



International Journal of Research in Agronomy

E-ISSN: 2618-0618

P-ISSN: 2618-060X

© Agronomy

www.agronomyjournals.com

2024; SP-7(6): 09-16

Received: 08-03-2024

Accepted: 13-04-2024

Satyanarayan Soni

Ph.D. Scholar, Department of
Agricultural Economics, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

Neeraj Jaiswal

Ph.D. Scholar, Department of
Agricultural Economics, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

Shraddha Nayak

Ph.D. Scholar, Department of
Agricultural Economics, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

Corresponding Author:

Satyanarayan Soni

Ph.D. Scholar, Department of
Agricultural Economics, Indira
Gandhi Krishi Vishwavidyalaya,
Raipur, Chhattisgarh, India

An economic analysis of pattern of investment for biopesticides production unit establishment in Chhattisgarh

Satyanarayan Soni, Neeraj Jaiswal and Shraddha Nayak

DOI: <https://doi.org/10.33545/2618060X.2024.v7.i6Sa.802>

Abstract

Four major producers as respondents and 350 farmers for fulfil constraints questionnaire were selected from three districts namely, Bilaspur, Raigarh and Raipur respectively. The secondary data of biopesticides production in Chhattisgarh was recorded from various publications of the government to accomplish the objective of study area. The primary data on different aspects to achieve the remaining objectives of study were personally recorded from the respondents.

The result of study revealed that main objective of this study is to reduce the harmful effects of the use of chemical pesticides on the environment due to traditional farming method. Instead of using chemical pesticides, we can improve the environment by removing their harmful effects by using biopesticides. This study provides information on the establishment of biopesticide production unit in Chhattisgarh, information on production cost of biopesticide production, information on return (income) and profit from production of biopesticides, information and suggestions on marketing of biopesticides in Chhattisgarh along with production of biopesticides and this study gives details of the problems faced in production and marketing and gives the measures to avoid them. From this study it was found that setting up a production unit of biopesticides requires 10-15 manpower, 5000-8000 sq ft of land along with a cost of Rs 1.5-2.0 crores. It costs 80-110 rupees to produce one kilogram of biopesticide and it depends on the biopesticide.

Keywords: Biopesticides, trichoderma, insect pest, scientist/ specialist, biochemical, marketing channel, skilled labour, generator, autoclave, insulation cost

Introduction

First sampled state Bio-Control Laboratory Chorbhatti (a unit of BTC college of agriculture and research station Bilaspur CG), short for biological control laboratory, is a facility dedicated to studying and implementing biological control methods for managing pests, diseases, and invasive species. This laboratory typically focus on production, marketing as well as research and developing strategies that involve the use of natural enemies, such as predators, parasites, and pathogens, to regulate populations of pest in agriculture. Key activities and functions of a bio control lab include. Second sampled producer bio control laboratory unit (a unit of college of agriculture Raipur), short for biological control laboratory, typically focuses on the study, development, and implementation of biological control methods to manage pests, diseases, or invasive species in agriculture, forestry, public health, or natural ecosystems. Third sampled established in 2011, Bharat Biocon Pvt Ltd is one of the enterprises of the state readily indulged in manufacturing a wide variety of Organic Fertilizers, Bio Insecticides, etc. The products offer is made-up in close exactness with the pre-set principles of supremacy using top-notch material and sophisticated techniques. Also, these offered products are credited to customers for superiority and rugged. Establishing a biopesticide production plant involves several steps and considerations. Fourth sampled producer R K Bio Crop Care Raipur the plant located in Rawabhata Raipur and involves in biopesticides production and marketing. Biopesticides produced like trichoderma, metarhizium, bacillus thuringiensis, Beauveria bassiana and pseudomonas. Biopesticides production plant involves several steps and considerations. Quality Control Implement rigorous quality control measures to ensure the consistency, purity, and efficacy of biopesticide products.

This may include testing for microbial contamination, potency, stability, and environmental safety. Distribution and marketing develop a distribution network to reach target market effectively. Invest in marketing and promotional activities to raise awareness of biopesticide products and differentiate them from conventional pesticides. Environmental considerations Implement environmentally sustainable practices in production process, such as waste management, energy efficiency, and pollution prevention. Training and safety provide training to staff on proper production techniques, safety protocols, and regulatory compliance requirements. Continuous Improvement continuously monitors and improves production process, product quality, and customer satisfaction to stay competitive in the market.

Materials and Methods

Selection of Producers

Four producers were selected from selected districts. Out of four producer, two producers from Raipur district, one producer from Raigarh district and one farmer from Bilaspur district. A list of selected producer with their location is shown below:

Table 1: District-wise list of selected respondents as producers.

S. No.	District Name	Producers	Location
1	Bilaspur	State Bio Control Laboratory. (SBCL)	Chorbhatti Bilaspur
2	Raigarh	Bharat Biocon Private Limited. (BB Pvt.ltd.)	Raigarh
3	Raipur	Bio Control Laboratory. (BCL)	College of agriculture campus, IGKV, Raipur (C.G.)
4	Raipur	R K Bio Crop Care Raipur. (RKBC)	Rawanbhata Raipur

Collection of Data

i. Sampling Procedure: Suitable statistical tools will be taken for sampling procedure.

The primary data were used which was collected from sample of 4 producer respondents and survey from 350 farmers. The data was collected using personal interview method and prepared questionnaire schedule from sampled producers.

ii. Collection of Data

a. Primary data: Primary data will be collected from selected production unit. Data will be collected through personal interview method with the help of questionnaires.

b. Secondary Data: The secondary data will be collected through different authentic agencies.

Analytical tools

Cost of establishment

To analyses establishment of biopesticide production unit standard formula will be applied.

Establishment cost Formula

$$\text{Total Cost} = \text{Total Plant Direct Cost (TPDC)} + \text{Land cost} + \text{Miscellaneous.}$$

Results and Discussion

The pattern of investment for establishment of production unit.

Establishing a biopesticides production unit involves various investments across different aspects of the business. Here's a general outline of the pattern of investment of sample producers:

State Bio Control Laboratory (SBCL) Chorbhatti

Cost for establishment of a biopesticides production unit mainly divided into two categories as total plant direct cost (TPDC) and land cost. Under TPDC includes equipment cost, provide proper electrical facility, insulation cost and building construction cost. Total plant direct cost Rs. 170.27 lakh in which 57.56 percent (Rs. 98.00 lakh) in total equipment cost as generator 35 lakh, autoclave 25 lakh, Fermentor 11 lakh and auxiliary facilities and other machinery 27 lakh and 40.25 percent in building construction cost.

Total plant direct cost (TPDC)

Table 2: Pattern of investment for establishment of production unit

Total Plant Direct Cost (TPDC)		
Equipment Purchase cost		
Particulars	Percentage of TPDC	Rs. in Lakh
Generator	20.56	35.00
Autoclave	14.68	25.00
Fermentor	6.46	11.00
Auxiliary facilities and Other Machinery	15.86	27.00
Total Equipment cost	57.56	98.00
Insulation cost	0.58	0.99
Electrical Cost	1.62	2.75
Building cost	40.25	68.53
TPDC	100.00	170.27

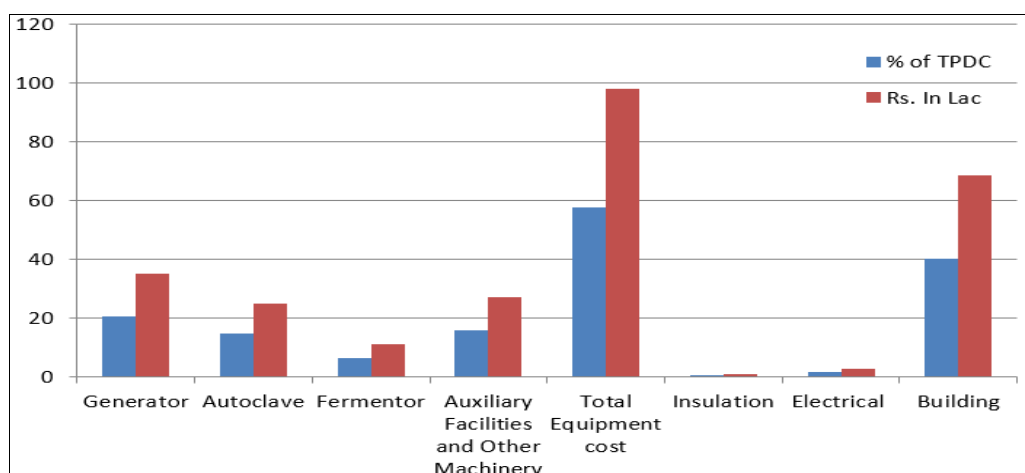


Fig 1: Pattern of investment for establishment of production unit.

Cost in building construction

Cost in different structure for production of biopesticides mainly in production units for bio-Agents, room for diet preparation, egg production, host culture and office. Total building construction cost Rs. 68.53 lakh in which Rs. 15.25 lakh in

production unit for bio agents, Rs. 38.78 lakh in production Unit for trichoderma and other biopesticides, Rs. 8.30 lakh in Room for diet preparation, egg production, host culture and Rs. 6.20 lakh in office establishment.

Table 3: Pattern of cost in building construction

Particular	Total Cost (in lakh Rs.)
Technical Building	
Production Units for Bio-Agents	15.25
Production Unit for Trichoderma and other Biopesticides	38.78
Room for diet preparation, egg production, host culture	8.30
Office	6.20
Sub total	68.53

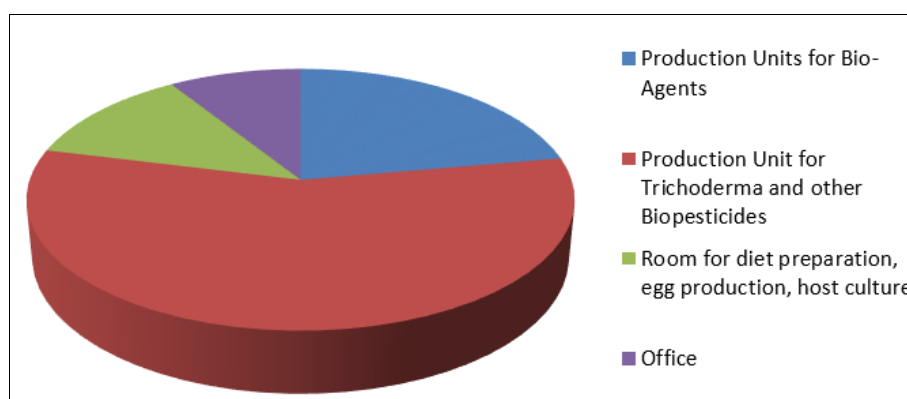


Fig 2: Pattern of cost in building construction.

Total cost in establishment of production unit

Total cost of establishment of production unit is 181.65 lakh in which 93.74 percent or 170.27 lakh Rs. invest for total plant direct cost (TPDC), 9.60 lakh Rs. land purchasing as annual rent and 1.78 lakh Rs. other expenses as taxes and regulatory licenses.

Table 4: Total cost in establishment of production unit

Particulars	Rs. in lakh	Percentage of total cost
TPDC	170.27	93.74
Land (as annual rent)	9.60	5.28
Miscellaneous	1.78	0.98
Total Cost	181.65	100.00

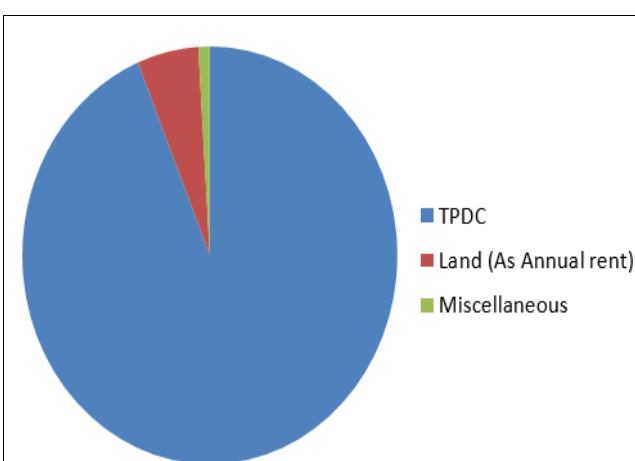
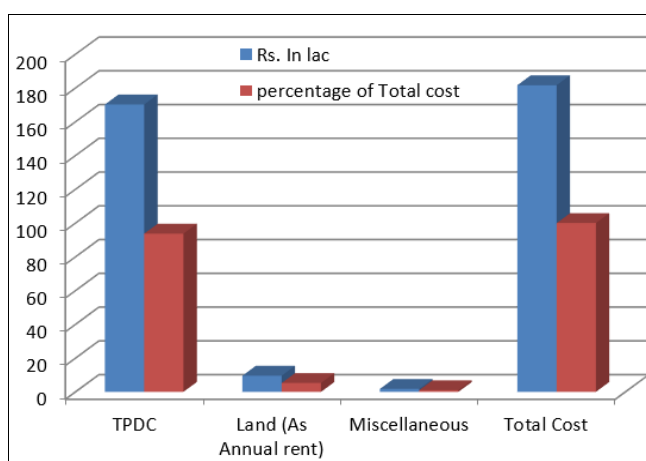


Fig 3: Total cost in establishment of production unit.

Bio Control Laboratory, Raipur (BCL, Raipur)

Cost for establishment of a biopesticides production unit same as above unit mainly divided into two categories as total plant direct cost (TPDC) and land cost. Under TPDC includes equipment cost, provide proper electrical facility, insulation cost

and building construction cost. Total plant direct cost Rs. 120.62 lakh in which 65.49 percent (Rs. 79.00 lakh) in total equipment cost and 34.51 percent in building construction cost.

Total plant direct cost (TPDC)

Table 5: Total plant direct cost (TPDC)

Total Plant Direct Cost (TPDC)		
Equipment Purchase cost		
Particulars	Percent of TPDC	Rs. in Lakh
Generator	26.53	32.00
Autoclave	16.58	20.00
Fermentor	9.95	12.00
Auxiliary Facilities and Other Machinery	12.44	15.00
Total Equipment cost	65.49	79.00
Building cost	34.51	41.62
TPDC	100.00	120.62

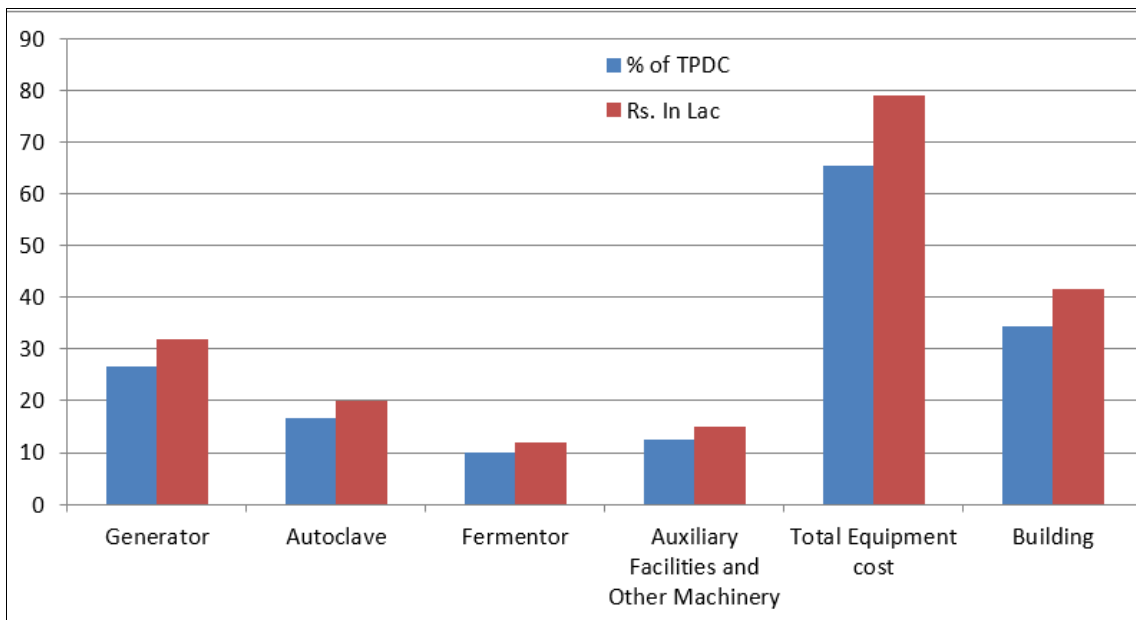


Fig 4: Total Plant Direct Cost.

Cost in building construction

Cost in different structure for production of biopesticides mainly in production unit in bio agent, production units for bio-agents, room for diet preparation, egg production, host culture and office. Total building construction cost Rs. 41.62 lakh in which

Rs. 13.78 lakh in production unit for bio agents, Rs. 17.14 lakh in production unit for trichoderma and other biopesticides, Rs. 6.2 lakh in Room for diet preparation, egg production, host culture and Rs. 4.5 lakh in office establishment.

Table 6: Pattern of cost in building construction

Particular	Total Cost (in lakh Rs.)
Technical Building	
Production Units for Bio-Agents	13.78
Production Unit for Trichoderma and other Biopesticides	17.14
Room for diet preparation, egg production, host culture	6.20
Office	4.50
Sub total	41.62

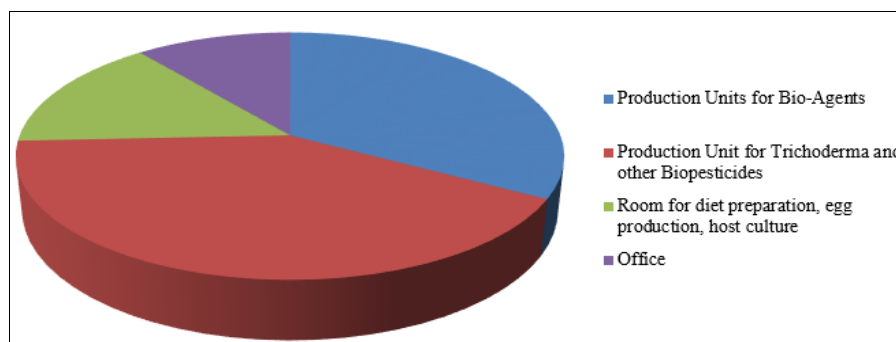


Fig 5: Pattern of cost in building construction.

2.3 Total cost in establishment of production unit

Total cost of establishment of production unit is 128.40 lakh in which 93.94 percent or Rs.120.62 lakh invest for total plant direct cost (TPDC), Rs. 6 lakh Land purchasing and Rs.1.78 lakh Other expenses as taxes and regulatory licenses.

Table 7: Total cost in establishment of production unit

Particulars	Rs. In lakh	Percentage of total cost
TPDC	120.62	93.94
Land (As annual rent)	6.00	4.67
Miscellaneous	1.78	1.39
Total Cost	128.40	100.00

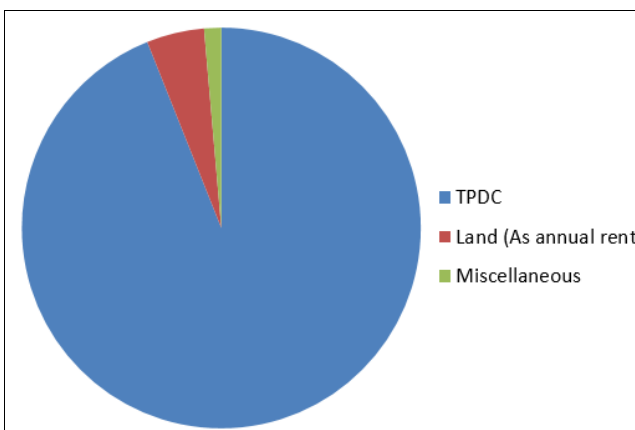
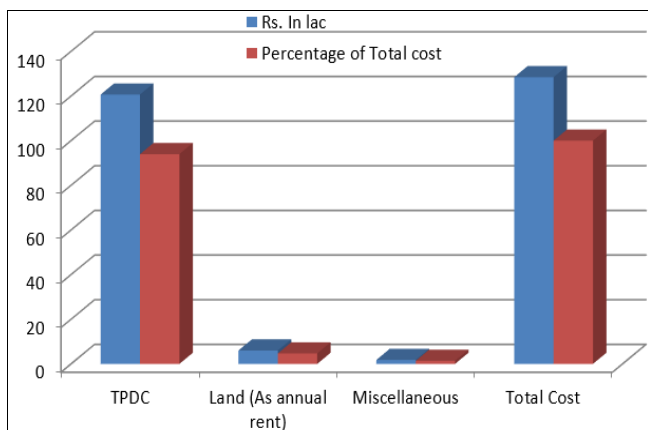


Fig 6: Total cost in establishment of production unit.

Bharat Biocon Private Limited, Raigarh (BBPL, Raigarh)

Cost for establishment of a biopesticides production unit same as above unit mainly divided into two categories as total plant direct cost (TPDC) and land cost. Under TPDC includes equipment cost, provide proper electrical facility, insulation cost

and building construction cost. Total plant direct cost Rs. 375.61 lakh in which 65.12 percent (Rs. 233.33 lakh) in total equipment cost and 33.28 percent in building construction cost.

Total plant direct cost (TPDC)

Table 8: Total plant direct cost (TPDC)

Total Plant Direct Cost (TPDC)		
Equipment Purchase cost		
Particulars	Percent of TPDC	Rs. in Lakh
Micro centrifuge	0.58	2.18
Laminar air flow cabinet	0.39	1.48
Generator(2)	21.30	80.00
Autoclave(3)	19.97	75.00
Fermentor(2*100ltr)	6.12	23.00
Auxiliary Facilities and Other Machinery	13.76	51.67
Total Equipment cost	62.12	233.33
Insulation	0.67	2.50
Electrical	3.93	14.78
Building construction cost	33.28	125.00
TPDC	100.00	375.61

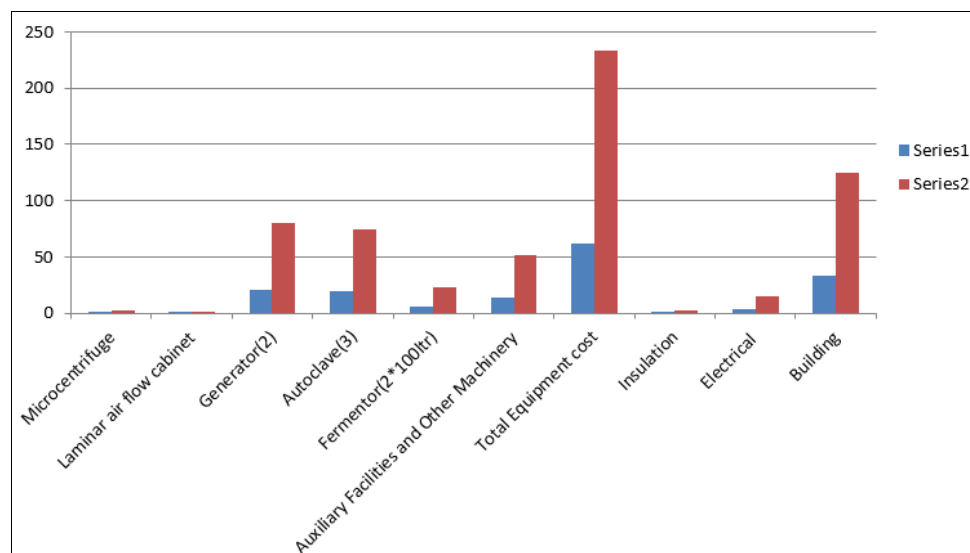


Fig 7: Total Plant Direct Cost.

Cost in building construction

Cost in different structure for production of biopesticides mainly in production unit in bio agent, production units for bio-agents, room for diet preparation, egg production, host culture and office. Total building construction cost Rs. 125.00 lakh in which

Rs. 37.00 lakh in production unit for bio agents, Rs. 60.21 lakh in production unit for trichoderma and other biopesticides, Rs. 22.89 lakh in Room for diet preparation, egg production, host culture and Rs. 4.90 lakh in office establishment.

Table 9: Pattern of cost in building construction

Particular	Total cost (in lakh Rs.)
Technical Building	
Production Units for Bio-Agents	37.00
Production Unit for Trichoderma and other Biopesticides	60.21
Room for diet preparation, egg production, host culture	22.89
Office	4.90
Sub total	125.00

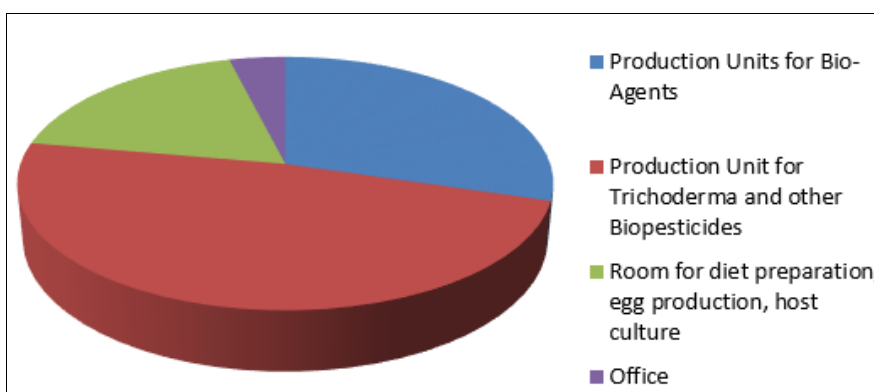


Fig 8: Pattern of cost in building construction.

Total cost in establishment of production unit

Total cost of establishment of production unit is 413.61 lakh in which 90.81 percent or Rs.375.61 lakh Invest for total plant direct cost (TPDC), Rs.18.00 lakh Land purchasing and Rs.20.00 lakh Other expenses as taxes and regulatory licenses.

Table 10: Total cost in establishment of production unit

Particulars	Rs. In lakh	Percentage of total cost
TPDC	375.61	90.81
Land (As annual rent)	18.00	4.35
Miscellaneous	20.00	4.83
Total Cost	413.61	100.00

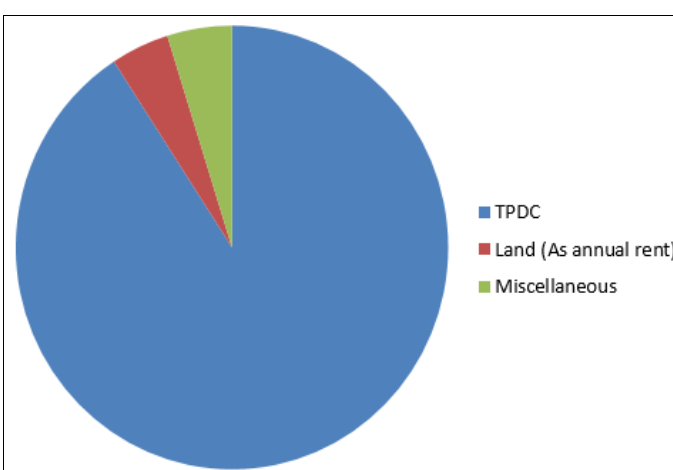
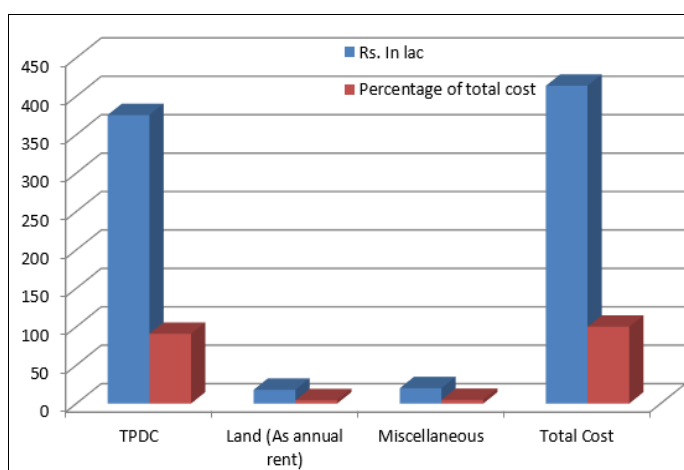


Fig 9: Total cost in establishment of production unit.

RK Bio crop care, Raipur (R K BCC, Raipur)

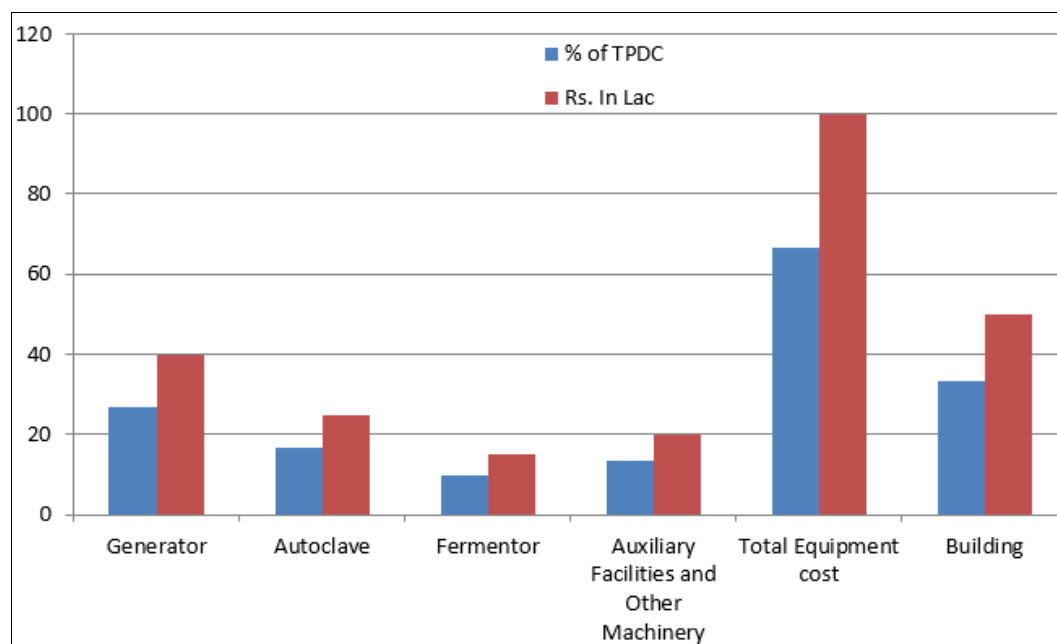
Cost for establishment of a biopesticides production unit same as above unit mainly divided into two categories as total plant direct cost (TPDC) and land cost. Under TPDC includes equipment cost, provide proper electrical facility, insulation cost

and building construction cost. Total plant direct cost Rs. 150.00 lakh in which 66.67 percent (Rs. 100.00 lakh) in total equipment cost and 33.33 percent in building construction cost.

Total plant direct cost (TPDC)

Table 11: Total plant direct cost (TPDC)

Total Plant Direct Cost (TPDC)		
Equipment purchase cost		
Particulars	Percent of TPDC	Rs. in Lakh
Generator	26.67	40.00
Autoclave	16.67	25.00
Fermentor	10.00	15.00
Auxiliary Facilities and Other Machinery	13.33	20.00
Total Equipment cost	66.67	100.00
Building	33.33	50.00
TPDC	100.00	150.00

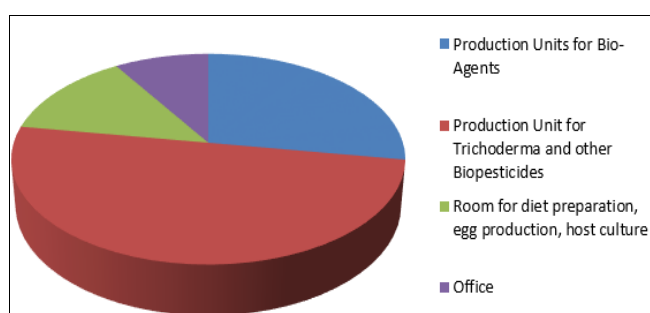
**Fig 10:** Total Plant Direct Cost.**Cost in building construction**

Cost in different structure for production of biopesticides mainly in production unit in bio agent, production units for bio-agents, room for diet preparation, egg production, host culture and office. Total building construction cost Rs. 50.00 lakh in which

Rs. 13.78 lakh in production unit for bio agents, Rs. 25.00 lakh in production unit for trichoderma and other biopesticides, Rs. 6.72 lakh in Room for diet preparation, egg production, host culture and Rs. 4.5 lakh in office establishment.

Table 12: Pattern of cost in building construction

Particular	Total cost (in Lakh Rs.)
Technical Building	
Production Units for Bio-Agents	13.78
Production Unit for Trichoderma and other Biopesticides	25.00
Room for diet preparation, egg production, host culture	6.72
Office	4.50
Sub total	50.00

**Fig 11:** Pattern of cost in building construction.**Total cost in establishment of production unit**

Total cost of establishment of production unit is 158.98 lakh in which 94.35 percent or Rs.150 lakh Invest for total plant direct cost (TPDC), Rs.7.20 lakh land purchasing and Rs.1.78 lakh Other expenses as taxes and regulatory licenses.

Table 13: Total cost in establishment of production unit

Particulars	Rs. In lakh	Percentage of Total cost
TPDC	150.00	94.35
Land (as annual rent)	7.20	4.53
Miscellaneous	1.78	1.12
Total cost	158.98	100.00

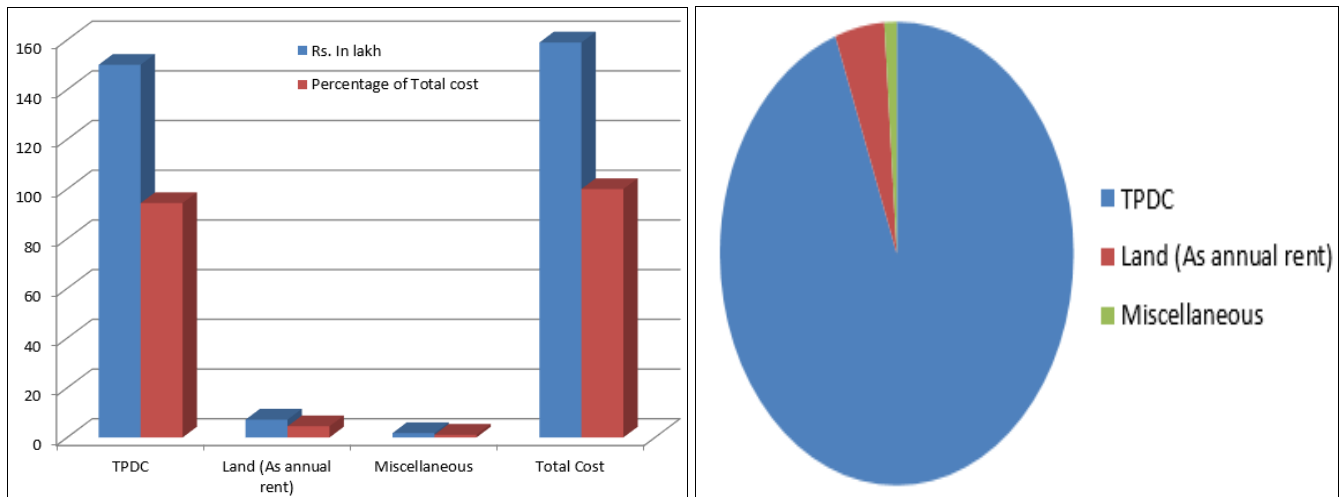


Fig 12: Total cost in establishment of production unit.

Conclusion

From the economic analysis of the research the first producer's total cost of establishment of production unit is 181.65 lakh in which 93.74 percent or 170.27 lakh Rs. invest for total plant direct cost (TPDC), 9.60 lakh Rs. land purchasing as annual rent and 1.78 lakh Rs. other expenses as taxes and regulatory licenses.

The second producer's total cost of establishment of production unit is 128.40 lakh in which 93.94 percent or Rs.120.62 lakh invest for total plant direct cost (TPDC), Rs. 6 lakh Land purchasing and Rs.1.78 lakh Other expenses as taxes and regulatory licenses.

The third producer's total cost of establishment of production unit is 413.61 lakh in which 90.81 percent or Rs.375.61 lakh Invest for total plant direct cost (TPDC), Rs.18.00 lakh Land purchasing and Rs.20.00 lakh Other expenses as taxes and regulatory licenses.

The fourth producer's total cost of establishment of production unit is 158.98 lakh in which 94.35 percent or Rs.150 lakh Invest for total plant direct cost (TPDC), Rs.7.20 lakh land purchasing and Rs.1.78 lakh Other expenses as taxes and regulatory licenses.

In this way, information has been given about the establishment of biopesticide production unit and how much cost it will cost. This will help in setting up a biopesticide production unit.

The information received from study area respondents, biopesticides have very little effect on agricultural pests as compared to chemical pesticides, due to which they have no interest in using biopesticides and encourage the application of chemical pesticides. Also it has been discovered from the information received that biopesticides have less effect on agricultural pests but there is supply of poor quality biopesticides in the market and similarly all the problems have come to light in this study, by removing which the use of biopesticides can be promoted and this will prove to be a help in improving the environment.

References

1. Thomas N, Thilagavathi M, Raguchander T. An economic analysis of biopesticides use in paddy farms of Kerala. *Indian J Econo Dev.* 2018;14(1a):41-5.
2. Honnunasi G. Biopesticides marketing and usage in North Karnataka - a case of Belgaum district [Internet]; c2007 [cited 2024 May 29]. Available from:

3. Vanpariya JP. Knowledge attitude of farmers towards 'SAWAJ' biofertilisers and biopesticides in Junagadh District of Gujarat State [Internet]; c2018 [cited 2024 May 29]. Available from: <http://krishikosh.egranth.ac.in/handle/1/71692>
4. Patel DK. Market potential of biopesticides and to recommend strategies to improve market share of PNT Marketing in Raipur District of Chhattisgarh. *JNKV Jabalpur*; c2009, 84.
5. Murthy BSR. Evaluation of certain biopesticides against *Earias vittella* (Fabricius) on okra (*Abelmoschus esculentus* (L.)). *AAU Anand*; c2001, 89.
6. Sahayaraj K, editor. Basic and applied aspects of biopesticides. New Delhi: Springer; c2016. p. 69-98.
7. Agrawal S, Rathore P. Nanotechnology pros and cons to agriculture: a review. *Int J Curr.* 2020;167-210.
8. Keawchaon L, Yoksan R. Preparation and characterization of biopesticides. 2014;43:182-6.