass as bulking material, for carrying out the study work of aerobic composting. The ratio of vegetable waste and fallen tree leaves and dry grass was taken as 5:2 in order to adjust C/N ratio (Table 1).

The following criteria were selected for an appropriate method for efficient disposal of vegetable waste and fallen tree leaves.

1. Nuisance and environmental friendly atmosphere.
2. No extra financial burden in collection and transportation of waste.
3. Minimum installation and operation cost.
4. Easy process to operate and maintain.
5. Effective disposal of vegetable waste generated from the kitchen.
6. Producing a final product which may be used as a good manure.

NADEP Method was selected for the aerobic composting of the said village waste. The vegetable waste generated from the kitchen of each household was collected and all the objectionable material was separated at the generation place itself. The average quantity of waste per day was 35 kg/day based on the collection of one week which was not sufficient to fill the tank. Hence it was decided to fill the tank in shifts after storing the waste of four days due to early subjectivity to microbial decay of vegetable waste.

The collected waste was stored daily in a pit of one feet deep along the one side of the tank. Besides vegetable waste, fallen tree leaves and dry grass was also collected from the streets, yards and gullies.

The percent composition of different vegetables was observed as below.

Cauliflower	20%	Karela	3%
Cabbage	23%	Coriander	1%
Brinjal	12%	Capsicum	1%
Lauki	10%	Lady Finger	2%
Beans	8%	Radish	2%
Potato	7%	Carrot	1%
Pumpkin	4%	Cucumber	1%
Spinach	4%	Peas	1%

Waste Characteristics

Observations and Findings

Findings

- The color of the finished product is dark brown.
- It is having an early scent and crumbly in nature.
- The temperature of the product is almost equal to ambient temperature (Table 2).

Table 1: Characteristics of Composting Material and Bulking Material

Waste Sample	Moisture content (%)	pH	Carbon(%)	Nitrogen (%)	C/N Ratio
Vegetable waste	83.00	6.71	33.00	1.50	22.00
Three leaves and grass cutting (Dry)	32.00	7.40	48.90	0.60	81.50
Combined waste (5 parts of vegetable waste + 2 part of fallen tree leaves)	65.50	6.80	36.50	1.179	30.96

Table 2: Observed Values of Temperature during Composting

Time (in Days)	Temperature °C	
	Ambient Temperature	Compost Temperature
1	27.50	29.00
8	25.30	42.00
15	28.00	49.50
22	31.00	50.50
30	33.00	47.00
37	32.50	40.00
45	35.00	40.00
52	34.50	36.00
60	31.20	32.20
67	34.00	33.50
75	32.40	32.50
82	31.40	30.50
90	31.00	30.50

- pH of the final compost is 8.02
- Final C/N ratio is 17.16.
- Material was reduced to final size in granular form except very small percentage of some soil lumps, which were formed due to some partially decomposed tiny grass cutting of cellulite nature.
- The percentage of seed germination in compost was found to be 92.50%.

CONCLUSION

It is concluded that the recycling of the vegetable waste through aerobic composting by NADEP method is a simple method to process and operate which is nuisance free, environmental friendly, aesthetically good looking, economical in long term and socially acceptable as the final product has good fertilizer value.

Graph 1: Change in Temperature During the Process

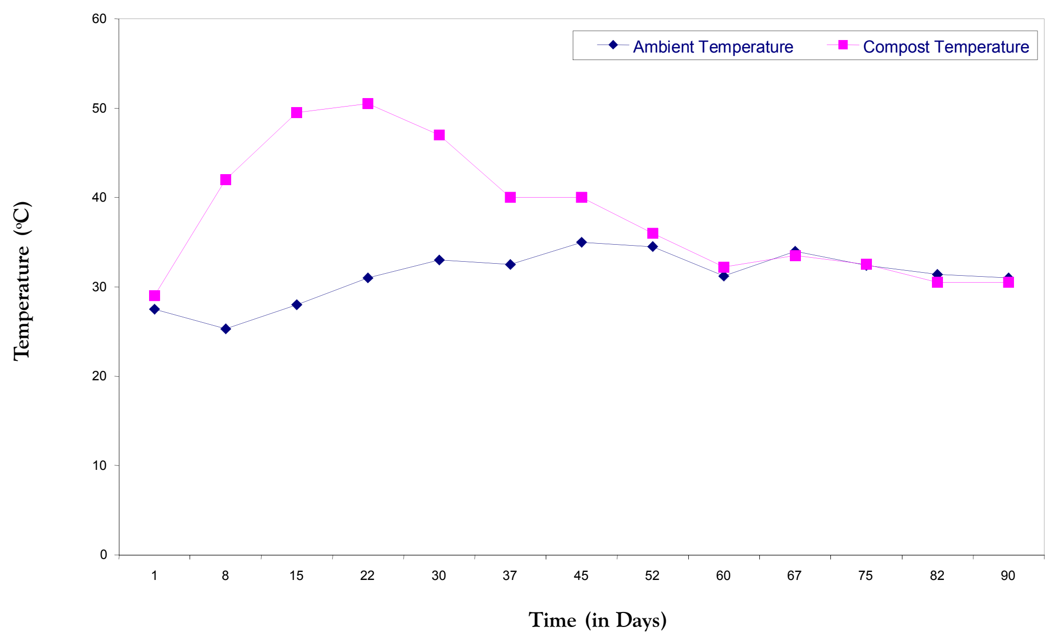

Table 3: Observed Values of Moisture Content during Composting

Time(in Days)	1	15	30	45	60	75	90
Moisture Content (%)	65.50	57.50	52.70	47.50	50.00	48.00	47.00

Graph 2: Change in Moisture Content During the Process

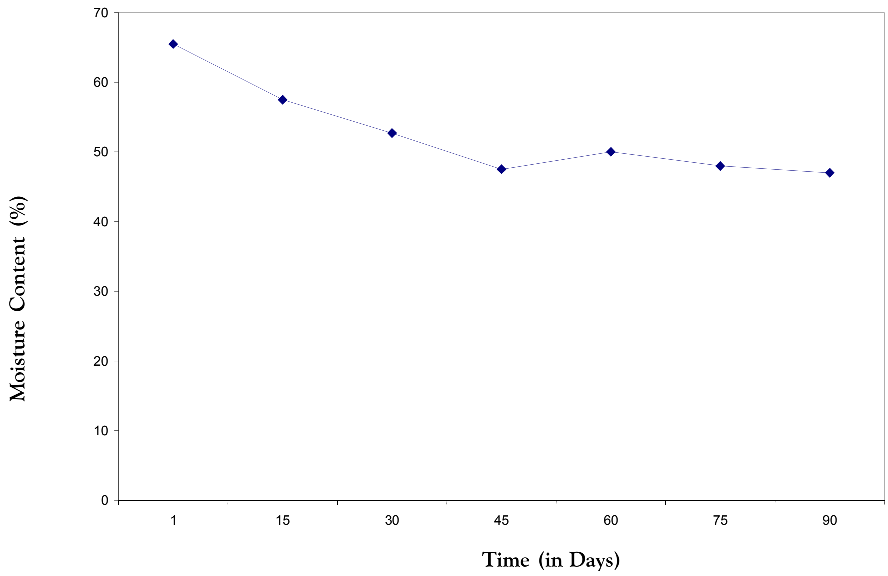

Table 4: Observed Ph Value during Composting

Time (in Days)	1	15	30	45	60	75	90
pH	6.80	5.50	7.00	7.80	8.00	8.00	8.02

Graph 3: Change in pH During the Process

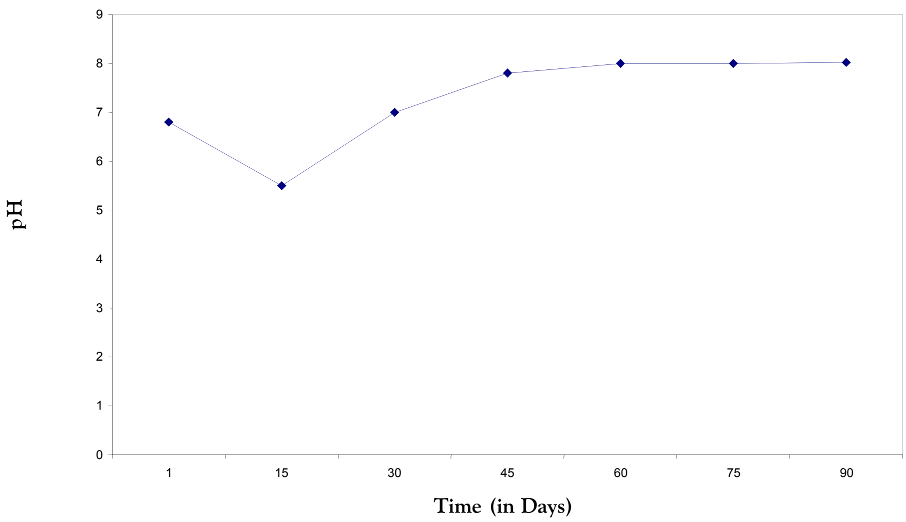

Table 5: Observed Organic Content During Composting

Time (in Days)	1	15	30	45	60	75	90
Organic Content (% Dry weight)	66.00	48.50	40.00	36.20	29.00	26.35	24.89

Graph 4: Change in Organic Content During the Process

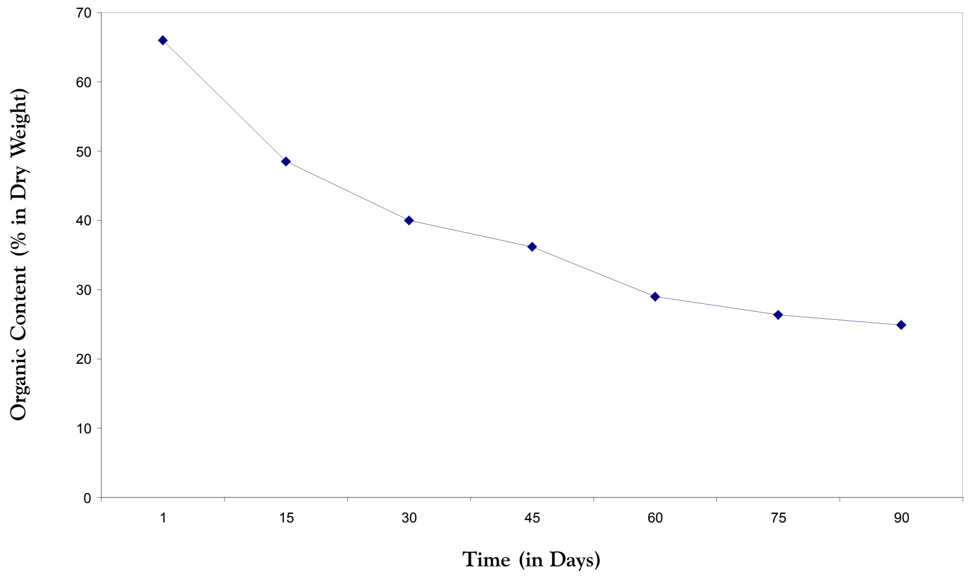

Table 6: Observed Value of Carbon Content During Composting

Time(in Days)	1	15	30	45	60	75	90
Carbon Content (% Dry weight)	37.77	28.00	23.4	20.95	16.82	15.27	14.43

Graph 5: Change in Carbon Content During the Process

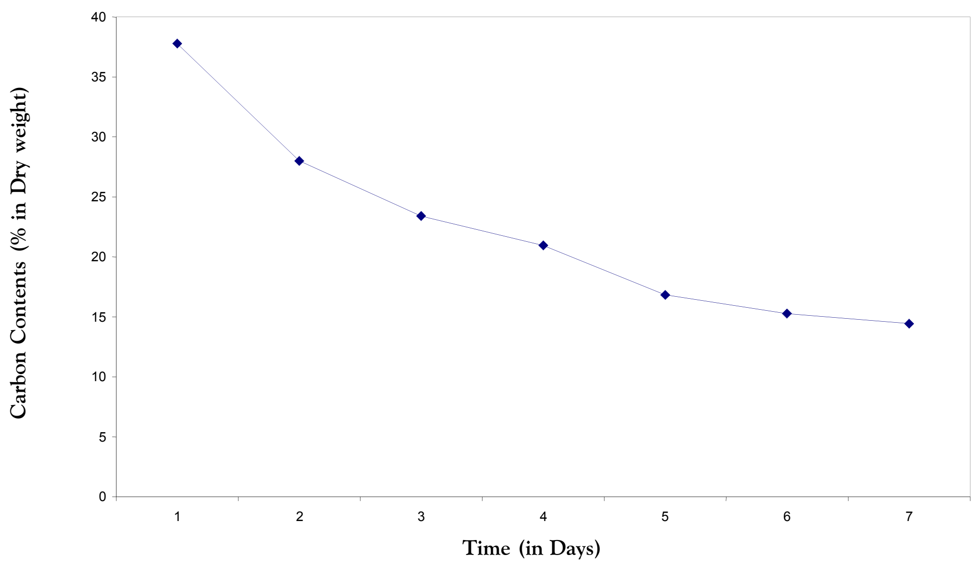

Table 7: Observed Value of Nitrogen Content During Composting

Time(in Days)	1	15	30	45	60	75	90
Nitrogen Content (% Dry weight)	1.187	0.92	0.80	0.698	0.724	0.721	0.841

Graph 6: Change in Nitrogen Content During the Process

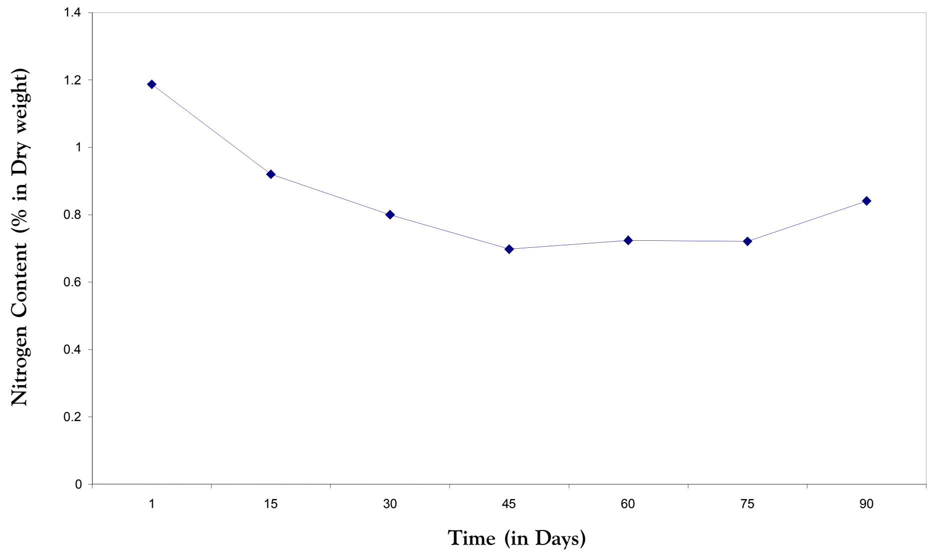

Table 8: Observed Value of Phosphorous Content During Composting

Time(in Days)	1	15	30	45	60	75	90
Phosphorus Content (% Dry weight)	0.611	0.584	0.570	0.567	0.588	0.585	0.598

Graph 7: Change in Phosphorous Content During the Process

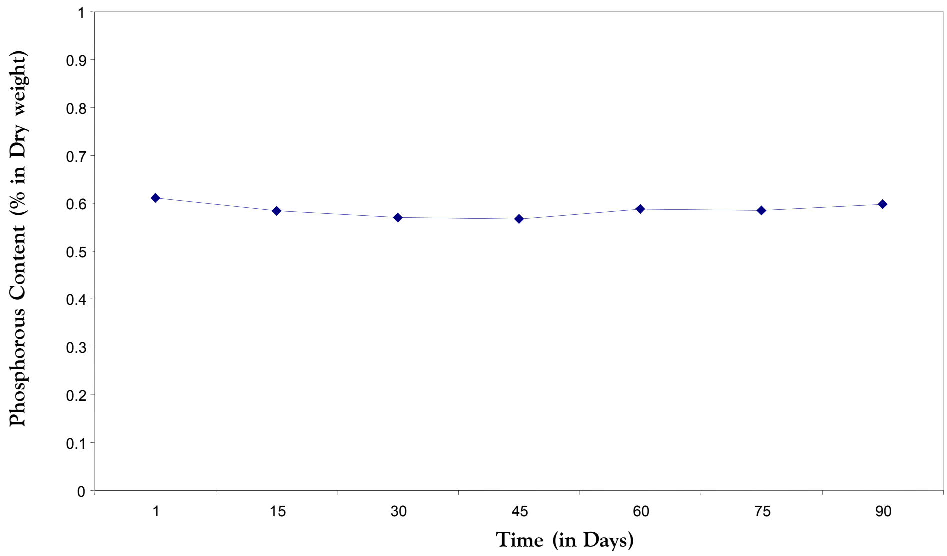

Table 9: Observed Value of Potassium Content During Composting

Time(in Days)	1	15	30	45	60	75	90
Potassium Content (% Dry weight)	0.52	0.567	0.580	0.540	0.560	0.564	0.551

Graph 6: Change in Potassium Content During the Process

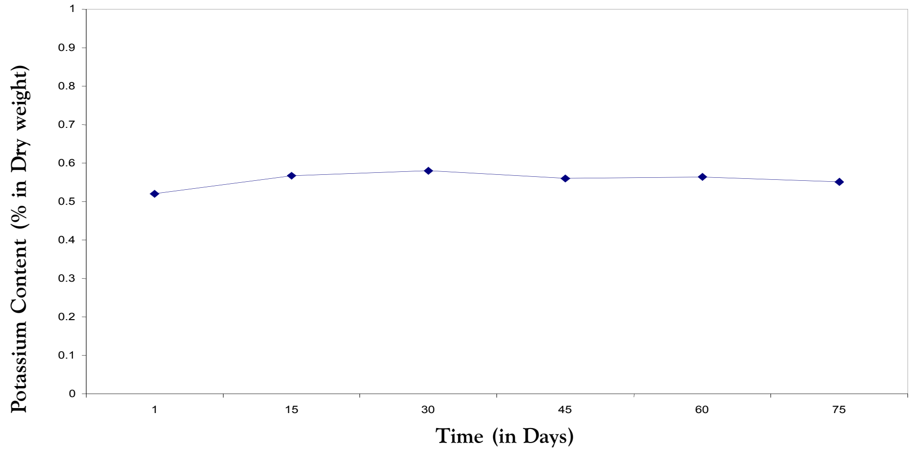

Table 10: Observed Value of C/N Ratio During Composting

Time (in Days)	Organic Content (%)	Carbon(%)	Nitrogen (%)	C/Nratio
1	66.00	37.77	1.187	31.82
15	48.50	28.00	0.92	30.43
30	40.00	23.40	0.80	29.25
45	36.20	20.95	0.698	30.01
60	29.00	16.82	0.724	23.23
75	26.35	15.27	0.721	21.18
90	24.89	14.43	0.841	17.16

Graph 9: Changes in C/N Ratio During the Process

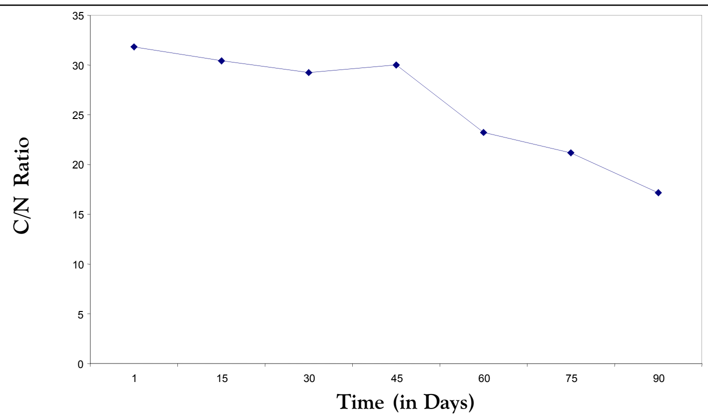

Table 11: Comparison of Chemical Characteristics of Fresh Waste, Finished Compost and Standard Compost

Parameters	Fresh Vegetable Waste	Finished Compost	Standard Compost
Organic matter	60.00	24.89	25 - 50
Carbon	37.77	14.43	8 – 40
Nitrogen	1.187	0.841	0.50 – 3.40
Phosphorous	0.611	0.598	0.50 – 3.50
Potassium	0.52	0.551	0.50 – 2.00
pH 6.80	8.02	7 – 8	

Note: All the values are in % except pH.

Composting process by selected method seems to be an economical and physical proposition because except its initial cost (involved for construction of NADEP tank), it will not require any extra cost of collection and transportation of the waste. The existing system has already the facilities of collection and transportation and need not appoint any additional establishment for this job. Since the masonry tank constructed for composting will be used trice every year (having a minimum life span of 20-30 years), hence introduction of this system will prove to be economical for long term.

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