

**Effect of Bio- compost on seed germination and growth of *Cucumis sativus*****¹Shivsant Kumar, ¹Manoj Kumar and ²V K Prabhat****¹P G Department of Botany, Magadh University Bodh Gaya, Bihar India****²P G Department of Botany, S K U, Chhatarpur, M P, India****DOI: <https://doi.org/10.5281/zenodo.14253744>****Abstract:**

The present communication deals with Effect of Bio- compost on seed germination and growth of *Cucumis sativus* . The domestic bio compost was used as both extract and decoction at different dilutions to analyze its effect on seed germination, leaf emergence, growth and plant biomass. Effect of different concentrations of waste extract and decoction was compared to that of distilled water (control). The results revealed that all the concentrations of extract/decoction promoted seed germination, also contributed to seedling height, plant growth and biomass accumulation. However, an increase in dilution ratios from 1:5 to 1:8 had a significant effect on germination and growth of cucumber plants. This suggests that domestic waste, which is one of the major causes of environmental pollution, can be used as an alternative to synthetic plant growth nutrients.

Keywords: Bio-compost, Seed germination, *Cucumis sativus***1. Introduction:**

Waste generation and its subsequent accumulation by increase in human population is one of the major problems confronting future generations. Solid waste results from various sources including food, animal, hazardous, industrial, medical, mineral wastes, etc. Urban solid waste includes household garbage, construction and demolition debris, sanitation residues, trade, industrial refuse



and biomedical solid waste (CPCB, 2000). India produces 300 to 400g of solid waste per person per day in town. At the same time the domestic waste can contain many reusable substances of high value, depending on there being an adequate technology to convert this residual matter into commercial products either as raw material for secondary processes as operating supplies or as ingredients of new products. Numerous valuable substances in food production are suitable for separation and recycling at the end of their life cycle, even though present separation and recycling processes are not absolutely cost efficient (Laufenberg et al., 2003).

Most of these wastes like agriculture wastes are biodegradable and can be converted into valuable resources that reduce their negative impacts. However, waste collected from homes may be recycled and used as a potential resource, which is the main objective of this study.

It is evident that the household waste discarded daily also has a potential source of carbon, nitrogen, vitamins and amino acids which generally induce plant growth. Therefore, the present work was undertaken to evaluate the effects of various domestic vegetable and fruit waste on the germination and growth of cucumber plants.

2. Material and Methods:

The domestic waste (peels) obtained from vegetables like potato (*Solanum tuberosum* L.), pomegranate (*Punica granatum*), outer leaves of cabbage (*Brassica oleracea*), root waste of coriander (*Coriandrum sativum*) were used to prepare extract and decoction samples. The vegetable and fruits used in the present study were selected based upon their (a) availability throughout the year; (b) source of plant growth promoting ingredients like: carbon, nitrogen, mineral and amino acids and (c) absence of toxic or harmful components. The collected vegetable and fruit waste was washed thoroughly with running tap water, distilled water, air dried for an hour to weigh them as follows-peels of potato peel (45 g), pomegranate (10g), cabbage leaves (25g) and



roots of coriander (5 g), which were finely chopped and used to prepare decoction as well as crude extract samples.

The decoction was made by crushing the waste material using sterile mortar and pestle, followed by heating at 70°C for 15 minutes, which was filtered through muslin cloth. The filtrate was centrifuged at 12000 rpm for 5 minutes to precipitate any unwanted particles. The supernatant was gently aspirated (up to 60ml) that was agitated using a shaker for 24hrs. This preparation was preserved at 4°C and used as a prospective medium for the seed germination studies. On the other hand the crude extract was prepared by grinding the waste material in a mixer grinder with 25ml distilled water. The mixture was filtered using a muslin cloth and the filtrate was incubated in a shaker for 24hrs. The extract obtained (about 70ml) was preserved at 4°C for future use and to avoid any contamination. The treatments designed from both decoction and crude extract fall in a range of dilution ratios from 1:1 (1 ml decoction/ extract + 1 ml distilled water) to 1:8 (1 ml decoction/ extract + 8 ml distilled water), respectively. The different dilutions ratios were used to assess their suitability and identify a best dilution that promotes significant seed germination and plant growth. The whole experiment was setup in a culture room with optimum conditions such as incubation temperature of 25±20°C, a light intensity of 2000 lux at 12 h photoperiod and a relative humidity of 80 per cent throughout the experiment. The seeds of tomato were thoroughly washed in running tap water for 2hrs and surface sterilized with a 0.5-2 per cent (v/v) sodium hypochlorite solution. Further, they were finally rinsed thrice with sterile distilled water and introduced for an overnight incubation in the respective dilution against a control which was distilled water. Five tomato seeds were sown in Petri plates with evenly spread cotton and treated by their respective decoction and extract dilutions at subsequent time intervals. The assessments including rate of germination, appearance of leaf and shoot length were carried out after 144hrs (6 days) and 168 hrs (7 days). While the other parameters like root length, wet weight and dry weight were recorded

after 7 days. The dry weight of seedlings was taken after keeping them in hot air oven at 800C for 24 hours.

3. Result and Discussion:

our results revealed that the present study on Cucumis sativus were analyzed and compared for determining different parameters including germination rate, leaf emergence, average length of whole plant, average fresh and dry weight of whole plant in response to decoction and crude extract. It was observed that the roots of cucumber inoculated in waste extract were thicker and stronger compared to control. The decoction treatment (ratio) from 1:1 to 1:4 showed 60 per cent germination and the dilution ratio from 1:5 to 1:8 showed 100 per cent germination along with the maximum plumule length of 10.5 cm, while the control showed only 40 per cent germination with no leaves appeared after 144hrs . Interestingly, leaves were emerged much earlier in all the treated plants in comparison to control . The observations recorded at 168 hrs showed a maximum increase in plumule length of 10.2 cm for 1:8 decoction treated plants. The effect of Bio compost on plant growth was consistent with the crude extract treatment.

Table 1: Growth of cucumber at different dilutions of decoction media

Time period	Parameters	Control	Treatments (sample dilution)							
			1:1	1:2	1:3	1:4	1:5	1:6	1:7	1:8
144 hrs.	Number of seeds germinated	2	3	3	3	4	5	5	5	5
	Appearance of leaf	-	+	+	+	+	+	+	+	+
	Length of plumule (cm)	1	2.2	2.5	2.7	2.8	3	3.1	3.3	3.5
168hrs	Number of seeds germinated	3	4	4	4	4	5	5	5	5
	Appearance of leaf	+	+	+	+	+	+	+	+	+
	Length of plumule (cm)	1.5	3.3	3.5	3.6	3.6	3.7	3.8	4	4.2

Note : - (+ presence of leaves) (- absence of leaves)



The crude extract supported 80- 100 per cent germination, early leaf emergence and a maximum plumule length of 10.8cm at 144hrs and 4.5 cm at 168 hrs . While the plants grown in distilled water (control) showed a plant length of only 4.3cm. When the cucumber plants were assessed for their total biomass content, by analyzing fresh and dry weights of shoots and roots, there was profound increase in the plants grown under treatment (both decoction and crude extract) compared to control . Peels of banana, pomegranate, sweet lime and orange are highly rich in potash, iron, zinc, etc. The powder of fruit peels extract was used as a natural fertilizer, along with fenugreek seeds to test the utilization of fruit peel powder as a natural growth enhancer (Mercy et al 2014). Results of current experiment showed that bio -compost has potential to promote and enhance plant growth. The use of domestic waste as plant growth promoter ingredient would be one of the beneficial strategies to reduce its accumulation and protect the environment.

4. References:

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