

HONEY FROM RUBBER PLANTATION: A STUDY OF ITS POTENTIAL

Dr. V. HARIDASAN, Dr. K. JAYARATNAM and C. R. NEHRU,
Rubber Research Institute of India, Kottayam-686 009.

Introduction

Bee-keeping as a vocation in rubber plantations was introduced by European Missionaries, who came to South Kerala and Kanyakumari district of Tamil Nadu. The YMCA and the Bee-keeper's Association at Marthandom played the pioneering role in this endeavour. In 1924 Dr. Spencer Hatch of the Marthandom YMCA introduced bee-keeping in that area. A regular training in bee-keeping was started in the YMCA in 1947. The Indian Institute of Honey, Kuzhithurai has also been in the forefront of propagating bee-keeping. Naturally Kanyakumari district began to take the lead in this respect. Even today the number of bee-keepers is more in that district than any other one in the country and they regularly migrate to other districts for bee-keeping. Since 1950 the Khadi & Village Industries Commission at the Centre and the Khadi & Village Industries Boards at the states have taken up the promotion of bee-keeping by offering financial, technical and training facilities to the bee-keepers.

According to the Khadi & Village Industries Commission there were around 8.1 lakhs bee colonies in India at the end of 1983-84. The National Commission on Agriculture recommended that the production of honey in India should be increased to 60,000 tonnes by 2000 AD. Taking an average production of 10 kg per colony, 6 million bee-colonies should be established in India by the turn of the century to achieve this target. In this context the role of rubber plantations in increasing the production of honey is worth examining.

Method of Study

For collecting the data for the study, the list of bee-keepers' societies operating in Kerala and Kanyakumari district of Tamil Nadu was obtained from the Khadi & Village Industries Commission. The offices of 28 societies and 11 purchase centres were contacted and the units were visited during the honey producing season in 1987. In the course of the visits it was found out that some of the societies have discontinued bee-keeping while others have come up afresh in the field. The new societies were mainly in Cannanore district. There were more bee-keeping activities in Cannanore district than in any other district in Kerala. The number of societies and the number of honey purchase centres in each district, at the end of March 1987, are shown in table-1.

In addition, the offices of the Sarvodaya Sanghams of Cannanore, Calicut, Alleppey, and Trivandrum were also visited. Supplementary data were collected from the offices of the Khadi & Village Industries Commission and the Khadi Board of Kerala. Visits were also made to the Directorate of Bee Keeping Industry, Bombay and the Central Bee Research Institute, Pune of the Khadi & Village Industries Commission. For estimating the consumption of rubber honey, the list of Ayurvedic Pharmaceutical manufacturers was collected from the Drugs Controllers' Office, Trivandrum and data were recorded through a questionnaire. The production and consumption of rubber honey in Karnataka state were estimated on the basis of discussions with the Khadi Commission Officials.

Table-1. Distribution of bee-keeping societies/purchasing centres in traditional rubber growing tract.

District	No. of bee-keepers' societies/organisations	No. of purchasing centres
Trivandrum	4	2
Quilon	1	—
Pathanamthitta	4	—
Alleppey	—	1
Kottayam	3	1
Idukky	3	1
Ernakulam	2	1
Trichur	2	—
Palghat	—	1
Malappuram	2	—
Kozhikode	3	2
Cannanore	14	1
Total in Kerala	38	10
Kanyakumari dist. of TN	4	3
Grand Total	42	13

Findings

There are two main sources of honey in India viz., wild honey collected from the forests and apiary honey collected from the hives maintained under scientific management. Bee-keeping in the present context means the rearing of certain varieties of domesticated bees. Although there are four such species, *Apis cerana indica* is the one reared.

A colony of bees of *Apis cerana indica* comprises of a queen, which is the only fertile female, 12000 to 15000 infertile female workers and a few hundreds fertile males called drones. Only one colony is reared in each hive. The main duty of the worker-bees is to collect honey and pollen. *Apis cerana indica* is the one reared in the rubber plantations also. Only about 10 per cent of the honey produced in India is from wild sources, the rest is from apiaries.

The rubber tree is a prolific producer of honey. The honey flow period of *Hevea* ranges from January to March and during this period honey-bees collect large quantities of nectar from the extra-floral nectary glands at the distal end of petioles where the leaflets join. Though the nectariferous bud scales and nectariferous glands on the lower surface of the leaf lamina secrete small amounts of nectar, only the nectariferous glands on the petiole tips are found to be visited by the bees for nectar. These extra floral nectary glands become very active from January to March, when the rubber tree produces new flushes of leaves. Rubber tree is among the very few plants in nature producing honey not from the flowers. The total production of honey and the share of rubber honey in India are shown in table-2.

According to the tentative estimates, the Indian production of honey is placed at 6500 tonnes in 1986-87 out of which the production of rubber honey is placed around 2750 tonnes (42%).

Table-2. Total production of honey in India and the share of rubber honey.

Year	Total honey production in India (tonnes)@	Estimated share of rubber honey (tonnes)
1981-82	5600	2300 (41%)
1982-83	5700	2700 (47%)
1983-84	4400	1600 (36%)
1984-85	5500	2200 (40%)
1985-86	6200	2600 (42%)
Average	5480	2280 (42%)

@ Source of Indian production of honey: KVIC, Bombay.

Potential Production

Published records indicate that the average production of honey per hive in India is only 7kg per year. Canada is reported to have achieved an average productivity of 53.3kg of honey per hive per year followed by Australia with 43.7kg. In 1987 season the bee colonies at the RRII experiment station at Chethackal produced 681 kg of honey from 35 hives, which worked out at 19.46 kg per hive. Studies made by the RRII indicate that an optimum number of 15 to 20 hives can be placed in a hectare of rubber plantation. At the end of 1985-86 India had 3 lakh hectares of mature rubber plantations capable of producing honey. Assuming even a production potential of 10kg per hive and 15 hives per hectare, the total production of India could be enhanced to around 45000 tonnes under scientific management.

There is an optimum number of hives a bee-keeper can manage. Statistics indicate that on an average there were 37 hives per bee-keeper in Canada in 1982, followed by Greece with 32 hives. Assuming that 30 hives (2 hectares in our calculation) can be managed by a bee-keeper, the rubber plantation industry can give part-time employment to one and a half lakh people. In the experiment station of the RRII, 35 hives are managed by one person.

Properties of Rubber Honey

Honey is a natural sweetening agent devoid of the harmful

effect associated with white sugar. The body can easily absorb the source of energy. It is particularly suited to elderly people, invalids, children and athletes and has medicinal and curative properties.

Honey is a super saturated solution of sugars. It contains three major sugars viz., the fruit sugar (levulose or fructose) grape sugar (glucose or dextrose) and cane sugar (sucrose). In the marketing of honey, colour, flavour, taste and moisture content considerably influence the preference. The important properties of rubber honey are shown in table-3.

According to Indian Standard Specification, honey is classified into three grades mainly on the basis of moisture percent by weight. This standard prescribes 20 percent moisture for special grade, 22 per cent for grade A and 25percent for standard grade. Rubber honey generally belongs to grade A under laboratory tests.

Qualitatively the most important drawback of rubber honey is the higher moisture content in it. Table-3 showed that the moisture content ranged between 21.5 and 25.5%. The internationally accepted standards of quality tolerate moisture content is only upto 19 per cent. The higher moisture content creates problems on storage. Activity of yeast in honey becomes brisk when the moisture content is higher leading to fermentation. Therefore, there is need for redu-

Table-3. Important properties of rubber honey

	Range	Average
1. Viscosity (in centipoise) at 27°C	550-3800	1358
2. Specific gravity at 27°C	1.3985-1.3400	1.379
3. Moisture (%)	21.50-25.50	22.00
4. Reducing sugars:	69.08-74.80	72.80
a) Levulose (%)	34.80-40-70	37.14
b) Dextrose (%)	33.57-37.97	35.98
5. Non-reducing sugars (%)	0.78-3.14	1.71
6. Acidity (%)	0.06-0.20	0.127
7. Ash (%)	0.09-0.39	0.216
8. Protein (%)	0.054-0.249	0.138
9. Yeast (million/g)	103.9-158.0	139.39

cing the moisture content immediately after collection to maintain the quality. The vacuum oven drying process could be introduced for upgrading the quality of rubber honey. Granulation of honey, though not a bad symptom of quality, is suspected by the Indian consumer to be due to adulteration. To prevent granulation and fermentation, honey should be heated at around 63°C under controlled conditions.

Problems of Bee-Keeping in Rubber Plantations.

The honey gathering activity in rubber plantations lasts until the end of March. Afterwards the bee-keeper has to see that the colonies are sustained till December. Carbohydrates are produced by the nectar and the protein by the pollen. An assured source of honey and pollen should therefore be made available in the vicinity to sustain brood rearing activity and maintain the colonies. The need for raising plants which will flower in sequences round the year is all the more important. The Rubber Research Institute of India has identified five promising bee forage plants along with twenty one major and minor sources of nectar and pollen for off-season bee management. These plants

provide a source of nectar and pollen during the long dearth period from April to December. These can be raised on the hedgerows, boundaries, bunds or vacant patches in the plantation.

Marketing of Rubber Honey

As rubber honey forms around 40 per cent of the total honey produced in the country the rubber planters stand to gain by increasing the overall consumption of honey in India. The present study shows that 50 per cent of the honey produced in the rubber plantations is consumed by the Ayurvedic and Allopathic pharmaceutical firms. The Ayurvedic firms consume the lion's share of the production. The remaining part is consumed in various sectors like confectionary, tobacco manufacturing, bakery, dairy and other food products. A small quantity is consumed by the temples in Kerala and Tamil Nadu for manufacturing *Panchamritam*. In addition, there is direct human consumption, through honey parlours and at home. The future promotional activities should be in the form of small packages sold through the Railway Stations, Military stores, Aerodromes and special kiosks in important towns. Rubber Board could also take active

steps in the promotion of rubber honey.

The World Situation.

The world production of honey has been placed at 9.4 lakh tonnes in 1984. Of this around 25 per cent enters the international market. China, Mexico and Argentina together account for 60 percent of the trade. The largest producer of honey in the world is USSR with 1.98 lakh tonnes in 1983, followed by China at 1.15 lakh tonnes. The tremendous increase achieved in the production and export of honey by China should be an eye opener to a developing country like India.

The International Trade Centre of the United Nations took up a study of international marketing of honey in developing countries in 1976-77. The study revealed that there was a growing demand for honey in the world because of greater interest in natural foods and higher living standard. The study noted that the supply of honey did not keep up with the increase in demand. Strict quality control requirements in importing countries, specific consumer preferences for certain flavours and colour and consistency of honey were the factors that commanded the market. Most of the markets prefer light and liquid honey than crystallised honey from a single plant species fetches higher price than mixed honey obtained from several sources. The future of honey is assured and there is every reason to promote this ancillary activity, on a large scale in rubber plantations.

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Pact to preserve plant germplasm

An agreement for technical co-operation in conservation of plant germplasm of south and south-east Asian region was signed between the Indian Council of Agricultural Research (ICAR) and the International Board for Plant Genetic Resources (IBPGR) in November 1987.

It provides for opening a field office of IBPGR for the region in India.

Hailing the accord Mr. G. S. Dhillon, agriculture minister, said it would enable the two organisations to collaborate in strengthening their activities.

Mr Dhillon inaugurated the IBPGR workshop in New Delhi on south and south-east Asian plant genetic resources. Sponsored by ICAR, the workshop was attended by 17 delegates from different countries of the region.

The minister pointed out that the region was the home of several major food crops and other economic plants and possessed enormous diversity in plant genetic resources. However, due to pressure on land as well as improper use, most of these resources were now facing the danger of extinction.

The situation demanded urgent efforts to salvage and preserve the endangered plant species before they were lost for ever, the minister said.

He said India's National Bureau of Plant Genetic Resource (NBPGR) maintained international linkages with over 80 countries and generated necessary facilities for long-term storage of germplasm.