

# **EFFECT AND EFFICACY OF PANCHAKAVYA AND VARIOUS VEGETABLE WASTES ON VERMICOMPOST PRODUCTION**

Submitted in partial fulfilment of the requirements for the award of  
Bachelor of Science degree in Microbiology

By

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**(DEEMED TO BE UNIVERSITY)**

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### **BONAFIDE CERTIFICATE**

This is to certify that this Project Report is the bonafide work of S,KARNAN (38300008) who carried out the project entitled “ **EFFECT AND EAFICACY OF PANCHAKAVYA AND VARIOUS VEGETABLE WASTES ON VERMICOMPOST PRODUCTION**” under our supervision from October 2019 to March 2020.

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**Submitted for Viva voce Examination held on \_\_\_\_\_ .**

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## DECLARATION

I **S.KARNAN (38300008)** hereby declare that the Project Report entitled

**“EFFECT AND EAFFICACY OF PANCHAKAVYA AND VARIOUS VEGETABLE WASTES ON VERMICOMPOST PRODUCTION”** done by me under the guidance of **Dr.P.Prakash** at **Sathyabama institute of Science and Technology, Chennai** is submitted in partial fulfillment of the requirements for the award of Bachelor of Technology degree in Biotechnology.

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## **ABSTRACT**

Vermicompost is the product of decomposing process using various species of earthworms usually red wigglers, white worms and other earthworms with waste vegetables or food waste, budding. In this study is to evaluated effect of individual waste vegetable along with treated with 50ml of panchakavya. The treated vegetables were, such as Okra, potato, brinjal and control were maintained as without treated vegetables. Among the treatment maximum length of earthworms were noted in potato and panchakavya followed by okra and tomato treated with panchakavya.

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## LIST OF ABBREVIATIONS AND SYMBOLS:

|        |   |                          |
|--------|---|--------------------------|
| gms    | - | Grams                    |
| ml     | - | Millilitre               |
| min    | - | Minute                   |
| w / v  | - | Weight by volume         |
| nm     | - | Nanometres               |
| mg     | - | Milligrams               |
| mg/ml  | - | Milligram per millilitre |
| mM     | - | Millimolar               |
| cm     | - | Centimetre               |
| %      | - | Percentage               |
| Kg     | - | kilo gram                |
| Liters | - | lit                      |

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## CHAPTER:1 INTRODUCTION

Earthworms have been on the Earth for over 20 million years. In this time they have faithfully done their part to keep the cycle of life continuously moving. Their purpose is simple but very important. They are nature's way of recycling organic nutrients from dead tissues back to living organisms. Many have recognized the value of these worms. Ancient civilizations, including Greece and Egypt valued the role earthworms played in soil. The Egyptian Pharaoh, Cleopatra said, "Earthworms are sacred." She recognized the important role the worms played in fertilizing the Nile Valley croplands after annual floods. Charles Darwin was intrigued by the worms and studied them for 39 years. Referring to an earthworm, Darwin said, "It may be doubted whether there are many other animals in the world which have played so important a part in the history of the world." The earthworm is a natural resource of fertility and life.

Earthworms live in the soil and feed on decaying organic material. After digestion, the undigested material moves through the alimentary canal of the earthworm, a thin layer of oil is deposited on the castings. This layer erodes over a period of 2 months. So although the plant nutrients are immediately available, they are slowly released to last longer. The process in the alimentary canal of the earthworm transforms organic waste to natural fertilizer. The chemical changes that organic wastes undergo include deodorizing and neutralizing. This means that the pH of the castings is 7 (neutral) and the castings are odorless. The worm castings also contain bacteria, so the process is continued in the soil, and microbiological activity is promoted.



## CHAPTER:2REVIEW OF LITERATURE

Bhattacharja,et al., (2000) the impact of manure and vermin-compost on the seed germination, seedlings, and growth parameters of marigold were comparatively studied. Seed germination and seedling parameters were maximum at 20% VC compared to other treatments. On the other hand, the vegetative growth and flowering parameters were maximum at 35% VC. Whole results reveal the potent effect of vermi-compost on marigold compared to the control treatments. The report suggested that the appropriate dose for nursery raising of marigold plants should be 20% VC whereas 35% VC is appropriate for the maximum vegetative growth, reproductive growth, and flowering of marigold.

Domingvez jj, ,et al., 2011 Vermicomposting is a process based on earthworms and microorganisms, whose joint action provides degradation and detoxification of organic waste as well as conversion into a product to be used for agronomic purposes. This eco-friendly method is cost effective and is the best among other remediation processes. In the earthworm gut, enzymatic activities lead to toxic metal immobilization, which suggests that vermitechnology is as efficient process for the remediation of heavy metals from industrial organic wastes/sludges

edwards ca et al., 2004 findings established the potentiality of earthworm for quality vermicompost production from vegetable wastes, and through intended selection and judicious mixture of different vegetable wastes the cast quality can be improved. The study demonstrated that vermicompost produced from the substrate, combining mixture of non-legume and legume vegetable waste at 2:1 will provide the major nutrients in more balanced proportion compared to sole individual family waste vermicompost (vermicompost obtained from the waste of one single plant family).

Scllion j et al., 2006 chemical fertilizers are produced from “vanishing resources” of earth and crops grown on chemical fertilizers have low and contaminated nutrient value in comparison to grown naturally or organic way. To preserve the agro-ecosystem and protect human health from the harmful chemical fertilizers ‘Ecological Agriculture and Organic Farming’ has to be promoted as the new emerging concept of “Organic Farming” focuses mainly on production of chemical free foods. Organic farming with use of organic fertilizers like “vermicompost” could substitute the chemical fertilizers and can reduce the economic cost and may also lead to organic products which fetches higher price in the market.

Karmegam n,et al., 2008 showed that among the different earthworm species, *Eisenia fetida* is the most efficient and commonly used earthworm for vermicomposting to develop appropriate compost using cow dung (dairy manure). Overall, this review has highlighted the various vermicomposting technologies, various earthworm and bacteria species involved in vermicomposting, effect on soil and plant growth as well as the benefits of using compost prepared by way of vermicomposting.

Wolka ,et al., 2015 Vermicomposting process improves soil aeration and thereby promotes the survival and dispersal of the useful bacterium within such systems, which is slowly becoming clear day by day. Vermicomposts could be prepared from the kitchen waste, farm waste, market waste, even from biodegradable city waste.

The most effective uses of earthworms are organic waste management and supplement of readily available plant nutrients and vermicompost demands the credit as it maintains as well as improves soil health.

Mane et al., 2012) The results from the casting analysis had revealed that the organic waste of plant debris, cattle dung and paper waste can be converted into usable form with its excellent nutrient release. Though there may not be a great increase in nutrient, the small change in nutrient value and the reduction in C:N ratio make the plant to uptake. The castings which are rich in microorganism enhance the plant growth hormones. The result showed the increase in three types of Earthworm population in three substrate of paper waste, cattle dung and plant debris. The vermicompost is a eco friendly and cost effective methods. It is an ideal method for the management and development of solid waste..

olive llaven et al.,2007 The vermicomposting of dry grass clippings, rice straw and cow manure using *Eisenia foetida* was successful. The produced vermicompost had a dark color, a mull-like soil odor and was homogeneous. It had all the essential macro- and micro-plant nutrients like N, P, K, Ca, Mg, Mn, Cu, Zn and Fe, indicating the achievement of getting an environment friendly nutrient-rich fertilizer for the agriculture sector. Possibilities of the production of vermicompost using other types of waste material and manure should also be explored in the future studies.

Shinha et al., 2010 stated that most kinds of biowastes can be converted into benign vermifertilizer with the amendment of cattle dung.Vermicomposting technology envisages the nutrient recovery through well-defined mechanisms in the presence of cattle dung and the end product,vermicompost serves to attain sustainable agriculture in an environmentally safe way. With the multiple benefits, the vermicomposting promises manifold applications in organic waste management, and recycling in a greener way solicits several issues to be addressed including

large scale feasibility, circular economic analysis, GHGs emissions and roots of transportation of raw materials and the final vermicompost.

### **Advantages of vermicompost**

- Vermicompost is rich in all essential plant nutrients.
- Provides excellent effect on overall plant growth, encourages the growth of new shoots / leaves and improves the quality and shelf life of the produce.
- Vermicompost is free flowing, easy to apply, handle and store and does not have bad odour.
- It improves soil structure, texture, aeration, and waterholding capacity and prevents soil erosion.
- Vermicompost is rich in beneficial micro flora such as a fixers, P-solubilizers, cellulose decomposing micro-flora etc in addition to improve soil environment.
- Vermicompost contains earthworm cocoons and increases the population and activity of earthworm in the soil.
- It neutralizes the soil protection.
- It prevents nutrient losses and increases the use efficiency of chemical fertilizers.
- Vermicompost is free from pathogens, toxic elements, weed seeds etc.
- Vermicompost minimizes the incidence of pest and diseases.
- It enhances the decomposition of organic matter in soil.
- It contains valuable vitamins, enzymes and hormones like auxins, gibberellins etc.

## CHAPTER:3 AIM AND SCOPE

### **3.1 AIM;**

Production of vermicomposting with various waste vegetables as substrate

### **3.2 Objectives**

- 1, To evaluate various substrate for vermicomposting .
- 2, to evaluate the growth rate of earth worms at different time interval
- 3, to evaluate microbial load in vermicomposting.

## CHAPTER:4 MATERILS AND METHODS

### 4.1 MATERILS

#### 4.1.1:VERMICOMPOST:

- 1.WATER
2. *COW DUNG (from village)*
- 3.thatch roof
- 4.soil and sand
- 5.gunny bags
- 6.erthworms
- 7.weed biomass
- 8.a large plastic bin
- 9.dry straw and leaves collacted from paddy fields
10. biodegradable wastes collected from fields and kitchan

#### 4.1.2. PANCHAGAVYA

- |                                  |   |       |
|----------------------------------|---|-------|
| 1.fresh cow dung ( from village) | _ | 1 kg  |
| 2.cow urine                      | _ | 1 lit |
| 3.cow milk                       | _ | ½ lit |
| 4.cow curd                       | _ | 1 lit |
| 5.cow ghee                       | _ | ½ lit |
| 6.tender coconut                 | _ | 1 lit |
| 7.jaggrey                        | _ | ½ kg  |
| 8.ripened banana                 | _ | 5lit  |

## 4.2 Metodology:

### 4.2.1 Materials for preparation of Vermicompost

Any types of biodegradable wastes-

1. Crop residues
2. Weed biomass
3. Vegetable waste
4. Leaf litter
5. Hotel refuse
6. Waste from agro-industries
7. Biodegradable portion of urban and rural wastes

### 4.2.2 Phase of vermicomposting

Phase : Processing involving collection of wastes, shredding, mechanical  
1 separation of the metal, glass and ceramics and storage of organic wastes.

Phase : Pre digestion of organic waste for twenty days by heaping the material  
2 along with cattle dung slurry. This process partially digests the material and fit for earthworm consumption. Cattle dung and biogas slurry may be used after drying. Wet dung should not be used for vermicompost production.

Phase : Preparation of earthworm bed. A concrete base is required to put the waste  
3 for vermicompost preparation. Loose soil will allow the worms to go into soil and also while watering, all the dissolvable nutrients go into the soil along with water.

Phase : Collection of earthworm after vermicompost collection. Sieving the  
4 composted material to separate fully composted material. The partially composted material will be again put into vermicompost bed.

Phase : Storing the vermicompost in proper place to maintain moisture and allow  
5 the beneficial microorganisms to grow.

### 4.2.3 What Worms Need

Compost worms need five basic things:

1. An hospitable living environment, usually called “bedding”
2. A food source
3. Adequate moisture (greater than 50% water content by weight)
4. Adequate aeration
5. Protection from temperature extremes

These five essentials are discussed in more detail below.

#### **4.2.4 Bedding**

Bedding is any material that provides the worms with a relatively stable habitat. This habitat must have the following characteristics:

##### **4.2.5 High absorbency**

Worms breathe through their skins and therefore must have a moist environment in which to live. If a worm’s skin dries out, it dies. The bedding must be able to absorb and retain water fairly well if the worms are to thrive.

##### **4.2.6 Good bulking potential**

If the material is too dense to begin with, or packs too tightly, then the flow of air is reduced or eliminated. Worms require oxygen to live, just as we do. Different materials affect the overall porosity of the bedding through a variety of factors, including the range of particle size and shape, the texture, and the strength and rigidity of its structure. The overall effect is referred to in this document as the material’s bulking potential.

##### **4.2.7 Low protein and/or nitrogen content (high Carbon: Nitrogen ratio)**

Although the worms do consume their bedding as it breaks down, it is very important that this be a slow process. High protein/nitrogen levels can result in rapid degradation and its associated heating, creating inhospitable, often fatal, conditions.

Heating can occur safely in the food layers of the vermiculture or vermicomposting system, but not in the bedding.

#### **4.2.8 Requirements**

- **Housing:** Sheltered culturing of worms is recommended to protect the worms from excessive sunlight and rain. All the entrepreneurs have set up their units in vacant cowsheds, poultry sheds, basements and back yards.
- **Containers:** Cement tanks were constructed. These were separated in half by a dividing wall. Another set of tanks were also constructed for preliminary decomposition.
- **Bedding and feeding materials:** During the beginning of the enterprises, most women used cowdung in order to breed sufficient numbers of earthworms. Once they have large populations, they can start using all kinds of organic waste. Half of the entrepreneurs have now reached populations of 12,000 to 15,000 adult earthworms.

#### **4.2.3 Vermicompost Production Methodology**

#### 4.2.3.1 Selection of suitable earthworm

For vermicompost production, the surface dwelling earthworm alone should be used. The earthworm, which lives below the soil, is not suitable for vermicompost production. The African earthworm (*Eudrillus engenial*), Red worms (*Eisenia foetida*) and composting worm (*Peronyx excavatus*) are promising worms used for vermicompost production. All the three worms can be mixed together for vermicompost production. The African worm (*Eudrillus eugenial*) is preferred over other two types, because it produces higher production of vermicompost in short period of time and more young ones in the composting period.



fig 4.2.3.2 African earthworm (*Eudrillus eugeniae*) Tiger worm or Red Asian worms (*perinonyx wrinkle (Eisenia foetida) ecavatus*)

Fig 4.2.3.3 Collacted earthworms



#### **4.2.3.4 Selection of site for vermicompost production**

Vermicompost can be produced in any place with shade, high humidity and cool. Abandoned cattle shed or poultry shed or unused buildings can be used. If it is to be produced in open area, shady place is selected. A thatched roof may be provided to protect the process from direct sunlight and rain. The waste heaped for vermicompost production should be covered with moist gunny bags.

##### **4.2.3.1 Vermicomposting covered mosquito net**



#### 4.2.3.2vermicompost coverd gunny bags



#### 4.2.3.3Containers for vermicompost production

A cement tub may be constructed to a height of 2½ feet and a breadth of 3 feet. The length may be fixed to any level depending upon the size of the room. The bottom of the tub is made to slope like structure to drain the excess water from vermicompost unit. A small sump is necessary to collect the drain water.

In another option over the hand floor, hollow blocks / bricks may be arranged in compartment to a height of one feet, breadth of 3 feet and length to a desired level to have quick harvest. In this method, moisture assessment will be very easy. No excess water will be drained. Vermicompost can also be prepared in wooden boxes, plastic buckets or in any containers with a drain hole at the bottom.

Fig 4.2.3.1 VERMICOMPOSTING IN PLASTIC BUCKETS



#### 4.2.4 PANCHAGAVYA:

##### 4.2.4.1. Panchagavya

Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity in plant system. Panchagavya consists of nine products viz. cow dung, cow urine, milk, curd, jaggery, ghee, banana, Tender coconut and water. When suitably mixed and used, these have miraculous effects.

#### 4.2.10.1 Ingredients of Panchagavya



**Cow dung**



**Cow urine**



**Cow ghee**



**Milk**



**Water**



**Cow curd**



**Jaggery**



**Tender Coconut**



**Well ripened  
poovan banana**

- Cow dung - 7 kg
- Cow ghee - 1 kg

Mix the above two ingredients thoroughly both in morning and evening hours and keep it for 3 days

- Cow Urine - 10 liters
- Water - 10 liters

After 3 days mix cow urine and water and keep it for 15 days with regular mixing both in morning and evening hours. After 15 days mix the following and panchagavya will be ready after 30 days.

- Cow milk - 3 liters
- Cow curd - 2 liters
- Tender coconut water - 3 liters
- Jaggery - 3 kg

- Well ripened poovan banana – 12 nos

**Fig 4.2.3.2 Sample collection from village**



#### **4.2.3.2. Preparation**

All the above items can be added to a wide mouthed mud pot, concrete tank or plastic can as per the above order. The container should be kept open under shade. The content is to be stirred twice a day both in morning and evening. The Panchagavya stock solution will be ready after 30 days. (Care should be taken not to mix buffalo products. The products of local breeds of cow is said to have potency than exotic breeds). It should be kept in the shade and covered with a wire mesh or plastic mosquito net to prevent houseflies from laying eggs and the formation of maggots in the solution. If sugarcane juice is not available add 500 g of jaggery dissolved in 3 liter of water

**Fig 4.2.3.1 preparation of panchagavya**



#### 4.2.3.3 Beneficial effects of Panchagavya on commercial crops

##### Mango

- Induces dense flowering with more female flowers
- Irregular or alternate bearing habit is not experienced and continues to fruit regularly
- Enhances quality by 12 days in



##### Acid lime

- Continuous flowering is ensured round the year
- Fruits are plumpy with strong aroma
- Shelf life is extended by 10 days



- room temperature
- Flavour and aroma are extraordinary

### Guava

- Higher TSS
- Shelf life is extended by 5 days



### Turmeric

- Enhances the yield by 22%
- Extra long fingers
- Ensure low drainage loss
- Narrows the ratio of mother and finger rhizomes
- Helps survival of dragon fly, spider etc which in turn reduce pest and disease load
- Sold for premium price as mother/seed rhizome
- Enriches the curcumin content



### Banana

In addition to adding with irrigation water and spraying, 3% solution (ml) was tied up at the naval end of the bunch after the male bud is removed. The bunch size becomes uniform. One month earlier harvest was witnessed. The size of the top and bottom hands was uniformly big.

### Jasmine

- Exceptional aroma and fragrance
- No incidence of bud worm
- Continuous flowering throughout the year

#### **4.2.3.4. Recommended dosage**

##### **Spray system**

3% solution was found to be most effective compared to the higher and lower concentrations investigated. Three litres of Panchagavya to every 100 litres of water is ideal for all crops. The power sprayers of 10 litres capacity may need 300 ml/tank. When sprayed with power sprayer, sediments are to be filtered and when sprayed with hand operated sprayers, the nozzle with higher pore size has to be used.

##### **Flow system**

The solution of Panchagavya can be mixed with irrigation water at 50 litres per hectare either through drip irrigation or flow irrigation

##### **Seed/seedling treatment**

3% solution of Panchagavya can be used to soak the seeds or dip the seedlings before planting. Soaking for 20 minutes is sufficient. Rhizomes of Turmeric, Ginger and sets of Sugarcane can be soaked for 30 minutes before planting.

##### **Seed storage**

3% of Panchagavya solution can be used to dip the seeds before drying and storing them.

##### **Periodicity**

|                                 |                                                                |
|---------------------------------|----------------------------------------------------------------|
| Pre flowering phase             | : Once in 15 days, two sprays depending upon duration of crops |
| Flowering and pod setting stage | : Once in 10 days, two sprays                                  |
| Fruit/Pod maturation stage      | : Once during pod maturation                                   |

#### **4.2.4.5. Panchagavya for animal health**

Panchagavya is a living elixir of many micro organisms, bacteria, fungi, proteins, carbohydrates, fats, amino acids, vitamins, enzymes, known and unknown growth promoting factors micronutrients trace elements antioxidant and immunity enhancing factors.

When taken orally by animals and human beings, the living micro organisms in the Panchagavya stimulate the immune system and produce lot of antibodies against the ingested microorganisms. It acts like vaccine. This response of the body increases the immunity of animals and humans and thus helps to prevent illness and cures disease. It slows down the aging process and restores youthfulness. The other factors present in Panchagavya improve appetite, digestion and assimilation and elimination of toxins in the body. Constipation is totally cured. Thus the animals and humans become hale and healthy with shining hair and skin. The weight gains are impressive.

##### **Pigs**

Panchagavya was mixed with drinking water or feed at the rate of 10 ml – 50 ml/pig depending upon the age and weight. The pigs became healthy and disease free. They gained weight at a faster rate. The feed to weight conversion ratio increased tremendously. This helped the piggery owners to reduce the feed cost and to get very good returns due to increased weight.

##### **Goats and Sheep**

The goats and sheep became healthy and gained more weight in a short period after having administered 10 ml to 20 ml Panchagavya per animal per day depending upon the age.

##### **Cows**

By mixing Panchagavya with animal feed and water at the rate of 100 ml per cow per day, cows become healthier with increased milk yield, fat content and SNF. The rate of conception increased. The retained placenta, mastitis and foot and mouth disease became things of the past. Now the skin of the cow is shiny with more hair and looks more beautiful. Instead of spraying urea on paddy straw (hay) before staking, a few farmers sprayed the 3 percent solution of Panchagavya, layer after layer during the staking and allowed it to ferment. The cows preferred such hay compared to unsprayed hay stock.

##### **Poultry**

When mixed with the feed or drinking water at the rate of 1 ml per bird per day, the birds became disease-free and healthy. They laid bigger eggs for longer periods. In broiler chickens the weight gain was impressive and the feed-to-weight conversion ratio improved.

fig 4.2.4.6 : EVALUATION OF GROWTHRATE



## CHAPTER :5 RESULT AND DISCUSSION

Composting and vermicomposting are biooxidative processes that stabilize the organic matter. Composting includes a thermophilic phase during which labile organic matter degradation occurs and pathogens are effectively reduced.

Vermicomposting includes coupled activities of earthworms and microorganisms, stabilizing the organic matter and does not involve a thermophilic phase (Tognetti et

al., 2005). In our study, aerobic composting was carried out using vegetable waste in

combination with plant litter which further could convert into bedding material for vermicomposting.

Scientific investigations have established the viability of using earthworms as a treatment technique for numerous waste streams besides producing organic fertilizers. Vermicomposting results in the bioconversion of the waste stream into two

useful products, earthworm biomass and vermicompost.

Panchagavya or panchakavyam is a mixture used in traditional Hindu rituals that is prepared by mixing five ingredients. The three direct constituents are cow dung, urine, and milk; the two derived products are curd and ghee. These are mixed in proper ratio and then allowed to ferment.

The Sanskrit word panchagavya means &quot;five cow-derivatives&quot;. When used

in Ayurvedic medicine, it is also called cowpathy

Earthworm growths: After 60 days of vermicompost production, weight of *E.*

*eugeniae* was calculated. The highest length of *E. eugeniae* was 49 cm, which is from treatment having potato, followed by okra and brinjal. as shown in Table 1.

According to Table 1, the length of *E. eugeniae* increased by 19 % compared to its initial earthworm weight. This might imply that potato had more considerable effect on *E. eugeniae* growth than okra and brinjal. This finding was supported by Zularisam et al. and Petmuenwai et al.

Organic farming alone could serve as the holistic approach towards achieving

sustainable agriculture as it is ecofriendly and ensures the conservation of resource

for the future. Earthworms and their vermicompost work like miracle growth promoter

and are nutritionally better to the conventional compost and chemical fertilizers.

## RESULTS

### EFFECT OF VARIOUS VEGETABLE WASTES ON VERMICOMPOST

| LADIES FINGER |                |           | POTATO          |                  |           | BRINJAL         |                  |           |
|---------------|----------------|-----------|-----------------|------------------|-----------|-----------------|------------------|-----------|
| I WEEK(CM)    | 2 ND WEEK (CM) | 3 RD WEEK | FIRST WEEK (CM) | SECOND WEEK (CM) | 3 RD WEEK | FIRST WEEK (CM) | SECOND WEEK (CM) | 3 RD WEEK |
| 7             | 7.2            | 7.4       | 4.5             | 8.5              | 11.3      | 10.5            | 11.2             | 8.4       |
| 4.5           | 6.5            | 6.2       | 6.2             | 10               | 10.9      | 6.5             | 6.5              | 7.5       |
| 2.5           | 7              | 10.1      | 8.5             | 7.6              | 9.7       | 8.2             | 7.2              | 6.1       |
| 5.4           | 8.5            | 8.1       | 5.8             | 6.5              | 12.9      | 6.8             | 11               | 9.3       |
| 8.5           | 7.2            | 7.5       | 9.1             | 10.5             | 15.2      | 5.4             | 9.3              | 8.4       |
| 27.9          | 36.4           | 33.3      | 34.1            | 43.1             | 47.84     | 37.4            | 45.2             | 32.9      |
| 5.58          | 7.28           | 6.55      | 6.66            | 8.4              | 9.3       | 6.2             | 9.3              | 6.5       |

## CHAPTER :6Summary and conclusion:

The art of collecting and using wastes from animal, human and vegetable sources for improving crop productivity is as old as agriculture. Manures are the organic materials derived from animal, human and plant residues which contain plant nutrients in complex organic forms. Naturally occurring or synthetic chemicals containing plant nutrients are called fertilizers. Vermicompost is the product of decomposing process using various species of earthworms usually red wigglers, white worms and other earthworms with waste vegetables or food waste, budding. In this study is to evaluated effect of individual waste vegetable along with treated with 50ml of panchakavya. The treated vegetables were, such as Okra, potato, brinjal and control were maintained as without treated vegetables. Among the treatment maximum length of earthworms were noted in potato and panchakavya followed by okra and tomato treated with panchakavya.

In this study, better growth effects were observed the earthwarm length treated various types of vegetable wastes. Interestingly, remarkable growth promoting effects were recorded in 19% potato and panchagavya, followed by okra, brinjal and panchagavya treated group. Potato and panchagavya could be explored as effective growth of earthwarm in the near future.

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