To, The Principal SSES Amt's Science College, Congress Nagar, Nagpur-12

Subject: For permission to conduct the add on courses in the Department of Zoology during 2019-2020

Respected Sir,

This is to request you that, the teachers of our Zoology department have prepared the syllabus and modules of the 30 hours certificate courses for the session 2019-2020.

The details of the course module, syllabus and time table is submitted here with.

Hence please permit to run the add on courses and oblige me.

Thanking you

Yours sincerely

Date: - 22/06/2019

Dr. A. D. Bobdey
Professor & Head
Department of Zoology,
Shri Shivaji Science College,
Congress Nagar, Nagpur-12.

Permitted provided

Shri Shivaji Education Society Amravati's Science College, Congress Nagar, Nagpur.

### Department of ZOOLOGY Certificate Course 2019-2020

Sustainable waste Management by Earthworm and Worm Manure

Date: 03/07/2019

### **Notice**

All the UG students of Zoology department are hereby informed that the Department of Zoology is conducting Certificate Course in "Sustainable waste Management by Earthworm and Worm Manure". Department provide opportunities to the students to learn Professional Skill, Professional Knowledge and Employability.

The duration of certificate course is 10 weeks (30 Hrs.) from 2<sup>nd</sup> August to 5<sup>th</sup> October 2019. This course contain per week 2 lectures and 1 practical. Under the certificate course department conducts workshops, guest lectures by experts, students participation in various competitions etc. Evaluation of the students takes place on the basis of examination of theory and practical. Last Date of Admission is 25<sup>th</sup> July 2019. The classes will be commencing from 2<sup>nd</sup> August 2019.

Interesting students of B.Sc. Part I, Part II & Part III should registered them self in early and contact to the Coordinator Dr. S.S.Deshmukh immediately. (cont.no.7083790255)

Dr. Shital S.Deshmukh
Coordinator
Sustainable waste Management by
Earthworm and Worm Manure".

Department of Zoology





### Objective

Worm Manure is to create high-quality natural fertilizer for soil by breaking down organic matter using worms.

Worm Manure increases the fertility and water-resistance of the soil. Helps in germination, plant growth, and crop yield. Nurtures soil with plant growth hormones such as auxins, gibberellic acid, etc.

To cultivate earthworms to increase their population and produce mutrient-rich compost.

Worm Manure is an eco-friendly process that recycles organic waste into compost and produces valuable nutrients.

The interested students will get the knowledge of composting later turn towards organic farming will help to maintain the environment pollution free.

Free Certificate Course for College Students
Duration -30 Hours (10 week)

Process of Registration -Interested students will be admitted

Last Date of Submission-2-8-2019
For registration contact Dr.Shital Deshmukh (7083790255)

### SSES Amravati's Science College, Congress Nagar, Nagpur-12

### DEPARTMENT OF ZOOLOGY

### COURSE MODULE AND SYLLABUS

Course Title: Certificate Course in Sustainable waste Management by Earthworm and Worm Manure

Course Coordinator : Dr. Mrs. Shital S. Deshmukh

### Course description:

Worm Manure is known to be the world's best fertilizer. It is a method of preparing enriched compost with the use of earthworms. It is one of the easiest methods to recycle agricultural wastes and to produce quality compost. Earthworms consume biomass and excrete it in digested form called worm casts. Worm casts are popularly called as Black gold. Worm Manure is stable, fine granular organic manure, which enriches soil quality by improving its physicochemical and biological properties. It is highly useful in raising seedlings and for crop production. Worm Manure is becoming popular as a major component of organic farming system. Using Worm Manure can fulfill the requirements for organically grown products. Worm Manure is an environmental friendly process that recycles organic waste into compost and generates valuable nutrients.

### Course Objectives:

The main objective of Worm Manure project is to produce organic manure of exceptional quality for the organically starved soil. Agricultural wastes, wastes from dairy and animal farms are usually dumped into at places resulting in a foul mess. By vermicomposting these wastes, they are not only utilized efficiently but also help in making a value-added product. The interested students will get the knowledge of composting . Students will be able to compost in a limited space and describe the decomposing process. They will also turn towards organic farming .It will help to maintain the environment pollution free.

Instructional Strategies: Theory class, Practical, Video clips, Models etc.

Evaluation Strategies: Oral discussions and Final MCQ examination.

Course outline: Course Outlines: (Relevance)

- Introduction: Importance of Worm Manure and an introduction to Worm Manure producers
- Earthworms: Biology of earthworms, identification of different types, and study of their external features
- Vermicomposting methods: Bed preparation, inoculation of earthworms, and management of the
  - vermicomposting process
- Worm Manure: Harvesting, drying, packaging, transport, and storage of Worm Manure,

- Worm Manure use: Benefits of vermicomposting and how to use Worm Manure
- Pests and diseases: Pests and diseases of earthworms, and measures to control them Vermiwash: Collection, composition, and use of vermiwash
- Climatic principles: Climatic principles of basic conditions

### Course Outcomes (COs):

- 1. Understand importance of earthworms in soil fertility.
- 2. Familiarize with alternative ways to manage the wastes.
- 3. Understanding the role of worm farming in Modern Farming
- 4. Understanding the potential of vermicompost as an alternative to chemical fertilizers 5. Role of vermicultre in maintaining the health of soil and humans
- 6. Economic importance of Worm Manure.
- 7. Role of Worm Manure in protecting the environment and managing the waste
- 8. Students can construct their own compost farm and thereby can get monthly income 9. To promote professional skills, entrepreneurship, knowledge and marketing skills through meaningful hands on experience through working in project mode.
- 10.To build confidence through end to end approach in product development.

Duration of course: Ten weeks (30 Hours)

The Structure of Syllabus and system of evaluation -

Course	Theory Papers and Practical	Total Mark s	
		Theory	Practical
Certificate Course in Sustainable waste Management by Earthworm and Worm Manure	Theory paper- Sustainable waste Management by Earthworm and Worm Manure Theory Examination will be of MCQ pattern having 60 or 80 questions each with equal marks.  * Practical examination will be based on	80	20
	performance evaluation in the laboratory	100	

Internal Quality Assurance Cell (IQAC)

S. S. E. S. A. Science College Congress Nagar, Nagpur.

Principal S. S. E. S. Amravati's Science College, Nagpur.

### **SYLLABUS**

### Certificate Course in Sustainable waste Management by Earthworm and Worm Manure (10 weeks)

Theory-

### Unit -1

- 1. Structure of Earthworm:
- 2. Earthworm Ecology: Distribution; Food habit and habitat; Ecological requirements:
- 3. Life cycle and Reproduction of Earthworm

### Unit -2

- 1. Principle of Worm Manure
- 2. Methods of vermicomposting
- 3. WormManure: Physicochemical features of vermicompost; Role of earthwonn and vermicompost in growth of plants; Vermiwash and its utility in agticulture.

### Unit-3

- 1. Applications of Worm Manure 1. Benefits of Worm Manure, Use of Worm Manure in agriculture. 2. Basic characteristics of earthworm suitable for vermicomposting.
- 3. Problems in vermicomposting

### Practicals

- 1. waste materials:classification, disposal techniques, their segregation and processing.
- 2. key to identify different types of earthworms.collection of native earthworms and their identification study of life stages and development of Eisenia fetida.
- 3. Study of vermiculture, vermiwash and vermicompost equipmentss, devices
- 4. Bed preparation for Anarobic and Aerobic composition and mixing of beds. Maintenance of vermicompost and climatic conditions.

### Distribution of marks: -

key to identify different types of earthworms Classification, disposal techniques
 Bed preparation and maintenance -

### Week-wise teaching plan:

Week	Hrs.	Syllabus
Week 1	1	key to identify different types of earthworms
	1	Earthworm Ecology: Distribution; Food habit and habitat; Ecological requirements
<del></del>	1	Life cycle and Reproduction of Earthworm
Week 2	1	Principle of Vermiculture
	2	Methods of vermicomposting
Week 3	1	Role of earthworm and vermicompost in growth of plants;
	2	Vermiwash and its utility in agticulture
Week 4	1	Physicochemical features of vermicompost
	1	Applications of vermiculture 1. Benefits of vermicompost
Week 5	2	Use of vermicompost in agriculture
	1	Problems in vermicomposting
Week 6	2	waste materials
	l 31	classification, disposal techniques, their segregation and processing

Week 7	2	Bed preparation for Anarobic and Aerobic composition and mixing of beds
	para .	Maintenance of vermicompost and climatic conditions.
Week 8	2	Low cost floor beds
		Tank system: Management during vermicomposting
Week 9	2	Laboratory techniques (Practical)
	Total Control of the	Nutritional Composition of Worm Manure
Week 10	I	Conventional commercial composting - Earthworm Composting larger scale
	2	Enemies of Earthworms, Sickness and worm's enemies. Frequent problems. How to prevent and fix them.

### SSES AMT'S SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR-12 DEPARTMENT OF ZOOLOGY

### Certificate Course : Sustainable Waste Management by Earthworm and Worm Manure

### Time Table

(Duration 2<sup>nd</sup> August 2019 to 5<sup>th</sup> October 2019)

Day	Theory	Practical
Friday	SSD (C9) Theory 4.00 PM - 5.00 PM	
Saturday	SSD (C9) practical, 4.00 PM - 5.00 PM	SSD (ZL) practical, 5.00 PM - 6.00 PM

弘

Shri Shivaji Education Society Amravati's SCIENCE COLLEGE, Congress Nagar, Nagpur.

### DEPARTMENT OF ZOOLOGY CERTIFICATE COURSE EXAMINATION (2019-2020)

Certificate Course: Sustainable waste Management by Earthworm and Worm Manure

Date: 03/10/2019

### **NOTICE**

All the admitted students of B.Sc. Zoology are hereby informed that the certificate course on "Sustainable waste Management by Earthworm and Worm Manure" examination will be held on 12/10/2019 (Saturday) at 4:00 pm to 5:30 pm in Zoology Laboratory at our college center. All Students should be present in the laboratory before 10 mins. of scheduled time of examination.

Dr. Shital S.Deshmukh
Coordinator
Sustainable waste Management by
Earthworm and Worm Manure

Department of Zoology

### Shri Shivaji Education Society Amravati's Science College, Congress Nagar, Nagpur Department of Zoology Academic Session 2019-20

### DEPARTMENT OF ZOOLOGY Certificate Course in

### Sustainable Waste Management by Earthworm and Worm Manure MCQ TEST EXAMINATION

Time: 45min	Maximum Marks: 80
N.B. 1 Solve all the questions.	ROLL NO:
✓ Tick for right answer	
1) Which of the following chemicals is used for protecting vermi-bed from a	nts? (2)
(a) DDT	agrant at
(b) Griscofulvin	
(c) Chloramphenicol	
(d) Chlorpyriophosphate	170
2) Which of the following is a commonly used earthworm species for the vermicomposting process?	(2)
a) Eisenia fetida	
(b) Perionix excavatus	
c) Both (a) and (b)	
d) None of the above 3) The highly decomposed organic matter rich in minerals like nitrogen, ph	conhorus and notassium, in
<ol> <li>The highly decomposed organic matter rich in minerals like introgen, paper ficular, produced from the activity of earthworms is called</li> </ol>	(2)
	4-2
g) Humus b) Vermicompost	
b) Vermicomposit	
di Compost hedding	
Vermicompost is used as a biofertilizer because it is rich in	(2)
a) Calcium	
o) Nitrogen	
) Phosphorus	
th All of the above	(2)
Which of the following is false about vermicomposting:	(2)
A Worms condition doubles in 90 days	
at the man and double their body working	
The wooden hin is best for vermicomposuing	
and the best for vermiconnounce	(2
Which of the following is true about vermiculture?	
) Composting using rats	
Composting using birds	
Composting using worms	
Street Will to Manager	C
Which of the following is true about vermitonipost.	
Vermicompost is red in colour	
Wermicompost is black in colour	
A Marmicompost is white in colour	
Vermicompost is brown in colour  Vermicompost is brown in colour  Vermicompost is brown in colour	
Vermicompost is brown in colour     Which of the following are the best worms used for composting?	
) Maggets	

(b) Pink worms	
(c) Red wigglers	
(d) All of the above	
9) The moisture level required for vermicomposting should be between (a) Below 30 per cent	
(a) Below 30 per cent	70
(b) 40 and 50 per cent	(2)
(c) 70 and 80 per cent	
(d) Above 90 per cent	
10) The maximum temperature required for vermicomposting is  (a) 20C to 25C	
(a) 20C to 25C	(2)
(b) 25C to 30C	***
(e) 30C to 35C	
(d) 35C to 40C	
11) Which of the following is not a drawback of vermicomposting?	24.
(a) Time-consuming process	(2)
(b) Require regular monitoring	
(c) Require minimum temperature	
(d) Enriches soil with microorganisms	
12) Which of the following is not raw material required for preparing composts?	(2)
(a) Cow dung	(-)
(b) Weed biomass	
(c) Dry straw and leaves	
(d) All of the above	
13) Which of the following procedures are used by the farmers to multiply the earthworms?	(2)
(a) By adding cow dung	
(b) By adding plant materials	
(c) By mixing more amount of biodegradable wastes	
(d) All of the above	(4)
14) Which of the following products cannot be used for vermicomposting?	(2)
(a) Cow dung	
(b) Plant materials	
(c) Animal Wastes	
(d) All of the above	(2)
15) Meat involved in composting?	(2)
a) Beetle	
b) Leech	
c) Snail	
d) Earthworm	(2)
16) Vermicomposting is a natural process	(-/
a) Producing compost	
b) Waste management creates it	
c) Producing worms	
d) Destroying worms	mposting? (2)
d) Destroying worms 17) Which among the following is not a major reason for choosing earthworms for Vermico	mboaring. (-)
a) Low incubation time	
b) Digestion rate	
c) Adaptability	
d) Low growth rate	(2)
d) Low growth rate 18) Which of the following species of earthworms is not suitable for Vermicomposting?	(2)
New Gille	
a) Epifilis	
b) Endogens	
c) Aneciques	(2)
d) Plasmodium  19) Which of the following species has a shorter body size?	<b>X</b> -7
19) Which of the following species and	
a) Epifilis	
b) Endogens	

c) Aneciques	
d) Eudriber	
20) Which of the C. v.	
a) Perionyr	
20) Which of the following species is most stable in Indian conditions?  b) Epifilis	
c) Endogens	(2)
d) Aneciques	
21)Earthworms and the	
21)Earthworms subsidize to the burial of wastes?	
b) False	(2)
22) Which of the Car	(2)
22) Which of the following is not a method of worm cast harvesting or manufacturing?  b) Active feeding	
b) Active feeding	(2)
c) Drying under adequate light	
d) Separation of cocoons	
23) What is the major at	
23) What is the major advantage of three-tire vermi-culture technology?  a) It can be applied to both solid and liquid wester.	(2)
a) It can be applied to both solid and liquid wastes b) It cannot be applied to both will be applied to both solid and liquid wastes	(2)
b) It cannot be applied to both solid and liquid wastes c) It involves chemical treatment	
d) It can degrade organic wastes	
24) The process in which could be a set to see the second	
24)The process in which earthworms are used to degrade organic wastes is (a) Compost bedding	(2)
(b) Humus forming	
(c) Vermicomposting	
(d) None	
25) Kitchen wastes and animal excreta can be minimized most profitably via (a) vermiculture	(2)
(b) biogas production	
(c) direct usage as biofertilizers	
(d) storing in underground storage tanks	
26) While burrowing, the anterior ends of earthworms become turgid serving as a hydrauli	a alralatan thaw-h
they do not possess a skeleton. This is as a result of	
(a) setae	(2)
(b) gut peristalsis	
(c) coelomic fluid	
(d) none of the above	
27)Vermicompost is a/an	(2)
(a) toxic material	(4)
(b) organic biofertilizer	
(c) inorganic fertilizer	
(d) synthetic fertilizer	
	(2)
28) This can be the best worm for composting	(2)
(a) pink worms	
(b) red wigglers	
(c) maggots	(2)
29)In earthworms, typhlosome is a	(2)
(a) excretory structure	
(b) a circulatory system structure	
(c) fold of intestine	
(d) defence mechanism	
30) Which of the following nutrients is abundantly found in worm castings?	(2)
(a) Phosphorus	
(b) Nitrogen	
(c) Calcium and other minerals	
(d) All of these	

31)At which of these segments does the nerve cord of the earthworm divide into two parts?  32) Which of these statements	
b) 8th, 9th	
c) 3 <sup>ed</sup> , 4th	
32) Which of these statements is true about nerve ring?  b) It has only sensory function	
I has only	0
) It has only sensory function	
b) It has only motor function  c) It is present on the server in the ser	
33) Larvae are formal side	C.
The Are formed during at	(2
True development of earth	
33) Larvae are formed during the development of earthworms. True or false?  34) Where does formed.	
34)Where does fertilization occur for the earthworm?	(2
1) Ovary	
o) Spermathecae	
c) Cocoon	(2
d) Female genital pore	
35)Which of the	
35) Which of these statements is true about earthworm?	
a) They are harmful for agriculture	(2)
They are used as fishing bait	
They decrease soil fertility	
d) They cannot live in burrows	
36)Earthworm is placed under which group?  a)Hirudinea	~
	(2
b)Polychaeta c)Crustacea	
d)Oligochaeta	
37)The presence of What causes the body colour of earthworms to change?  a) Blood	(2
b) Haemoglobin	
c) Haemocyanin	
d) Porphyrin	
38) The animal does not show any metamorphosis of larval Stage	(2)
a)Musca domestica	(2)
b)Asteria	
c)Butterfly	
d)Pheretima Posthuma	
39) What is the most effective organ for food digestion in Earthworm is	(
a) Stomach	
b) Mouth	
c) Pharynx	
40)The Mouth is located in the earthworm on	(2
a) Prostomium	
b) Stomium	
c) Protostomium	
d) Peristomium	



### Shri Shivaji Education Society Amravati's Science College, Congress Nagar, Nagpur Session: 2019-20

### DEPARTMENT OF ZOOLOGY

### Certificate course in Sustainable waste Management by Earthworm and Worm Manure

L	Sr. No	Roll N	0		Nan	ne of Student		Signature
L	1	101		Ku	Ambade	Manasi	13	
1	2	102			Angal	Mukul	N	-41. W (100)
Ŀ	3	103			Atone	Akshay	N.	Manje
4		104		Ku	Bhaisare	Vishwani	P	Atone
5		105		Ku	Bhagat	Megha	V	Bhat 2052
6		106			Bodkhe	Prathmesh	S	Ma pag at
7		107			Chaware	Subodh	A	Bedthe
8		108	P	(u	Chachire	Anagha	R	Schowed
9		109	K	ίu	Dhakne	Aditi	A	Acherenie,
10	0	110	K	(u	Dharmadhikari	the second secon	M S	Adalone
11	L	111			Dhodare	Shruti	K	Green
12		112	K	u	Dubey	Kajal	P	Saedare
13		113	K	u	Dudhagawli	Sakshi	~	k. Duber
14		114			Gawande	Anurag	R	Du
15	1	115	Kı	1	Gorle	Srushti	K	Aumys
16	1	16	Kı	,	Hinge	Shubhangi	V	
17	1	17		-	Hinge	Yash	A	S. Hinge
18	1	18	Ku		Juwar	Ketki	A	yarh
19	1	19	Ku	-	Kale		В	Keehi
20	-	20	Ku	_	Khan	Pranjali Sana	P	Absent
21	-	21	Ku	_	Pandey		S	Sana
22	-	22	Nu	_	Pandel	Sanya	S	Su
3	12	-	Ku			Yash	В	(Henry.
4	12		Nu	+	Patil	Yashwant	R	Yalhurg.
5	12		V		atle	Jayant	D	Penny
6	12		Ku		awankar	Shreya	Α	L. Lawarlea
7	_		Ku	_	unjabi	Ruchi	Y	Puch
-	12		Ku	_	aha	Mitali	-	Mital:
3	12		Ku		amteke	Rutuja	R	Rutura
	129		Ku	Sa	alame	Vaishnavi	D	Legan
	130	)	Ku	Sa	tpute	Saraswati	K	Smaswatt

	31			Ku	Sheikh	Alina		
	32	-		Ku	Sukhadeve	Mayuri	H	As Shedely
	33	133		Ku	Tekam	Pranali	A	M. Sulcheday
	34	134		Ku	Zodpe	Anushka	M	Pranali
	35	135			Ambagade	Parlay	A	Raspell
	36	136		Ku	Balaskar	Mokshada	M	Robert
	37	137		Ku	Bopche	Surabhi	N	No.
	38	138		Ku	Dambhare	Samiksha	S	ABSENT
	39	139			Deshmukh	Rohan	R	Symitohet BD.
	40	140		Ku	Dhande	Akruti	A	
	41	141	1	Ku	Dhote	Prachi	R	Abruti
	42	142	1	(u	Gajghate	Ankita	A	Pacuhi,
-	43	143	ŀ	(u	Hatkare	Shradha	V	BSENT
1	44	144	K	(u	Ingle	Shraddha	V	Spadolm
1	45	145	K	(u	Joshi	Dhananjay	M	Auny
L	46	146	K	u	Kadwe	Trupti	R	Dheimin
L	47	147	K	u .	Khadakakr	Sakshi	V	(Fun)
L	48	148	K	_	Kodape	Sneha	B	Sakin
	49	149	K		Kulkarni	Manasi	S	Sneha
!	50	150	Kı	_	Mahant	Neha	D	Deulbary,
5	51	151	Kı		Mohatkar	Aishwarya		Mehry
5	52	152	Kı	_	Mutkule	Pallavi	S	1 routland
5		153	Ku		Vaik		G	Pallery
5		54	-	_	achare	Saloni Himnshu	U	(Same)
5		55	Ku		andav		G	Seem
56		56	Ku	_		Anisha	G	( A. pindom
57		57		_	angnath able	Radha	V	Ranthey
58		58	Ku	_		Tanuja	C	ABSENT
	_		Ku		rora	Taniya	H	Mrs.
59	_	59	Ku		satkar	Akansha	K	1 Same
60	_		Ku		handarkar	Nayan	D	Wayan
61	16		Ku	Bo	pche	Khushbu	A	Brown
62	16	2	Ku	Fe	ddewar	Prajakta	C	Walshi
63	16	3	Ku	G	andhi	Khushi	R	Jan Dani
64	164	4	Ku	G	rodikar	Kiran	R	Ti Ban
65	165	5	Ku	-	ottiparthi	Anushadevi	R	AGSENT
66	166	i	Ku	-	inde	Sanyukta	J	
67	167		Ku		mble	Sahyadri	P	ABJENT -
58	168		Ku	Kh		Tehseen		Sahyadmi
59	169		Ku	-	had	Harshita	M	Jehren
0	170		Ku	-	lhe		H	C Labor
1	171		Ku	-	lkarni	Shrutika	G	s.kolhe
-				-		Renuka	M	Reniew
2	172		Ku	Ma	nkar	Himali	M	HM.

73	173		Matte	Vadilar		
74	174	7.		Kartikey	P	Burrely
_		Ku	Morghade	Dhanashree	S	1300000
75	175	Ku	Nakahle	Vaishali		Dhimaghade
76	176	Ku	Nikose	Shruti	D	My my.
77	177	Ku	Rajani	Swati	R	Derus:
78	178	Ku	Selukar	The second secon	1	Qm
	1	1XU	Sciukar	Kanchan	D	Karcher

Co-cordinator

Name: Sly'

Head of the Zoology Department

Dr. A. D. Bobdey
Professor & Head
Department of Zoology,
Shri Shivaji Science College,
Congress Nagar, Nagpur-12.

### SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S SCIENCE COLLEGE DEPARTMENT OF ZOOLOGY

Report 1019-20

### Certificate Course in Sustainable waste Management by Earthworm and Worm Manure

The plow is one of the most ancient and most valuable of Man's inventions; but long before he existed, the land ... was regularly ploughed, and still continues to be ploughed, by earthworms. It may be (doubtful) whether there are many other animals which have played so important a part in the history of the world as these lowly, organized creatures.

### Charles Darwin, 1881

Worm Manure is the practice of using worms to turn organic waste into nutrient-rich fertilizer. Vermicomposting is basically a managed process of worms digesting organic matter to transform the material into a beneficial soil amendment. Developing country like India. Firstly, it makes way for utilization of available organic wastes to produce the rich source of organic manure of high quality, which is superior to other types of organic manures in its physico-chemical and biological properties. Secondly, the manure is produced in a shorter duration of time of six weeks and is a fully matured, homogenous matter. Thirdly, the programme provides job opportunities for the unskilled labour force. Finally, it is the best way of safe guarding the environment. Vermicompost (compost produced by the activity of selected species of earthworms) has been adjudged as the best source of organic amendments to soil. Using vermicompost can fulfill the requirements for organically grown products.

Certificate Course in Sustainable waste Management by Earthworm and Worm Manure was under taken by the students of B.Sc.I,II,III CZM GP as a part of additional academic curriculum under the guidance of Dr.S.S.Deshmukh with view to provide complete knowledge of Earthworm and Worm Manure which will be beneficial for the student for self employment with little investment future. Seventy eight students participated in this certificate course in Sustainable waste Management by Earthworm and Worm Manure. In the present investigation, the study is carried out on the proper utilization of agriculture waste from market yard through vermicomposting and obtaining the nutrient rich organic manure.

There is no such thing as waste, for one organism's waste is another's resource. **Action taken:** Vermicomposting offers students a hands on learning experience, integrated science, nature and sustainability concepts. It fosters environmental awareness, critical thinking and STEM education preparing students for sustainable practices and careers.













Dr.S.S.Deshmukh





### Shri Shivaji Education Society Amravati's Science College, Congress Nagar, Nagpur Session: 2019-20 DEPARTMENT OF ZOOLOGY Certificate course in

### Sustainable waste Management by Earthworm and Worm Manure

Sr.	Sr. Roll		Nome of Startant	80 M	arks 20	Total Marks	Grades
No	NO		Name of Students	Theory	Practical	Total Marks	
1	101	ky	Manasi M. Ambade	62	18	80	At
2	102		Mykul M. Angal	60	15	75	Α
3	103		Akshay Atone	55	15	70	A
4	104	Ky.	vishwani Bhaisare	65	17	82	AT
5	105	KH	megha Bhagat	56	16	72	A
6	106		pratumesh Bodkhe	55	15	70	A
7	107		subodh chaware	53	15	68	A
8	108	Mu	Anagra chachite	5	14	65	Α
9	109	the	Adili Dhanne	54	15	69	Α
10	110	Ku	Sace Dharmadinkari	56	14	٥ŗ	A
11	111	Ken	shruli shodace	58	14	72	A
12	112	Bu	Kajal Dubey	60	15	15	A
13	113	Ku	sakshi Dydhag quli	64	18	82	A+
14	114		Anurag Gowande	44	15	59	13
15	115	KM	srusher v Gorle	50	15	55	Α
16	116	Ku.	Shubhangi A. Hinge	54	14	68	A
17	117	J. W.	yash A. Hinge	57	12	69	A
18	118	Ky	Kethi B. Juwgr	60	14	74	A
19	119	ku	Pranjali P. Kalo	-	-	Absent	Absent
20	120	Key -	sang s. Klaican	60	12	72	Ą
21	121	2/1	Sanya S. Pandey	55	15	70	Α
22	122	Jus.	yash B. Pandel	63	15	78	At
23		164	yashwant A- Pali)	54	16	70	A

24	124		Jayant D. Patle	40	15	~ C	B+
25	125	Ku	Shreya A. Pawankor	46	10 17 -0	55	
26	126	Ker.	Ruchy Pynjabj	55	16	62	Α
27	127	Ky	Mitali Raha	59	15	70	A
28	128	Ku-	Rutaja R. Ramteke	55	15	15	A+
29	129	ky.	vaishnavi D. Salome	49	16	70	A
30	130	KM.	sgraswali Kisatpulé	48		65	
31	131	My.		62	18	65	A
32	132	M.	Meyeri A. surrigder	100	18	80	AT
33	133	hy.	pranali M. Tekam			85	
34	134	ky	Anushka A. zodpe	55	15	70	Α
35	135	1000	and and A Lough	56 35	16	72	A
36	136	14	pasley M. Ambagade	1 1 1 1 1 1 1 1 1 1 1 1	15	50	ß
37	137	ky	Mokshada Balaskan Surabhi N. Bopune	58	12	70 Absent	Absent
38	138	1	Samikely S. Damblan		14	72	A
39	139	Ky.	Rohan R. Deshmuke	2 58 59	14	73	
40	140	m	0 1	43	12	55	B+
41	141			63	15	78	AT
42	142	ky	Ankila A. hajquate	211	1	AB	ABSENT
43	143		shrady Hatkare	59	15	74	A
44	144		Shradha V. Ingale	41	14	55	Bt
45	145	ky	Dhanani ay M. Toski	70	15	85	At
46	146	KM.	- 120 4 1. 1 1.	72	18	d b	At
47	147	101.	sakshi v. Khadskaki	72	18	90	At
48		1120	8 20 3				
	148	1	encha B. Kodare	38	12	50	B
49	148	hi.	sneha B. Kodape	38 55	12	50 70	A
49		ku.	manasi S. Kulkarni		,		A
	149	KM.	Manasi S. Kulkarni Neha D. Mahant	55 57	15	70	A A+
50	149 150	KM.	Manasi S. Kulkarni Neha D. Mahant Aishuarya S. Mahal	55 57 - 66	15	70 72	A A+ A+
50 51	149 150 151	KN. KN. KN.	sneha B. Kodape Manasi S. Kulkarni Neha B. Mahart Aishwarya S. Mahal Pallari G. Mutkula	55 57 - 66	15	70 72 85	A A+ A+ A+
50 51 52	149 150 151 152	KM.	sneha B. Kodape Manasi S. Kulkarni Neha B. Mahant Aishwarya S. Mahal Pallari G. Mutkula Saloni U. Naik	55 57 66 62 66	15	70 72 85 86 85	A A+ A+ A+ B+
50 51 52 53	149 150 151 152 153	KM. KM.	sneha B. Kodape Manasi S. Kulkarni Neha D. Mahant Aishwarya S. Mahal Pallari G. Mutikula Saloni U. Naik Himanshu G. Pachare	55 57 66 62 66	15 15 19 18	70 72 85 86 85	A A+ A+ A+
50 51 52 53 54	149 150 151 152 153 154	KM. KM.	sneha B. Kodape  Manasi S. Kulkarni  Neha D. Mahant  Aishwarya S. Mahad  Pallari G. Mutikula  Saloni U. Naik  Himanshu G. Pachare  Anisha G. Pandar	55 57 66 62 66 44	15 15 19 18 19	70 72 85 86 85	A A+ A+ A+ B+ B
50 51 52 53 54 55	149 150 151 152 153 154 155	KM. KM.	sneha B. Kodape Manasi S. Kulkarni Neha D. Mahant Aishwarya S. Mahal Pallari G. Mutikula Saloni U. Naik Himanshu G. Pachare	55 57 66 62 66 44 36	15 19 18 19 15	70 72 85 86 85 59	A A A A A A B

	450						
59	159	ky	Taniya H. Arorg	60	15	75	A.+
60	160	Ky.	Akansha K Acat kar	52	16	68	A
61	161	Ky.	Nayan D. Bhandarkan	43	16	59	13 <sup>+</sup>
62	162	KM.	Khushby A. Bopthe	69	16	85	A <sup>†</sup>
63	163	Ky.	Prajakta c Fedding	71	17	88	AT
64	164	Ky.	Khuhi R. Gandhi				
65	165	ky.	Kiran R. Garodikar	35	15	50	B
66	166		11.000.01.		_	Absent	Absent
	167	1,001	- GOH OCTION	_		Absent	Absent
67		Ky.	Anyhadenj A. Sanyykta J. Hande	59	15	74	A
68	168	ky.	Sqhyadoi P. Komble	56	16	72	A
69	169		Tehseen M. Khan	55	15	70	^
70	170	Ky.	Harshill H. Kohad	62	16	78	A+
71	171	ky.	shrulika 4. Kolhe	65	17	82	At
72	172	Ku,	Renuka M. Kulkarni	43	12	55	B
73	173	Ku.	Himeli M. Mankar	48	17	65	
74	174		Kartikey P. Matte.	50	15	65	A
75	175		Dhanashree s. Morghe		18	85	At
76	176	ky.	vaishali 2. Nakahla		17	88	A+
77	177		Shruli R. Nikose	67	18	85	At
78	178	ky.		71	18	89	At

Coordinator

Name: 2r. Shital S. Deshmuku

Head of the Zoology Department

Dr. A. D. Bobdey Professor & Head Department of Zoology, Shri Shivaji Science College, Congress Nagar, Nagpur-12.

## Shri Shivaji Education Society Amravati's



# SCIENCE COLLEGE, CONGRESS NAGAR, NAGPUR



Accredited with CGPA of 3.51 at 'A+' Grade
A College with Potential for Excellence

### CERTIFICATE

cours	Mr./Ku
course entitled, Certificate course in "Sustainable Waste Management by Earl	Mr./Ku. Manash M. Awwoa etc. is awarded with
l, Certific	7423
ate cour	3
se in <b>"S</b> ı	Amy
ustainab	कि ट्राप्ट विकास
le Waste	- A
Manag	is a
ement b	warded
y Earth	with ce
worm a	ertificat
ind Wer	e on sı
n and Worm manure" .	ificate on successful completion of the
ure".	ul comp
	oletion
	of the

SSESA's, Science College, congress Nagar, Nagpur 440012 Session 2019-20 under Add-on course conducted for **30 hours from 02/08/2019 to 05/10/2019** by Department of Zoology,

He/She has passed the Examination with "A" Grade.

Dr. S. S. Deshmuh

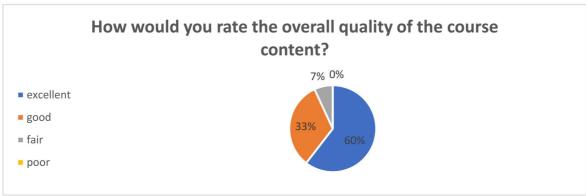
Coordinator, Department of Zoology

Prof. M. P. Dhore

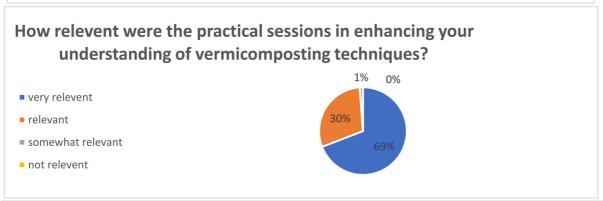
south

Principal, Science College, Nagpur

### Feedback analysis









Internal Quality Assurance Cell (IQAC)

good g average poor

S. S. E. S. A. Science College Congress Nagar, Nagpur.



S. S. E. S. Amravati's Science College, Nagpur.