PROMOTING AGRIPRENEURSHIP THROUGH SCIENTIFIC BEEKEEPING : A PAN INDIA OVERVIEW

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Promoting Agripreneurship through Scientific Beekeeping : A pan India Overview

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Acronyms

1. KVK- Krishi Vigyan Kendra
2. ATARI- Agricultural Technology Application Research Institutes
3. SC- Scheduled Caste
4. ST- Scheduled Tribe
5. Kg- Kilogram
6. F.Y – Financial Year
7. NBHM- National Beekeeping and Honey Mission
8. NBB- National Bee Board
9. DFI- Doubling Farmers Income
10. ICAR- Indian Council of Agricultural Research

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Foreword

The Agricultural Extension Division in Indian Council of Agricultural Research, New Delhi spearheading a network of 731 Krishi Vigyan Kendras (KVKs) under Agricultural Technology Application Research Institutes (ATARIs) spreading over 11 Zones across the country, has been playing a pivotal role in NARES in translating the agricultural research to development. In its pursuit of excellence, the SMD is actively engaged to reach the unreached small farm holders at the grass-root level under different micro agro-ecological conditions through various programmes like *Mera Gaon Mera Gaurav* (MGMG), CFLD (Oilseeds), CFLD (Pulses), Natural farming, NICRA, Skill Development in Agriculture, ARYA, NARI, and Farmers FIRST etc.

KVKs, perceived as the robust frontline extension mechanism in Indian Public extension system, are addressing the location specific problems of the respective districts and providing the need-based solution to problems. Keeping eye upon the changing paradigms of Indian agriculture, presently the spectrum of KVKs have been expanded a lot to address all day-to-day issues of farming community in a seamless manner. Currently, the KVKs are playing multi-dimensional roles starting from core mandated activities such as technology assessment, demonstration of cutting-edge techniques, up scaling and out scaling of technologies, envisioning agri-tech entrepreneurial opportunities in rural areas and skilling of rural youth and farm women for sustainable income generation.

I am happy to learn that ICAR-ATARI, Umiam has taken a timely initiative to bring out a publication on *"Promoting Agri-preneurship through Scientific Beekeeping : A pan India Overview"* compiling the information collected from 11 ATARI's of the country related to impact of capacity building on Beekeeping under a government sponsored programme implemented during 2020-2022. I compliment the Director, ICAR-ATARI, Umiam Dr. A. K.Mohanty and the entire editorial team for their effort to bring out this valuable publication. The efforts put by the editors and the contributors under the guidance of Dr R.R. Burman and Dr. R.K Singh, ADGs in the SMD in presenting the information in such a nice manner showing a tangible impact of the mission, which deserves appreciation. I am sure this publication will be of immense help to the farmers, other stakeholders and KVKs countrywide.

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PREFACE

Presently, the impacts of escalating climate change and amplified demands for nutritious food entwined with complex socio-economic dynamics of the farming community have created adverse situations affecting the livelihood security of millions of poor small farm holders across the globe, putting them into the vicious cycle of poverty and subsequently hampering the food and nutritional security of the large-scale farming community. Hence, there is urgent need to help these vulnerable people with alternative income generation in which KVK plays a pivotal role to bring a transformation in agriculture in a sustainable manner.

Krishi Vigyan Kendra (KVK) is considered as the science–based technology application institution at district level agro-climatic condition with a unique amalgamation of subject experts specializing in various facets of agriculture and has established its presence at the grass root level by spreading its wings in almost each and every district across the country.

Scientific beekeeping is perceived as a potential entrepreneurial option, which can support the millions of smallholder farmers of our country in attaining the food, nutritional, livelihood, income and environmental security. So, realizing the importance of beekeeping in Indian context, the Govt. of India has announced National Beekeeping and Honey Mission (NBHM) under *Atmanirbhar Bharat* Scheme to achieve the goal of Sweet Revolution implemented through the National Bee Board (NBB). The government approved an allocation of 500 Crores for the National Beekeeping and Honey Mission for three years from 2020-21 to 2022-23. In India beekeeping is mostly practised as a full-time occupation and an engrossing hobby to produce handsome income and table honey. This compilation entitled *"Promoting Agri-preneurship through Scientific Beekeeping : A pan India Overview"* has been prepared by synthesizing the information on the training programmes conducted by 100 KVKs across 11 zones under Agricultural Technology Application Research Institutes (ATARIs) in the country during 2020-22.

We must place on record our sincere thanks to all the KVKs and ATARIs for conducting the training programmes on beekeeping successfully and providing the required inputs in time for bringing out this valuable document. We express our deep gratitude and heartfelt thanks to all of our esteemed colleagues in the SMD (AE), Directors ATARIs, KVK Heads and SMSs associated with this programme for their whole-hearted cooperation and intellectual inputs that helped us in bringing out this manuscript. Lastly, we whole-heartedly appreciate the initiative of team ATARI, Zone-VII, Umiam, Meghalaya for their painstaking efforts for compilation and preparation of the manuscript. We are quite hopeful that this document will help our farmers, KVK scientists, field extension functionaries, start-ups and entrepreneurs across the country to make the right choice for adoption of beekeeping as a viable alternative enterprise for boosting farm income amidst the climate change scenario.

Editors

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Chapter 1

Introduction

In a diverse and resource-rich country like India, beekeeping emerges as a flourishing and well-established agricultural enterprise. It not only harnesses the intrinsic health benefits of bee products but also generates multiple avenues for agri-business opportunities and income generation in addition to increasing crop production through natural pollination. Unlike many agricultural pursuits, beekeeping doesn't demand cutting-edge technology, substantial financial investments, or extensive infrastructure. Instead, it thrives as a supplementary activity within integrated agricultural systems, bolstering the income of farming communities across the nation.

Scientific beekeeping has witnessed significant growth and development in India in recent years, contributing substantially to both the agricultural and economic landscapes. This practice, known as apiculture, involves the meticulous management of bee colonies for honey production and pollination services. It plays a pivotal role in enhancing agricultural productivity through improved crop pollination and offers a sustainable source of income for beekeepers.

Several factors have propelled the rise of scientific beekeeping in India. These include the increasing recognition of pollinators' vital role in crop production, surging demand for high-quality honey in domestic and international markets, and government initiatives aimed at promoting beekeeping as a livelihood option. State agricultural universities, research institutions, and Krishi Vigyan Kendras (KVKs) are actively engaged in research and extension activities, fostering modern and sustainable beekeeping practices nationwide.

Key features of scientific beekeeping in India encompass the adoption of modern techniques, such as the use of movable frame hives, the cultivation of improved bee breeds, and the application of scientific principles for effective colony management. This approach has not only led to increased honey production but has also elevated the quality of honey and other bee-related products. Furthermore, scientific beekeeping aligns with environmental conservation efforts by safeguarding the health and welfare of honeybee populations, which serve as vital pollinators for a wide array of crops.

Scientific beekeeping doesn't solely drive economic growth and agricultural sustainability; it also presents opportunities for income generation and livelihood improvement, particularly in rural areas. It empowers beekeepers with knowledge and skills to efficiently manage their apiaries, thus contributing to their economic well-being. In essence, scientific beekeeping in India represents a promising sector that marries modern practices with traditional wisdom, thereby contributing to sustainable agriculture, rural development, and biodiversity conservation.

As the importance of pollinators continues to soar, the scientific approach to beekeeping plays a pivotal role in ensuring food security, economic prosperity, and environmental sustainability in the country. Recognizing the significance of beekeeping in the Indian context, the Government of India announced the National Beekeeping and Honey Mission (NBHM) under the *Atmanirbhar Bharat* Scheme. This mission aims to usher in a "Sweet Revolution" and is overseen by the National Bee Board (NBB) under the Ministry of Agriculture and Farmers' Welfare. The government has allocated 500 crores for the National Beekeeping and Honey Mission for the three-year period from 2020-21 to 2022-23.

Understanding the immense potential of Beekeeping in Doubling Farm Income (DFI) and empowering the farming community while promoting environmental sustainability through entrepreneurship and agri-start-ups, the Indian Council of Agricultural Research (ICAR), headquartered in New Delhi, has embarked upon a grand initiative of capacity building of stakeholders on scientific beekeeping. This initiative was taken in collaboration with the Ministry of Agriculture and Farmers' Welfare, Government of India, with the aim of conducting capacity-building programs on 'Scientific Beekeeping' across the length and breadth of the country by involving 100 KVKs, spanning over 27 states strategically located under the purview of 11 Agricultural Technology Application Research Institutes (ATARIs) across the nation.

This initiative seeks to build the capacity of beekeepers in crucial areas such as honey production, optimizing the utilization of local flora, effective marketing strategies, and branding. The success of beekeeping businesses depends significantly on these aspects, as they not only enhance the quality of products but also facilitate market access and recognition.

KVKs, operating at the district level, play a pivotal role in providing vocational training in beekeeping. They serve as hubs for imparting practical skills to rural youth, grooming them to become proficient beekeepers and potential entrepreneurs. In doing so, they contribute substantially in realizing the overarching goal of the "Sweet Revolution."

Notably, Beekeeping has also become a means through which rural women are effectively generating income. Such activities offer rural women a unique opportunity

to participate in the economic process, fostering gender equality and empowerment. Various training programs geared towards skill development and entrepreneurial growth for rural communities, especially women, have been organized with the overarching aim of enhancing their quality of life.

The impact of these skill development programs and methodologies becomes evident when applied in the field. Honeybee training, in particular, demonstrates its potential in increasing the participation of women in business ownership, microfinance activities, and financial markets. As beekeeping continues to flourish in India, it not only contributes to economic growth but also serves as a symbol of empowerment and sustainability, encapsulating the nation's rich agricultural heritage and its promising future on the global stage.

Table 1.1: Scientific beekeeping training programmes organised during 2020-2021

S. No.	ATARI	Physical Training organised			Online training organised		
		No. of KVK	No. of training	No. of participants	No. of KVK	No. of training	No. of participants
1	Zone-I, Ludhiana	3	3	75	0	0	0
2	Zone-II, Jodhpur	1	1	27	2	2	80
3	Zone-III, Kanpur	0	0	0	0	0	0
4	Zone-IV, Patna	14	38	932	6	6	205
5	Zone-V, Kolkata	14	21	525	0	0	0
6	Zone-VI, Guwahati	1	4	55	1	2	30
7	Zone-VII, Umiam	3	9	222	1	1	69
8	Zone-VIII, Pune	9	15	359	3	26	153
9	Zone-IX, Jabalpur	9	21	560	5	5	134
10	Zone-X, Hyderabad	3	3	81	3	3	179
11	Zone-XI, Bengaluru	3	7	164	4	4	282
	Total	**60**	**122**	**3000**	**25**	**49**	**1132**

Table 1.2: Scientific beekeeping training programmes organised during 2021-2022

S. No.	ATARI	Physical Training organised			Online training organised		
		No. of KVK	No. of training	No. of participants	No. of KVK	No. of training	No. of participants
1	Zone-I, Ludhiana	15	71	1851	14	14	395
2	Zone-II, Jodhpur	8	39	1000	7	6	344
3	Zone-III, Kanpur	4	16	400	2	2	76
4	Zone-IV, Patna	13	33	830	7	7	331
5	Zone-V, Kolkata	15	26	653	4	4	113
6	Zone-VI, Guwahati	5	25	1130	4	4	288
7	Zone-VII, Umiam	3	6	157	1	1	61
8	Zone-VIII, Pune	10	35	935	7	7	387
9	Zone-IX, Jabalpur	10	33	913	5	5	195
10	Zone-X, Hyderabad	12	56	1392	9	13	718
11	Zone-XI, Bengaluru	4	15	370	4	4	339
	Total	**99**	**355**	**9631**	**64**	**67**	**3247**

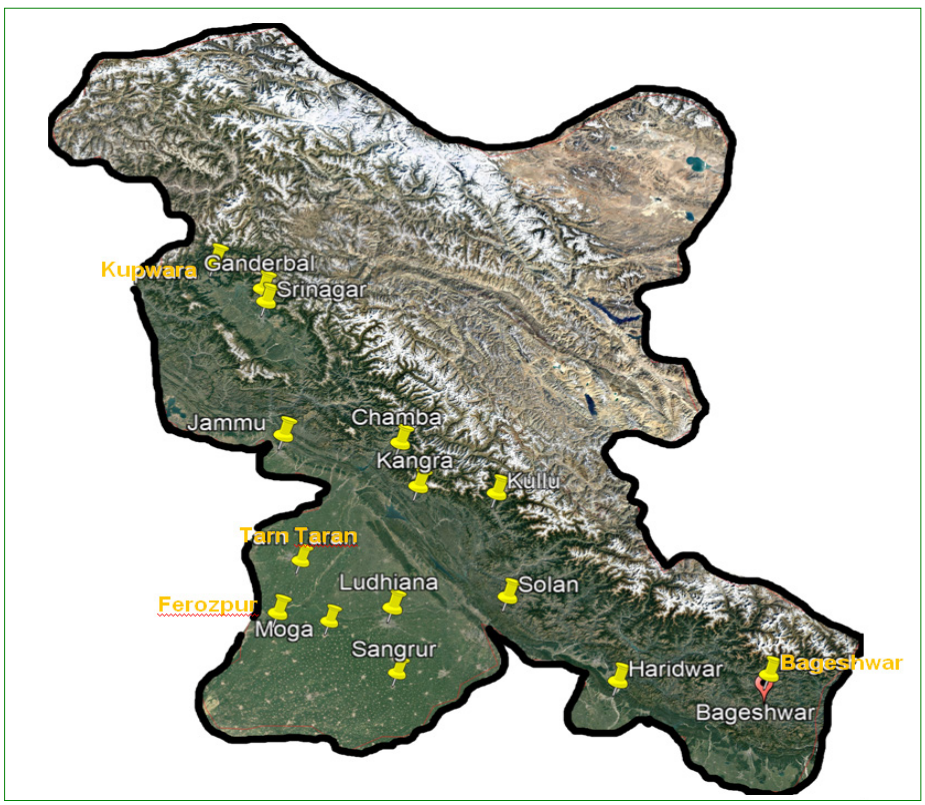
Table 1.3: Details of beekeeping enterprise (apiary) started by the trainees after getting training

S. No.	State	No. of KVK	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of boxes)	Average honey production (kg/box)
1.	Zone-I, Ludhiana	10	254	1172	64
2.	Zone-II, Jodhpur	7	70	925	187
3.	Zone-III, Kanpur	3	39	21	25

4.	Zone-IV, Patna	12	270	226	35
5.	Zone-V, Kolkata	16	201	166	65
6.	Zone-VI, Guwahati	5	175	46	6.5
7.	Zone-VII, Umiam	3	53	208	11
8.	Zone-VIII, Pune	9	41	83	47
9.	Zone-IX, Jabalpur	9	255	287	36
10.	Zone-X, Hyderabad	11	212	39	11
11.	Zone-XI, Bengaluru	4	66	234	12
	Total	**89**	**1636**	**3407**	**499.5**

Chapter 2

1. Overview of Training Programmes conducted by KVKs under Zone-I, Ludhiana



Picture 1 Map showing KVKs involved in Scientific Beekeeping Training under Zone-I

The Table 2.1 provides data on scientific beekeeping through physical training conducted in Punjab during the fiscal year 2020-2021. However, no online training programme was conducted by any KVK in the zone during the period. From the table, it is found that a total of 75 farmers attended the training programme of 7 days duration. This included 61 male farmers and 14 female farmers. The percent share of female farmers constituted 18% of the total beneficiaries in such training on scientific beekeeping.

Table 2.1: Scientific beekeeping training programmes (physical) organised in Zone-I during 2020-2021

Sl. No.	State	No. of KVK	No. of physical training conducted	No. of participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Punjab	3	3	9	1	52	13	61	14	75
Total		3	3	9	1	52	13	61	14	75

When we compare the participation across the three districts, it becomes evident that there is a significant gender disparity in beekeeping training. The majority of participants were male, with only a small proportion of females were taking part. This highlights the need for initiatives to encourage more females to engage in beekeeping and address gender imbalances in this sector.

Picture 2. Beekeeping Unit established in Srinagar

Table 2.2: Scientific beekeeping training programmes (physical) organised in Zone-I during 2021-2022

Sl. No.	State	No. of KVK	No. of physical training conducted	No. of participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Punjab	5	20	128	43	258	53	386	96	482
2	Himachal Pradesh	4	20	173	45	250	25	423	70	493
3	Jammu & Kashmir	4	21	117	37	276	190	0	227	620
4	Uttarakhand	2	10	27	14	207	8	234	22	256
Total		15	71	445	139	991	276	1436	415	1851

The above table 2.2 provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 A total of 71 physical Training Programmes were conducted for 1851 participants, which included 1436 male and 415 female. State-wise, Punjab had a total of 482 participants, with 386 males and 96 females, Himachal Pradesh had 493 participants, with 423 males and 70 females, Jammu& Kashmir had 620 participants, with 393 males and 227 females and Uttarakhand had 256 participants, with 234 males and 22 females. Overall, there's a notable gender gap, with more males participating in physical training sessions compared to females in all states.

Table 2.3: Scientific beekeeping training programmes (online) organised in Zone-I during 2021-2022

Sl. No	State	No. of KVK	No. of online training conducted	No. Of Participants						
				SCs/STs		Others		Total		Total
				M	F	M	F	M	F	
1	Punjab	4	4	15	5	63	16	78	21	99
2	Himachal Pradesh	4	4	36	16	29	20	65	36	101
3	Jammu & Kashmir	4	4	13	0	91	21	104	21	125
4	Uttarakhand	2	2	11	1	52	6	63	7	70
Total		14	14	75	22	235	63	310	85	395

With regard to online training, as many as 14 Training Programmes were conducted by 14 KVKs under the zone for 395 participants during 2021-22. Punjab had 99 participants, with 78 males and 21 females, Himachal Pradesh had 101 participants, with 65 males and 36 females, Jammu& Kashmir had 125 participants, with 104 males and 21 females, Uttarakhand had 70 participants, with 63 males and 7 females. Similarly in online training programmes, number of male participants was higher than that of female participants. Across both physical and online beekeeping training, there is a consistent gender disparity, with a higher number of male participants compared to female participants. To promote gender equity in the beekeeping sector, efforts should be made to encourage and support more female participation in these training programs.

Table 2.4: Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-I

S. No.	State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
1	Punjab	3	121	285	14
2	Himachal Pradesh	3	28	112	30
3	J&K	2	32	569	5
4	Uttarakhand	2	73	206	15
Total		10	254	1172	64

Table 2.4 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 254 beekeeping units (apiary) with 1172 nos. of boxes had been established by farmers in their farming situations with technical supports from 10 KVKs. The average production of 64 kg/box of honey was reported across the beekeeping units in the zone. The table also provides details of beekeeping enterprises (apiaries) established by trainees in different states. In Punjab, Ludhiana trainees established 121 beekeeping units with an average of 285 bee boxes each, producing 14 kg of honey per box. In Himachal Pradesh, farmers could establish 28 beekeeping units, with 112 bee boxes per unit, producing 30 kg of honey per box. In Jammu & Kashmir, Farmers established 32 beekeeping units, with an average of 569 bee boxes per unit, producing 5 kg of honey per box. In Uttarakhand, farmers set up 73 beekeeping units, with 206 bee boxes, producing 15 kg of honey per box.

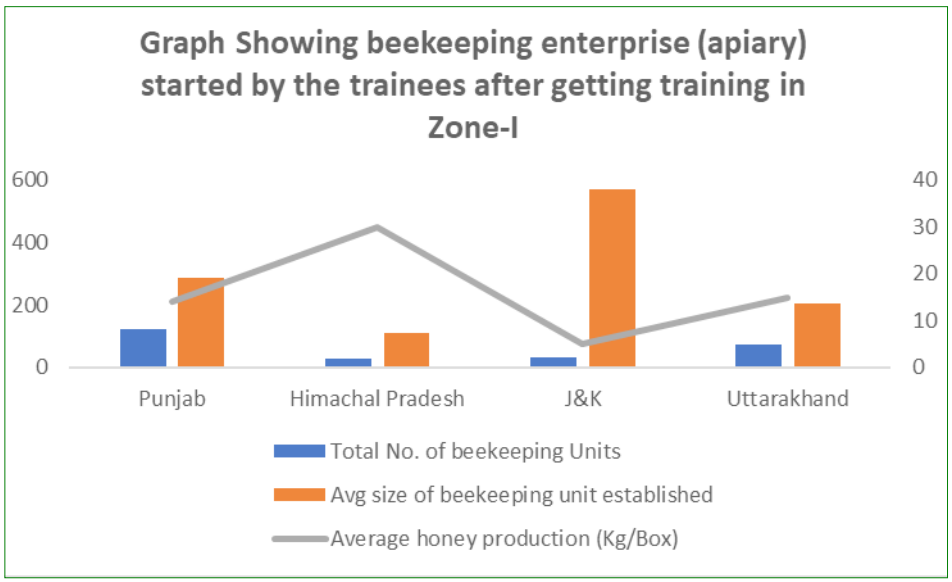
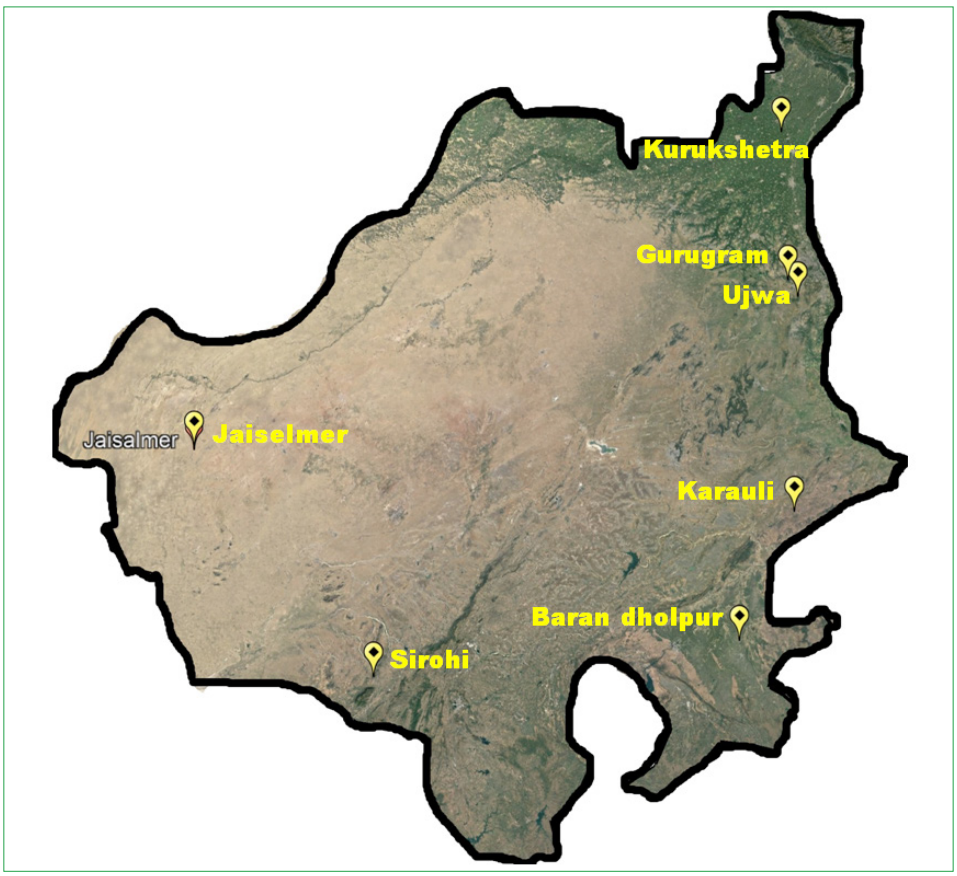


Figure 1 Graph Showing Beekeeping enterprize established in Zone -I

Picture 3. Handling of Honey Bee during training in Kulu, Himachal Pradesh

Chapter 3

2. Overview of Training Programmes conducted by KVKs under Zone -II, Jodhpur



Picture 4 Map showing KVKs involved in Scientific Beekeeping Training under Zone-II

Table 3.1 presents data on scientific beekeeping training conducted by KVKs under Zone-II, Jodhpur during the fiscal year 2020-21. Only 1 KVK out of 8 participating KVKs, namely KVK Sirohi, Rajasthan conducted 1 Physical training during the period which included a total of 27 individual participants, 24 male participants and 3 female participants.

Table 3.1 : Scientific beekeeping training programmes (physical) organised in Zone-II during 2020-2021

Sl. No.	State	No. of KVK	No. of physical training conducted	No. of participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Rajasthan	1	1	1	1	23	2	24	3	27
Total			**1**	**1**	**1**	**23**	**2**	**24**	**3**	**27**

Subsequently, two online Training Programmes (Table 3.2) were conducted by KVKs in Haryana and Rajasthan for 80 individual participants with 73 male and 7 female participants.

Table 3.2 : Scientific beekeeping training programmes (online) organised in Zone-II during 2020-2021

Sl. No	State	No. of KVK	No. of Physical Training conducted	No. of participants						Total
				SCs/STs		Others		Total		
				Male	Female	Male	Female	Male	Female	
1	Haryana	1	1	0	0	25	1	25	1	26
2	Rajasthan	1	1	2	2	46	4	48	6	54
Total		**2**	**2**	**2**	**2**	**71**	**5**	**73**	**7**	**80**

Table 3.3: Scientific beekeeping training programmes (physical) organised in Zone-II during 2021-2022

Sl. No	State	No. of KVK	No. of Physical Training conducted	No. of Participants						Total
				SC/ST	ST/SC	Other	Other	Total	Total	
				Male	Female	Male	Female	Male	Female	
1	Haryana	2	10	15	6	173	58	188	64	252
2	Rajasthan	5	24	100	19	486	21	586	40	626
3	Delhi	1	5	5	2	101	14	106	16	122
Total		**8**	**39**	**120**	**27**	**760**	**93**	**880**	**120**	**1000**

Table 3.3 provides an overview of scientific beekeeping training during the fiscal year 2021-2022. A total of 1000 individual participants participated from Zone-II, in physical training during period, which included 880 males and 120 females. The percent share of female farmers constituted only 12% of the total beneficiaries. In the state of

Rajasthan significantly higher number of males (586) can be seen participating in the physical training compared to females (40), followed by Haryana with 188 male and 64 female participants. Efforts to promote gender inclusivity in beekeeping training programs may help address this imbalance and encourage more female participation in the sector.

Table 3.4 : Scientific beekeeping training programmes (online) organised in Zone-II during 2021-2022

Sl. No	State	No. of KVKs	No. of online training conducted	No. of participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Haryana	2	1	0	0	20	11	20	11	31
2	Rajasthan	4	4	52	4	149	14	201	18	219
3	Delhi	1	1	2	1	84	7	86	8	94
Total		7	**6**	**54**	**5**	**253**	**32**	**307**	**37**	**344**

Subsequently, 6 online Training Programmes were conducted, which included 344 total participants from Haryana, Rajasthan and Delhi. Highest participants were seen from Rajasthan with a total of 219 participants, 201 males and 18 females. This was followed by Delhi with 94 participants. In total, across online training sessions, there were 307 male participants and 37 female participants.

Table 3.5 : Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-II

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Rajasthan	4	56	204	28
Haryana	2	9	30	25
Delhi	1	5	50	25
Total	**7**	**70**	**284**	**78**

Table 3.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 70 beekeeping units (apiary) with 284 nos. of boxes had been established by farmers in their farming situations with technical supports from 7 KVKs. The average production of 78 kg/

box of honey was reported across the beekeeping units. In total, Rajasthan had 56 Beekeeping units with 204 bee boxes, Haryana had a total of 9 units with 30 bee boxes, and Delhi had 5 apiary units with 50 bee boxes producing 25 Kg / Box on average. Overall, the data indicates varying levels of beekeeping success across the states, with Rajasthan leading in the number of Beekeeping units and honey production per box, followed by Haryana and Delhi.

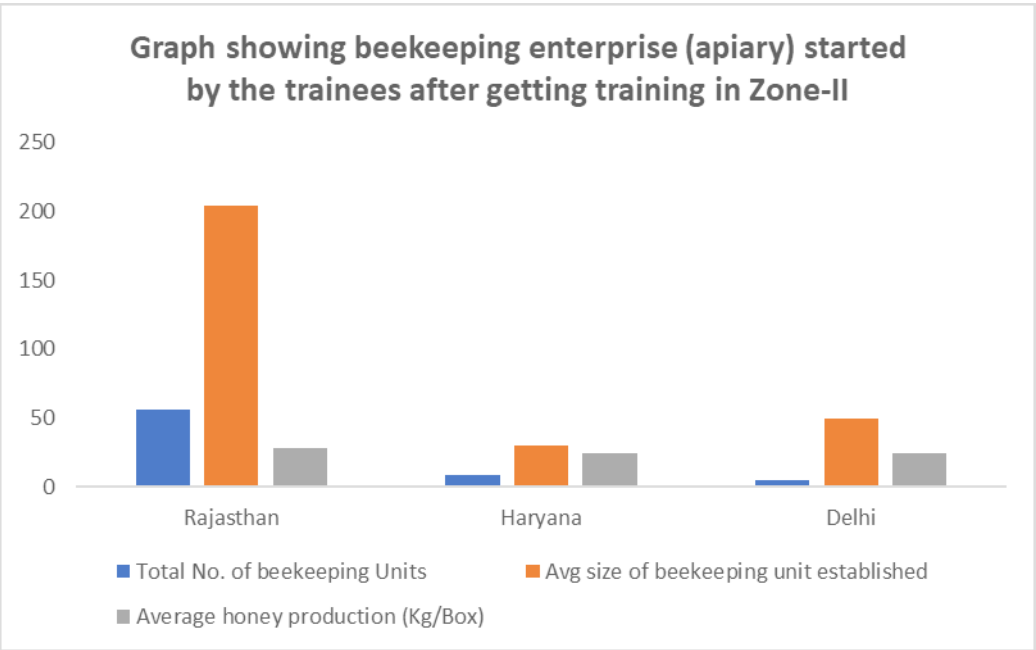
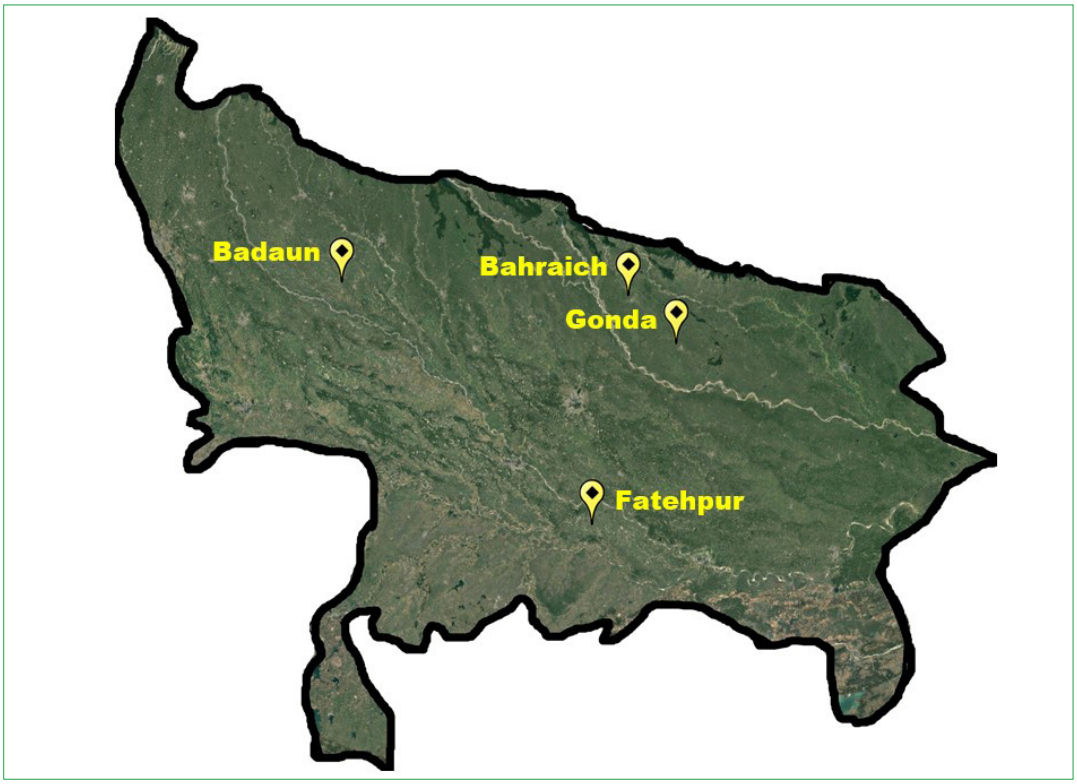


Figure 2. Graph showing beekeeping enterprize established in Zone II

Chapter 4

3. Overview of Training Programmes conducted by KVKs under Zone -III, Kanpur



Picture 5. Map showing KVKs involved in Scientific Beekeeping in Zone III

The table below provides an overview of scientific beekeeping training during the fiscal year 2021-2022 in Uttar Pradesh. From the table, it is found that a total of 400 farmers attended the training programme of 7 days duration. This included 344 male farmers and 56 female farmers. The percent share of female farmers constituted 14 % of the total beneficiaries in such training on scientific beekeeping.

Table 4.1: Scientific beekeeping training programmes (Physical) organised in Zone-III during 2021-22

Sl. No.	State	No. of KVK	No. of physical training conducted	No. of participants						Total
				SCs/STs		Others		Total		
				Male	Female	Male	Female	Male	Female	
1	Uttar Pradesh	4	16	54	13	290	43	344	56	400
Total		4	16	**54**	**13**	**290**	**43**	**344**	**56**	**400**

With regard to online training, only 2 Training Programmes were conducted by 2 KVKs under the zone for 76 participants during 2021-22 with 66 males and 10 females. Hence, the number of male participants was higher than that of female participants in online mode as well.

Table 4.2 : Scientific beekeeping training programmes (online) organised in Zone-III during 2020-2021

Sl. No	State	No. of KVK	No. of Online training conducted	No. of Participants						Total
				SC/ST		Others		Total		
				Male	Female	Male	Female	Male	Female	
1	Uttar Pradesh	2	2	9	2	57	8	66	10	76
Total			2	9	2	57	8	66	10	76

Table 4.3 . Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-III

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Uttar Pradesh	3	39	21	25
Total	**3**	**39**	**21**	**25**

Table 12 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 39 beekeeping units (apiary) with 21 nos. of boxes had been established by farmers in their farming situations with technical supports from 3 KVKs. The average production of 25 kg/box of honey was reported across the beekeeping units.

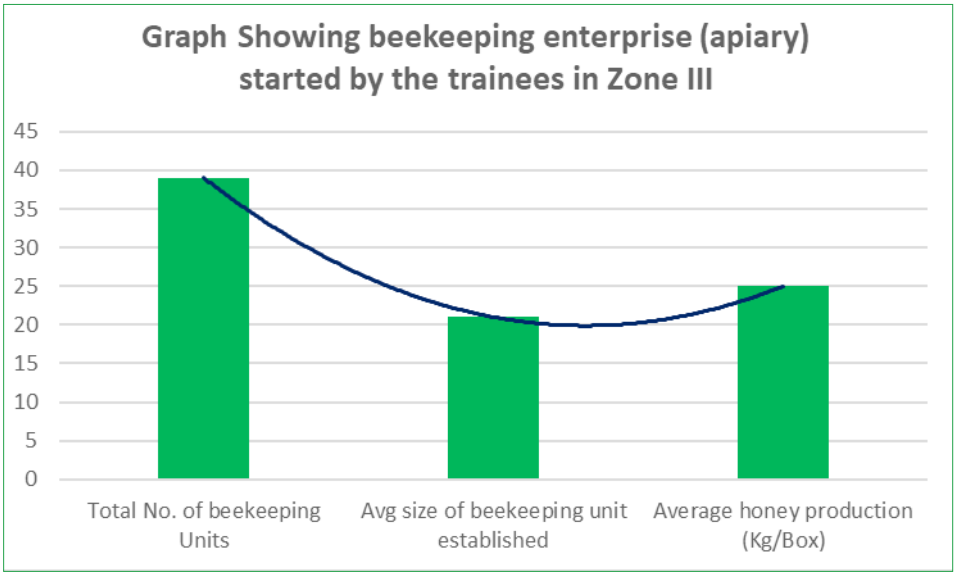
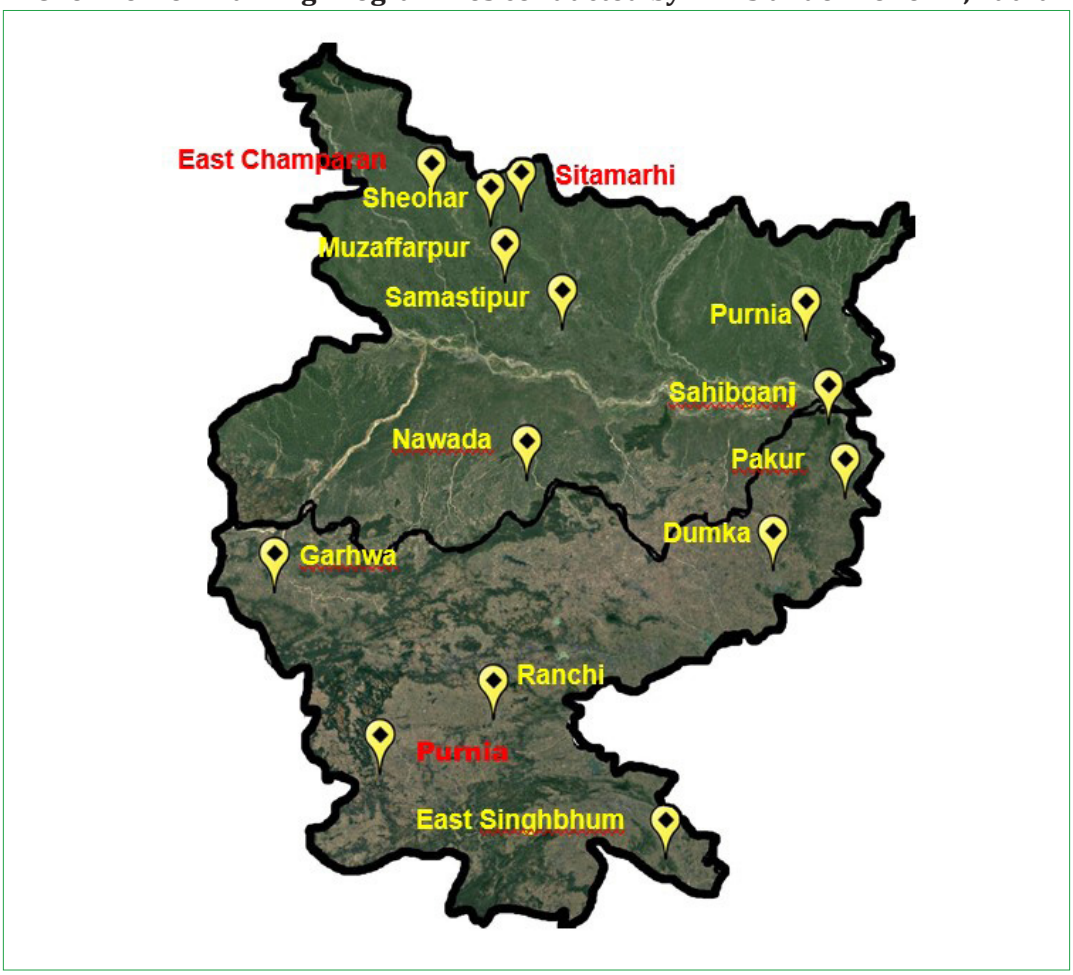


Figure 3. Graph showing Beekeeping enterprizes established in Zone III

Chapter 5

4. Overview of Training Programmes conducted by KVKs under Zone -IV, Patna



Picture 6. Map showing KVKs involved in Scientific Beekeeping Training in Zone IV

Data presented in Table 5.1 show details of scientific beekeeping training conducted by KVKs under Zone-IV during the fiscal year 2020-2021 in Bihar and Jharkhand. From the table, it is found that a total of 932 farmers attended the physical training programme of 7 days duration. This included 687 male farmers and 210 female farmers. The percent share of female farmers constituted 22% of the total beneficiaries in such training on scientific beekeeping. It is noted that among the two states, Bihar has highest participants (500), with 397 males and 103 females. The total participants in Jharkand was 432, with 290 males and 107 females. It is seen that women participation in Jharkhand state is more than Bihar. Hence there is scope for engaging females in beekeeping and address gender imbalances in this sector.

Table 5.1 Scientific beekeeping training programmes (physical) organised in Zone-IV during 2020-2021

Sl. No.	State	No. of KVK	No. of physical training conducted	No. of participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Bihar	7	20	30	9	367	94	397	103	500
2	Jharkhand	7	18	202	72	92	52	290	107	432
Total		**14**	**38**	**232**	**81**	**459**	**146**	**687**	**210**	**932**

Subsequently, in online training, as many as 6 Training Programmes as shown in table 5.2 were conducted by 6 KVKs, involving 205 farmers. It is reported that 146 males and 59 females participated in online Training Programmes conducted by KVKs. Only 28 % female participated in Online training during 2020-21.

Table 5.2 : Scientific beekeeping training programmes (online) organised in Zone-IV during 2020-2021

Sl. No.	State	No. of KVK	No. of Online training conducted	No. of Participants						
				SCs/STs		Others		Total		Total
				Male	Female	Male	Female	Male	Female	
1	Bihar	**4**	4	14	8	75	18	89	26	115
2	Jharkhand	**2**	**2**	28	21	29	12	57	33	90
Total		**6**	**6**	**42**	**29**	**104**	**30**	**146**	**59**	**205**

The table below provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the zone. A total of 33 physical Training Programmes were conducted for 830 participants, which included 497 male and 293 female. State-wise, Jharkhand had a total of 454 participants, with 249 males and 165 females, followed by Bihar with 376 participants, including 248 males and 128 females. Overall, there's a notable gender gap, with more males participating in physical training sessions compared to females in all states.

Table 5.3: Scientific beekeeping training programmes (physical) organised in Zone-IV during 2021-2022

State	No. of KVK	No. of physical training conducted	No. of Participants						
			SC/ST		Other		Total		Total
			Male	Female	Male	Female	Male	Female	
Bihar	6	15	41	23	207	105	248	128	376
Jharkhand	7	18	165	112	98	44	249	165	454
Total	**13**	**33**	**206**	**135**	**305**	**149**	**497**	**293**	**830**

However, in online training, as many as 7 Training Programmes were conducted by 7 KVKs under the zone for 331 participants during 2021-22. Jharkhand had 277 participants, with 225 males and 52 females and Bihar had only 54, with 51 males and 3 females

Table 5.4: Scientific beekeeping training programmes (online) organised in Zone-IV during 2021-2022

State	No. of KVK	No. of Online training conducted	No. of Participants						
			SC/ST		Other		Total		Total
			Male	Female	Male	Female	Male	Female	
Bihar	2	2	4	0	47	3	51	3	54
Jharkhand	5	5	125	21	100	31	225	52	277
Total	**7**	**7**	**129**	**21**	**147**	**34**	**276**	**55**	**331**

With a significantly higher number of males participating compared to females in beekeeping training programs in both Bihar and Jharkhand, there has been an effort to include more female participants in online training. Efforts to further promote gender inclusivity in beekeeping training may help address this imbalance and encourage more female participation in the sector.

Table 5.5 Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-IV

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Bihar	6	110	160	17
Jharkhand	6	160	66	18
Total	**12**	**270**	**226**	**35**

The Table 5.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 270 beekeeping units (apiary) with 226 nos. of boxes had been established by farmers in their farming situations with technical supports from 12 KVKs. The average production of 35 kg/box of honey was reported across the beekeeping units**.** In Bihar, trainees established a total of 110 beekeeping units across various districts. In Bihar a Farmers established 110 beekeeping units and 160 bee boxes and an average honey production of 17 kg per box. In Jharkhand, trainees set up a total of 160 beekeeping units, with 66 bee boxes and an average honey production of 18 kg per box.

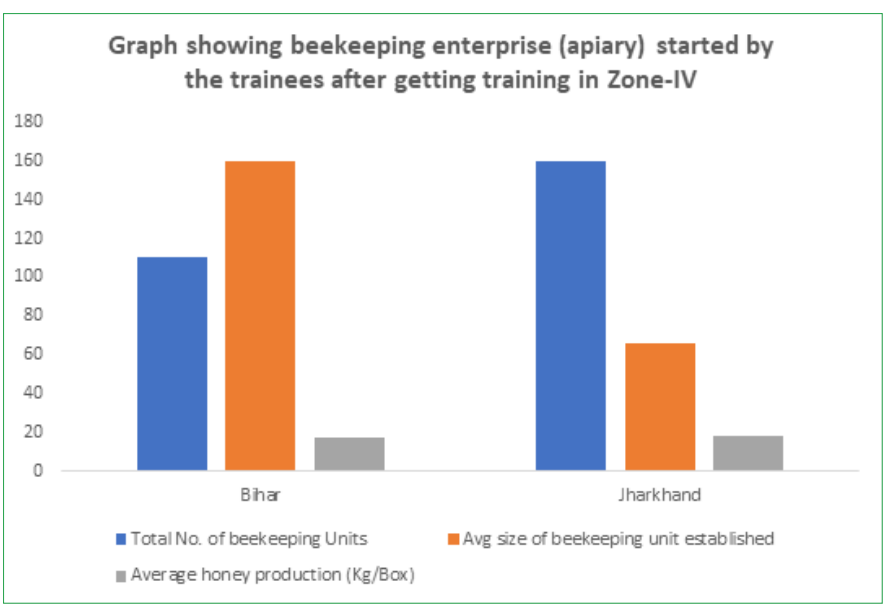
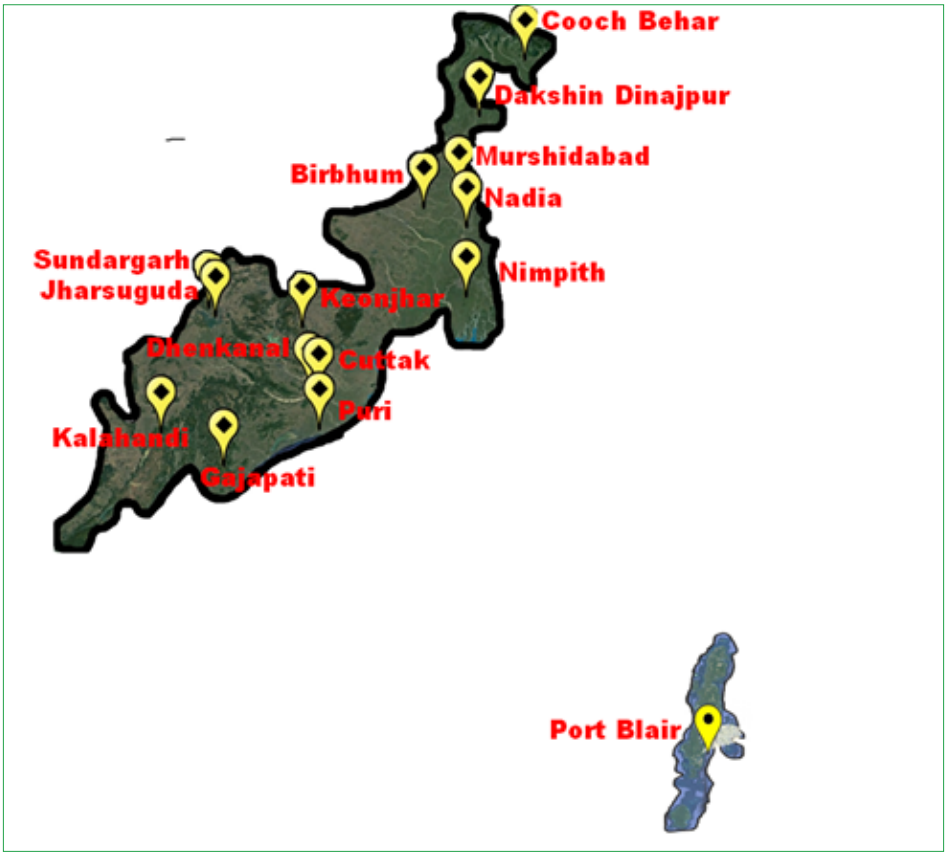


Figure 4. Graph Showing Beekeeping enterprize established in Zone IV

Chapter 6

5. Overview of Training Programmes conducted by KVKs under Zone -V, Kolkata



Picture 7. Map showing KVKs involved in Scientific Beekeeping Trainingin Zone V

The Table 6.1 depicts details of information on scientific beekeeping through physical training conducted by KVKs under Zone –V, during the fiscal year 2020-2021. However, no online training programme was conducted by any KVK in the zone during the period. From the table, it is found that a total of 525 farmers attended the training programme of 7 days duration.

Table 6.1 : Scientific beekeeping training programmes (physical) organised in Zone-V during 2020-2021

State	No of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Odisha	8	13	67	41	136	81	203	122	325
West Bengal	6	8	47	14	104	35	151	49	200
Total	**14**	**21**	**114**	**55**	**240**	**116**	**354**	**171**	**525**

This included 354 male farmers and 171 female farmers. The percent share of female farmers constituted 30 % of the total beneficiaries in such training on scientific beekeeping.

The majority of participants were male, with only a small proportion of females were taking part. This highlights the need for initiatives to encourage more females to engage in beekeeping and address gender imbalances in this sector. Among the 3 states, Odisha had highest number of participants (325) including 203 males and 122 females followed by west Bengal having 200 individual participants including 151 male and 49 females. This shows that Odisha has more women involvement in beekeeping practices than West Bengal and Andaman & Nicobar Islands under Zone V.

Table 6.2 : Scientific beekeeping training programmes (physical) organised in Zone-V during 2021-2022.

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
A&N Islands	1	3	21	9	45	13	56	22	78
Odisha	8	11	65	21	133	56	198	77	275
West Bengal	6	12	79	29	148	56	218	85	300
Total	**15**	**26**	**165**	**59**	**326**	**125**	**472**	**184**	**653**

The above table provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the zone V. A total of 26 physical Training Programmes were conducted for 653 participants, which included 472 male and 184 females during the period. State-wise, West Bengal had a

total of 300 participants, with 218 males and 85 females, Odisha had 275 participants, with 198 males and 77 females and Andaman & Nicobar Islands had 78 participants, with 56 males and 22.

Table 6.3: Scientific beekeeping training programmes (online) organised in Zone-V during 2021-2022

State	No. of KVK	No. of online training conducted	No. of Participants						
			SC/ST		Others		Total		Total
			Male	Female	Male	Female	Male	Female	
West Bengal	4	**4**	**30**	**17**	**41**	**25**	**71**	**42**	**113**
Total	**4**	**4**	**30**	**17**	**41**	**25**	**71**	**42**	**113**

With regard to online training, 4 Training Programmes were conducted by 4 KVKs of West Bengal under the zone for 113 participants during 2021-22. West Bengal had 113 participants, with 71 males and 42 females. However, no online training was conducted by KVKs in Odisha and Andaman & Nicobar Islands during the period.

Table 6.4: Details of beekeeping enterprise (Apiary) started by the trainees in Zone V

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
A&N Islands	1	2	10	25
Odisha	8	156	128	20
West Bengal	7	43	28	20
Total	**16**	**201**	**166**	**65**

The table 6.4 above shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 201 beekeeping units (apiary) with 166 nos. of boxes had been established by farmers in their farming situations with technical supports from 16 KVKs. The average production of 65 kg/box of honey was reported across the beekeeping units. The State-wise breakdown shows that in the Andaman & Nicobar Islands, 2 beekeeping units were established with 10 bee boxes each, resulting in an impressive honey production of 25 kg per box. In Odisha, trainees across various districts established a total of 156 beekeeping units.

In Odisha had a total of 128 bee boxes and an average honey production of 20 kg per box. In West Bengal, a total of 43 beekeeping units were established producing 20 kg/ box honey.

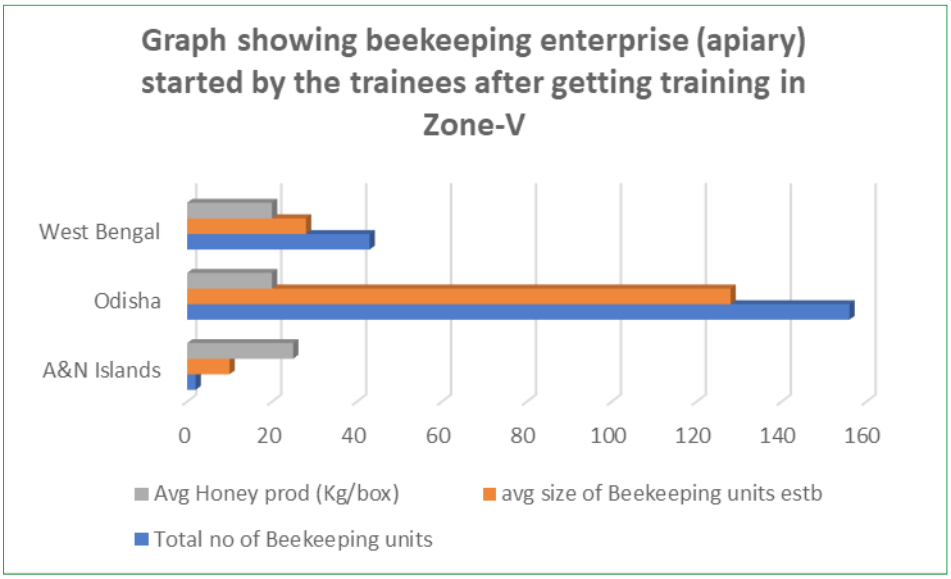


Figure 5. Graph showing Beekeeping Enterprize established in Zone V

Chapter 7

6. Overview of Training Programmes conducted by KVKs under Zone -VI, Guwahati

Picture 8. Map showing KVKs involved in Scientific Beekeeping Training in Zone VI

Table 7.1 provides information on beekeeping training conducted by KVKs in Arunachal Pradesh under Zone-VI, Guwahati during the 2020-21. No KVK in Assam conducted the Training Programmes on scientific beekeeping during the period. In the Physical Training section, 4 training sessions were conducted for 55 participants. Among these, there were 16 male participants and 39 female participants, emphasizing a significant presence of female trainees in beekeeping. Subsequently, in the Online Training, 2 training sessions were conducted by KVK East Kameng for 30 participants. In this case, 12 participants were male and 18 were female, indicating a significant number of female representations in the online training sessions.

Table 7.1: Scientific beekeeping training programmes (physical) organised in Zone-VI during 2020-2021

Sl. No	State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
				SC/ST		Others		Total		
				Male	Female	Male	Female	Male	Female	
1	Arunachal Pradesh	East Kameng	4	16	39	0	0	16	39	55
Total			**4**	**16**	**39**	**0**	**0**	**16**	**39**	**55**

Table 7.2: Scientific beekeeping training programmes (online) organised in Zone-VI during 2020-2021

State	No. of KVK	No. of online training conducted	No. of participants						
			SCs/STs		Others		Total		Total
			Male	Female	Male	Female	Male	Female	Total
Arunachal Pradesh	1	2	12	18	0	0	12	18	30
Total	**1**	**2**	**12**	**18**	**0**	**0**	**12**	**18**	**30**

Both Physical and Online Training Programmes appeared to have attracted female participants This suggests that there may be opportunities to improve female participation in online training programs and further promote gender equity in the beekeeping sector.

Table 7.3: Scientific beekeeping training programmes (physical) organised in Zone-VI during 2021-2022

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Other		Total		
			Male	Female	Male	Female	Male	Female	
Arunachal Pradesh	3	15	109	451	126	139	235	590	825
Sikkim	2	10	120	81	71	33	191	114	305
Total	**5**	**25**	**229**	**532**	**197**	**172**	**426**	**704**	**1130**

Table 7.4: Scientific beekeeping training programmes (online) organised in Zone-VI during 2021-2022

State	No. of KVK	No. of online training conducted	No. of participants						
			SCs/STs		Others		Total		Total
			Male	Female	Male	Female	Male	Female	Total
Arunachal Pradesh	2	2	69	62	0	0	69	62	131
Sikkim	2	2	31	22	71	33	102	55	157
Total	**4**	**4**	**100**	**84**	**71**	**33**	**171**	**117**	**288**

The above Table 7.4 presents a detailed overview of scientific beekeeping training conducted by KVKs in Arunachal Pradesh, Assam and Sikkim during the fiscal year 2021-22 under the zone VI. The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 25 physical Training Programmes were conducted for 1130 participants, which included 426 male and 704 female. About 62 % of the total participants were females. This shows a notable increase in women participation in beekeeping. State-wise, data show that Arunachal Pradesh had a total of 825 participants, with 235 males and 590 females. Similarly, Sikkim had 305 participants, with 191 males and 141 females. This shows that Women participation in Arunachal Pradesh is more prominent as compared to the state of Sikkim. With regard to online training, as many as 4 Training Programmes were conducted by 4 KVKs under the zone for 288 participants during 2021-22. Sikkim had 155 participants while Arunachal Pradesh had 131 participants. In online training programmes, number of male participants (102) was higher in Sikkim than that of female participants. (55). In case of Arunachal Pradesh, a balanced gender ratio can be seen with 69 males and 62 female participants. Hence, these training programs appear to be striving for gender inclusivity and empowerment of women in the beekeeping sector.

Table 7.5 : Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-VI

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Arunachal Pradesh	3	65	39	3
Sikkim	2	110	7	3.5
Total	**5**	**175**	**46**	**6.5**

Table 7.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 175 beekeeping units (apiary) with 131 nos. of boxes had been established by farmers in their farming situations with technical supports from 5 KVKs. The average production of 3.12 kg/ box of honey was reported across the beekeeping units. The table also provides details of beekeeping enterprises (apiaries) established by trainees in different states. In Arunachal Pradesh, trainees established a total of 65 beekeeping units and 117 bee boxes were set up across various districts. The largest number of units, 57 in East Kameng, had an average of 105 bee boxes per unit, producing 5.5 kg of honey per box on an average. In Sikkim, trainees established 110 beekeeping units in districts like South Sikkim and North Sikkim. South Sikkim had 12 units with 10 bee boxes each, with average yield of 2.5 kg of honey per box. In contrast, North Sikkim had 98 units with 4 bee boxes each, with average production of 4.3 kg of honey per box. The state of Sikkim had an average honey production of 6.8 kg per box.

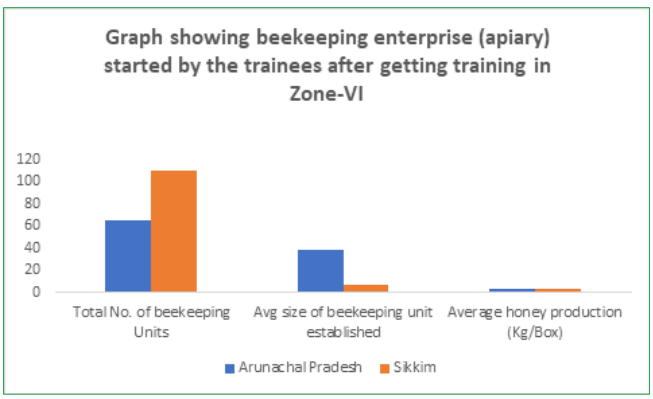
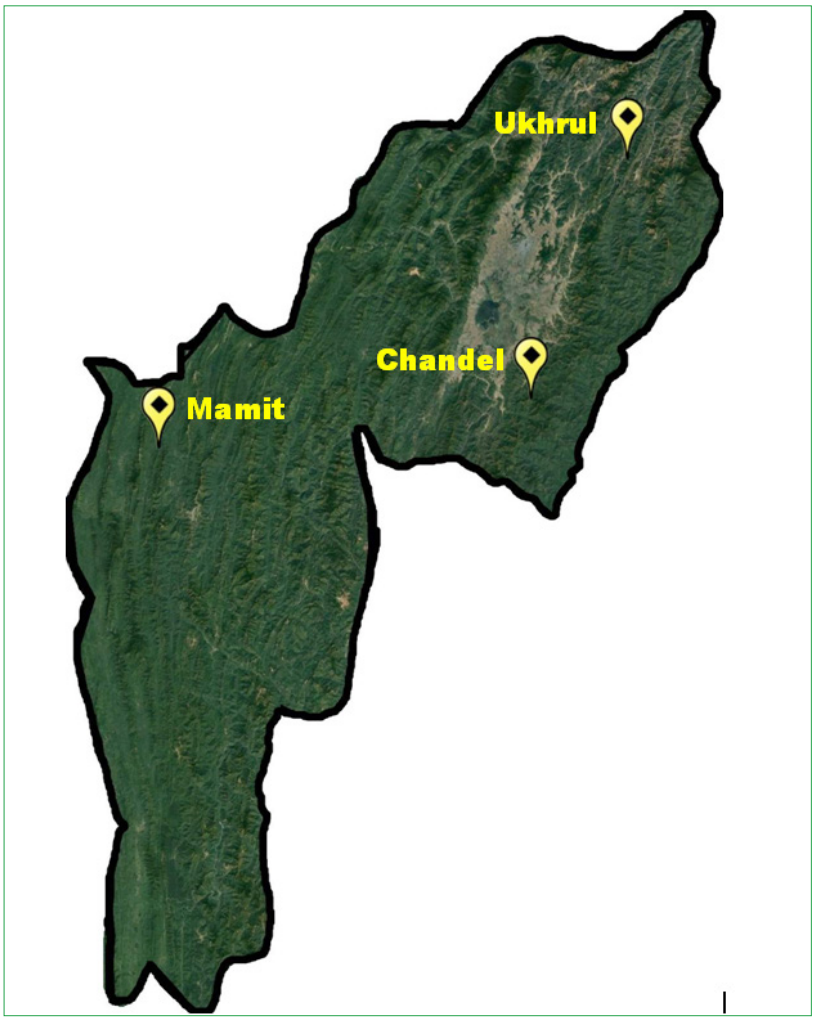


Figure 6. Graph Showing Beekeeping enterprizes established in Zone VI

Figure 7.honey processing plant of Bonphool Agro Producer Company Ltd. under the technical guidance of Nimpith KVK, South 24 Parganas, West Bengal

Chapter 8

7. Overview of Training Programmes conducted by KVKs under Zone -VII, Umiam



Picture 9. Map showing KVKs involved in scientific Beekeeping in Zone VII

The table 8.1 provides data on scientific beekeeping through physical training conducted in Zone VII during the fiscal year 2020-2021. From the table, it is found that a total of 9 physical Training Programmes for 222 were conducted during the period. This included 12 male farmers and 18 female farmers in the online training program on scientific beekeeping.

Table 8.1: Scientific Beekeeping Training Programmes(Physical) conducted in 2020-21

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Other		Total		
			Male	Female	Male	Female	Male	Female	
Manipur	2	6	75	72	0	0	75	72	147
Mizoram	1	3	50	25	0	0	50	25	75
Total	3	9	125	97	0	0	125	97	222

Table 8.2: Scientific beekeeping training programmes (online) organised in Zone-VII during 2020-2021

State	No. of KVK	No. of onlineTraining Programmes conducted	No. of Participants						Total
			SC/ST		Other		Total		
			Male	Female	Male	Female	Male	Female	
Manipur	1	1	12	18	0	0	12	18	30
Total		1	12	18	0	0	12	18	30

The percent share of female farmers constituted 60% of the total beneficiaries in such training on scientific beekeeping, which is more than proportion of males in the training.

Table 8.3 : Scientific beekeeping training programmes (physical) organised in Zone-VII during 2021-2022

State	No. of KVK	No of Physical Training Programmes conducted	No. of participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Manipur	2	**4**	**63**	**44**	**0**	**0**	**63**	**44**	**107**
Mizoram	1	2	39	11	0	0	39	11	50
Total	**3**	**6**	**102**	**55**	**0**	**0**	**102**	**55**	**157**

Table 8.4: Scientific beekeeping training programmes (online) organised in Zone-VII during 2021-2022

State	No. of KVK	No of Physical Training Programmes conducted	No. of participants						
			SC/ST		Others		Total		Total
			Male	Female	Male	Female	Male	Female	Total
Mizoram	1	1	32	29	0	0	32	29	61
Total		**1**	**32**	**29**	**0**	**0**	**32**	**29**	**61**

The above table provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-22 in various states under the zone. The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 6 physical Training Programmes were conducted for 157 participants, which included 102 male and 55 female. State-wise, Manipur had a total of 107 participants, with 63 males and 44 females and Mizoram had 50 participants, with 39 males and 11 females. With regard to online training, only 1 training was conducted by KVK under the zone for 61 participants during 2021-22. Mizoram had 32 male farmers and 29 women farmers participating in online training program.

Table 8.5. Details of Beekeeping enterprises (Apiary) started by the trainees

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Manipur	2	51	83	5
Mizoram	1	2	125	6
Total	**3**	**53**	**208**	**11**

Table 8.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 53 beekeeping units (apiary) with 290 numbers. of bee boxes had been established by farmers in their farming situations with technical supports from 3 KVKs namely Chandel, Ukhrul and Mamit. The average production of 5.16 kg/box of honey was reported across the beekeeping units. In Manipur State, trainees established a total of 51 beekeeping units and 165 bee boxes were set up in 2 districts, producing 9.5 kg of honey per box on an average. Similarly, trainees of KVK Mamit in Mizoram established 2 beekeeping

units with 125 bee boxes each, with average yield of 6 kg of honey per box. This suggests that Mizoram also possesses significant beekeeping potential. Overall, the data showcases the budding beekeeping potential in both Manipur and Mizoram, with favourable conditions for beekeeping activities and honey production. These states have the opportunity to further develop their beekeeping enterprises and contribute to the beekeeping industry in the region.

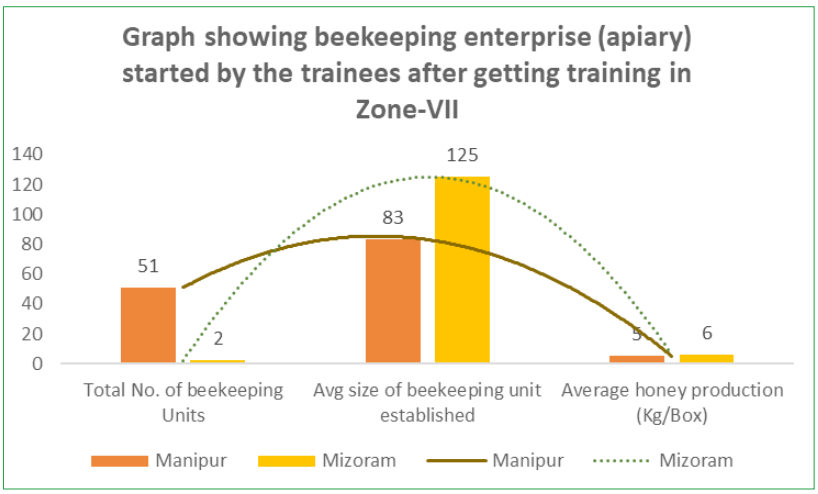
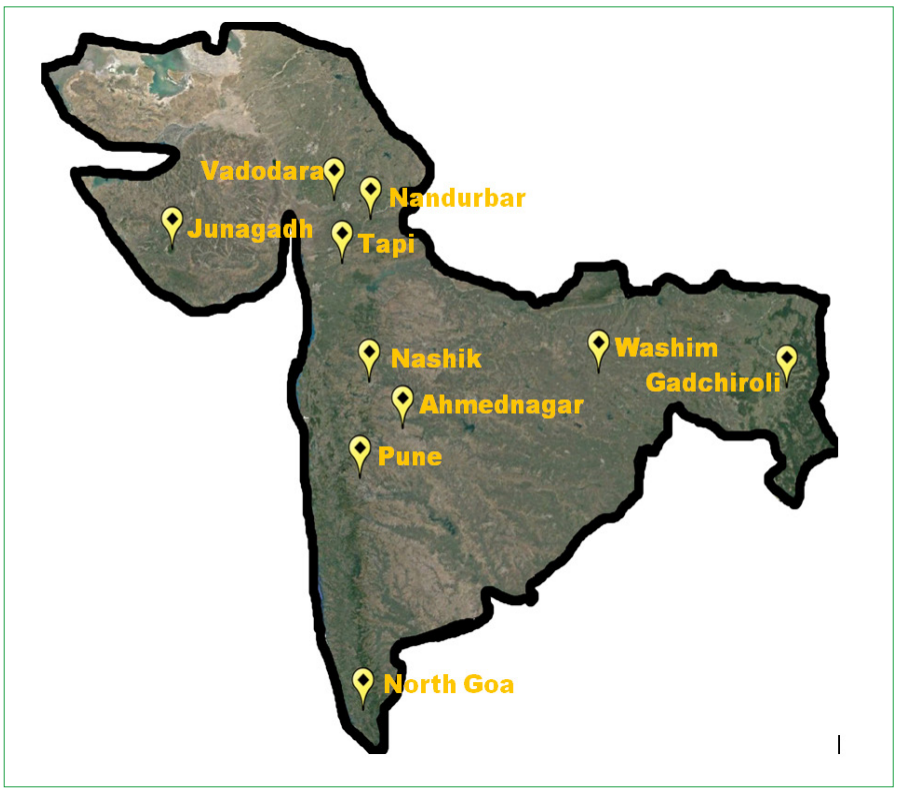


Figure 8. Graph showing Beekeeping enterprize established in Zone VII

Figure 9. An Established Apiary in Nashik, Maharashtra

Chapter 9

8. Overview of Training Programmes conducted by KVKs under Zone -VIII, Pune



Picture 10. Map showing KVKs involved in Scientific Beekeeping in Zone VIII

The Table 9.1 provides detailed data on scientific beekeeping through physical training conducted in Punjab during the fiscal year 2020-2021. From the table, it is found that as many as 15 physical Training Programmes were conducted by 9 KVKs for 395 farmers. This included 312 male farmers and 47 female farmers. The percent share of female farmers constituted 11% of the total beneficiaries in such training on scientific beekeeping. The highest number of participants was from Maharashtra (167) followed by Gujarat (142) and Goa (50).

Table 9.1 Scientific beekeeping training programmes (physical) organised in Zone-VIII during 2020-2021

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Maharashtra	5	7	85	0	79	3	164	3	167
Gujarat	3	6	47	17	78	0	117	25	142
Goa	1	2	4	3	27	16	31	19	50
Total	**9**	**15**	**136**	**20**	**184**	**19**	**312**	**47**	**359**

Table 9.2: Scientific beekeeping training programmes (online) organised in Zone-VIII during 2020-2021

State	No. of KVK	No. of online training conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	female	Male	Female	Male	Female	
Maharashtra	2	2	18	2	63	6	81	8	89
Goa	1	1	8	5	33	18	41	23	64
Total	**3**	**3**	**26**	**7**	**96**	**24**	**122**	**31**	**153**

With regard to online training, 3 Training Programmes were conducted by 3 KVKs under the zone for 153 participants during 2021-22. Maharashtra had 89 participants, with 81 males and 8 females, whereas Goa64 participants, with 41 males and 23 females.

Table 9.3: Scientific beekeeping training programmes (physical) organised in Zone-VIII during 2021-2022

State	KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Maharashtra	6	23	225	18	362	54	587	72	659
Gujarata	3	9	36	37	128	0	164	37	201
Goa	1	3	6	5	37	27	43	32	75
Total	10	35	267	60	527	81	794	141	935

Table 9.4 : Scientific beekeeping training programmes (online) organised in Zone VIII during 2021-2022

State	No. of KVK	No. of online training's conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Maharashtra	4	4	30	0	156	45	186	45	231
Gujarat	3	3	21	4	123	8	144	12	156
Total	**7**	**7**	**51**	**4**	**279**	**53**	**330**	**57**	**387**

The above table 9.4 provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the Zone VIII. The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 35 physical Training Programmes were conducted for 935 participants, which included 794 male and 141 female. State-wise, Maharashtra had a total of 596 participants, with 587 males and 72 females and Gujarat had 156 participants, with 144 males and 12 females during the period 2021-22. Overall, there's a notable gender gap, with more males participating in physical training sessions compared to females. With regard to online training, as many as 7 Training Programmes were conducted by 7 KVKs under the zone for 387 participants during 2021-22. Maharashtra had highest participants followed by Gujarat with 231 and 156 individual participants respectively. In both the states, the number of male participants was higher than that of female participants.

Table 9.5: Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-VIII

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Maharashtra	6	26	24	12
Gujarat	3	10	37	30
Goa	1	5	22	5
Total	**9**	**41**	**83**	**47**

Table 9.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 41 beekeeping units (apiary) with 276 nos. of boxes had been established by farmers in their farming situations with technical supports from 10 KVKs. The average production of 4.00 kg/box of honey was reported across the beekeeping units**.** In Maharashtra, trainees established a total of 26 beekeeping units across various districts, by setting up of 142 Bee boxes yielding 125 kg honey per box. (Average). Gujarat, on the other hand established 10 beekeeping units with 112 Bee boxes, producing 90 kg of honey per box. (Average). In Goa, trainees established 5 beekeeping units in North Goa, each featuring 22 bee boxes and producing 5 kg of honey per box, indicating a budding beekeeping potential in the state.

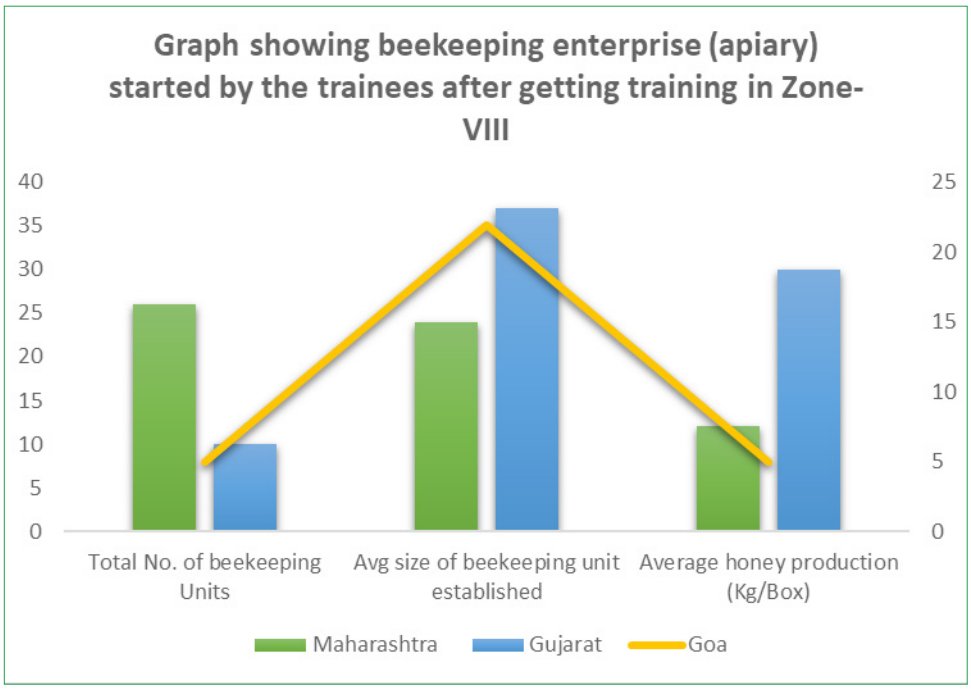


Figure 10. Graph Showing Beekeeping enterprizes established in Zone VIII

Chapter 10

9. Overview of Training Programmes conducted by KVKs under Zone -IX, Jabalpur

Picture 11. Map showing KVKs involved in Scientific Beekeeping in Zone IX

Table 10.1. Scientific Beekeeping training (physical) conducted in 2020-2021

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
MP	8	20	121	13	356	45	477	58	535
Chhatisgarh	1	1	23	0	2	0	25	0	25
Total	**9**	**21**	**144**	**13**	**358**	**45**	**502**	**58**	**560**

Table 10.2: Scientific beekeeping training programmes (online) organised in Zone-IX during 2020-2021

State	No. of KVK	No. of Online Training programs conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
MP	5	5	8	2	110	14	118	16	134
Total	**5**	**5**	**8**	**2**	**110**	**14**	**118**	**16**	**134**

It is also seen that majority of participants were male, with only a small proportion of females were taking part. This highlights the need for initiatives to encourage more females to engage in beekeeping and address gender imbalances in this sector. In case of online training, as many as 5 Training Programmes were conducted by 5 KVKs under the Zone for 134 participants, with 118 males and 16 females. The data highlights that there is a significant gender gap in the participation of females in beekeeping training, especially in Madhya Pradesh, where the majority of trainees are male.

Table 10.3 Scientific beekeeping training programmes (physical) organised in Zone-IX during 2021-2022

State	KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
MP	9	29	206	54	498	55	704	109	813
Chhatisgarh	1	4	78	13	9	0	87	13	100
Total	10	33	284	67	507	55	791	122	913

Table 10.4: Scientific beekeeping training programmes (Online) organised in Zone-IX during 2021-2022

State	No. of KVK	No. of Online Training Conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
MP	4	4	32	4	101	18	133	22	155
Chattissgarh	1	1	12	2	10	6	32	8	40
Total	5	5	44	6	111	24	165	30	195

The above table provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the zone. IX. The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 33 physical Training Programmes were conducted for 931 participants, which included 791 male and 122 female. State-wise, Madhya Pradesh had a total of 831 participants, with 704 males and 109 females, and Chhattisgarh hadas many as 100 participants, with 87 males and 13 females. Overall, there's a notable gender gap, with more males participating in physical training sessions compared to females in both states. With regard to online training, as many as 5 Training Programmes were conducted by 5 KVKs under the zone for 195 participants during 2021-22. Madhya Pradesh had155 participants, with 133 males and 22 females, whereas Chhattisgarh had 40 participants, with 32 males and 8 females in online training programmes, during the period 2021-22.

Table 10.5: Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-IX

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
MP	**8**	**155**	**137**	**28**
Chhattisgarh	**1**	**100**	**150**	**8**
Total	**9**	**255**	**287**	**36**

Table 10.5 also shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 255 beekeeping units (apiary) with 1249 numbers. Of Bee boxes had been established by farmers in their farming situations with technical supports from 9 KVKs. The average

production of 25.71 kg/box of honey was reported across the beekeeping units. The table also provides details of beekeeping enterprises (apiaries) established by trainees in different states. In Madhya Pradesh (MP), trainees established a total of 155 beekeeping units, reflecting a growing interest in the state. The data suggests that Madhya Pradesh has substantial beekeeping potential, especially in districts like Morena and Damoh. In Chhattisgarh (C.G.), trainees established 100 beekeeping units in Surguja district, each with 150 bee boxes and producing 8.4 kg of honey per box on average. This indicates a growing interest in beekeeping activities in Chhattisgarh as well. Overall, the data highlights the beekeeping potential in both Madhya Pradesh and Chhattisgarh, with various districts showing promise in honey production and beekeeping unit establishment. These states have the opportunity to further develop their beekeeping enterprises for economic and agricultural benefits.

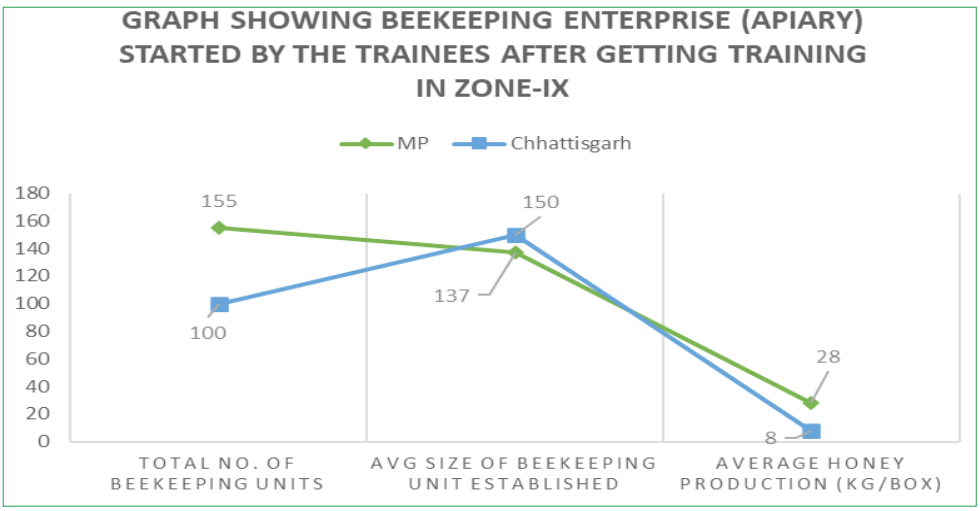


Figure 11. Graph showing Beekeeping enterprizes established in Zone IX

Chapter 11

10. Overview of Training Programmes conducted by KVKs under Zone -X, Hyderabad

Picture 12. Map showing KVKs involved in Scientific Beekeping in Zone X

Table 11.1 below shows the detailed data on scientific beekeeping through physical training conducted in KVKs under Zone X, during the fiscal year 2020-2021. From the table, it is found that a total of 81 farmers attended 3 physical training programme of 7 days duration. This included 44 male farmers and 37 female farmers. The percent share of female farmers constituted 45 % of the total beneficiaries in such training on scientific beekeeping. State wise data shows that Tamil Nadu had a greater number of Farmers participating (56) in Physical training than Andhra Pradesh (25).

Table 11.1: Scientific beekeeping training programmes (physical) organised in Zone-X during 2020-2021

State	No. of KVK	No of Physical Training Programmes conducted	No. Of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Tamil Nadu	2	2	4	5	20	27	24	32	56
Andhra Pradesh	1	1	0	0	20	5	20	5	25
Total	**3**	**3**	**4**	**5**	**40**	**32**	**44**	**37**	**81**

Table 11.2: Scientific beekeeping training programmes (online) organised in Zone-X during 2020-2021

State	No. of KVK	No. of online training conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Tamil Nadu	2	2	9	6	99	40	108	46	154
Andhra Pradesh	1	1	0	0	20	5	20	5	25
Total	**3**	**3**	**9**	**6**	**119**	**45**	**128**	**51**	**179**

In contrast to Andhra Pradesh, Tamil Nadu showed higher participation (32) of women in Physical training program compared to males (24). Subsequently, 3 online Training Programmes were conducted for 179 participants, with Tamil Nadu having highest number of participants (154) followed by Andhra Pradesh (25)

Table 11.3: Scientific beekeeping training programmes (physical) organised in Zone-X during 2021-2022

State	No. of KVKs	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Tamil Nadu	6	29	50	75	375	214	426	288	714
Andhra Pradesh	4	17	180	32	171	42	351	74	425
Telanagana	2	5	86	39	101	27	187	66	253
Total	**12**	**51**	**316**	**146**	**647**	**283**	**964**	**428**	**1392**

Table 11.4: Scientific beekeeping training programmes (online) organised in Zone-X during 2021-2022

State	No. of KVKs	No. of online training conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Tamil Nadu	4	8	8	5	320	167	328	172	500
Andhra Pradesh	4	4	33	11	114	44	147	55	202
Telanagana	1	1	12	0	3	1	15	1	16
Total	**9**	**13**	**53**	**16**	**437**	**214**	**490**	**228**	**718**

The above table provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the zone X. The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 56 physical Training Programmes were conducted for 1392 participants, which included 964 males and 424 females. State-wise, Tamil Nadu had highest number of participants (714) followed by Andhra Pradesh (425) and 253 in Telangana. However, the highest participation of women was seen in Tamil Nadu (288). With regard to online training, as many as 13 Training Programmes were conducted for 718 participants during 2021-22. Tamil Nadu had 500 participants, in contrast to Andhra Pradesh having 202 participants in total for online training programs. Only 16 participants were seen to participate in Telangana for Online training programs.

Table 11.5: Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone-X

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Tamil Nadu	6	165	8	3
Telanagana	1	12	22	3
Andhra Pradesh	4	35	9	5
Total	**11**	**212**	**39**	**11**

Table 11.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 212 beekeeping units (apiary) with 103 nos. of boxes had been established by farmers in their farming situations with technical supports from 12 KVKs. The average production of 4.0 kg/box of honey was reported across the beekeeping units. In Tamil Nadu, trainees established a total of 165 beekeeping units across various districts with 45 bee boxes with average yield of 20 kg per box. Similarly, in Telangana, trainees set up 12 beekeeping units with 22 bee boxes each, resulting in 3 kg of honey per box. In Andhra Pradesh, trainees established 35 beekeeping units with 36 bee boxes. The average honey production was 44 Kg per box.

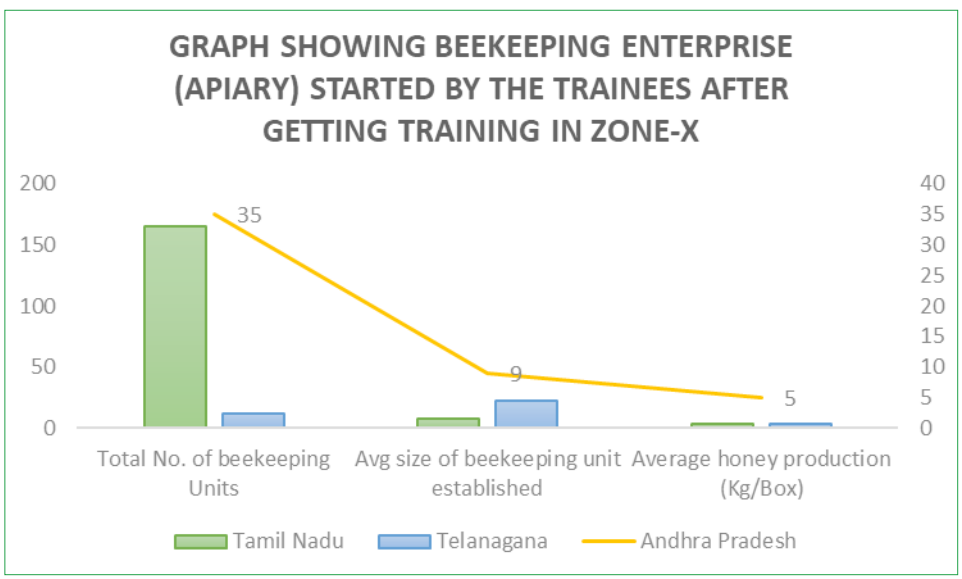
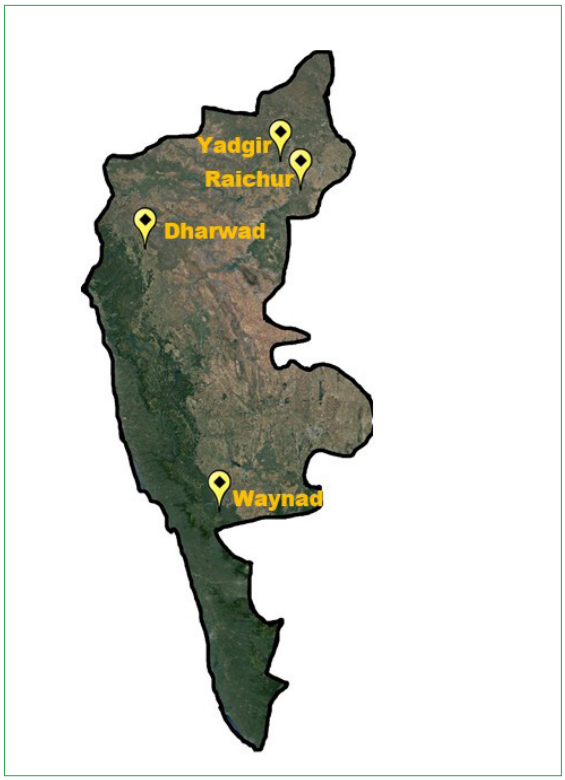


Figure 12. Graph Showing Beekeeping enterprizes established in Zone X

Chapter 12

11. Overview of Training Programmes conducted by KVKs under Zone -XI, Bengaluru



Picture 13.Map showing KVKs involved in Scientific Beekeeping in Zone XI

Table 12.1 presents data on scientific beekeeping through physical training and Online training conducted in KVKs under Zone XI during the fiscal year 2020-2021. From the table, it is found that a total of 164 farmers attended the training programme of 7 days duration. This included 118 male farmers and 46 female farmers. The percent share of female farmers constituted 28% of the total beneficiaries in such training on scientific beekeeping. Subsequently, 4 online Training Programmes were conducted by 4 KVKs namely Raichur, Yadgir, Dharwad and Wayanad.

Table 12.1: Scientific beekeeping training programmes (physical) organised in Zone-XI during 2020-2021

State	No. of KVK	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Karnataka	2	4	6	0	72	21	78	21	99
Kerala	1	3	0	1	40	24	40	25	65
Total	**3**	**7**	**6**	**1**	**112**	**45**	**118**	**46**	**164**

Table 12.2: Scientific beekeeping training programmes (online) organised in Zone-XI during 2020-2021

State	No. of KVK	No of Online Training Programmes conducted	No. of Partcipants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Karnataka	3	3	42	4	145	73	132	9	207
Kerala	1	1	0	0	48	27	48	27	75
Total	**4**	**4**	**42**	**4**	**193**	**100**	**180**	**36**	**282**

A total of 282 participants participated in online Training Programmes , wherein 180 were males and only 36 were females. Only a small proportion of females were seen to take part in online training program. This highlights the need for initiatives to encourage more females to engage in beekeeping and address gender imbalances in this sector.

Table 12.3: Scientific beekeeping training programmes (physical) organised in Zone-XI during 2021-2022

State	No. of KVKs	No of Physical Training Programmes conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Karnataka	3	11	29	5	204	31	233	36	269
Kerala	1	4	3	8	41	49	44	57	101
Total	**4**	**15**	**32**	**13**	**245**	**80**	**277**	**93**	**370**

Table 12.4: Scientific beekeeping training programmes (online) organised in Zone-XI during 2021-2022

State	No of KVKs	No of Online training programs conducted	No. of Participants						Total
			SC/ST		Others		Total		
			Male	Female	Male	Female	Male	Female	
Karnataka	3	3	42	4	145	73	187	77	264
Kerala	1	1	0	0	48	27	48	27	75
Total	**4**	**4**	**42**	**4**	**193**	**100**	**235**	**104**	**339**

The above table provides a detailed overview of scientific beekeeping training conducted during the fiscal year 2021-2022 in various states under the Zone XI The data were categorized into physical training (Section A) and online training (Section B), with a focus on gender and social group participation. A total of 15 physical Training Programmes were conducted for 370 participants, which included 277 male and 93 female. State-wise, Karnataka had a total of 296 participants, with 233 males and 36 females, and Kerala had 101 participants, with 44 males and 57 females. It is to be noted that female participation was more in Kerala than in Karnataka in case of physical training. With regard to online training, as many as 4 Training Programmes were conducted by 4 KVKs under the zone for 339 participants during 2021-22. Karnataka had 264 participants, with 187 males and 77 females and Kerala had 75 participants, with 48 males and 27 females. The total female participants were 104 while male participants were 235.

Table 12.5: Details of beekeeping enterprise (apiary) started by the trainees after getting training in Zone XI

State	No. of KVKs	Total number of beekeeping units (apiary) established	Average size of beekeeping unit established (No. of bee boxes)	Average honey production (kg/box)
Karnataka	3	58	207	6
Kerala	1	8	27	6
Total	**4**	**66**	**234**	**12**

Table 12.5 shows the outcome of both categories of training programmes during 2020-21 and 2021-22. From the table, it is seen that a total of 66 beekeeping units (apiary) with 647 nos. of boxes had been established by farmers in their farming situations with technical supports from 4 KVKs. The average production of 5.77 kg/box

of honey was reported across the beekeeping units. In Karnataka, trainees established a total of 58 beekeeping units across three districts. Raichur had the highest number of units with 31, each featuring 155 bee boxes, producing 5 kg of honey per box. Yadgir had 17 units, each with 204 bee boxes and an impressive 7.1 kg of honey per box. Dharwad had 10 units with 261 bee boxes per unit, resulting in 5 kg of honey per box. In total, Karnataka had 620 bee boxes and an average honey production of 17.1 kg per box. In Kerala, trainees established 8 beekeeping units with support from Wayanad KVK, with a total of 27 bee boxes, yielding 6 kg of honey per box. The table illustrates the beekeeping efforts undertaken by trainees in these regions, with Karnataka having larger units and Kerala contributing with smaller but productive units.

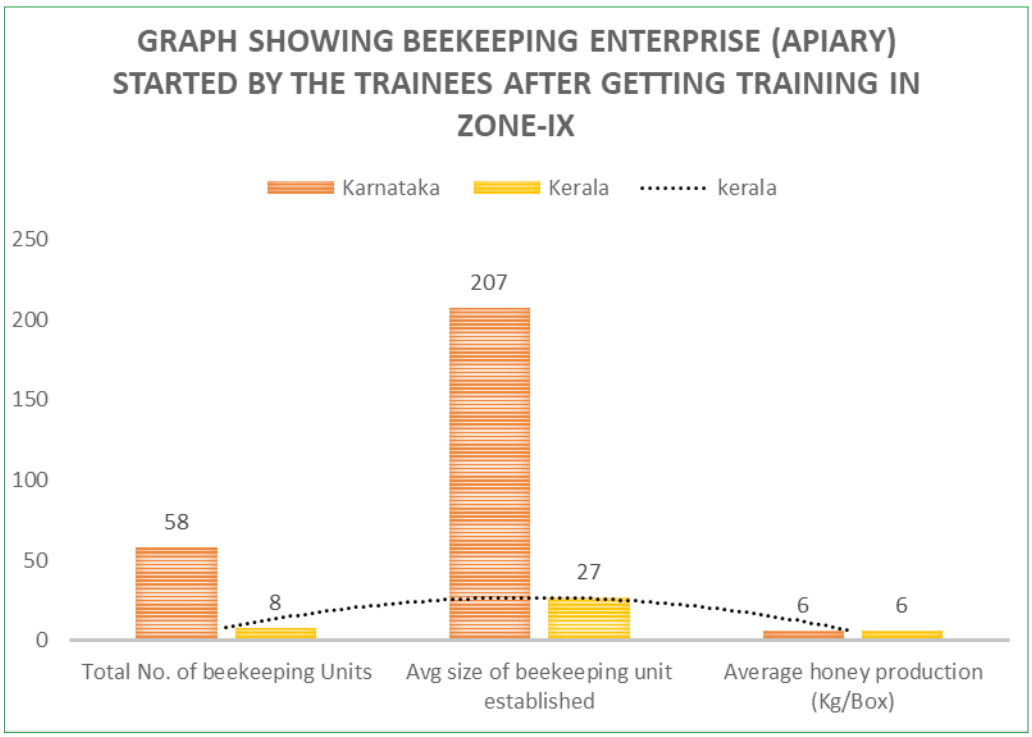


Figure 13. Graph showing Beekeeping enterprizes established in Zone XI

Chapter 13

Summary

The summary of the scientific beekeeping training programmes (both physical and online) conducted during 2020-22 across 11 different ATARI zones in the country has been depicted in Table 33. This included targets and achievements, total participants, and the number of apiary units established along with average yield level of honey production. It is found that Zone-I had the highest number of physical training participants (1923) achieving 82.2% against the target, and 100% online training participants which could establish a total of 395 apiary units. In case of Zone-II, 100% achievement was found in both physical and online Training Programmes with a total of 424 participants, which helped to establish 70 apiary units. The table also shows that Zone-III had an achievement rate in both physical (80%) and online (50%) training, with 76 participants and 39 apiary units. It is also observed that Zone-IV achieved 100% of both physical and online training against the targets, with 536 participants and 270 apiary units. Zone-V showed a significant disparity in achievement, with 62.6% in physical training and only 26.6% in online training, totalling 113 participants and 201 apiary units. Zone VI had a high achievement rate in both physical (116%) and online (120%) training, resulting in 318 apiary units from 175 participants. In case of Zone VII, 100% achievement was reported in physical training against the target but only 66.6% in online training, with 130 participants and 32 apiary units were established during the period. While Zone VIII reached 100% of both physical and online training targets, with 540 participants and 41 apiary units. Zone IX also achieved 98.18% in physical training and 90% in online training, resulting in 319 apiary units from 255 participants. Zone X achieved 98.33% in physical training and 133.3% in online training, with 897 participants and 212 apiary units. Zone XI surpassed both physical (110%) and online (200%) training targets, with 564 participants and 66 apiary units. Thus, Zone-I, Zone-II, and Zone-IV excelled in achieving their training targets and establishing apiary units, while Zone-V experienced lower online training participation. Zone VI demonstrated high achievement in both physical and online training, leading to a significant number of apiary units. Zone-XI outperformed all zones in terms of training achievement and apiary unit establishment.

Table 13.1: Zone-wise summary of scientific beekeeping training programmes organised and Apiary units established

Zones	Physical Training			Online Training			Total Participants in Physical Training	Total Participants in Online Training	Apiary Units established (No.)
	T	A	%	T	A	%			
Zone -I	75	74	98.67	15	14	93.33	1926	395	254
Zone-II	40	40	100	8	8	100	1027	424	70
Zone-III	20	16	80.00	4	2	50.0	400	76	39
Zone-IV	70	70	100	13	13	100	1762	536	270
Zone-V	75	47	62.6	15	4	26.6	1178	113	201
Zone VI	25	29	116	5	6	120	1185	318	175
Zone VII	15	15	100	3	2	66.6	379	130	32
Zone VIII	50	50	100	10	10	100	1294	540	41
Zone IX	55	54	98.18	11	10	90	1473	319	255
Zone X	60	59	98.33	12	16	133.3	1473	897	212
Zone XI	20	22	110	4	8	200	534	564	66
Total									

*T-Target, A-Achievement

Chapter 14

Conclusion and Recommendation

Conclusion:

It was observed that both small scale adoption and large-scale adoption of scientific beekeeping is promising venture. The majority of the beekeepers found this venture to be lucrative in terms of income enhancement. Thus, it can be concluded that beekeepers can significantly increase farm revenue and improve their livelihoods through Scientific Beekeeping. Beekeeping is a very valuable occupation in rural areas. It generates employment and provides income to people of rural areas that reduced poverty in the long run. Beekeeping provides nutritional and ecological security to the rural communities at the household level andit is the 5th and most important input for overall sustainable development of agriculture and horticulture in India. It plays a key role in pollination that enhances agriculture production. They provide a valued product like honey and their by-products to the community that has antimicrobial and medicinal properties.

The North Eastern Region of India being a home to a large number of floras can be a good source of nectar flow for the reared honeybees resulting in good average honey production and therefore, beekeeping can result in good supplementary income generation. The tribal population of the region generally practice the traditional methods of beekeeping which results in poor honey yields. These traditional practices should be upgraded according to the climatic suitability of the hills and farmers should be encouraged to adopt the new advance practices to increase honey production.

Recommendations:

There is a vast scope of adoption of recommended beekeeping practices in India. Adoption of these practices will help to increase both quality as well as the quantity of honey which will ultimately add to the farmers income. Beekeeping is an easy occupation and investment in this profession is very minimal and hence everyone can start easily. Major constraints in beekeeping are the expensive inputs, pest attacks, lack of scientific production and rearing techniques, and training. Thus, to overcome such constraints researchers and technical experts should focus on the provision of low-cost inputs, pesticides/ insecticides, scientific techniques and training, and value chain market facilities at the local and regional level. Training centres should be constructed for Skill upgradation at the local level so that beekeeprs can easily tackle the problems. Transportation and marketing facilities networks should be developed for enhancing income. Credit facilities on low-interest rates should be provided to encourage youth to start and continue the business in the long run. Moreover, Bee foraging crop should be multiplied for enhancement of honey business in targeted areas.

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