KERALA AGRICULTURAL UNIVERSITY
AICRP on Honey bees and Pollinators, Vellayani centre

SUCCESS STORY

Project Title : Popularization of Meliponiculture for food safety and empowerment of women in Kerala

- **Theme Identification/subject identification**

Identify specific intervention taken out under a RKVY project: Popularisation of Meliponiculture for food safety and empowerment of women in Kerala

- **Situation/Background**

Backdrop (genesis)

Honey bees are important group of beneficial insects that provide not only honey and other valuable hive products, but also play a vital role in enhancing crop productivity through pollination. India contributes only 1.2 per cent of about 500 million kg of total honey yield in the world. The enterprise has great scope in the country to develop self employment for over 15 million rural and tribal families as they can make an annual income of over Rs. 4.5 billion by producing 1,50,000 tons of honey (Shende, 1992). Among the different states in the country, Kerala and Tamil Nadu were traditionally the leading states in beekeeping with Kerala contributing 70 per cent of the annual production of honey in India.

AICRP on Honey Bees and Pollinators, Vellayani centre, Kerala Agricultural University (KAU) has standardized technologies for hiving and domestication of an indigenous species of stingless bee, *Trigona iridipennis* which is the best pollinator in various agricultural crops, which was the first effort in India. Despite the small amount of honey produced per hive, its demand is great and fetches comparatively high price in the market due to its medicinal value. The present production of stingless bee honey is insufficient to meet the demand. Their abundance combined with diversity, has a vital role in pollination of crops in sustainable agriculture resulting in food safety. Apart from these, they are harmless potential pollinators to beekeepers and greenhouse workers, which visit a wide range of crops, tolerant to high temperature, active throughout the year and can be transported easily. In this context, the project was undertaken with the following objectives:

Objectives

i) Popularization of Meliponiculture in the homesteads of Kerala
ii) Imparting training to the selected women
iii) Empowerment of women
iv) Quality assessment of honey

Importance (project)

The exploration of the potential of beekeeping with stingless bee (Meliponiculture) and its popularization in the State assumes importance. The project aims to give a scientific dimension and systematic approach to Meliponiculture. The technologies standardized in domestication and management of stingless bees will be transferred to the rural women.
Meliponiculture is a suitable enterprise for women as it does not involve heavy physical work and painful sting. It can contribute to the economy of peasant households, as a single component or integrated in farming systems with other honeybees. Thus through this project, by imparting advanced training to women, popularization of stingless beekeeping (Meliponiculture) in the State and enhancement of crop productivity ensuing food safety could be achieved.

- **Programme Activities**

Steps taken to carry out the programme:

The following steps were carried out under each objective of the project.

I. Popularization of Meliponiculture in the homesteads of Kerala -The technologies standardized by KAU on Meliponiculture including domestication, hiving and management of stingless bees were disseminated to the people in different districts of Kerala.

II. Imparting training to the selected women

Selected women trainer's trainee from different districts and imparted training on high tech Meliponiculture -hiving and domestication, high tech management, genetic improvement, honey extraction and bee health.

III. Empowerment of women

Mass multiplication of stingless bee colonies by selected women and supply of sufficient stingless bee colonies in different districts.

IV Quality assessment of honey

Standardization of quality parameters of honey and other hive products from different locations and from diversified flora

Steps taken to fulfill the objectives

The following steps were carried to fulfill the objectives of the project.

I. Popularization of Meliponiculture in the homesteads of Kerala

The technologies of K.A.U. for hiving feral stingless bee colonies, domestication and management were disseminated through different media like Kerala Karshakan, Karshakashree, Karshakan, dailies and visual media like Doordarshan, Asianet etc.

II. Imparting training to the selected women

As a part of the project with regard to the imparting of training, three trainer's training was conducted during the project period. In the first year, training was conducted from 24 to 25th February 2011 at Kanakakunnu, Trivandrum; two batches were combined as a single unit. The training to third and fourth batch during the second year was conducted at College of Agriculture, Vellayani from 20th to 22nd July, 2011 and at Kanakakunnu, Trivandrum from February 29 to March 01, 2012. The beekeepers (women) were selected from different parts of the State.

Imparted training on high tech Meliponiculture developed by KAU

- Transfer of the feral stingless bee colonies in natural habitats (basement of old buildings, compound walls, tree trunks etc.) into artificial hives without demolishing the structures.
- Techniques for high tech management of stingless bee colonies during different seasons such as division of colonies, extraction of honey etc.,
- Genetic improvement of the stingless bee species through selective breeding and mass multiplication
- Refinement of techniques used for extraction of honey
- Formulation of eco-friendly measures for bee health management in stingless bees

III. Empowerment of women

Mass multiplication of stingless bee colonies: One woman each from four districts was selected and was trained in mass multiplication of colonies. Colonies with good quality and highly prolific queen were selected and subjected to mass queen rearing technique by Queen grafting method.

IV. Quality assessment of honey

Standardization of quality parameters of honey and other hive products from different locations and from diversified flora:In order to assess the different constituents of stingless bee honey, honey samples were collected from stingless bee hives of different districts of Kerala. The quality parameters of the honey samples were analysed in the laboratory of AICRP on Honey Bees & Pollinators, Vellayani centre.

- **Methodology followed**

Mass multiplication of stingless bee colonies by selected women

Stingless bee colonies having better traits like better brood development, honey storage and less swarming were selected. The selected colonies were fed with honey/ sugar syrup as artificial food and produced queen cells during brood rearing season resulting in the production of 10 – 18 queen cells per hive (mass queen rearing technique). The divided colonies without queen cell were provided with queen cells by queen grafting method.

Quality analysis of honey:

The stingless bee samples were collected from different districts of Kerala for quality analysis. Each samples were maintained at three replication and analysed for moisture, pH, reducing sugar, non reducing sugar, vitamin C, presence of protein and amino acid.

- **Results/Outcomes**
  - **Important outcomes achieved**

Technical guidance was given on scientific Meliponiculture to the beekeepers from different parts of Kerala to initiate stingless beekeeping and this motivated the public about commercial Meliponiculture.

Four batches of trainer's trainee were selected two each in the first and second year. A total of 174 women were trained.

- First and second batch : 71 nos.
- Third batch : 38 nos.
- Fourth batch : 65 nos.

A booklet in Malayalam on Meliponiculture entitled "Cherutheneecha valarthal" with latest innovations and advanced technologies on hiving, management, honey extraction etc. was released on 24-02-2011.

As a part of the post assessment of training, observations on the number of colonies, honey yield and adoption of scientific management practices by these trainees were recorded. All the trainees have adopted the scientific management and they have added more colonies by hiving the feral colonies and through proper and successful division of colonies. A mean per cent honey yield increase of 82.37 per cent was recorded after adopting the scientific management by the trainer's trainee

In the mass multiplication experiment of stingless bees, the divided colonies which were provided with queen cells by queen grafting method exhibited the characters of the mother colony having better qualities.

Quality analysis of stingless bee honey samples of various districts revealed the presence of following parameters; moisture- 24.69 per cent, reducing sugar-57.90 per cent, non-reducing sugar-3.28 per cent, pH-4.03, vitamin C- 1.83 mg/l and trace amount of protein and amino acid.

- **Quantitative and qualitative data**

i) Assessment of adoption of scientific management by trainees

Five trainer's trainee who attended the training was randomly selected from nine districts throughout the State. As a part of the post assessment of training, observations on the number of colonies, honey yield and adoption of scientific management practices by these trainees were recorded. All the trainees have adopted the scientific management and they have added more colonies by hiving the feral colonies and through proper and successful division of colonies. A mean per cent honey yield increase of 82.37 per cent was recorded after adopting the scientific management by the trainer's trainee (Table 1.).

Table 1. Assessment of scientific management adoption by trainer's trainee

District	No. of beneficiaries	Pre assessment	Post assessment				% yield increase
		No. of colonies	Adoption of scientific management	No. of colonies	Honey yield/ colony (g)	Total honey yield/year (Kg)	

1. Thiruvananthapuram	1.	14	Adopted	150	350	52.50	90.66
	2.	10	Adopted	100	400	40.00	90.00
	3.	320	Adopted	1000	650	650.00	68.00
	4.	2	Adopted	44	450	19.80	95.45
	5.	13	Adopted	80	500	40.00	83.75
2. Kollam	1.	34	Adopted	270	600	162.00	87.40
	2.	5	Adopted	40	550	22.00	87.50
	3.	3	Adopted	25	450	11.25	88.00
	4.	1	Adopted	15	300	4.50	93.33
	5.	2	Adopted	20	450	9.00	90.00
3. Pathanamthitta	1.	3	Adopted	30	500	15.00	90.00
	2.	5	Adopted	40	550	22.00	87.50
	3.	3	Adopted	40	350	14.00	92.50
	4.	2	Adopted	25	500	12.50	92.00
	5.	2	Adopted	24	550	13.20	91.66
4. Idukki	1.	6	Adopted	25	550	13.75	76.00
	2.	8	Adopted	60	600	36.00	86.66
	3.	12	Adopted	50	350	17.50	76.00
	4.	18	Adopted	85	400	34.00	78.82
	5.	4	Adopted	30	450	13.50	86.66
5. Kottayam	1.	8	Adopted	50	450	22.50	84.00
	2.	2	Adopted	30	450	13.50	93.33
	3.	3	Adopted	40	550	22.00	92.50
	4.	12	Adopted	60	500	30.00	80.00
	5.	2	Adopted	15	400	6.00	86.66
6. Alappuzha	1.	1	Adopted	10	250	2.50	90.00
	2.	2	Adopted	11	200	2.20	81.81
	3.	2	Adopted	10	250	2.50	80.00
	4.	4	Adopted	18	250	4.50	77.77
	5.	12	Adopted	50	250	12.50	76.00
7. Kozhikode	1.	8	Adopted	35	550	19.25	77.14
	2.	7	Adopted	25	500	12.50	72.00
	3.	6	Adopted	20	550	11.00	70.00
	4.	3	Adopted	15	550	8.25	80.00
	5.	2	Adopted	15	450	6.75	86.66
8. Kannur	1.	8	Adopted	50	550	27.50	84.00
	2.	9	Adopted	60	600	36.00	85.00
	3.	7	Adopted	40	450	18.00	82.50
	4.	15	Adopted	100	600	60.00	85.00
	5.	5	Adopted	50	500	25.00	90.00
9. Kasaragod	1.	4	Adopted	15	550	8.50	73.33
	2.	8	Adopted	20	500	10.00	60.00
	3.	7	Adopted	20	550	11.00	65.00
	4.	8	Adopted	25	500	12.50	68.00
	5.	9	Adopted	20	550	11.00	55.00
Mean							**82.39**

ii) Quality analysis of stingless bee honey samples

Quality analysis of stingless bee honey samples collected from different districts (Table 2) revealed that the moisture content varies from 23.1 to 27.0 per cent with an average of 24.69 per cent. Thus, decreased moisture content in stingless bee honey enables them to inhibit the growth of bacteria and make it viable for long term storage without processing. The content of reducing sugar ranged from 44.16 to 69.44 per cent with a mean of 57.90 per cent while that of the non-reducing sugar ranged from 1.90 to 4.87 with a mean of 3.28 per cent. The percentage of reducing sugar was found to be maximum in samples collected from Kannur district compared to other districts. The pH of stingless bee honey was low, where the values ranged from 3.50 to 4.87 with a mean of 4.03, and hence were acidic which was in accordance with that of De Bruijn and Sommeijer, 1997. Presence of vitamin C ranged between 1.04 to 2.80 mg/l with a mean of 1.83 while the protein and amino acid were present in trace amounts in all the samples collected. The quality parameters of stingless bee honey were found to be varying over various districts. This may be due to the diversity in flora available in respective locations.

Table 2. District wise analysis of stingless bee honey parameters

District **Parameters**	**Thiruvananthapuram**	**Kollam**	**Pathanamthitta**	**Kottayam**	**Idukki**	**Kannur**	**Kasaragod**	**Alappuzha**	**Thrissur**	**Palakkad**	**Mean**
Moisture (%)	24.20	25.00	23.10	27.00	24.20	24.20	25.00	24.20	25.00	25.00	24.69
Reducing Sugar (%)	58.68	45.78	68.30	62.50	56.81	69.44	44.16	44.64	67.20	61.50	57.90
Non Reducing Sugar (%)	3.49	4.56	1.90	2.61	2.60	2.56	2.61	3.87	4.87	3.73	3.28
pH	4.15	4.50	3.64	3.90	3.50	3.85	4.35	3.87	4.87	3.73	4.03
Vitamin C (mg/l)	1.04	2.08	2.80	1.52	2.10	1.55	1.09	2.09	2.15	1.90	1.83
Protein & Amino Acid	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces	Traces

- **Difference it made to farmers income, productivity or any other measurable indicator**

Beekeepers income through selling of honey and colonies

Adoption of scientific management practices

- **Evidence/Evaluation**

- **How the success measured**

The success was measured by assessing the additional income generated by selling the honey and colonies, adoption of scientific techniques of selected bee keepers from different districts who has already attended the training.

- **Pre and post assessments**

A survey format was distributed among the trainer's trainee before the training in order to assess the number of hives, honey yield and beekeeping practices followed by them. Post assessment was done by selecting randomly the beekeepers from different districts who attended the training. Observations on the number of colonies, honey yield, sale of colonies and scientific beekeeping practices adopted by them were recorded (Table 1).

- **Beneficiary interaction**

The technologies standardized by Kerala Agricultural University on commercial Meliponiculture are disseminated to the public and a large number of them have adopted the technologies in different parts of the State.

One success story is given below:

During February 2011, a trainers training programme was conducted as per the objective of the RKVY project "Popularisation of Meliponiculture in Kerala" at Kanakakunnu Palace. Smt. Santhy, Anappadu, Kadakkal, Kollam district, an educated, unemployed young lady, who is trained in Indian bees and Italian bees, attended the training programme. She was fascinated with the amazing behaviour of stingless bees, their non-stinging nature, medicinal uses and high price of stingless honey. Stingless honey is used for the treatment of even cancer. She got an inspiration to collect the feral colonies in her premises and to start Meliponiculture. Large number of feral colonies were present in the compound walls, electric meter boxes etc and she has collected the colonies and hived them in the hive standardized by KAU, adopting the knowledge and technologies obtained from the training programme.

She could collect more than 15 feral colonies and later multiplied the same using mass queen rearing techniques imparted through the RKVY project. Now she is domesticating 30 stingless bee colonies and is able to supply colonies and stingless bee boxes to the farmers in small scale. She is also planning to sell stingless bee honey too.

Principal Investigator