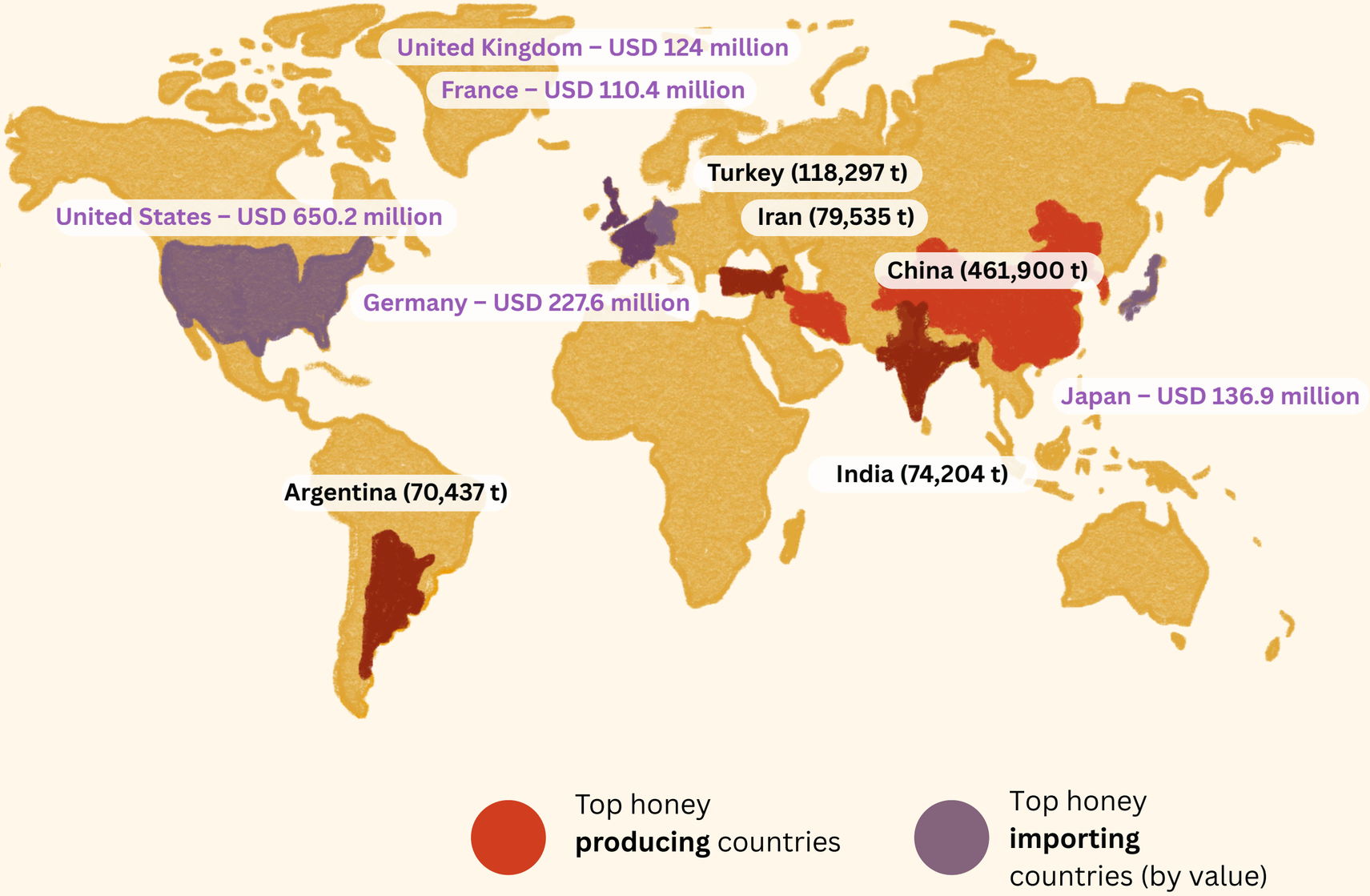
Honey in India

UNDERSTANDING PRODUCTION SYSTEMS,
VALUE CHAINS & INTERVENTION PATHWAYS

Globally, honey production is concentrated, while consumption and imports are spread across high-income markets.

This creates a global value chain where origin, quality and trust determine price and where adulteration and standardisation pressures are increasing.

India occupies a critical position as both a major producer and a potential supplier of differentiated honey, but only if its production systems are understood and served appropriately.



source : https://worldpopulationreview.com/country-rankings/honey-production-by-country ; https://comtradeplus.un.org/

Honey sits at the intersection of food, health and wellness markets, with demand driven by:

- **Sugar replacement** in food and beverages
- **Therapeutic and medicinal use**
- **Clean-label and natural product** trends

These shifts are increasing demand for traceable, high-quality honey products, particularly in premium food and wellness markets.

India hosts a wide diversity of honeybee species, each with distinct biological traits.

For value chains and interventions, what matters most is not species identity alone, but the degree of human manageability each species allows.

Manageability influences yield predictability, moisture control, tolerance to handling, storage life and the types of markets honey can realistically access.

Species and production practices together determine which interventions are technically feasible and economically viable in a given geography.

Major Honeybee Species in India

Apis dorsata

Wild, open-nesting species found in forests and cliffs. Produces high-quality, medicinal honey but involves high-risk collection and minimal control.

Colony size: ~40,000–80,000 bees | Honey yield: 25–45 kg/year

Apis cerana indica

Indigenous cavity-nesting species well adapted to local climates. Suitable for forest and agroforestry systems and commonly used in community-led beekeeping.

Colony size: ~20,000–30,000 bees | Honey yield: 5–10 kg/year

Apis mellifera

Exotic species dominant in global apiculture. High yields but input-intensive and less suited to dense forest ecosystems.

Colony size: ~40,000–60,000 (can reach ~80,000) | Honey yield: 25–60 kg/year

Trigona species

Stingless bees producing very small quantities of honey with high medicinal and cultural value.

Colony size: ~500–5,000 bees | Honey yield: 0.1–1 kg/year

Apis florea

Small open-nesting species with limited honey yield but important pollination roles.

Colony size: ~3,000–10,000 bees | Honey yield: 0.5–1 kg/year

Bees Matter Far Beyond Honey Production

Bees are foundational to agricultural productivity through pollination services.

The economic value of bee pollination is estimated to be 15–20 times greater than the value of all hive products combined. Yield increases due to pollination vary widely across crops, ranging from 5% to over 300%.

Bees underpin crop diversity, food security and farm resilience, making their health and management a cross-sectoral concern rather than a niche livelihood issue.

In several parts of India, bee colonies are commercially transported to mustard fields, sunflower farms and orchards to improve pollination.

Source - https://www.pib.gov.in/newsite/printrelease.aspx?relid=157604®=3&lang=2

Global Mismatch in Designs and Standards

Globally over 99% of commercially managed honeybee colonies are Apis mellifera.

As a result, most beekeeping equipment, processing methods, quality standards and market expectations are designed around mellifera biology and behaviour.

When these standards are applied uncritically to India’s forest-based and indigenous honey systems, they often distort outcomes rather than improve them. This mismatch is a root cause of inappropriate technology transfer and policy design.

The Adulteration Crisis

India’s honey market is experiencing increasing quality challenges, shaped by **widening demand–supply gaps and the growing presence of low-cost sweetener substitutes** that closely resemble honey.

These substitutes are significantly cheaper than pure honey, placing strong downward pressure on prices across the market. As a result, genuine producers often struggle to compete and consumers face greater difficulty distinguishing between authentic and compromised products.

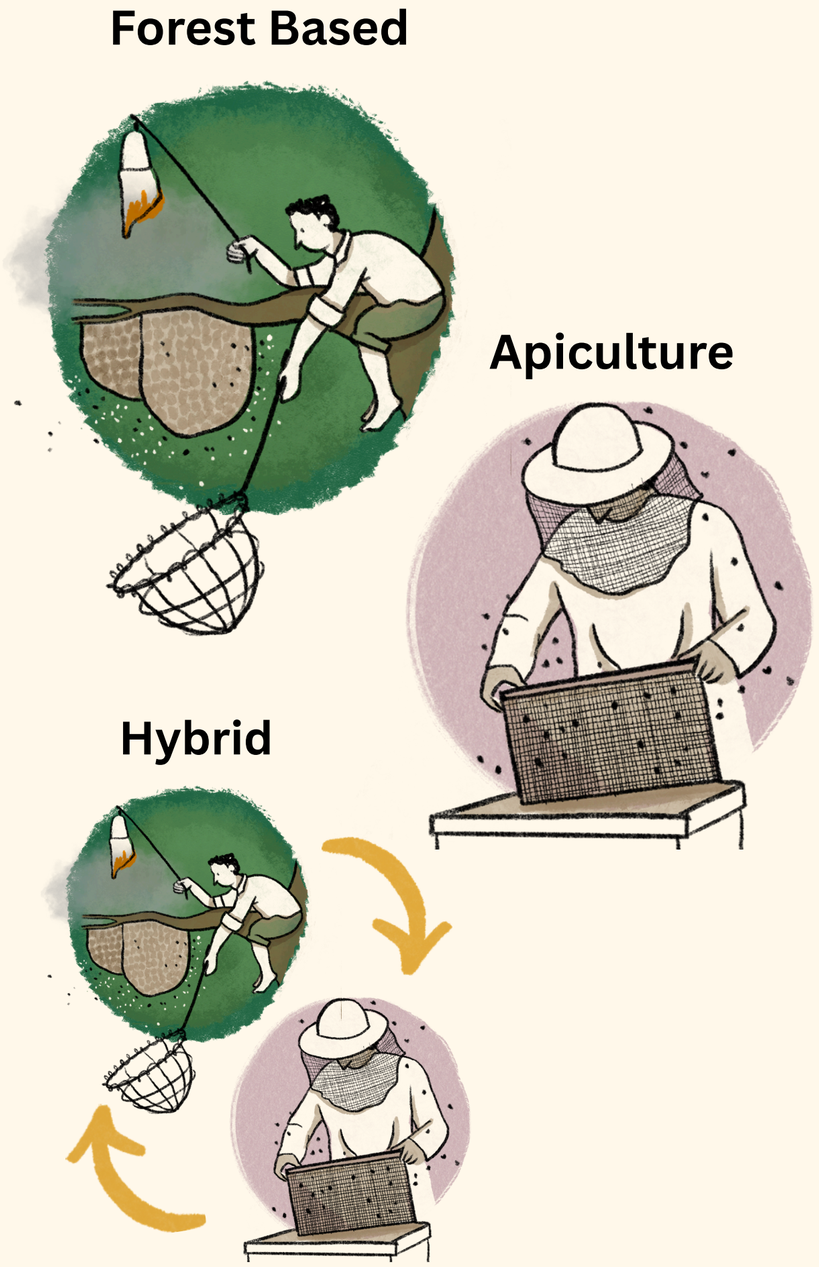
These challenges go beyond enforcement alone. They point to underlying gaps in:

- **Production planning and traceability**
- **Aggregation and bulk handling systems**
- **Consistent, field-linked quality assurance mechanisms**

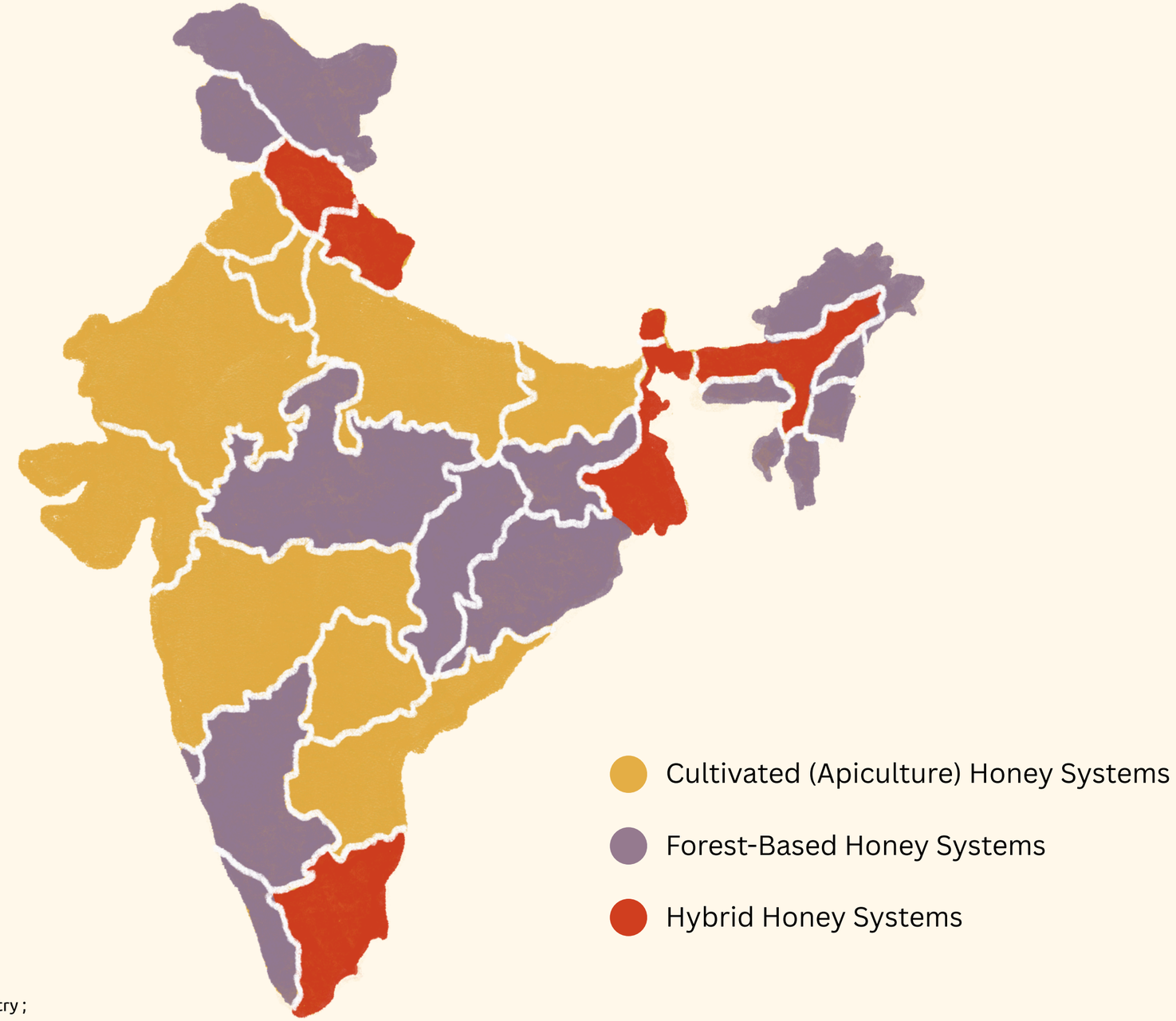
Honey is often treated as a single, uniform commodity; in practice, it is produced through very different production systems that shape harvesting practices, yield stability, quality control and risk exposure.

Across India, honey is produced through **forest based collection** and **apiculture**. In many regions, these boundaries blur, giving rise to hybrid systems where semi-managed colonies depend heavily on forest and agroecological landscapes.

When these differences in ecology, species management and harvesting practices are ignored, value is lost, quality declines and producers are pushed into solutions that are poorly suited to their contexts.



India’s honey landscape spans forest based, hybrid and cultivated systems, often coexisting within the same regions.



source : https://worldpopulationreview.com/country-rankings/honey-production-by-country ; https://comtradeplus.un.org/

Production systems shape risk, quality and value

Honey quality and value are largely determined at the **point of production,** shaped by **ecology, bee species and harvesting practices.**

Production conditions influence:

- Quality and moisture levels
- Yield reliability across seasons
- Storage Life
- Suitability for value addition and premium markets

Forest Based Production System

Forest-based honey is collected primarily from wild bee species, with colonies nesting on tall trees, cliffs and rock faces. Harvesting is physically demanding and high-risk.

Collection is **seasonal and ecologically driven,** closely linked to flowering cycles, rainfall and forest health.

In many indigenous and forest-dependent communities, honey collection is governed by collective norms, rituals, songs and rules that regulate when, how and by whom honey can be harvested. These practices are central to sustaining both bee populations and community livelihoods.

Forest systems produce honey with high medicinal and cultural value. At the same time, they offer very limited control over yield volumes, moisture content, harvest timing and consistency across seasons. These wild bees act as keystone pollinators, sustaining forest plant diversity and regeneration.

These constraints are intrinsic to the system, not failures of practice.

Apiculture

Cultivated honey relies on managed hives. It is practiced in agricultural, peri-forest and irrigated landscapes and requires dedicated inputs such as hive boxes, tools, regular inspection, pest and disease management and access to reliable floral resources.

Compared to forest-based systems, apiculture allows producers to influence colony placement, harvest cycles and production volumes, enabling more predictable supply and easier integration into formal markets.

However, cultivated systems are input-intensive and ecologically sensitive. When promoted in forest-dominated or biodiverse landscapes without adaptation, they often perform poorly or displace more suitable indigenous practices.

Greater control and scale come with higher costs and dependencies.

Forested and Cultivated Systems are not interchangeable

Forest-based honey systems cannot simply be “upgraded” into cultivated apiculture without significant ecological and cultural loss.

Similarly, cultivated systems cannot replace the roles forest honey plays in sustaining biodiversity, indigenous livelihoods and high-value niche markets.

Hybrid systems combine elements of both forest and cultivated approaches, but they behave differently from either end of the spectrum and require distinct intervention strategies.

Treating these systems as substitutes rather than complementary leads to misplaced investments, inappropriate technologies and poor outcomes across the value chain.

While North America reports massive colony losses from multiple stressors (US: up to 70% in 2025), **global research ties climate change to bee declines through floral loss and malnutrition;** India already sees heat/erratic rains disrupting nectar availability and honey yields.

Observed Impacts of Climate Change on Indian Honey Systems:

Flowering shifts: Blooms advanced 10-15 days (e.g. Assam mustard); migratory beekeepers chase nectar flows amid shifting patterns.

Nectar shortages: 2019-20 droughts/heat cut Bihar yields 40%; prolonged dry spells reduce pollen availability nationwide.

Heat stress: >35°C waves (20+ extra days/year in Assam) spike mortality, confine bees to hives, lowering output.

Extreme rains: Assam 2024 floods/intensified monsoons drown hives, devastate crops; cyclones disrupt Northeast collections.

Pests rising: Warmer conditions exacerbate diseases, stressing colonies per field reports.

https://india.mongabay.com/2024/05/migratory-beekeepers-sweeten-assams-honey-production/
https://apnews.com/article/india-honey-bees-beekeepers-climate-change-d38a29dbfaf2d67aca1455241ae28eda
https://abcnews.com/US/honey-bee-colonies-face-70-losses-2025-impacting/story?id=120191720

Across production systems, honey moves through a common value chain:

Production and harvesting

↓

Primary handling

↓

Aggregation

↓

Processing

↓

Packaging

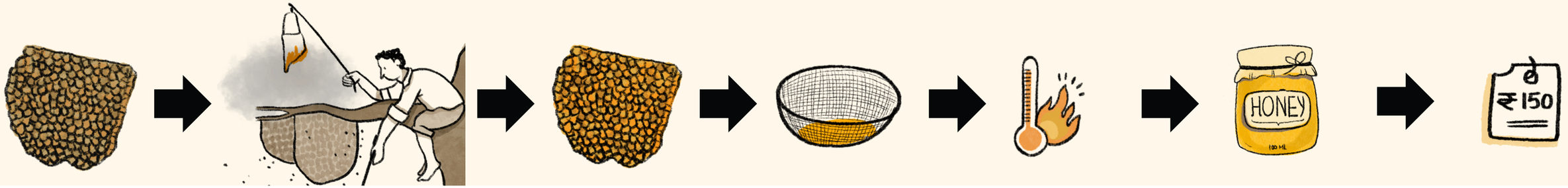
↓

Markets

While the structure remains common, the way each stage functions varies across forest-based, hybrid and cultivated systems.

Understanding these behavioural differences point to where value is lost and where interventions would be most effective.

The Honey Value Chain - Forest System



Hive Identification (Tribal Collectors)	Honey Collection (Tribal Collectors)	Honey Extraction (Tribal Collectors)	Honey Filtering (Tribal Collectors)	Dehydration (LAMPS / Producer Groups)	Packaging (LAMPS / Producer Groups)	Retail
Risky Harvesting Honey collected from cliffs & trees using traditional methods. **Physically demanding & high-risk activity; weakening transfer of traditional knowledge affects timing, sustainability & safety**		**Manual Extraction & Handling** Honeycombs are manually processed to separate & filter honey under basic conditions **Lack of controlled environments leads to contamination, inconsistent quality & reduced shelf life**		**Moisture & Processing Challenges** Moisture is reduced to improve shelf life and prevent fermentation **Heat-based drying methods degrade enzymes, aroma and nutritional properties of honey**		**Limited Market Access** Honey is transported from remote forest areas and sold through local traders or informal channels **High transportation costs and poor connectivity limit access to formal markets, leading to lower and unstable price realization for producers**

The Honey Value Chain - Apiculture

Colony Procurement (Beekeepers)

Honey Extraction (Beekeepers)

Honey Filtering (Beekeepers)

Dehydration (Producer Groups)

Packaging (Producer Groups)

Retail

Input Dependence & Colony Management
Beekeepers procure colonies & manage them in bee boxes under controlled conditions

Dependence on external suppliers, seasonal migration of bees & input costs affect consistency and production

Extraction & Handling Practices
Honey is collected using tools or manual methods & then filtered

Manual handling & limited standardisation can lead to hygiene issues, drudgery & variability in quality

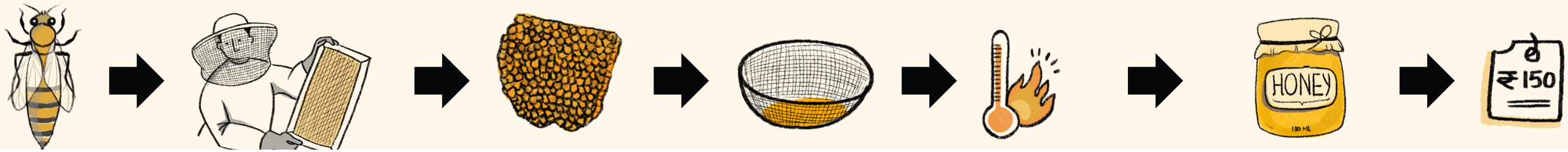
Processing & Quality Control
Honey is dehydrated & processed to meet storage & market requirements

Inadequate moisture control and excessive heating can degrade nutritional quality and reduce market value

Market Linkages
Honey is packaged, transported and sold through organized or semi-organized channels

Despite better production, weak aggregation, transport challenges and inconsistent branding limit price realization

The Honey Value Chain - Hybrid System



Collecting Queen Bees (Tribal Collectors)

Installing Bee box (Community team)

Honey Extraction (Tribal Collectors)

Honey Filtering (Tribal Collectors)

Dehydration (Producer Groups)

Packaging (Producer Groups)

Retail

Colony Establishment & Stability
Queen bees are collected from the wild & placed in bee boxes or tree hollows to establish semi-managed colonies

Colony establishment is uncertain; bees may migrate & exposure to weather & animal attacks affects stability & productivity

Inconsistent Extraction & Handling
Honey is extracted & filtered manually from semi-managed colonies under varying conditions

Practices differ widely, leading to hygiene concerns, higher drudgery and inconsistent quality across batches

Moisture & Processing Variability
Honey is dehydrated to reduce moisture & improve shelf life

Moisture levels remain difficult to control (especially in monsoons) & heat-based drying can reduce nutritional quality

Access & Market Constraints
Honey is packaged & transported to local or semi-organised markets

High transport costs, limited connectivity & weak market linkages restrict access to better-paying markets

Where Value Is Lost Across Systems

Forest based systems

Value loss is concentrated at **harvesting and primary handling.** Risky extraction, high moisture content, contamination and lack of basic handling infrastructure result in quality loss before honey enters the chain.

Hybrid systems

Value loss occurs **across multiple stages.** Variability in extraction is compounded by weak aggregation, inconsistent storage and inappropriate processing, making these systems especially vulnerable to misplaced interventions.

Cultivated systems

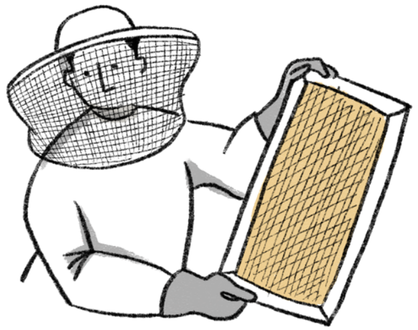
Value loss shifts downstream. Inadequate aggregation, poor moisture control during storage and excessive heat during processing reduce quality and market value despite higher production volumes.

Despite these ecological and climate risks, honey systems remain economically important because

producers derive value from multiple income streams.

Products

Honey
Beeswax
Propolis, Royal jelly, Pollen



Services

Colony sales
Hive rental for beekeeping
Hive rental for crop pollination

Indirect value

Improved crop productivity through pollination

Among these income streams, honey itself has diverse value pathways across food, wellness and medicinal markets.

Direct Honey Products

Value is added through product differentiation, flavouring and packaging formats

- Raw honey
- Monofloral honey
- Infused / flavoured honey
- Creamed honey
- Honey powder
- Honey Syrup
- Honey Sachets (single serve packets)
- Nutraceutical Honey

Food & Beverage Applications

Honey used as a natural sweetener or ingredient in processed foods.

- Drinks and beverages
- Candies and confectionery
- Jams, spreads and baked goods
- Nutrition bars and wellness foods

Therapeutic & Personal Care

Honey used for medicinal and cosmetic formulations due to antimicrobial and moisturizing properties.

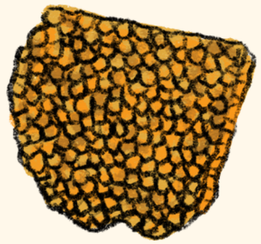
Pharmaceutical

- Wound care and burn treatment
- Cough syrups and throat lozenges

Cosmetics

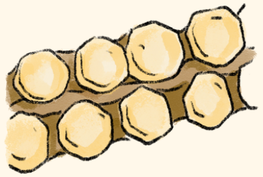
- Face masks and creams
- Soaps, shampoos and lip balms

In addition to honey, hive products create additional high-value market opportunities.



Beeswax
Used in candles, cosmetics, food wraps, polishes and leather care.
Growing demand in eco-packaging and zero-waste markets.

Propolis
Used in throat sprays, supplements and anti-inflammatory cosmetics.
High value but requires careful extraction.



Royal Jelly
Used in nutraceuticals, energy supplements and anti-aging products.
Premium product with strict quality requirements.

Pollen
Used in health supplements and functional foods.
Highly sensitive to contamination and moisture.

Most value-addition efforts fail not because of processing limitations, but due to upstream weaknesses.

Common constraints include:

- **Inconsistent quality due to moisture and contamination**
- **Unreliable volumes across seasons**
- **Weak aggregation and batch mixing**
- **Low buyer trust and traceability**

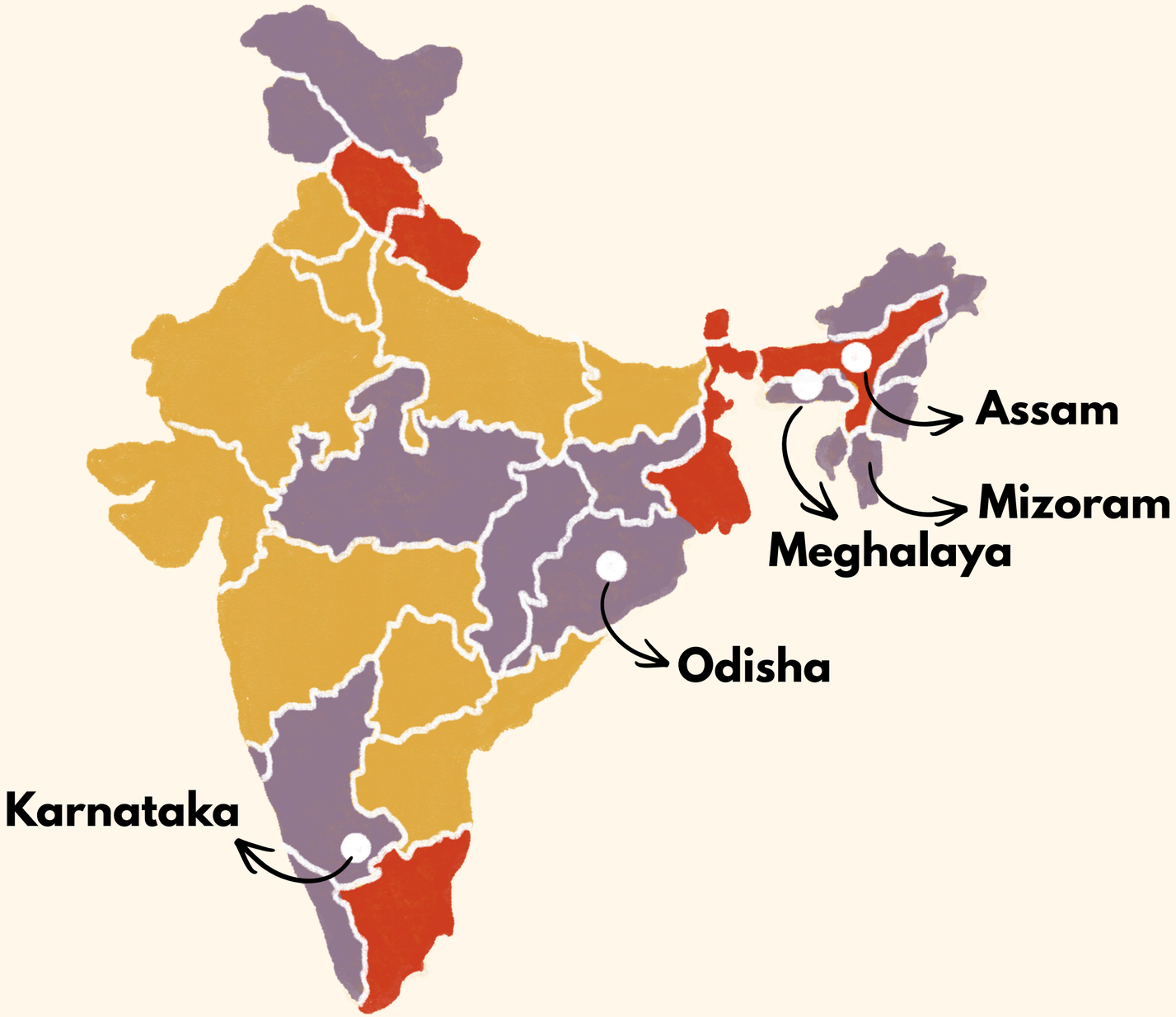
Successful value addition requires stronger production systems and better early-stage handling.

Given the diversity of honey systems in India, SELCO Foundation's work has focused on forest-based and hybrid production systems where conventional apiculture models and downstream market solutions often fail.

These systems:

- **Support indigenous and forest-dependent livelihoods**
- **Face the highest mismatch with mainstream technologies and standards**
- **Experience early-stage value loss that downstream interventions cannot fix**

SELCO Foundation’s honey work is currently concentrated in forest based and hybrid systems, where early value loss is highest and system appropriate solutions are most needed.



Forest System | BR Hills, Karnataka - Soliga Community

For the Soliga people, honey is inseparable from forest life. Honey is viewed as a gift of the forest, not a resource to be maximised. Collection is guided by forest calendars, rituals and collective norms that ensure regeneration.

System Characteristics:

- Wild honey collection
- Seasonal & ecology dependent
- High cultural and medicinal value
- Low control over moisture & consistency

Key Challenge:
Processing methods relied on heat to reduce moisture, which compromised the delicate aroma and quality of stingless bee honey.

Intervention:
Introduction of a non-heat-based dehydrator at the community processing unit.

What Changed:

- Moisture reduced without damaging quality
- Preservation of flavour and medicinal value
- Better positioning in premium markets

Market Linkage:
Packaged and sold under the Adavi brand, primarily to tourists visiting BR Hills.

Forest + Hybrid System | Karnataka - Siddi Community

The Siddi community, recognised as a PVTG (Particularly Vulnerable Tribal Group), depends on forest honey collection, supported by highly coordinated group harvesting practices.

System Characteristics:

- Wild honey collection (rope-based, night harvesting)
- Beekeeping practiced alongside forest honey collection
- Group-based harvesting practices with shared traditional knowledge

Key Challenge:
High moisture content in forest honey led to lower prices and the use of heat-based drying methods further reduced its quality and market value.

Intervention:
Introduction of a non-heat-based dehydrator for both forest and box-collected honey.

What Changed:

- Improved moisture control without quality loss
- Better price realization
- Ability to process both wild and managed honey

Market Linkage:
Honey is marketed under the Sidhi Sri brand with ongoing support from Manuvikasa.

Hybrid System | Assam, Meghalaya, Mizoram

Communities combine forest knowledge with semi-managed practices by establishing colonies using indigenous bee species. Traditional practices involve identifying trees with natural hollows, introducing a queen bee and allowing colonies to establish naturally.

System Characteristics:

- Queen bees sourced from forests
- Colonies established in tree hollows or bee boxes
- Relies on forest ecology and natural bee behaviour, with limited human control
- Minimal external inputs or artificial colony management
- Unpredictable colony stability, migration and honey yields

Key Challenge:
Colony establishment is uncertain, with bees not always settling in introduced hives. Production and quality vary across seasons and hive conditions are difficult to monitor.

Intervention:
End-to-end system support was introduced, including IoT-enabled bee boxes, honey extractors, non-heat dehydrators and packaging solutions.

What Changed:

- Improved colony monitoring and stability
- Better control over production and quality
- Enhanced ability to scale while retaining indigenous practices
- Stronger foundation for more consistent, market-ready production

Forest System | Mayurbhanj, Odisha

Honey collection is organised in small, specialised groups, each responsible for specific forest areas. These informal territorial systems regulate access and ensure that harvesting happens only once a season, allowing for natural regeneration.

System Characteristics:

- Wild honey collection from trees and rock faces
- Strong dependence on forest ecology and seasonal cycles
- Minimal processing and limited market access

Key Challenge:
High moisture content, localised sales with low value realisation and weak aggregation and market linkages limited the overall value captured by producers.

Intervention:
A hub-and-spoke processing model was introduced under the Made in Odisha initiative, with village-level dehydrators for primary processing and centralised aggregation, bottling and branding through an FPO.

What Changed:

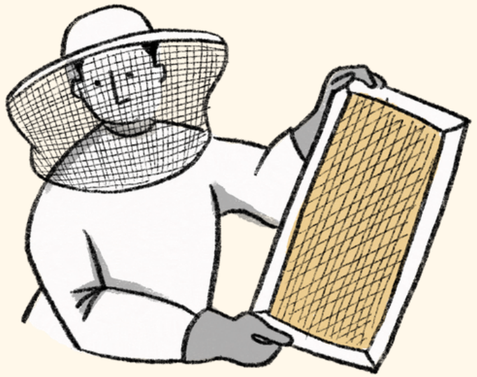
- Improved moisture control without quality loss
- FPO-led aggregation increased consistency across batches
- Centralised processing and branding enabled access to higher-value markets

Market Linkage:
Honey is marketed under the Made in Odisha brand.

Interventions across the Value Chain

Queen bee collection

Safety kit



Scouting

Safety kit

Honey-bee rearing

Bee box
IoT baed bee box
Flow hive
Pollen trap

Honey wax Collection

Melting

Wax melter

Mixing

Mixing vessel
with stirrer

Cooling and packaging

- Filling machine
- Cooling rack

Honey collection

Honey extractor
Smoker

Filtering

Honey filter

Dehydration

Honey dehydrator

Bottling

Filling and bottling
machine
cap sealing

Branding & sales

Solution deep dives

Protective gears

Includes Veils, Suit, Gloves, Gumboot, Smoker

Solving for

Drudgery and Health Risks:
During honey harvesting, there is a significant risk of bee attacks. In cases of multiple stings, collectors often experience fever and other health complications, increasing the physical strain and occupational hazards associated with the activity.

Pollen trap

Brushes pollen off their legs while allowing them to pass inside safely. The collected pollen is stored for beekeepers as a nutrient-rich product.

Solving for

Efficiently collects pollen from foraging bees without harming them

Solution deep dives

IoT based Honey bee hives

The system monitors the temperature and humidity levels inside the hives and operates using solar energy. It is integrated with a mobile application, enabling farmers to receive real-time alerts and notifications if any irregularities occur.

Solving for

Bee colonies tend to migrate from traditional hives when exposed to unfavorable internal conditions, particularly due to adverse weather effects that make the hive environment unsuitable for habitation.

Flow hives

A flow hive enables honey extraction without disturbing the bees, eliminating the need for traditional extractors and minimizing stress on the colony.

Solving for

Conventional honey harvesting is labor-intensive and poses risks to both the bees and the farmers, often causing physical strain to collectors and stress or harm to the colonies.

Solution deep dives

Smoker

Collecting honey without sm used to calm honeybees during hive inspections and harvesting. It consists of a metal canister, a fire chamber, and bellows that produce controlled, cool smoke from smoldering fuels like wood chips or pine needles. The smoke masks alarm pheromones, reducing defensive behavior and allowing beekeepers to safely manage the hive.

Solving for

Collecting honey without smoke will lead to bee attacks which will harm the beekeepers

Semi automatic honey extractor

The honeycomb is placed inside the extractor chamber, and once the machine is switched on, it rotates. The centrifugal force generated during rotation pulls the honey out of the comb, allowing it to flow down and be collected through the valve at the bottom.

Solving for

Manual honey extraction often leads to higher wastage and raises concerns regarding hygiene and quality control.

Solution deep dives

Honey dehydrator

The honey is poured into trays and placed inside the machine. Once switched on, the built-in dehumidifier and fans work together to remove excess moisture, gently dehydrating the honey without the need for heat.

Solving for

The ideal moisture content of honey should be around 18%. Traditionally, excess moisture is reduced through heat processing, which can compromise the honey's natural quality, aroma, and nutrients. A non-heat-based dehydrator lowers the moisture content without exposing the honey to heat, thereby preserving its original quality and characteristics.

Filling machine & cap sealing

The required volume can be preset, and the filling machine will automatically dispense honey into glass jars with precision. The jars can then be securely sealed using an induction sealer. Since honey is a viscous liquid, a compressor is integrated with the filling machine to ensure smooth and consistent flow during the filling process.

Solving for

The farmers typically sell honey locally in reused water bottles, and even when glass bottles are used, each one has to be weighed individually before sale, making the process time-consuming and inconsistent.

Solution deep dives

Spiral Mixer

Specialized machine used for kneading dough, and mixing the ingredients

Value added products

Honey Cake, Honey Candy, Honey Jam, Honey Peanut Butter, Honey Protein Bar

Planetry Mixer

Used for blending viscous materials like honey with other ingredients

Value added products

Honey Cake, Honey Candy, Honey Jam, Honey Peanut Butter, Honey Protein Bar

Blender

Used for blending viscous materials like honey with other ingredients in a small scale

Value added products

Honey Cake, Honey Candy, Honey Jam, Honey Peanut Butter, Honey Protein Bar

Solution deep dives

Honey filter

Simple tool used for filtering the honey to remove any impurities

Value added products

Honey syrup and Honey sachet

Baking Oven

Used for baking

Value added products

Honey cookie, Honey cake

Heat Sealer

Used for packing the food products

Value added products

Value addd honey food products

Solution deep dives

Cookies press/Sheeter

Used for make the dough into sheets which can then turn into shapes

Value added products

Honey cookie

Weighing scale

For weighing

Value added products

Food products, Cosmetics, Honey(In case bottle filling machine is not there)

Bottle filling

For filling the defenite quantity to the bottle (Viscous liquids)

Value added products

Honey syrup, Honey jam

Solution deep dives

Steam jacketted kettle

For heating the bevarages for longer shelf life

Value added products

Honey Candy, Honey Syrup, Honey Jam, Honey added sqash

Digital Thermometer

To measure the heat of food products

Value added products

Food and bevarages which is using heat, Cosmetics made with honey bee wax

Silicon Mould

For moulding the wax into finished products

Value added products

Honey soap, Bees wax

Solution deep dives

Cooling table/ Cooling rack

Can be used for wax cooling, Cookie production etc

Value added products

Honey Candy, Honey Cake, Beeswax Lipbalm, Honey Protein Bar, Honey Soap

Induction sealer

To seal the bottles

Value added products

Honey Jam, Honey candy,

Labeling machine

For labeling

Value added products

Honey soap, Bees wax

Solution deep dives

Batch coding and printing

For printing the batch code

Value added products

Honey Candy, Honey Cake, Beeswax Lipbalm, Honey Protein Bar, Honey Soap

Roaster

To roast the ingredients for cookies, protien bars etc.

Value added products

Honey Peanut Butter & Honey Nuts

Grinder

To mix and grind the ingredients

Value added products

Honey peanut butter

Stakeholders Across the Honey Ecosystem

Training & Capacity Building

Under The Mango Tree (UTMT)
B Wise
Ashoka trust for research in Ecology and Environment (ATREE)

Finance

National Beekeeping & Honey Mission (NBHM)
Khadi and Village Industries Commission (KVIC) loans
Pradhan Mantri Formalisation of Micro Food Processing Enterprises scheme (PMFME)

Policy

Pradhan Mantri Van dhan yojana (PMVDY)
National Beekeeping and Honey Mission (NBHM)

Bee Keepers/ Honey Gatherers

Technology Innovation

Alto precision
Intero pactech
Ksheera enterprise
Bwise (red mountain soil)

Government Department

Tribal Cooperative Marketing Development Federation of India Limited (TRIFED)
State Rural Livelihood Mission (SRLM)
Ministry of Agriculture and Farmers Welfare (MoAFW)
Khadi and Village industries Board (KVIB)
National Bee Board (NBB)

Linkages

Pragtimitra
Cerena honey
Madhukranti Portal
Made In Odisha (MIO)
Sidhi sri

Implementation Parties

Manuvikasa
Adavi
Made In Odisha (MIO_
Champion Farmers
Under The Mango Tree (UTMT)
Meg LIFE - Meghalaya Govt

Stakeholder mapping Honey.xlsx

Strengthening honey systems requires moving beyond uniform approaches and investing in system-specific pathways to value.

Building on our work in forest and hybrid systems, the next step is to expand into apiculture systems; while continuing to ground interventions in ecology, production realities and community practices.

This creates opportunities to improve quality, scale responsibly and enable stronger, more reliable market linkages.