

Knowledge about preparation and uses of bio-enzyme among urban population

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ABSTRACT

Household organic waste can be minimized by fermenting fruit and vegetable wastes. This is an alternative method of utilizing organic waste into bio-enzyme. The study was conducted to assess the implementation of bio-enzyme production and usage as an initiative to reduce organic waste. The study aimed to determine the awareness and knowledge of urban respondents about bio-enzyme in Amravati city. An intervention involving a video was done, hence a pre- and post-experimental design without a control group was used. In the pre-test, a majority of 48.68 percent of respondents had moderate knowledge about bio-enzyme with a mean pre-test score of $36.65, \pm 19.18$. In the post-test, a majority of 92.1 percent of samples had adequate knowledge about bio-enzyme with a mean post-test score of $76.17, \pm 10.04$. A significant increase in knowledge was observed regarding the preparation and uses of bio-enzyme for various household and farm practices by watching the video. The calculated Z value was found to be significant at P value 0.05. Therefore, it can be concluded that the video clip has a significant effect on increasing the knowledge of urban respondents about bio-enzyme.

Keywords: Bio-enzyme, Videoclip, Knowledge

INTRODUCTION

Garbage originating from households, industries, or various settlements is generally very diverse, out of which around 75 per cent consists of organic waste and the rest is inorganic. Organic waste is often found in the environment around us, consisting of food scraps, seed shells from fruits and vegetables, fruit waste, and leaves rotting from trees. This group belongs to the category of organic waste because it is recyclable in nature (Adelliya and Muliarta, 2021). When organic wastes go into landfills, they create obnoxious gases like ammonia, sulphides, methane, carbon dioxide, etc., resulting in air, water, and soil pollution. Landfill gases are produced when bacteria break down organic wastes. These can cause coughing, irritation of the eyes, nose and throat, nausea, headache, and breathing difficulties (Khandve and Harle, 2014). To overcome this problem, one of the steps is to utilize these organic wastes and convert them into bio-enzymes. Bio-enzyme is a kind of organic compound. It is a complex solution produced by fermenting fresh kitchen waste such as vegetable

and fruit peels (Muruganadam and Kumar 2022).

Bio-enzyme is an organic solution formed by fermentation of fruits, vegetables, sugar, or molasses and water (Muliarta, 2021). It is a multipurpose, natural cleaner produced from vegetable or fruit waste. These cleaners use good bacteria which help to digest waste, soil, stain, and bad odor. These bacteria produce enzymes which help in the breakdown of certain molecules into smaller pieces (Sethi, *et al.* 2021). It is a truly supernatural solution according to thousands of users. There is an important need to move forward for natural and sustainable living because the planet is reeling under the unchecked pollution of harmful chemicals (Dhavale *et al.*, 2020). The bio-enzyme solution is not only a cleaning agent but can also serve as an excellent fertilizer for growing various crops. It is also known to purify groundwater and can be used as a natural pesticide and herbicide (R. Kanchana, *et al.*, 2023).

Video-based materials help boost individuals' creativity and cooperation. Access to

video can motivate individuals and create a distinctive context for their learning experiences (Babalola, 2007). Video clips, also known as multimedia teaching materials, help improve the learning process (Fadlilah, *et al.* 2020). It refers to the recording, manipulating, and displaying moving images, especially in a format that can be presented on television. Video clips can help generate interest in individuals (Wong, 2020). The main motivation for testing the effectiveness of video clip integration into multimedia presentations is that visual stimulation with media applications specific to the individual population can increase their engagement (Mercado, 2022). The purpose of this study is to evaluate how the implementation of a knowledgeable video on teaching would influence the understanding of the preparation of bio-enzyme processes and satisfaction in a group of individuals. The purpose of this study was to evaluate how the implementation of a knowledgeable video on the learning process of bio-enzyme preparation and household-level uses.

METHODOLOGY

The video clip was prepared to raise awareness among urban population about the preparation and uses of bio-enzyme, and the effectiveness was evaluated in terms of knowledge. An educational video intervention was implemented to inform respondents about bio-enzyme; the before-after knowledge of respondents was assessed. Thus, an experimental design without a control group was utilized for the study. The target population of the study was urban respondents

from Amravati city. A list of respondents was compiled. A WhatsApp group was utilized to identify interested individuals and contact them online by sharing an announcement about bio-enzyme, following which 200 people were pre-tested. The video clip was produced in the Audio-Visual Laboratory of the Department of Home Science at Sant Gadge Baba Amravati University in Amravati in 2023. The video content focused on the preparation, process, and uses of bio-enzyme made from rose flowers that can substitute for various vegetable, fruit, and flower waste. A questionnaire was used to gather personal, social, and situational information from the respondents. A knowledge test was created and administered to assess knowledge before and after the video intervention. Data collection was carried out using Google Forms. The 152 respondents who watched the video clip and completed the Google Forms were considered as participants in the study. A Z-test was conducted to determine the difference between the mean pre-test and post-test knowledge regarding the preparation, process, and uses of bio-enzyme.

RESULTS AND DISCUSSION

The observation regarding the personal profile and effect of video clip in terms of knowledge are discussed.

Personal profile of the Respondents

The personal and social profile of the respondents has influence on the knowledge of the individual. The observed characteristics are discussed below in Table 1.

Table 1
Personal profile of the respondents

Characteristics	Respondents (n=152)	
	Frequency	Percentage%
Age		
21-30years	44	28.95
31-40years	42	27.64
Above50years	66	43.41
MeanandSD		
Gender		
Male	43	28.3
Female	109	71.7

FamilySize		
Small(1to4)	73	48.03
Medium(5to7)	72	47.36
Large(Above8)	7	4.61
AnnualFamilyIncome		
UptoRs200000	56	36.84
Rs200000toRs500000	49	32.24
AboveRs500000	47	30.92
MeanandSD	435184.21,± 3149.48	
Education		
Secondary	14	9.22
Highersecondary	31	20.39
Graduateandabove	107	70.39
Use ofMedia*		
YouTube	12	7.90
Whatsapp	60	39.47
Instagram	34	22.37
Facebook	22	14.47
Newspaper	13	8.55
Magazine	7	4.60
Radio	4	2.64

**Percentage exceeds hundred due to multiple choices.*

The data presented in Table 1 shows that, according to age, the 43.41 per cent of urban respondents were in the group of Above 50 years, with a mean age of 40.07 and a standard deviation of ±11.55. The majority of urban respondents (71.7%) belong to the female category, while the remaining (28.3%) belong to the male category. Regarding family size, 18.03 per cent of urban respondents 48.03 per cent have a small family size. The more number of respondents (36.84%) have a family annual income up to ₹ 200000 with a mean income of ₹ 435184.21 and a standard deviation of ±314,980.48. In terms of education, the majority of urban respondents (70.3%) were graduated. Regarding the

use of media, of urban respondents 39.4 per cent used WhatsApp, while only of respondents 2.64 per cent used Radio only. In social participation, the majority of urban respondents (65.1%) did not participate, while the remaining of respondents (34.9%) did participate in social work.

Change in knowledge about bio-enzyme

The pre-test and post-test knowledge of respondents about preparation, process, and uses of bio-enzyme were assessed, and the percent change in knowledge of the respondents was calculated. The data is presented in the Table 2 provided below.

Table 2
Distribution of respondents according to the knowledge about bio-enzyme and its preparation

Sl. No.	Particulars	n=152		Per cent change in knowledge
		Pre-test Frequency (%)	Post-test Frequency (%)	
A	Knowledge about importance of bio-enzyme			
1	Aware about bio-enzyme			
	a) Yes	27 (17.8)	152 (100)	461.79
	b) No	125 (82.2)	0	-100
2	Environmental effects of throwing kitchen waste			
	a) Spreads stench	8 (5.3)	10 (6.6)	24.52
	b) Pollution	15 (9.9)	0	-100
	c) Spread diseases	14 (9.2)	2 (1.3)	-85.86
	d) All of these	115 (75.7)	140 (92.1)	21.66
B	Material Required			
3	Bio-enzyme is prepared by			
	a) Micro-organisms	27 (17.8)	138 (90.8)	410.11
	b) Viruses	29 (19.1)	6 (4.2)	-78.01
	c) Bacteria	37 (24.3)	8 (5)	-79.42
	d) None of these	59 (38.8)	0	-100
4	Avoid while making bio-enzyme			
	a) Jaggery and water	12 (7.9)	0	-100
	b) Waste of fresh leafy vegetables	45 (29.6)	11 (7.2)	-75.67
	c) Empty bottle	32 (21.1)	0	-100
	d) Rotten fruits	63 (41.4)	141 (92.8)	124.15
5	The bottle used for making bio-enzyme			
	a) Plastic	55 (36.2)	132 (86.8)	139.77
	b) Glass	17 (11.2)	0	-100
	c) Steel	20 (13.2)	0	-100
	d) None of these	60 (39.5)	20 (13.2)	-66.58
C	Process			
6	The correct quantity of ingredients required while making bio-enzyme			
	a) 1:3:10	28 (18.4)	128 (84.2)	357.60
	b) 2:3:15	29 (19.1)	1 (0.7)	-96.33
	c) 1:2:10	88 (57.9)	23 (15.1)	-73.92
	d) 1:6:20	7 (4.6)	0	-100
7	The following gas is produced while making bio-enzyme			
	a) Methane	33 (21.7)	83 (54.6)	151.61
	b) Ethane	45 (29.6)	69 (45.4)	53.37
	c) Ozone	51 (33.6)	0	-100
	d) Oxygen	23 (15.1)	0	-100
8	Frequency of expelled of gases while making bio-enzyme			
	After 2-4 days	39 (25.7)	132 (86.8)	237.74
	After 3-5 days	53 (34.9)	8 (5.3)	-84.81
	a) After 1-2 days	48 (31.6)	12 (7.9)	-75
	b) After 6-7 days	12 (7.9)	0	-100
9	The bio-enzyme is ready to use after			
	a) 90 days	29 (19.1)	143 (94.1)	392.67
	120 days	39 (25.7)	4 (2.9)	-88.71
	60 days	63 (41.4)	5 (3)	-92.75
	40 days	21 (13.8)	0	-100

Table 2 presents distribution of respondents according to the knowledge about bio-enzyme and its preparation. It was observed that 82.2 per cent respondents was not aware about bio-enzyme in pre-test while in post-test all respondents was aware about bio-enzyme. The 75.7 per cent respondents were aware about impact of throwing kitchen waste into the environment in pre-test while in post-test 92.1 per cent respondents were aware about it. In pre-test only 17.8 per cent respondents know about the bio-enzyme prepared by microorganisms while in post-test majority 90.8 per cent of them answered correctly. About 41.4 per cent respondents were unaware about the materials required for bio-enzyme in pre-test while 92.8 per cent respondents know about it in post-test. The 39.5 per cent respondents were unaware of type of container or bottle used in bio-enzyme preparation while in post-test majority 86.8 per cent respondents gained knowledge about it. In pre-test only 18.4 per cent respondents had knowledge about required quantity of ingredients in ratio for bio-enzyme

preparation while majority 84.2 per cent respondents were aware of it. Only 21.7 per cent respondents had knowledge about gas produced during bio-enzyme process in pre-test while in post-test 56.4 per cent respondents had knowledge about it. Regarding expulsion of gases while making bio-enzyme only 27.5 per cent respondents are known about it in pre-test while in post-test majority 86.8 per cent respondents were aware of it. In pre-test only 19.1 per cent respondents had knowledge about time required for bio-enzyme preparation while in post-test 94.1 per cent respondents known about it.

The noticeable percentage change in knowledge was observed about the materials required for the process of preparing the bio-enzyme using various household and farm materials. From the above findings of the study, it can be concluded that the majority of respondents had gained knowledge after the intervention of a video clip about the preparation and process of bio-enzyme.

Table 3
Distribution of respondents according to the knowledge about uses of bio-enzyme

Sl. No.	Particulars	n=152		Per cent change in knowledge
		Pre-test Frequency (%)	Post-test Frequency (%)	
A	Uses			
1	Bio-enzyme used for which of the following purpose			
	a) Fertilizer for plants	12 (7.9)	18 (11.8)	49.36
	b) As an insecticide	15 (9.9)	3 (2)	-79.79
	c) Tomop the floor	24 (15.8)	0	-100
	d) All of these	101 (66.4)	131 (86.2)	29.81
2	The cleaning purpose by using bio-enzyme includes			
	a) Kitchen and Bathroom sinks	7 (4.6)	3 (2)	-56.52
	b) Bathroom tiles	23 (15.1)	2 (1.6)	-93.37
	c) Tomop the floor	17 (11.2)	5 (3.6)	-67.85
	d) All of these	105 (69.1)	142 (93.4)	35.16
3	Bio-enzyme is useful for better plant growth by			
	a) Improves soil texture	8 (5.3)	2 (1.6)	-81.13
	b) Use as an insecticide	24 (15.8)	2 (1.6)	-89.87
	c) Provide nutrients	19 (12.5)	0	-100
	d) All of these	101 (66.4)	148 (97.4)	46.68

4	Bio-enzyme promotes following farm practices			
	a) Organic farming	49 (32.2)	133 (87.5)	171.73
	b) Chemical farming	11 (7.2)	0	-100
	c) Both of the above	45 (29.6)	5 (3.3)	-88.85
	d) None of these	47 (30.9)	14 (9.2)	-70.22
5	Bio-enzyme should be taken to improve soil texture in the ratio of			
	a) 1:50	37 (24.3)	139 (91.4)	276.13
	b) 2:20	41 (27)	11 (7.2)	-73.33
	c) 3:40	54 (35.5)	2 (1.6)	-96.05
	d) 5:30	20 (13.2)	0	-100
6	Bio-enzyme is used to clean the vegetable and fruits in proportion of			
	a) 50ml:1	44 (28.9)	43 (28.3)	-2.07
	b) 30ml:1	43 (28.3)	107 (70.4)	148.76
	c) 60ml:2	49 (32.2)	2 (1.3)	-95.96
	d) 70ml:1	16 (10.5)	0	-100

Table 3 presents distribution of respondents according to the knowledge about uses of bio-enzyme. It revealed that in the pre-test, 66.4 per cent of respondents were aware of the use of bio-enzyme for different purposes while in the post-test, the majority of 86.2 per cent of respondents were knowledgeable about it. Regarding the use of bio-enzyme for cleaning purposes, approximately 69.1 percent and 93.4 per cent of respondents had knowledge about it in the pre-test and post-test respectively. In terms of bio-enzyme use for plants, the majority of 66.4 per cent and 97.4 per cent of respondents were aware of it in the pre-test and post-test respectively. The promotion of bio-enzyme for farm practices indicated that 32.2 per cent and 87.5 per cent of respondents were knowledgeable about it in the pre-test and post-test respectively. In the pre-test, only 24.3 per cent of respondents were aware of the ratio of bio-enzyme required for soil

improvement while in the post-test, the majority of respondents (91.4%) were knowledgeable about it. In the pre-test and post-test, 28.3 per cent and 70.4 per cent of respondents respectively had knowledge about the ratio required for cleaning vegetables and fruits. A remarkable change in knowledge was observed in the understanding of the uses of bio-enzyme for various household and farm practices by watching the video.

It was concluded that the majority of respondents had gained knowledge about the uses of bio-enzymes in the post-test compared to the pre-test. Therefore, we can conclude that the video clip helps in increasing the knowledge of respondents about bio-enzymes and their uses.

The overall level of knowledge about bio-enzyme and their uses are computed and presented in the following table.

Table 4
Assessment of Pre-test and Post-test level of knowledge regarding Bio-enzyme

Sl. No.	Level of Knowledge	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
1	Low	67	44.08	0	0
2	Moderate	74	48.68	12	7.9
3	High	11	7.24	140	92.1

Table 4 presents the frequency and percentage of pre-test and post-test levels of knowledge regarding bio-enzyme. Majority of respondents in pre-test 48.68 per cent had moderate knowledge; while 44.08 per cent had low knowledge and the remaining 7.24 per cent had high knowledge about bio-enzyme. However, in the post-test majority 92.1 per cent respondents had adequate

knowledge while remaining 7.9 per cent respondents had moderate knowledge and none of them had low knowledge about bio-enzyme.

From the above findings of the study we can conclude that the majority i.e. 92.1 per cent respondents had gained high level of knowledge about bio-enzyme after the intervention of the

Table 5
Per cent age change in knowledge about preparation and uses of bio-enzyme

Sl. No.	Knowledge	Mean	Percent age change in knowledge
1	Pre-test	38.46	116%
2	Post-test	83.13	

Table 5 reveals that the mean post test knowledge score about bio-enzyme was 83.13, which was higher than the mean pre-test knowledge score about bioenzyme (38.46). The per cent age change in knowledge was 116 per cent.

From the findings of the study, we can conclude that in the post-test, the majority of respondents had changed their knowledge about bio-enzyme after the intervention of a video clip.

Table 6
Effectiveness of video clip on knowledge of urban respondents about bio-enzyme

Sl. No	Knowledge	Mean	SD	'Z' value
1	Pre-test	38.46	19.36	-25.12**
2	Post-test	83.13	10.26	

****Significant level=0.01, where $P < 0.01$ significance**

Table 5 reveals that the mean post knowledge score about bio-enzyme were 83.13, higher than mean pre-test knowledge score about bio-enzyme, which were 38.46 with standard deviation of 10.26 and 19.36, respectively. The obtained 'Z' value was -25.12 and the P value was found at significant value at 0.01 level.

Conclusion

The percent change in the knowledge of respondents was noticeable, and a significant difference was found between the mean of pre-test and post-test knowledge. It was concluded that the

video clip is an effective tool for increasing the knowledge of respondents about bio-enzyme. The educational video clip has an effect on increasing the knowledge about the preparation, process and uses of bio-enzyme among the respondents. Similar findings were found by (Babalola, 2007, Fadlilah, *et al.* 2020, Mercado, 2022, Wong, 2020). Therefore, more educational video clips should be prepared and disseminated through popular media for awareness about eco-friendly household technologies.

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