7.1 Best Practice:1 Production of Biopesticides and Biofertilzers

The institution has a goal to provide facility to the farmers to use the Biopesticides and Bio fertilizer in the farm to avoid the chemical hazardous effect on the soil.

Objectives of Practices:

Goals

To increase the soil fertility and quality of crop in the sence of disease free as well as productivity.

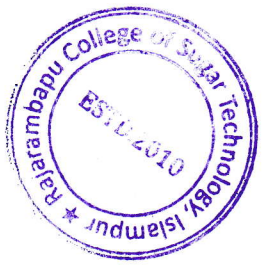
Introduction

Main goal of this production is to accelerate certain microbial processes in the soil, which augment the extent of availability of nutrients in a form easily assimilated by plants. Use of biofertilizers is one of the important components of integrated nutrient management, as they are cost effective and renewable source of plant nutrients to replace the chemical fertilizers for sustainable agriculture. Several microorganisms and their association with crop plants are being exploited in the production of biofertilizers. They can be grouped in different ways based on their nature and function.

Importance of Biofertilizers and Biopestisides

Bio fertilizers are known to make a number of positive contributions in agriculture.

- Supplement fertilizer supplies for meeting the nutrient needs of crops.
- They liberate growth promoting substances and helps to maintain soil fertility.
- They suppress the incidence of pathogens and control diseases.
- Increase the crop yield by 10-50%. N2 fixers reduce depletion of soil nutrients and provide sustainability to the farming system.
- Cheaper, pollution free and based on renewable energy sources.
- It maintains the pH of soil.
- They improve physical properties of soil, tilth and soil heal.



The context

In our laboratory **we** are going to manufacture different types of bio fertilizers and biopesticides which helps to use of laboratory more effectively and students have a good platform to perform some practical and innovative work.

Practice

At the beginning, we have make one team in which we have decided role of every students and staff. The list of required material is prepared and approval of management is taken. We have prepared SOP through which we started the production of biofertilzer and biopsticides in our lab.

Evidences of success

We have given publicity through printed pamphlets. After producing these products, they were packed properly and send it for the sale. We have a sweetener Shoppe where the farmers will get the product. We have collected feedback from the people who have purchased our product. These feedback is analysed and it is found that farmers are happy with these products.

Future plan:

In future we have a plan to produce these products in large scale. Also we develop one separate marketing team to popularize these products and get more & more benifit & job to our own students.

Production:-

1. Production Process:-

- **Details of production.**
- **Standard production process (step by step operations)**

Slant preparation

(Purified slant and plates.)

↓

Mother culture preparation.

(Preparation flasks with respective to individual organisms.)

↓

Sterilization of mother culture.

(Preparation above broth and distribute equally into 3 parts and sterilize at 121˚C at 50 psi for 20 minutes.)

↓

Inoculation of mother culture.

(Once media is cooled dpown after sterilization inoculation can be done with respective to its own individual organism in laminar air flow.)

↓

Incubation operation.

(5-6 days of incubation are required flasks are kept on shaker (bacterial) or without shaker (fungi) with 28-30˚C temperature.)

↓

Media sterilization

(100 lit.media has to be sterilized and allowed it to cool down in tanks.)

↓

Mother culture inoculation in fermenter or tanks.

(Fully grown mother culture can be added in fermenter or into tanks in equal proportion, allow it to incubate for 5-6 days.)

↓

Quality control of sample.

(Microscopic and total viable count has to be checked for sample before filling.)

↓

Formulation addition

(Formulation has to be added to the tanks 24 hrs. before filling. formulation is evenly mixed in tanks.)

↓

Filling and Curing

(After incubation mat layer on top of media to be crushed separately aseptically and later can be added to tanks and even mixture is created of all organisms in individual tank. Once all addition is done and inner vent caps are placed. Allow bottles to withstand for curing for 24 hrs.)

↓

Labelling and packing

(After 24 hrs. of curing bottles can be packed completely with labels on it. Material is then for dispatch.)

PROCEDURE OF MEDIA PREPRATION:

1. Weigh all the ingredients as per the media composition.
2. Take these ingredients in conical flask.
3. Then add hot water.
4. Then shake it for dissolving all ingredients.
5. Then check its pH and adjust as per requirement.
6. Then autoclave it @ 1 5lbs for 15 mm.

Name of products:-

1. Azophospho.
2. Rhizophospho.
3. Acetobacter.
4. Decomposing Culture.
5. Micronutrients.
6. EM Solution.
7. Potash mobilizing bacteria.
8. Ferro- Zinco.
9. Humic Acid
10. VAM
11. Trichoderma.
12. Beauveria
13. Phosphorous Solublizing Bacteria
14. Metarhizium.
15. Verticilium .
16. Sulpho.
17. Silico.
18. Pseudo.

These products are prepared by unit but they gave only 4 products information in detail. These are…..

1.ACETOBACTER:

Acetobacter is also called as acetic acid bacteria. It has the ability to convert ethanol to acetic acid in the presence of oxygen. It fixes nitrogen non-symbiotically. It is mostly used in sugarcane crop. It also secretes the useful growth promoting hormones such as **Indole Acetic Acid andGibberlin.** It is saccharophilic bacteria.

Beneficial properties They are used in the production of vinegar.

1. They are used to Internationally acidified beer during long maturation period.
2. It increases the nitrogen up take efficiency of sugarcane.
3. It is eco-friendly product.

4. It fixes the nitrogen in sugarcane crop is 30kg N/ha. It increases crop yield 5-25%.
5. It increases the sugar content of the sugarcane.

Composition of media : LGIP Media.

- K2HPO4. - 0.6 g.
- K2HPO4. - 0.2 g.
- CaCl2 - 0.02 g.
- FeCl3 - 0.01 g.
- MgSO47H2O. - 0.2 g.
- Na2M0O4 - 0.002 g.
- BTB - 0.5%.
- Cane sugar - 100 ml.
- Agar Agar- 1.8 g.
- Distilled water - 1000 ml.

Source Of Isolation:-

Sugarcane samples (Roots, leaf, stem & bud)

Procedure of isolation:-

1. Take 1 gram of sugarcane sample (root/leaf/stem/bud) are to be washed thoroughly in the running tap water.
2. Surface sterilization with 70%ethanol and subsequently washed in changes of sterilized distilled water.
3. Surface sterilized samples are to be macerated in sterile blended and serial dilution are prepared up to 10 dilution.
4. >1 ml of 10 dilutions is to be inoculated into various enrichment media viz. diluted cane juice semisolid medium, LGIP semisolid medium and acetic LHIP semisolid media.
5. Enrichment culture are to be sub cultured for every 2-3 days.
6. The isolated cultures grown on acetic LGIP broth are used for further characterization

Colony Characters of Acetobacter:

The white colonies which become yellow orange & finally dark orange and 2-3mm in diameter.

Manufacturing process of Acetobacter liquid, biainoculant:-

Step 1-Pure culture of Acetobacter is maintained at refrigerator (4°C), inoculated 1 ml of the suspension in 250ml volume conical flask containing 100 ml growth media.

Step 2 – Inoculated the flask for 48 hrs. – 72 hrs. at 120 rpm on rotary incubator shaker at 28+/-˚c checked the growth of purity and biomass used as mother culture.

Step 3 – Inoculate the 15-20 ml of culture of Acetobacter to 2000 ml volume flask containing 1800 ml media and incubate on rotary shaker for 120 hrs. (5days) at 150 rpm at 28-30˚c. Check the pH, cell growth and contamination periodically and use it for mass production of Acetobacter.

Sterilize 100 lit growth medium at 121˚c for 30 min and cool at 28-30˚c. inoculate 10 lit culture of acetobacter in fermenter for 5 days. Check the pH, cell growth & contamination periodically.

Step 4 – After completion of fermentation, formulate the liquid Acetobacter bioinoculant by adding cell protectants, cell growth boosters, adjutants and fill-packed in plastic bottles or cans of different capacity, informative labels with details of method of applications and others.

Stem 5- Packing, Marking, Storage & Application.

5.1 PACKING:-

Acetobacter Liquid Bio-fertilizers are packed in milky white plastic containers (1/5 ltrs.) of 160gms and 350gms wt. respectively.

5.2 MARKING:-

Each plastic container marked legibly and indelibly with the following information:

a) Name of the product: *Acetobacter* liquid bio-inoculant.

b) Name of the manufacturer: Yashwantrao Mohite Krishna S.S.K. Ltd,Karad, Satara.

c) Crops for which intended: Sugarcane, wheat, Jowar, Bajara, Maize and all sugar containing crops.

d) Type of the carrier used: Liquid.

e) Count: $1x10^9$.

f) Batch no.:

g) Date of Manufacture:

h) Expiry date : 3 months) Net weight: 1/5 ltrs.)

Storage instruction: Store in cool and dry place and keep away from direct sunlight.

1) **Any other information :-.**

I. Do not mix inoculated seeds/setts or liquid bioinoculant with chemical fertilizer.

II. Liquid bioinoculant treatment should be followed after fungicidal and insecticidal seed treatments.

III. Use the liquid bioinoculant before the date of expiry.

IV. Do not use any sticker during spraying of Liquid*Acetobacter*

5.3 Directions for use:-

Sett treatment / ratoon treatment –

1 . L in 200 L of water and sell dipping for 30 mins or spraying on ratoon.

Foliar application-

1. L in 200 L of water for 2-4 months old sugarcane or ratoon crop.

5.4 Storage

Acetobacter Liquid bioinoculant are stored in a cool and dry place away from direct heat and temperature is maintained at 20 ^{0}C.

Recommended for:- Sugarcane, sweet potato, tea, ragi, coffee, mango,pineapple, etc.

Response: Increase in yield by 15-30 %

2.AZOshakati:

AZOTOBACTER INTRODUCTION:-

Azotobacter species are Gram negative bacteria found in neutral and alkaline soils, in water , and in association with some plants. They are aerobic, free-living soil microbes which play an important role in the nitrogen cycle in nature, binding atmospheric nitrogen, which is inaccessible to plant, and releasing it in the form of ammonium ions into the soil .

Beneficial Properties:-

1. Ability to fix atmospheric N_2 – 20-40 mg BNF/g of C source in laboratory equivalent to 20-40kg N/ha .
2. Production of growth promoting substances like vit . B, IAA, GA. Ability to produce thiamine, riboflavin, pyridoxine, cyanocobalamine, nicotinic acid, pentathonic acid, etc.
3. Biological control of plant diseases by suppressing *Aspergillus, Fusarium.*
4. It improves seed germination and plant growth.
5. It thrives even in alkaline soils.

PHOSPHATE SOLUBLIZING BACTERIA INTRODUCTION:

It play important role in soil by solubilizing phosphorus and making it available plants. Many fungi, bacteria, actinomycetes and cyanobacteria are potential solubilizer of bound phosphate in soil

So the isolation of efficient PSB required use of proper technique and media depending upon kind of organism to isolated.

Composition of media

Azotobacter media (Jensen's medium *g/l*)

Sucrose : 20
$FeSO_4$: 0.1 K_2HPO_4 : 1.0 $MgSO_4,7H_2O$: 0.5NaCl
: 0.5 $CaCO_3$: 2.0 Na_2MoO4 : 0.005Distilled water
: 1000 mlpH : 6.8 - 7.2

Pikovskyaya's (*g/l*) for P Solubilizing BacteriaGlucose :
10.0Tricalcium Phosphate : 5.0
$(NH_4)_2SO_4$: 0.5NaCl : 0.2 $MgSO_4.7H_2O$
: 0.1KCl : 0.2
$Mn(SO_4).2H_2O$: Trace $FeSO_4$: TraceYeast
Extract : 0.5pH: 6.8-7.0

PROCEDURE

STEP-1- Pure culture of *Azatobactorchroococcum,Bacillus megaterium, B. polymyxa and Pseudomonas striata*maintainted at refrigerated (4^0C),incubate 1 ml of the suspension in 250 ml volume conical flask containing 100 ml growth media.

STEP- 2- Incubate the each flask for 96 hours at 120 RPM on rotary incubator shaker at 28±^{0}C. Check the growth for purity and use biomass as Mother Culture.

STEP -3- **i.**Incubate 5-10 ml of culture of *Azatobactor, Bacillus megaterium, Bacilluspolymyxa* and *Pseudomonas striata* to separate 2000 ml volume conical flask containing 1350 ml respective media and incubate on rotary shaker for 96 hours(3 days) at 120 rpm at 28-30^{0}C.Check the p^H, cell growth and contamination periodically and use it for mass production of bio-fertilizer.

ii. Sterilize the fermenter with respective growth medium at 121^{0}C for 30 min. and cool at 28-30^{0}C . Incubate 10 *l* inoculum of *Azatobactor, Bacillus megaterium, Bacillus polymyxa*and *Pseudomonas striata* separately in fermenter. Incubate for 3-4 days. Check the p^H, cell growth and contamination periodically.

STEP -4- After completion of fermentation, mix all culture in formulation vessel, formulate the liquidbioinoculant by adding cell protectants, cell growth boosters, adjuvants, cure it for 24-48hrs and aseptically fill-pack by semi-automatic filling machine in plastic bottles or cans of different capacity , informative labels with details of method of application and others fix & put in corrugated boxes .

STEP -5- Packing, marking, storage and use.

5.1 PACKING

Pack liquid biofertilizers in milky white HDPE plastic containers (1/5/20 *l* capacity of 160 gms,350gms &1.5kg wt.) resp.

5.2 MARKING

Each plastic container mark legibly & indelibly with the following info:

i. Name of the product : Azophospho liquid bioinoculant.

ii. Name of the manufacturer : Y. M. Krishna SSK Ltd, Karad, Satara.

iii. Crops for which intended : S'cane, Wheat, Jowar, Bajara, Maize, Cotton, Turmeric, Ginger, Potato, Tobacco, Brinjal , Tomato, etc.

iv. Type of the carrier used : Liquid.

v. Count :1×10^9.

vi. Batch No . :

vii. Date of Manufacture :

viii. Expiry Date : 6 months from packing.

ix. Net wt. : 1/5lit.

x. Storage instruction : Store in cool & dry place , away from direct heat & sunlight.

Any other information:-.

i. Do not mix liquid bioinoculant with chemical fertilizers.

ii. Liquid bioinoculant treatment should be followed after fungicidal ,weedicidal, insecticidal treatments .

iii. Use the liquid bioinoculants befor the date of expiry.

5.3 DIRECTIONS FOR USE :Soil/Field application:

As per recommended dose , add 2.5 *l*/ha (1*l*/acre) of Azophospho liquid bioinaculant in 500 kg of FYM /compost & mix it uniformly. Add water just sufficient to maintain moisture up to 20 to 25 % & keep it for overnight. Apply this mixture in fields eqully before planting.

OR

Add 2.5 *l*/ha of Azophospho liquid inoculants in 500 litr.Water, drench the solution near root zone of crop.

5.4 STORAGE

Azophospho liquid bioinoculant are stored in a cool and dry place away from direct heat and temp. maintained at 20^0C.

3.RHIZOSHAKATI:

RHIZOBIUM INTRODUCTION:-

Rhizobiums are special bacteria that can live in soil or in nodules formed to the roots legumes. It formasymbiotic association with the legumes obtaining nutrients form plant and producing nitrogen & the process are called as biological nitrogen fixation. They are broadly classified as fast or slow growing based on their growth on laboratory media.

Beneficial properties

1. Direct contribution of N symbiotically with legumes.

2. Residual nitrogen benefit for the succeeding crop.

3. Yield increase is by 10-35%.

4. Improve soil structure.

5. Produces exopolysaccharides.

6. Produces plant growth hormone.

PHOSPHATE SOLUBLIZING BACTERIA INTRODUCTION

It play important role in soil by solubilizing phosphorus and making it available plants. Many fungi, bacteria, actinomycytes and cyanobacteria are potential solubilizer of bound phosphate in soil.

So the isolation of efficient PSB required use of proper technique and media depending upon kind of organism to isolated.

Composition of Media

YEAST EXTRACT MANNITOL (YEM) media

Yeast Extract	-	1g
Mannitol	-	10g
K_2HPO_4	-	0.5g
$MgSO_4$, $7H_20$	-	0.2g
NaCl	-	0.1g
Congo Red	-	2.5ml
Distilled water	-	1000ml
pH	-	7

Composition of Pikovskyaya's for P solubilizing bacteria

Glucose	-	10.0g
Tricalcium Phosphate	-	5.0g
$(NH_4)_2SO_4$	-	0.5g
NacI	-	0.2g
$MgSO_4.7H_2O$	-	0.1g

KC1	-	0.2g
Mn (SO_4). $2H_2O$	-	Trace
FeSO4	-	Trace
Yeast extract	-	0.5
pH	-	6.8 to 7.0

Manufacturing process of Rhizophospho Liquid Bioinoculant

STEP 1- Pure culture of *Rhizobium*, *Bacillus megaterium, Bacillus polymyxa* and *Pseudomona striata* maintained at refrigerator (4^0 C), inoculate 1ml of the suspension in 250m1 volume conical flask containing l00 ml following growth media.

STEP 2- Incubate the each flask for 48-72 hours at 120 RPM on rotary incubator shaker at 28 ± 2^0 Cheek the growth for purity and use biomass as Mother Culture.

STEP 3--i. Inoculate 5-10 ml of culture of *Rhizobium*, *Bacillus megaterium,Bacillus polymyxa* and *Pseudomonas striata* to 2000 ml volume conical flask separately containing 1250 ml respective media and incubate on rotary shaker for 72-96 hours (3-4days) at 120 RPM at 28- 30 0C. Check the pH, cell growth and contamination periodically and use it for mass production of biofertilizers.

ii. Sterilize the Fermenter with respective growth medium at 1210C for 30 minutes and cool at 28-30 °C. Inoculate 10 L inoculum of *Rhizobium*, *Bacillus megaterium, Bacillus polymyxa*and *Pseudomonas striata* separately in fermenter. Incubate for 3-4 days. Check the pH, cell growth and contamination periodically.

STEP 4-- After completion of fermentation, formulate the liquid *Rhizobium*, *Bacillus megaterium*, *Bacillus polymyxa* and *Pseudomonas striata* bioinoculant, mix it in formulation vessel by adding cell protectants, cell growth boosters, adjuvants and aseptically fill-pack by semiautomatic filling machine in plastic bottles or cans of different capacity, informative labels with details of method of application and others fix and pack in corrugated boxes.

STEP 5. - Packing, Marking, Storage and use

5.1 PACKING

1. DECOMPOSING CULTURE:

COMPOSITION OF MEDIA

Czapec Dox / DC media

Glucose	-	10g
KH_2PO_4	-	0.875g
KNo_3	-	3.5g
$MgSO_4$	-	0.75g
Distilled water	-	1000ml
pH	-	5.5to6.0

Manufacturing process of Liquid Decomposing Culture

STEP 1- Pure culture of Decomposing culture (*Aspergilus awamori, Aspergillus niger, Peniciiiumchrysogenum, Trichoderma viride, 4 cellulomonassps. and 2 Streptomyces sps.)* maintained at refrigerator (4 ^{0}C), inoculated bit of inoculum from 90 mm petri- dishes containing media (PDA) / 250m1 volume conical flask containing l00 ml growth media.

STEP 2- Incubated the flasks for 6-8 days till sporulation or completion of growth (For fungal growth incubate at stationary phase and for bacterial growth incubate on at 120 RPM on rotary Incubator shaker at 28±°C) checked the growth for purity and biomass used as Mother Culture.

STEP 3-Inoculate fungal bit of 5-10 mm thick of decomposing cultures to 2000ml volume conical flask containing 2000ml media and incubate it at stationary phase (at 25-28 ^{0}C). Check the pH, cell growth and contamination periodically and used it for mass production.

STEP 4--After completion of different microbial growth, collect all mat, aseptically mash it in sterile mixer mix all bioculture formulate the decomposing culture by adding cell protectants, cell growth boosters, adjuants and fill-packed in plastic bottles or cans of different capacity, informative labels with details of method of application and others fixed and put in corrugated boxes.

STEP 5.- Packing, Marking, Storage and use

5.1 PACKING

Liquid Bio-fertilizers are packed in milky white plastic containers (1/5/ 20 ltr capacity of 160gms, 350gms and 1.5kg wt.) respectively

5.2 MARKING

Each plastic container are marked legibly and indelibly with the following information:

a) Name of the product : Liquid Decomposing Culture

b) Name of the manufacturer : Yashwantrao Mohite Krishna SSK Ltd, Karad, Satara.

c) Decomposition of : Any agro-industrial waste including sugarcane trash, other crops trash, cowdung, and PMC &spentwash of distilleries of sugar factories.

d) Type of the carrier Used : Liquid

e) Count : 1×10^9

f) Batch No :

g) Date of manufacture :

h) Expiry Date : 6 months.

i)Net weight. : 1/5/20 lit.

j) Storage Instruction : store in cool and dry space & keep away from direct sunlight.

k) Any other Info.:

i. Do not mix liquid bioinnoculant with chemical fertilizer
ii. Liquid bio-inoculant treatment should be followed after fungicidal , weedicidal& Insecticidal treatments.
iii. Use the bio-inoculant before the date of expiry.

5.3 Direction for use:

Pit method & Heap method

Size: pit method: 1m depth×1.5-2m width×10-15m length.

Heap method: 4-5m length (as per required) ×1.5-2m width ×1.5 m height

- Give the first layer of 15 cm with a disposed sugarcane trash ,agril.wastes, garden wastes, garbage etc. and add water up to 60% just to wet the materials
- Then add 8kg urea 16kg SSP in 1 Mt of trash or Agril.residues in each layer
- After 4-8 days add 100 kg dung in 500 lit. of water and 1 lit. Decomposing culture per 4 T of trash ,agril. Residues uniformly on each layer.
- Cover pit/Heap with mixture of soil/press mud cake, dung, trash, grass and water
- While filling the pits the space of 1-2 feet should be kept towards the longer side of pit in order to supply oxygen.
- 2-3 turning should be given at the interval of 45 days.
- In this way good quality compost will be ready within 90-120 days.

5.4 Storage

Liquid decomposing culture are stored in cool and dry place away from direct heat and temp.is 28^0C.

2. Plant & Machineries: Automized, Semi-automized and manual operating machineries.

1] Autoclave:-

It is an apparatus in which saturated steam under a pressure effects sterilization. The pressure increases the temperature to which water can be heated. Cells are destroyed by the higher temperature and not by the pressure. Most of the organism are killed at temperature 121°C(i.e. 1 lb/in2) in 15 minutes. Sterilization in autoclave is done with saturated steam under pressure.

2] Laminar air flow chamber:-

The cabinet is fabricated out of thick bore of sun mica or stainless steel. Interior surface of working platform is of stainless steel with the sun mica clayed at the top. Side of the panel is of thick transparent plexi glass duly framed. The unit is fitted with both pre filter and high-efficiency particulate air (HEPA) filters. Air is drawn through pre filter and is made to pass through highly effective HEPA filters having efficiency rating as high as 99.99%thus retaining all the particles of size 0.3 pm or larger. A blower and motor assembly of 1.5 HP.

The working area is illuminated by fluorescent light fitted with the unit. A UV light is also fixed underneath the sun mica clayed at the top and it is to be switched on 10 to 20 minutes before working.

Laminar flow provides aseptic environment for performing various activities such as pouring of sterilized media in sterilized plate, isolation, transfer of pathogen.

3] BOD incubators-

Incubators providing controlled conditions (light, temperature, humidity, etc.) required for the growth and development of microorganisms. Multiplication of starter culture can be done in this instrument. Normally temperature in BOD is 27°C to 29°C. in generally temperature inside the BOD is below or above the ambient temperature.

4] Rotary shaker:-

It is used for agitating culture flasks by circular motion under variable speed control. Shaking provides aeration for growth of cultures. Shakers holding

upto20-50 flasks are generally used. The capacity of the shaker may be increased if it is a double- decker type.

5] Hot air oven:

Hot air oven is meant for sterilizing all glassware materials. Dry heat is used in this apparatus to sterilize the materials. Normally 180°C is used for 20 min for sterilizing glasswares.

7] pH meter:-

An instrument for measuring pH of the solution using a 0-14 scale in which seven represents neutral points, less than seven is acidity (excess of H over -OH) and more than seven is alkality (excess of -OH over H) useful in adjusting the pH of the growth medium.

8] Refrigerator:-

Refrigerator is need to maintain the cultures in pure form for further studies. Maintenance of cultures in generally carried out at low temperature (0- 5 °C). The mother culture is periodically sub-cultured and stored in the refrigerator for long-term usage. Temperature maintained inside the refrigerator is always below ambient temperature.

9] Fermentor:-

A fermentor is the equipment, which provides the proper environment for the growth of a desired organism. It is generally a large vessel in which, the organism may be kept at the required temperature, PH, dissolved oxygen concentration and substrate concentration. Different models of fermentors are available depending upon the necessity. A simple version model contains steam generator, sterilization process devices and agitator.A sophisticated fermentor contains pH regulator, oxygen level regulator, anti-foam device, temperature controller, etc.

9] Colony counter:-

Colony counter are used to estimate a liquid counter's density of micro-organisms by counting individual colonies on an agar plate, slide, mini gel or petri dish. It counts the number of colonies of micro-organisms that have grown on an agar plate prepared from a sample. Counting is done by using pen marker.

10] Bottling Unit:-

Once comment is given 1/5 lit. of liquid bioinoculant is released through bottling unit and packed aseptically. Semi-automized bottling unit is used to fill pack correct amount of content under aseptic conditions.

11] Weighing balance:-

It is instrument which is used to determine the weight and mass of an object. They are used to measure solids, liquids, etc. exact mass is then determined using an analytical balance.

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी अॅड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— अवधूत सुरेश तोडकर

पत्ता :— मु. पो. नागठाणे ता. पलूस

मो. नं.:— 8788354404

वापरलेल्या फर्टिलायझरचे नाव:—

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	15-1-22	
२	सध्याचे पिक	ऊस, खपली गहु	
३	प्लॉट नंबर	2	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	17-1-22	
६	फवासणी करण्याच्या आधी पिकावरील फरक	खपली गहु कोलोथी आणण्यासाठी	
७	फवारणी केल्यानंतर पिकावरील फरक	खपली गहु चांगली लोंबी बाहेर पडुन कोलोथी टिकुन आहे	
८	पी.एच.(PH)		

लॅब इनचार्ज सही

Avdkar

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— मी. अभिजीत मोने.

पत्ता :— रेठरे बु॥ ता. सातारा.

मो. नं.:— 9620814507

वापरलेल्या फर्टिलायझरचे नाव:— राय झोशान्ती

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	16/08/2024	
२	सध्याचे पिक	~~ऊस~~, ~~कुईम ऊस~~, ~~विस्कोट घेवडा~~	
३	प्लॉट नंबर	1	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	17/8/2024	
६	फवासणी करण्याच्या आधी पिकावरील फरक	पीक ~~वाढ~~ न वाढ.	
७	फवारणी केल्यानंतर पिकावरील फरक	पीक वाढ झाली. उत्पन वाढले.	
८	पी.एच.(PH)	7:00	

लॅब इनचार्ज सही

प्रोडक्शन ~~घेणाऱ्या~~ शेतकऱ्याची सही

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी अॅड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नावः— श्री. दिपक बाबासो पवार

पत्ता :— कुपारी जि. सांगली.

मो. नं.:— 1262070821

वापरलेल्या फर्टिलायझरचे नावः— ॲसिटोशाणी, कामकोशाणी, मेपश्चली.

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	14/12/2021	
२	सध्याचे पिक	ऊस	
३	प्लॉट नंबर	1.2.3	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	18/12/2021	
६	फवासणी करण्याच्या आधी पिकावरील फरक	ऊस ~~जाडी~~ जाडी कमी होती.	
७	फवारणी केल्यानंतर पिकावरील फरक	ऊस जाडी व धाणी वाढली, फुटवे जादा झाले कुमणी तयार झाली	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

Pawar

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— माहिती चव्हाण

पत्ता :— मल्हारपेठ जि. सातारा

मो. नं.:— 9860069099

वापरलेल्या फर्टिलायझरचे नाव:— मेटाशक्ती, द्रायकोशक्ती, कार्पोशक्ती

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	31-3-21	
२	सध्याचे पिक	ऊस, उसाचा पाला पाचोळा, हुमणी	
३	प्लॉट नंबर	1, 3	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	4-4-21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	पाला पाचोळा कुजवणे, हुमणी नष्ट करणे	
७	फवारणी केल्यानंतर पिकावरील फरक	हुमणी नष्ट झाली आहे, पाला कुजवलेला आहे	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— विलास पवार

पत्ता :— मोरी ता. कराड जि सातारा

मो. नं.:—

वापरलेल्या फर्टिलायझरचे नाव:— ॲसिटोबाक्टो, रायझोबाक्टो

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	28-1-21	
२	सध्याचे पिक	ऊस.	
३	प्लॉट नंबर		
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	1
		५लिटर	
५	फवारणी केलेल्याची दिनांक	2-2-21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	ऊसाची वाढ कमी	
७	फवारणी केल्यानंतर पिकावरील फरक	ऊसाची वाढ	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— शैलजा पवार.

पत्ता :— हुबालवाडी ता. वाळवा जि. सांगली

मो. नं.:— 9860067709

वापरलेल्या फर्टिलायझरचे नाव:— ॲसिटोबाक्टर

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	15-2-21	
२	सध्याचे पिक	ऊस	
३	प्लॉट नंबर	2	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	25-2-21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	ऊसाची काडी जाड करणे	
७	फवारणी केल्यानंतर पिकावरील फरक	ऊसाची काडी लांब व जाड झालेली दिसुन येते	
८	पी.एच.(PH)		

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajaramnagar College of Sugar Technology, Islampur ★ ESTD 2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायझर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— महेंद्र पाटील

पत्ता :— इस्लामपूर ता.वाळवा जि.सांगली

मो. नं.:— 8421665252

वापरलेल्या फर्टिलायझरचे नाव:— मेटारायझी, ॲसिडोथायो

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	8-12-20	
२	सध्याचे पिक	ऊस.	
३	प्लॉट नंबर	1, 2, 3	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	15-12-20	
६	फवासणी करण्याच्या आधी पिकावरील फरक	हुमणी, काजकी आळी,	
७	फवारणी केल्यानंतर पिकावरील फरक	हुमणी अळ्या (५०%) कमी झालेली आहे. काजकी आळी कमी आहे.	
८	पी.एच.(PH)		

लॅब इनचार्ज सही

प्रॉडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology Islampur ★ ESTD 2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— मनोज मोहन पाटील

पत्ता :— बोरगाव ता. वाळवा जि सांगली

मो. नं.:— 7558767636

वापरलेल्या फर्टिलायझरचे नाव:— ॲसिडोशक्ती

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	10 - 11 - 21	
२	सध्याचे पिक	ऊस लागण	
३	प्लॉट नंबर	2	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	८
		५लिटर	
५	फवारणी केलेल्याची दिनांक	11 - 11 - 21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	ऊस जाड होणे, उंची वाढवणे	
७	फवारणी केल्यानंतर पिकावरील फरक	ऊस जाड झाला.	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— रघुदास बबन पाटील

पत्ता :— इस्लामपूर ता. वाळवा जि सांगली.

मो. नं.:— 8669076697

वापरलेल्या फर्टिलायझरचे नाव:— फॉस्फोशनी

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	27-12-2021	
२	सध्याचे पिक	ऊस (लागण)	
३	प्लॉट नंबर	3	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	31-12-2021	
६	फवासणी करण्याच्या आधी पिकावरील फरक	काळकी नाही, उंची नाही	
७	फवारणी केल्यानंतर पिकावरील फरक	उंची वाढली, काळकी आली	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— विक्रम कुंभार

पत्ता :— मसुचीवाडी

मो. नं.:— 9960544658

वापरलेल्या फर्टिलायझरचे नाव:— मेटाशक्ती, ट्रायकोडेल्मी

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	22-2-21	
२	सध्याचे पिक	सोयाबीन.	
३	प्लॉट नंबर		
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	८
		५लिटर	
५	फवारणी केलेल्याची दिनांक	30-2-21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	सोयाबीन उंची वाढवणे, अशातील हुमणी	
७	फवारणी केल्यानंतर पिकावरील फरक	सोयाबीन उंची वाढली. हुमणी नाश झालेली	
८	पी.एच.(PH)	7.00	

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

राजारामबापु कॉलेज ऑफ टेक्नॉलाजी ॲड रिसर्च सेंटर इस्लामपूर

बायोफर्टिलायजर फिडबॅक फॉर्म

शेतकऱ्याचे नाव:— अभिजित पाटील

पत्ता :— 77 रेठरे हरणाक्ष ता.वाळवा. जि.सांगली

मो. नं.:— 7709920996

वापरलेल्या फर्टिलायझरचे नाव:— ॲसिटोबॅक्टी

१	बायोफर्टिलायझराचे प्रोडशनची दिनांक	12-4-21	
२	सध्याचे पिक	ऊस लागण	
३	प्लॉट नंबर	2	
४	बायोफर्टिलायझराचे प्रोडशन किती दिले	१लिटर	✓
		५लिटर	
५	फवारणी केलेल्याची दिनांक	13-4-21	
६	फवासणी करण्याच्या आधी पिकावरील फरक	ऊसाचे उत्पन्न वाढवणे, उंची वाढवणे.	
७	फवारणी केल्यानंतर पिकावरील फरक	उंची, वाढली आहे.	
८	पी.एच.(PH)		

लॅब इनचार्ज सही

प्रोडक्शन घेणाऱ्या शेतकऱ्याची सही

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

Microbiology Departments Production

Biofertilizers

Biofertilizers

RCST'S

SUGAR TECHNOLOGY RESEARCH & DEVELOPMENT CENTER, ISLAMPUR

बायोफर्टिलायझर व बायोपेस्टीसाईड

ॲसिटोशक्ती

फायदे :

ॲसिटोशक्ती हे ॲसिटोबॅक्टर जैविक खत असून मुख्यत्वे शर्करायुक्त पिकांसाठी वातावरणातील नत्र खताची उपलब्धता करण्यासाठी उपयुक्त आहे.

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

काम्पो प्लस

फायदे :

काम्पोप्लस हे सर्व प्रकारचे सेंद्रिय पदार्थ रुजवणारे जिवाणूसंवर्धक कंपोस्ट कल्चर आहे. शेतीतील पाचट व पालापाचोळा शहरातील टाकाऊ पदार्थ साखर कारखान्यातील प्रेसमड, शेतातील ताग, धोंचा यासारखे सेंद्रिय पदार्थ कुजण्याची अत्यंत उपयुक्त.

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

रायझोशक्ती

फायदे :

* पर्यावरणपूरक * नत्र स्थिरीकरण करून पिकास उपलब्ध करून देते. * मुळ्यांची व फुटव्यांची वाढ होते उत्पादन वाढवते. * रासायनिक खतांची बचत होते. * जमीनीचे आरोग्य वाढवते.

भुईमूग, सोयाबीन, मेथी यांच्यासाठी उपयुक्त व इतर द्विदल कडधान्य पिके इ. साठी उपयुक्त

फॉस्फोशक्ती

फायदे :

* पर्यावरणपूरक * फॉस्फरस स्थिरीकरण करून पिकास उपलब्ध करून देते. * मुळ्यांची व फुटव्यांची वाढ होते उत्पादन वाढवते. * रासायनिक खतांची बचत होते. * जमीनीचे आरोग्य वाढवते.

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

ट्रायको-शक्ती

बुरशीनाशक

फायदे :

* जैविक बुरशीनाशक
* सेंद्रिय पदार्थाचे विघटन घडवून आणते.
* बियाण्याची उगवनशक्ती वाढवते.

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

बुरशीवर्धक

फायदे :

* जैविक बुरशीवर्धक
* सेंद्रिय पदार्थाचे विघटन घडवून आणते.
* बियाण्याची उगवनशक्ती वाढवते.

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

मेटाशक्ती

फायदे :

* जैविक किटकनाशक
* ऊसामधील हुमनीवरती विशेष परिणामकारक
* पर्यावरणास व उपयुक्त जैविक घटकांना धोका पोहचत नाही

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

रत्नपोटॅश

फायदे :

* अविद्राव्य पालाश पिकास उपलब्ध करून देण्याचे काम हे जिवाणू करतात. त्यामुळे पालाशयुक्त रासायनिक खतांची बचत होते. * मुळांची व फुटव्यांची वाढ होते. * फळांचा आकार वाढतो

ऊस, भाजीपाला, तेलबिया, द्राक्षे, डाळींब, कापूस, केळी इ. पिकांसाठी उपयुक्त

Shivam Ads 9112155707

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BEST PRACTICES 2.

ONE STUDENT ONE PLANT

Goals :

Environmental awareness has become part of our college culture and the college conducts environmental awareness activities since the establishment. One plant one student is a global movement with an ambitious goal to fight the climate crisis by planting trees around the world and establish green Society of India to be a healthy world. One plant one student is an initiative in line of a green and healthy environment as a helping hand to this noble initiative and for making the college students socially responsible. All faculty members, administrative staff and management of the institutions were also participating in this movement.

The context

One student one plant will educate and encourage the student about the benefits of planting trees on our planet. We encourage the students to get information of trees which will help to develop the environmental susceptibility One student one plant is a movement where each student should plant one tree and also nurture that tree.

Practice

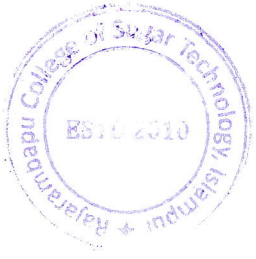
In the year 2018-19, we announced the scheme of 'one student one plant'. Under this scheme we have appealed the students to donate a plant to college. Throughout the year, most of the students donated plants to the college. The collected plants were distributed among the students. The students prepared plant by filling up organic manure and soil. Students have planted them with a variety like Mango, Neem, Bamboo etc. These plants have been planted in different areas from 2019 onwards to till date. Students become climate ambassadors and pass on their knowledge and encourage other students to take on social responsibility and shape their future.

Evidences of success

Department of Alcoholtech, Sugartech and NSS organized tree plantation programme at Kille Machhindragad fort. Under this program we have planted variety of trees like Mango, Neem, Bamboo etc . Through this program one student has planted one tree and makes a promise that we will take care of every tree we have planted. After one year we have taken a survey of the survival of trees. It was found that most of the trees are alive and we fill very satisfied.

Future plan

Our institution has planned to distribute various varieties of trees at free of cost to college students and to the society. Also we will educate and encourage the people about environment protection through plantation.



Tree Plantation Program

Tree plantation on the occasion of World Envirnoment Day

Rajarambapu College of Sugar Technology, Islampur ★ ESTD.2010

Tree plantation at Killemachindragad

Rajarambapu College of Sugar Technology, Islampur

M.Sc. I (Alcohol Technology)

Activity Name: Tree Plantation Cone Plant One Tree Activity at K. Machindragad.

Date – 05/06/2022

Sr no	Student name	sing
1	Awati Ratandeep Rameshchandra	
2	Basawraj Roogy	
3	Chavan Jivraj Kedarnath	
4	Chougule Sumed Pradip	
5	Dadas Saurabh Sitaram	
6	Desai Shubham Sanjay	
7	Deshmukh Kunal Rajaram	
8	Devmore Aniket Shantinath	
9	Dhokare Abhishek	
10	G.Pramod Gopal Naik B	
11	Gaikwad Ashish Anil	
12	Gaikwad Swarup Rajendra	
13	Hegaje Prakash Malgonda	
14	Jamadar Mohasin Alataf	
15	Jangam Vinayak Shashikant	
16	Kadam Mrunal Ganpati	
17	Kamble Mayur Sanjay	
18	Kapre Prashant Sambhaji	
19	khade Sachin Baburao	
20	Khalate Tushar Rajendra	
21	Khot Sangram Vijay	
22	Londhe Pranav Prakash	
23	Mali Avadhoot Maruti	

24	Mane Swapnil Shivaji	
25	More Shivaji Pandurang	
26	Naykawade Shubham S.	
27	Netane Shubham Rameshwar	
28	Nimbalkar Pratik Yuvraj	
29	Patil Abhay Jaysing	
30	Patil Akshay Bhagvan	
31	Patil Harshvardhan Shahaji	
32	Patil Shubham Sunil	
33	Patil Somgaonda Pirgonda	
34	Patil Suraj Balasaheb	
35	Patil Sushil Bhagvat	
36	Patil Vikas Bhikaji	
37	Pawar Ashitosh Suresh	
38	Pawar Dishant Dilip	
39	Potdar Yash Ravindra	
40	Raje Akash Chandrakant	
41	Raynade Arihant Vijay	
42	Shinde Avishkar Ravindra	
43	Suryawanshi Raviraj Jagnnath	
44	Swant Akash Sampat	
45	Tahasildar Ijaj Ibrahim	
46	Tawandkar Vivekanand Dattatray	
47	Upadhye Suyog Sagar	
48	Wakchaure Abhishek Shashikant	
49	Zende Pravin Ashok	
50	Bokare Krishna Ramrao	