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Economic analysis of major constraints of production and marketing of biopesticides in Chhattisgarh

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Abstract
The present study was conducted with a view to analyze major constraints of biopesticides production and marketing in Chhattisgarh state of India which is located in central region in India. The object of this research work was to determine/ assess the major problem for establishment of biopesticides production unit and constraints of production and marketing activities during the research area. In study three districts of Chhattisgarh state of India namely Raipur, Bilaspur and Raigarh district and the study was conducted with the selection of four producers. Information was obtained from the four producers and 350 respondent farmers on the problems faced in production, marketing and use of biopesticides. Many problems have been identified in this study, the main problems are as came up were traditional agricultural practices possess a dominant influence concerning the utilization of biopesticides and hence, they promote the use of pesticides that are chemical derivatives rather than biopesticides. Lack of knowledge about the subject was another significant issue the production technology of biopesticides; Producers are not interested in producing biopesticides due to limited marketing channels.

Keywords: Biopesticides, *Trichoderma*, insect pest, garrett ranking, biochemical, marketing channel

Introduction
Numerous pests, including bacteria, fungi, weeds, and insects, have a negative impact on agriculture, resulting in decreased yield and poor quality of produce. Pest control has been most commonly achieved through the intensive use of synthetic pesticides since the 1960s. In the 1940s, a pesticide was introduced using dichloro-diphenyl-trichloroethane (DDT) and then followed by other organophosphate and carbamate pesticides. By using intensive inputs, Green Revolution technology of crop production could increase food production in developing countries chemical fertilizers and pesticides are used in various ways. Natural formulations that control pests through non-toxic mechanisms and in an eco-friendly manner are called biopesticides these technologies are not recent. Since human civilization, they have been utilized in various forms. Biopesticides, which are either living organisms (natural enemies) or products of them, pose a lesser risk to the environment and human health. Therefore; it is advantageous for pest control. Bacillus thuringiensis is a popular microbial biopesticide, The potential benefits of using biopesticides in agriculture and public health programmes are significant and widely known as Bt. Biopesticides are produced from toxins found in biological organisms that are harmful to the pests that invade plants. They do not affect the plant and in fact, reduce soil pollution and erosion. Hence, organic farming requires biopesticides for good crop production. Though, to raise the production of biopesticides is important for organic farming to encourage sustainable Agriculture.

Materials and Methods
Garrett's ranking technique
Garrett's ranking Technique is a tool that is commonly utilized to evaluate a variable that uses mean scores expressed in ranks. There are 24 methods available for converting orders of constraints and benefits into numerical ratings. From the point of view of respondents, this technique has a primary advantage over simple frequency distribution; the constraints are organized based on their intensity. The ranking of the same number of respondents could have been different based on two or more constraints.

Garrett uses a formula to convert ranks into percentages

Percentage position = 100 * (Rij-0.5) / Nj

Where,
Rij = Rank given for ith; constraint by jth individual.
Nj = Number of constraints ranked by jth; individual.
Garrett and Woodworth (1969)'s table was used to convert the percentage position of each rank into scores.

Each factor had the scores of individual respondents added together and divided by the total number of respondents who had scores added. All constraints had their mean scores arranged in descending order and were ranked accordingly.

Results and Discussion

The various constraints faced by biopesticides producers were studied and analyzed in context of the sample farmers from study area. The table 4.44 displays the findings that most of the farmers had problem of lack of technical information which was about 76.87%. Also, a large number of them have unavailability of skilled labour which was about 63.20%. Especially in the peak period the labour availability was less as fixed number of labours from the village had to work for many producers. Thus, cost was also high. This restriction was succeeded by Lack of knowledge of machinery and equipment which was 54.02%. The fourth constraint faced in production was inadequate electricity supply about the biopesticides production which was 45.23% and fifth constraint faced was inadequate knowledge of package and practices which was about 35.60%.

Problems in the marketing of biopesticides faced by biopesticide producers were also studied the table 4.46 presents the results. The Awareness about biopesticides uses the most significant obstacles that are confronted by 74.34% farmers. The high transportation cost during marketing of biopesticide was the next most important constraint faced by 65.66% producers and the third constraint that must be met by producers in Marketing of biopesticide was there are no packaging facilities to be found 52.50%. The Constraints faced by producers in marketing of biopesticide was inadequate distribution in channels 47.52%. And the lastly 37.00% producers faced the resistance from conventional Agriculture.

Table 1: Constraints faced by biopesticides producers in production of biopesticides

S. N.	Particular	Rank
F1.	Inadequate electricity supply	1st
F2.	Lack of training for production method	2nd
F3.	Unavailability of skilled labour	3rd
F4.	Lack of knowledge of proper raw material and its chemical precautions.	4th
F5.	Lack of knowledge of machinery and equipment	5th
F6.	Lack of technical information	6th
F7	Inadequate knowledge of package and practices	7th

Table 2: Percentage position and the matching value in the Garrett's table

Rank	Percentage Position	Garret Table	Score
1	100*(1-0.5)/7	7.14	78
2	100*(2-0.5)/7	21.43	66
3	100*(3-0.5)/7	35.71	57
4	100*(4-0.5)/7	50.00	50
5	100*(5-0.5)/7	64..29	43
6	100*(6-0.5)/7	78.57	34
7	100*(7-0.5)/7	92.86	22

Table 3: Multiply the Garret value by the specified value for every rank

Factors	1st*78	2nd*66	3rd*57	4th*50	5th*43	6th*34	7th*22	Total	Average score (Total/350)	Rank
F1	3588	2640	3420	3200	2924	2108	1848	19728	56.37	IV
F2	4368	4092	2850	1600	2150	2142	770	17972	51.35	VI
F3	6396	5082	2793	2200	2107	1360	1892	21830	62.37	II
F4	2808	2904	2394	3600	2666	1088	792	16252	46.43	VII
F5	6864	4620	2052	2000	1548	2142	924	20150	57.57	III
F6	3432	3960	4560	3500	3311	2448	1584	22795	65.13	I
F7	2496	3234	3534	3550	1720	2754	704	17992	51.41	V

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Table 4: Constraints faced by biopesticides producers in Marketing of biopesticides

S. No.	Particular	Rank
F1.	Awareness about biopesticides use	1st
F2.	Transportation and storage are costly	2nd
F3.	Packaging materials are not accessible	3rd
F4.	Limited distribution in marketing channels	4th
F5.	Resistance from conventional Agriculture	5th

Table 5: Percentage position and the matching value in the Garrett's table

Rank	Percentage Position	Garret Table	Score
1	100*(1-0.5)/5	10	75
2	100*(2-0.5)/5	30	60
3	100*(3-0.5)/5	50	50
4	100*(4-0.5)/5	70	40
5	100*(5-0.5)/5	90	25

Table 6: Multiply the Garret value by the specified value for every rank

Factors	1st*75	2nd*60	3rd*50	4th*40	5th*25	Total	Average score (Total/350)	Rank
F1	3450	2400	3000	2560	1700	13110	37.46	III
F2	4200	3720	2500	1280	1250	12950	37.00	IV
F3	6150	4620	2450	1760	1225	16205	46.30	I
F4	2700	2640	2100	2880	1550	11870	33.91	V
F5	6600	4200	1800	1600	900	15100	43.14	II

Conclusion

According to Result and Discussion main constraints after Garrett's ranking sequence as Packaging materials are not available, Resistance from conventional Agriculture, Awareness about biopesticides use, Transportation and storage are costly and Limited distribution in marketing channels.

The information received from study area farmers, 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 the study, by removing which the application of biopesticides can be promoted and this will prove to be a help in improving the environment.

According to result and discussion main constraints after Garrett's ranking sequence of marketing of biopesticides as lack of technical information, unavailability of skilled labour, lack of knowledge of devices and equipment, inadequate electricity supply, inadequate knowledge of package and practices, lack of training for production method and lack of knowledge of proper raw material and its chemical precautions.

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