

# Bee Keeping: A Review

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**Abstract-** Apiculture or beekeeping is the caring and managing honey bees for producing honey and wax. Bees help in making ecosystem healthy and helps in shaping of environment.. Beekeeping is done in two types i.e. Stationary beekeeping and Migratory beekeeping. Beekeeping is a low investment business and rural youth can become self employed by doing beekeeping. Various bee products like Honey, Propolis, Pollen and bee bread, Bee bread, Royal jelly and Bee venom can help in fetching business.

**Keywords-** Beekeeping , Migratory bee keeping , Royal Jelly

## I. INTRODUCTION

### I. Beekeeping definition:

#### Apiculture Meaning

Apiculture or beekeeping is the practice of taking care and management of honey bees for producing honey and wax. In it, apiaries bees are bred on commercial basis, apiary is an area where large number of beehives could be placed. Apiaries are kept in places where there are enough bee pastures – those areas where there are flowering plants.

Beekeeping is also known as apiculture or meliponiculture and had been defined in many ways ( Cadwallader, 2011 ). All definitions commonly say that the skill of managing honeybees sustainability for the purpose of tapping them into resource benefits. Beekeeping is collection and retention of bees in a hive and apiary, or keeping a hive inside apiary and keep waiting for results from the bee colony (Guyo et al., 2015). Beekeeping needs efficient and sustainable management of the bee colony. It requires latest equipments and tools, application of required beekeeping knowledge and skills and analysing potential and profitable markets.

Beekeeping is through plant pollination and conservation of the natural environment. Beekeeping is an environmental sustainable activity which could be helpful for agricultural practices like crop production, animal husbandry, horticultural crops and conservation of natural resources. (Gibbon, 2001).

### I (a) Benefits of Beekeeping

Benefits of beekeeping are:

- Beekeeping gives an important nutritional food i.e. honey.
- Beekeeping makes bee wax which could be used in industries such as cosmetics, polishing, pharmaceutical etc.
- Beekeeping plays important role in pollination which helps in increase of the yield of several crops.
- According to the latest studies, the honey bee's venom contains a mixture of proteins which can potentially be used as a prophylactic to destroy HIV that causes AIDS in humans
- Honey could be used as medicine, consumption as a food and could be utilised as an additive in various types of food and beverages. Honey could be utilised for treatment of variety of ailments by its wide range of applications.( Tarunika, 2014)
- Beekeeping is very much beneficial because it helps in preservation of natural plants because of whom bees collect nectar and had therapeutic usage of honey. Bees and beekeeping is advantageous for rural populations as it helps in setting up a secondary source of income with low input cost. (Kumari et.al. 2016).
- Apiculture business is profitable and has helped in increasing individuals monthly income and could increase the income of the farmers. (Esakkimuthu, 2017).
- Beekeeping as a business is done mainly for pollination services, honey, beeswax, propolis and bee venom (Tej et.al., 2017)
- Honey could be used as medicine and food. Honey helps in generating income and could help in creating primary income source for various sectors within a society (Chikamai et al., 2009).
- The honey has been used for dressing wounds, as an anti-diarrhea drug, in alcoholic drinks, tobacco curing, bakery and confectionery and in manufacturing of cosmetics
- Honey products like bee wax, propolis, bee venom, and royal jelly are foreign exchange earning commodities for some countries. (Codex Alimentarius Commission, 2001).
- Honey is convenient for cosmetic products and dressings for different wounds and burn wounds. Clinical trials have revealed positive effects of honey for acne, herpes, skin

rashes, contact dermatitis, diaper dermatitis, psoriasis, and hemorrhoids (Burlando et.al. 2017)

### I (b). Beekeeping as entrepreneurship

Beekeeping does not require upgraded technologies, big financial investments and huge infrastructure. Bee-keeper just needs bees for harvesting honey and hive products, bees are advantageous in fertilising of crops and breed bees for selling to other beekeepers. Advantage of beekeeping is that it provides self-employment. Production of honey, pollen, beeswax, venom, and royal jelly provides entrepreneurship for rural educated youths in the collecting, processing and marketing of bee products (Nath et al., 2019)

Bees helps in making ecosystem healthy and helps in shaping of environment (Abbott, 2016). . Honey is required by consumers for supporting their health. The status of purchase of honey is increasing drastically and it had provided opportunity for honey entrepreneurs for increasing satisfaction level of consumer in order to survive during the health shock. (Jaisy et. al. 2021)

Honeybees builds honeycomb on trees, inthe caves and below the roof of building. People keep bee colonies for business purpose. Farmers keep bees for extraction of honey which bees produce (Dia et al., 2018).

Beekeeping is a traditional honey-hunting and rural-based activity in developing areas (Guyo et al., 2015). Beekeeping is done by local communities for local purposes in which managing hive is difficult. Beekeeping has been given little attention and no responsibilities concerning towards the development of the sector has been assigned. (Nyatsande et al. 2014)

Beekeeping sector had few extension services and it depends towards the usage of local equipment's and tools in harvesting, extracting, processing and packaging of hive products. It had resulted in poor productivity, poor quality hive products and unreliable markets. This sector had failed towards tapping the societal and economical benefits. (Mwakatobe, 2006; Nyatsande et al. 2014)

### II. Beeproducts:

Various bee products are

- Honey
- Prophilis
- Pollen and bee bread (Perga, ambrosia)
- Bee bread (Perga)
- Royal jelly

- Bee venom

**Honey:** Honey is a sweet, thick, supersaturated sugar solution produced by honeybees from the nectar of plants or from secretions of living parts of plants or excretions of plant-sucking insects on the living parts of plants, which the bees transform by combining with specific substances of their own, deposit, dehydrate, store, and leave in the honeycomb to ripen and mature, to feed their larvae. (Julianti et al., 2017; Kurek et al., 2020). Bee honey is composition is of fructose, glucose and water, in different proportions and it also constitutes of several enzymes and oils. (Rahman et al., 2019).

**Propolis:** Propolis, or bee glue is a resinous substance collected from plant buds and shoots by honey bees. Bees use propolis to seal holes and honey combs and fixing of internal walls of the hive and to prevent the bodies of intruders who had died inside the hive from decaying. It is used against a broad range of micro-organisms in the hive and in keeping intruders away. Propolis was used for mummification rituals in ancient times (Freires et. al. 2016). Now these days propolis is used for many reasons, as a beneficial apitherapeutic agent and as a functional food additive (Andrade et. al. 2017).

**Pollen and bee bread (Perga, ambrosia):** Pollen is gathered by honey bees from flowers and pack these into granules. Honey bees uses pollen as a source of proteins, lipids, sterols, vitamins, minerals and carbohydrates in the form of plain pollen or bee bread. A colony can collect fifty to two hundred fifty gram of bee pollen in a day, and fifteen to forty kilogram of pollen a year. Foraging bees carry the pollen to the hive in the form of pollen loads in recesses on the shins of the hind legs known as “cages.” The average weight of pollen carried by one bee is approximately 7.5mg. Most pollen consists of a single grain, sometimes attached to two or more grains (Komosinska et.al. 2015)

**Bee bread (Perga):** Bee bread is highly valuable natural bee product and is also known as asperga or ambrosia. Bee pollen is stored by honey bees in their colony as a bee bread and bee bread is consumed by adult bees and is fed to the larvae (Kieliszek et. al. 2018).

**Royal jelly:** Royal jelly (RJ) is secreted from the hypopharyngeal and mandibular glands of young worker bees (*A. mellifera*). Young female larvae is fed royal jelly and it develops into queen bee and genetically identical female larvae fed on worker jelly develops into worker bees (Sobral et. al. 2017). Royal Jelly is consumed by the queen bee only. Honeybee larvae after hatching is fed royal jelly which helps it to nurture the brood. Royal jelly has an immune stimulatory

effect and had been defined as “a secret of life” or elixir (Kucharski et. al. 2008).

**Bee venom:** Bee venom is used by honey bees use for self protection and is produced in poison glands in the abdominal cavity. Bee venom is having complex chemical structure which consists of various enzymes, proteins and peptides. Bee venom possesses various biological active properties in humans which includes the immune system, central and peripheral nervous system, and cardiovascular system, antibacterial, fungicide, antiviral, antiinflammatory, antiarthritis, antitumoral, and antineurodegenerative effects, and potential for use in acupuncture and homeopathy [4,128,129]. Bee venom is very beneficial for apitherapy (Imai et. al. 2012)

### **I (c) Beekeeping practices: (Velmurugan. 2022)**

Beekeeping is done in two ways:

- 1) Stationary beekeeping
- 2) Migratory beekeeping

1) **Stationary beekeeping :** It is a practice of keeping hives at one place on agricultural lands. The time is perfect for beekeeping in the integrated farm because of the presence of variety of crops (trees, plants, vines) which provide food to the bees throughout the year because of which there is no requirement to relocation of beehives. This method could be used for up to 10-15 beehives per acre.

2) **Migratory beekeeping :** In migratory beekeeping beehives are shifted to the places where there are flowers and the beekeeping is done. This practice suits the landless and self-employed start-ups because they don't have land to cultivate flowers and can keep beehives only on farmlands by the consent of the farmers. Handsome profits could be obtained by keeping and maintaining up to 50-100 hives in this method and also various types of bees are available as beekeeping is done among different crops.

### **I (d) Types of manufactured Honey (Muhammad 2015)**

- Strained honey.
- Ultra-filtered honey.
- Pasteurized honey.
- Varietal or monofloral honey.
- Flavored honey.
- Infused honey.
- Dried honey.
- Honey sticks.

## **II. METHODS AND MATERIALS**

Beekeeping research papers were studied on topics Honey Production, marketing of Honey, analysis of Honey Market, Beekeeping and Constraints, Constraints in Honey Production, consumer Behaviour towards Honey, honey Bee Development Model, honey Consumption, processing of Honey, profitability of Honey and Supply Chain of Honey

## **III. REVIEW OF LITERATURE**

Kassa et. al (2017) analysed the honey production profit and the performance of honey markets in Chena district of Kaffa zone, Southern Ethiopia .It was concluded that beekeepers gross profits of 788.70 birr/hive and 270.05 birr/hive from improved and traditional beehives per year was obtained.

According to Fani (2017) aimed to find out the nutritive qualities significance of alimentary products, towards the customer behaviour. Nutritive marketing aimed to position the company superior in the competition, with the final benefit of producing a rival superiority, which leads to a higher selling rate and profit. The capacity for holding client for whole life is a powerful tool. Social responsibility is connected to marketing communication with the support from marketing communication, social responsibility and social responsibility.

According to Risper (2015) a study was conducted in Baringo County of Kenya to analyse honey production and operations of all honey products . It was concluded that most beekeepers get very less price for selling honey as in raw form. This leads to poverty and the beekeepers are not able expand their business. Those beekeepers who do processing get good prices of their products and are able to expand the business too. If beekeepers work in collaboration, this will result in less transaction costs and bargaining costs. This will result in good returns for the products and their socio-economic conditions will be improved

Steven et. al. (2013) aimed to find out the main points that would influence consumers buying perceptions of honey allied products. It was concluded that Medical condition, Quality of product, Brand Reputation and Pricing do influence the buying perceptions of consumers.

Ikechi et. al. (2020) aimed to find out the socio-economic characteristics of honey marketers; to measure the honey marketers profitability, to identify the channels of honey marketing; to determine the effect on profitability of honey marketing due to socio-economic characteristics and to

find out constraint of honey marketing . It was concluded that 68 percent of the marketers were female, 92 percent received formal education and 39 percent of the respondents were between the ages of 31 – 40. Mainly (48 percent) the respondents had household size between 1–5 persons.

Cherish et.al. (2022) aimed to analyse the marketing of honey. The results showed that the average marketing cost of the beekeepers was Rs. 27.99 per kg, and price spread in channel II was Rs.105 per kg and in channel I it was Rs. 0 per kg. The producers share in consumers rupee was 73.75 per cent channel II and 100 per cent in channel I. The demand for Indian bee produced honey is huge in International market. To bring structural transformation in marketing of honey bee keepers should be interested in export of honey as it has great potential in international market.

Peter et. al. (2018) aimed to apply nutrition marketing concept to do analysis of chemical, microbiological, antioxidant, antimicrobial profile of honey and suggest strategies of marketing for honey producers. The results showed that honey good biological properties and mineral composition which could offer many new opportunities for applying nutrition marketing. Beekeepers should educate their consumers regarding positive healing effects and nutritional point of view of honey.

Samuel et. al (2017) aimed to find out the potential of processed honey bee products and their financial analysis for honey bee keepers. The results showed that the beekeeper that promotes and sells processed honey can earn good margins.

Nahusenay (2015) to characterize honey production and marketing , to explore the factors that influence honey production and marketing and to derive strategy to improve the performance of beekeepers. It was concluded that average productions of honey from traditional beehives increased from 7.81kg to 8.30kg per hive , the average production of honey from modern beehives increased from 9.38kg to 17.92 per hive. The growth of modern beehive is much higher than that of traditional beehives. This shows that the technical skill, knowledge and efficiency of honey harvesting from modern beehives shows progress. It resulted that there is increment in honey production which is having a direct link to better income and poverty alleviation

Sileshi et. al (2019) aimed to characterize the marketing system and market structure and conduct, to the impacts of domestic honey marketing system on export marketing, and to identify the major opportunities and challenges of honey marketing. Market concentration ratio showed that the market structure was a moderately concentrated and weak oligopoly market ( $CR_4 = 47.1\%$ ).

Moreover, this study revealed that the domestic price at different market points is higher than the export price, indicating the impact of domestic honey marketing on export marketing. As a result, establishing legal honey marketing framework and regulatory

Šedík (2018) aimed to develop the strategies for honey marketing using concept of generation marketing. The results showed that there are significant differences among generations in terms of preferences, consumer and purchasing behaviour. The results are useful in situation analysis for beekeepers who consider the difference while designing marketing mix strategy. Promotion tools are need for different generations of consumers and also in their promotional strategy. Beekeepers should think towards forming of event marketing , excursion to apiaries, observation hives, honey festivals, seminars with honey breakfast in schools.

Ferencz (2008) observed that in small farms honey and similar products are produced and sold. The community marketing had a prime importance. Hungarian farmers had modest means for market research, but utilising the possibilities in Hungarian demand even a bit more would give a tremendous jump in the turnover. It was concluded that with proper marketing, the sales of the special Hungarian brand of honey can increased . For advertisement of honey in foreign and domestic market, marketing is required. Community marketing is significant for Hungarian producers and distributors that can afford only limited amounts of market improvement.

Kassa et. al (2017) analysed the honey markets in Chena district of Kaffa zone, Southern Ethiopia for profitability of honey production and its performance. Results showed that beekeepers obtained gross profits of 788.70 birr/hive from improved beehive per which is almost double of the gross profit from traditional beehive. Gross profit from market performance analysis on marketing margins generated positive actors. The result also revealed that the producers share is maximum, when they sell directly to consumers, retailers and cooperatives. Thus, cooperative organizations which are involved marketing should focus on promoting improved beehives and encouraging them.

Chilumuru et. al (2015) aimed to develop a simple, sensitive, selective and precise HPLC method for the determination of oxytetracycline in bulk and honey samples. The results of assay of the oxytetracycline in the selected honey samples indicated that in most of the collected samples the antibiotic residues were higher than the maximum residue. The proposed method is useful in the monitoring and quantification of the oxytetracycline in honey samples.

Tizazu (2017) conducted a study in Shebedino district of Ethiopia which is known for its high production of honey. However, there is a gap in honey marketing in the district in that honey marketing system in the district was inefficient. The result indicated that the structure of honey market in the district was oligopoly with four firms' concentration ratio of 58.18 percent. The price of honey is controlled by top firms which affect individual firms. It was also concluded that middlemen earn large margins and it showed that honey market is inefficient.

Samuel (2017). aimed to suggest directions for future improvement of honey marketing by assessing the honey marketing channels, structure-conduct-performance of honey marketing and factors affecting honey market chain. Results from Market chain analysis found that the main players in the chain were honey producers, rural assemblers, wholesalers, processors (tej-makers) and retailers. The structure of the honey market was strong oligopoly feature. To enhance volume of honey beekeepers training is required, agro-ecology is essential, education of household is needed, size of livestock holding and number of modern hives are required.

Amanuel et. al (2017) aimed to study the structure of production costs, to determine profitability of the production and to evaluate the performance, structure and conduct of marketing of honey. It was concluded that a major amount of honey produced is sold directly to consumers by producers (56.61 percent). About 28.46 percent of total gross marketing margin was added to honey price when it reaches the final consumer. Gross margin of honey collectors was 13.15 percent, gross margin of retailers was 15.32 percent. It was also identified that honey is main income generating commodity next to farming.

Shilpa et. al (2017) aimed to analyse the natural honey's pattern of export, import and balance of trade in India by tabular analysis. The results showed that the performance of export of natural honey showed increasing trend, upward and downward trend of the imports of natural honey was observed for past ten years. It was also concluded that there is a need for suitable export strategy. There is tremendous export potential of Indian honey. Suitable export strategy is required. Main points of application are latest technology for collection and processing of honey, application of quality standards, bee keeping should be recognised as agro-industry profession and development of efficient export marketing network.

Ajabush et. al. (2019) aimed to study the honey marketing behavior in Jima and West shewa zones of Oromia region. The main focus of the research was, to evaluate structure-conduct-performance of honey marketing by

characterizing the demand and supply pattern of honey production. The results showed that total honey supplied to market was 29,307.5 kg at 2016/17 production year, which was about 90.4% of total production. The result of SCP indicated that the structure of honey market in the study area characterized with an existence of oligopoly with four firms' concentration ratio of 40.7%. It was concluded from marketing margin analysis that large profit was going to processors and variations in profit share across the actors. It was also concluded from the results of market structure, conduct and performance analysis that the study area of honey market shows inefficiency.

Sileshi et. al (2019) aimed to characterize the marketing system and marketing structure and conduct of honey, to study the impacts of domestic honey market system on export market, and to identify the challenges and opportunities of honey marketing in Gozamen district, East Gojjam Zone, and Amhara Region, Ethiopia, from September 2017 to July 2018. It was concluded that market concentration ratio showed results that the market area was a moderately concentrated and weak oligopoly market (CR4 = 47.1%). The results also showed that export price is lower than the domestic price at different market points and indicated the impact of domestic honey marketing on export marketing. As a result, establishing legal honey marketing framework and regulatory measures are indispensable tasks to establish healthy honey marketing system.

Kassa et.al (2017) aimed to study the honey value chain in Kaffa and Sheka zones of Southern Ethiopia. The main honey value chain actors are input suppliers, producers, cooperatives, local collectors, wholesalers, retailers, processors and final consumers of the product. The results showed the major share of honey goes to marketing through producer-collectors-wholesalers--retailer--consumer.

Interventions in the study needed improvement and encouraged use of transitional and introducing modern bee-hives with full packages, and establishing beekeepers cooperatives.

Nebiyu et. al. (2013) conducted a study to assess the honey bee production systems, constraints and opportunities in Gamo Gofa zone of southern Ethiopia. The main aim of keeping honey bees was for home usage and for earning. It was concluded that the average amount of honey harvested per hive per year from traditional hive was 5.88 kg, transitional was 14.07 kg and modern hive was 20.64 kg. The important criteria that govern the cost of honey is color and test of honey (59 percent) and season (40 percent). The main constraints of beekeeping were lack of beekeeping equipment's, shortage of

bee colony , high cost of modern hive , Pests and predators , lack of training , shortage of bee forage , shortage of water and absconding .

Shibru et. al. (2016) aimed to study the opportunities and constraints of honey beekeeping in Gambella zuria (Abol) and Godere weredas, South West Ethiopia. It was concluded that the main opportunities were high existence of honeybee colony (19 percent), Socio economic values (17 percent), presence of honey bee flora (17 percent), water resources for honeybees (16 percent), market demand of honey bee products and honey (15 percent) and experience of honey beekeeping (14 percent). Results also showed that 95 percent respondents sell their honey after harvesting and remaining 5 percent store for house usage.

Aman (2019) aimed to identify the opportunities and constraints of Beekeeping Practices in Ethiopia. It concluded that major opportunity of beekeeping in Ethiopia is that , it has largest honeybee population in Africa with over 10 million bee colonies, of which 5 to 7.5 million are hived while the remaining exists in the forest area. Seeing these figures Ethiopia is major producer of honey and beeswax in Africa. Ethiopia also has great potential for honey production due to the presence of plenty apicultural resources, natural forests with required apiculture flora, water resources and large number already present honeybee colonies. The results also showed that the main constraints are lack of trained labor, less knowledge of standardization , problems regarding honey bee pests and diseases, very high price and less availability of latest beekeeping equipment's for beekeepers and absconding and migration of bee colonies.

Workneh et.al (2010) aimed to identify beekeeping constraints and to study the perception of beekeepers towards modern beekeeping practices. It was concluded that the major constraints are drought, honeybee pests and disease, less availability of beekeeping materials, death of colony, shortage of required extension support, marketing problems, shortage of bee forage, lack of skill and reduction of honeybee colonies. It was also concluded that regarding Perception, the beekeepers are positive towards modern practices.

Gebreaweria et. al.(2018) aimed to analyse the beekeeping practices and potential in the district of Afar Region, northern Ethiopia. Results show that the mean live colony ownership of the sample beekeepers is 10.08 colonies per household, with a maximum ownership of 62 colonies. It was also concluded that the yearly honey production per beehive varies from 4 to 17 kg, with mean production of 9.66 kg. Most of the respondents harvest twice a year, while 18 percent of respondents harvest three times a year, 19 percent

of respondents harvest four times a year, and 14.2 percent of respondents harvest five times a year . This is due to the special floral calendar of tropical plants in the areas. The major constraints of honey production are drought, lack of extension services, poor access to latest technology, deforestation etc.

Sebsib et. al. (2018) aimed to study the beekeeping practices, marketing system of honey, presence of opportunities and constraints in Ethiopia. Results showed that opportunities for beekeeping are presence of forest area with required apiculture flora and water resource, presence bee colonies, knowledgeable farmers availability and socio-economic value of honey and requirement for honeybee products. Results showed that 10 percent of the honey produced is consumed by the beekeepers families. The rest 90 percent is sold for profit making. The bee products marketing in Ethiopia is presently informal and has poor structure. The domestic honey market begins at the small beekeeper level, who sells most crude honey to collectors in the closet town and village market.

Beyene, et. al. (2014) aimed to identify beekeeping constraints and opportunities in Wonchi District, Oromia, Ethiopia. The results showed that the average amount of honey harvested /hive/year from traditional hive was  $5.22 \pm 0.042$ , transitional hive was  $10.83 \pm 1.05$  and modern hive was  $15.2 \pm 2.52$  .The factors influencing pricing of honey were distance from market( 28 percent), honey quality (25 percent), consumers liking (20 percent), color (15 percent), and test of honey (12 percent).The constraints of beekeeping were huge cost of latest hives with accessories , lack of bee forage , pests and predators , positioning of honeybee colonies , poor quality of honey product and lack of infrastructure development. Opportunities of honey beekeeping were abundance of bee colonies, regular increase in demand for honey, beekeepers association are present and great government policies. The results also showed that price of honey is affected by quality, colour, consumers taste, location and test of honey.

Yetimwork et. al (2014) aimed to characterize beekeeping systems and honey marketing in Kilte Awlaelo District (KAD), Eastern Zone of Tigray, Ethiopia. It was concluded that 95.5 percent of beekeepers own framed hive with an average number of 6.39 hive/hh and in average production of 19.4 kg per hive per harvest. Most of the beekeepers check the apiary and colonies daily and only less of them (1.90 percent) annually at the time of honey harvesting. The most of the beekeepers (85.3 percent) sell honey in local market. About above half of the beekeepers (51.30 percent) keep t honey in plastic pot, tine cane, glass and

clay pot. It was also concluded that there is a huge potential of honey bee production and it is dominated by framed hive (modern) production system.

Bekele et. al (2017) aimed to study the beekeeping practices, trends and constraints of beekeeping production in Bale, south-eastern Ethiopia. It was concluded that most (98.26 percent) of the respondents followed traditional production system. Average honeybee colony holding size was 6.18 per head with 5.70 kg mean honey yield per traditional hive. Results also showed that challenges of beekeeping were application of herbicides and pesticides, pests, shortage of beekeeping equipment's, lack of bee forages, shortage of improved beehives, migration, absconding, poor extension services, swarming, and death of bee colonies.

Hasan et.al. (2009) aimed to analyse the apiaries technical and economic aspects in Turkey. Results showed problems in the activities of beekeepers were deficiency of qualified queen, lack of standards in beehives and materials, use of pesticide, problems in selecting places, no proper advertisement of bee products to consumers and marketing problems. Honey production is having export potential. Results also showed that 1 percent increment in old type hives will lead to decrease of 0.29 percent of honey production and 1 percent increment in new type hives will lead to 0.47 percent increment in honey production.

Fred et. al. (2015) aimed to analyse the local honey value chain to ascertain specific constraints affecting beekeeping. It was concluded that providing good education and training in beekeeping was the major factor of motivation for adoption of improved beehives. Beekeepers, middlemen and commercial processors dominate the honey value chain. Identified factors affecting honey production were shortage of equipment, poor prices for bee products and farm sprays. Constraints faced by middlemen were huge costs of transportation, less quantities of honey collected and non-cash payments by buyers. Constraints faced by commercial processors were honey adulteration, high cost of equipment and not much promising honey supply.

Dereje et. al (2020) aimed to determine the adoption rate, determinate factors, and community perception of improved beekeeping technologies in south-western Ethiopia. Results showed that out of total of 180 beekeepers, 61 (33.9 percent) were adopters and 119 (66.1percent) were non adopters. Main advantages were high yield, easily inspection and quality of honey. Major detriments to the adoption of improved beekeeping technology were high cost, the requirement for high skill and technology. Results of multivariable logistic regression analysis showed that

identified age (OR = 1.3), an education level (OR = 13.3), awareness of technology (OR = 7.3), visited demonstration site (OR = 21.2), participated in field day (OR = 26.8), marketing problem (OR = 6.2) and access to credit (OR = 4.2) as the determinant factors ( $P < 0.05$ ) for improved beekeeping technology. Main constraints of improved beekeeping technology were diseases and pests of the honeybee, shortage of beekeeping equipment, and credit

Shalini et. al (2007) aimed to study the perceived needs, constraints and enablers of beekeeping in Haryana. Results showed that large number of respondents were motivated for training and start beekeeping as a business. Enablers for beekeeping were economic enablers, physical, health related and agricultural. Major constraints faced by respondents was technical constraint. The major enabler perceived by findings also revealed that good number of respondents was economic enablers. Respondents were interested in taking training and were interested in adopting beekeeping as a business. Results also showed beekeeping has agricultural and health related benefits.

Suraj et. al. (2018) aimed to observe the socio demographic characteristics, kinds of hives, per hive average production, rate of colonization, hive baiting, inspecting, cleaning and protection, and beekeeping constraints. It was concluded that majority of the beekeepers less working capital for beeking. This was the main reason of not able to produce best quality of honey, either they sell it directly in market or in combination form. The productivity of hives is not good because of the attack of pest, predator and diseases and various internal and external constraints,.

Gamze et. al. (2004) aimed to analyse technically and economically aspects of apiaries in Turkey. Results showed that beekeeping sector is facing many problems related to quality, variety, mix harvest, sugar and residues. Average estimated production per colony was 16 kg. Turkish government policy will encourage beekeeping and honey production with a financial support (€ 2.6) per hive. Results also showed that with technically replacing selected queen bees, annual honey yield could be increased from 16 kg to 30 kg. Turkish beekeeping sector will lead the world market if government keeps on giving financial support and best quality management techniques.

Chala et. al. (2012) conducted a research aimed to assess the opportunities and constraints of beekeeping in Gomma district South west Ethiopia. It was concluded that the opportunities for beekeeping were presence of ample amount of honeybees, presence of potential flowering plants, good availability of water resources for bees, experience of

beekeepers and socio-economic value of honey. Results also showed that challenges of beekeeping were poor knowledge, existence of pests and predators, shortage of bee forage, poisoning due to pesticides, absconding, shortage of beekeeping equipment and materials. Traditional production systems for beekeeping is being followed mostly.

Sumit et. al. (2018) aimed to analyse the constraints of honey production and marketing. Results showed that constraints in production and marketing of beekeepers unawareness regarding social, environmental, physical, economical and technological. Main constraints marketing of honey were less selling price of honey, huge expenditure on transportation and payments delay.

Nebiyu et. al. (2013) aimed to assess the honey bee production systems, constraints and opportunities in Gamo Gofa zone of southern Ethiopia. Results showed that the main purpose of beekeeping was for income generation and home consumption. Mainly (87.8percent) of the beekeepers owned traditional hives. Beekeepers prevent the incidence of swarming by transferring incidental swarms (69.2 percent), removing queen cell (19.2 percent) and cutting down of combs (10.9 percent). The average honey harvested per hive per year from traditional hive was 5.88 kg, transitional was 14.07 kg and modern hive 20.64 kg. The main factors that control the prices of honey were color and test of honey (59.6 percent) and season (40.4 percent). It was also concluded that major constraints of beekeeping were shortage of beekeeping equipment's, lack of bee colony, huge cost of modernized hive, predators and Pests, poor training, lack of bee forage and lack of water.

Fikru (2015) aimed to study the beekeeping sub-sector as an integral part of agriculture in Ethiopia. It was concluded that beekeeping contributed towards the household income generation and poverty alleviation and national economy by exporting. Results also showed that the large percentage of honeybee population is hived in traditional, transitional and modern hives and very small proportion is remain as wild. The production and quality of honey can be improved by transforming the beekeeping system, processing and marketing.

Dinku et. al. (2019) aimed to analyse the honey production system, constraints and opportunities in Hawassa city. It was concluded that the main aim of beekeeping was for income generation and House usage. The major source of the foundation colony was catching swarm (80 percent) and gift from parents (20 percent). Mainly (40 percent) of the beekeepers have traditional hives and other three types of hive owned (32 percent). Beekeepers prevented the incidences of

swarming by return back to the colony (56 percent), removing queen cell (16 percent) and cutting down of combs (28 percent). The average amount of honey harvested per hive per year from traditional hive was  $5.6 \pm 1.49$ kg, transitional was  $11.9 \pm 3.15$ kg and frame hive was  $10.8 \pm 2.91$ kg, respectively.

Gebreaweria et. al. (2018) aimed to assess beekeeping practices and potential in three districts of Afar Region, northern Ethiopia. It was concluded that most of the respondents used traditional honey production system. The mean live colony ownership of the sample beekeepers was 10.08 colonies per household, with a maximum ownership of 62 colonies. Results also showed that the annually honey production per beehive ranges from 4 to 17 kg, with mean production of 9.66 kg. Most of respondents harvest honey two times annually, while 18 percent of respondents harvest three times, 19 percent of respondents harvest four times, and 14.2% of the respondents harvest five times per year respectively. Annually beekeepers sell 77.86 kg of honey year at individual level with a range of 0 to 353 kg. Major constraints of honey production were drought, bad extension services, poor access to improved technology, deforestation.

Michael (2015) aimed to study the socio economic characteristics of honeybee keepers, to examine the profits of honey production, to estimate the production of honey, to do analysis of determinants of honey production and to identify the constraints of honey production. It was concluded that bee farmers raise their own capital by themselves and use their family members as replacement of labor. Main constraint of honey production was lack of working capital. Results also showed that quantity of honey produced was positively related to coefficients of age, sex, income and household size and honey production is very attractive because the gross margin of N47,183.33 is there.

Haftay et. al. (2018) aimed to analyse the honey production constraints in Ethiopia. It was concluded that main constraints were poor knowledge of beekeeping, lack of skilled labor, shortage of bee equipments, pests and predators, danger from pesticide on honey production, lack of infrastructure development, lack of bee forage and poor research extension.

Awraris et. al. (2012) aimed to analyse the honey production system. It was concluded that ninety nine percent of beekeepers practice beekeeping system. Honey yield per traditional hive/harvest in Masha and Gesha were mainly high ( $P < 0.05$ ). It was also concluded that honey production contributed almost fifty percent of the total household income. Mainly honey comes from forest beekeeping only. Honey production is done by removing the content of the hive



by discarding the colony in Kaffa and Sheka Zones while in Bench-Maji Zone harvesting of honey is done by leaving all brood. Results also shows that main constraints of honey production are ant attacks, poor adoption of modern beekeeping technologies and management practices, shortage of skill training, less utilization of apicultural resources.

Onwubuya (2013) assessed the use of honey production for increasing household income among rural communities of Nsukka Local Government Area of Enugu State, Nigeria. Interview schedule and focus group discussion were used to collect data from a sample of sixty (60) heads of households. Data were analyzed using frequency and percentage. Majority (71.7%) of the respondents sold honey in local community markets. Constraints to honey production were lack of funds for establishing hives (71.7%), poor storage facilities (60.0%), adverse weather on quantity (60.0%) and quality (43.3%) of honey produced, poor processing facilities (46.7%), unavailability of modern harvesting techniques (50.0%), among others. Adequate provision of funds and extracting machines will help increase productivity of honey thus boosting household income. Efforts of the government are highly required in organizing youths in agriculture by providing them with the necessary capitals needed to promote beekeeping in order to ensure maximum production of honey for enhanced household income.

Tewodros et. al (2015) aimed to assess the postharvest handling of honey and to identify opportunities and constraints of honeybee production. Results showed that main constraints were drought, pests and predators and use of chemicals. Opportunities were experienced and knowledgeable beekeepers and focus given by governmental and non-governmental organizations for modifying the honey production practices and quality. The storage of honey ranges from a month to two years. Material used for storage of honey was Gourd, earthen pot, plastics and animal skins. For sustainable development of the apicultural conservation essential things are natural resources, knowledge on queen rearing techniques, provision of scientific control measures for the major bee enemies and diseases and for credit facilities and inputs.

Cherish et. al (2022) aimed to examine the constraints faced by the beekeepers. The results showed that there is lack of skilled labour and less price of honey. Including apiculture in agriculture for promoting For diversification of agriculture beekeeping could provide food, nutritional, medicinal and livelihood security for rural household.

Bendahbia et. al. (2017) aimed to study the purchase behaviour and the aim of consumers regarding honey. It was concluded that most consumers use honey from time to time and not on regular basis. It was also conclude that 45 percent respondents purchase honey from beekeepers directly, 22 percent of honey is sold in special markets and 11 percent of honey is sold markets. Results also showed that the major factor influencing the consumption of honey was the satisfaction of the taste (70 percent), usage of honey for treatment (15percent), for sweetness (9 percent), for rest of uses (6 percent).

Iwona et. al. (2017) aimed to analyse consumer behaviour and preference for honey and its determinants. It was concluded that Pole consumption of honey is several times a month. The major benefits for consuming honey were health benefits, culinary usage and taste. Polish consumers purchase honey from apiaries and open market. Major factors considered for buying of honey were the type of honey, cost and colour. Honey was mainly used as consumption for taste, on sandwich spread and sweetness. Medical and cosmetic purposes shows low application of honey. Main socio-demographic characteristics that differente consumer behaviours for honey market were gender, age, place of residing and income.

Addam et.al (2017) aimed to analyse the misinterpretation and moods for honey marketing. It was concluded that 58 percent of respondents always checks that whether their honey is adulterated or not, seventy five percent of respondents do not trust honey labels and forty percent of respondents buy honey from producers.

Steven et. al (2013) aimed to find out the factors influence consumers buying behaviour for honey products. Results showed that factors that motivate the buying of honey were Medical condition, products quality, reputation of brand and costing.

Peter et. al. (2021) aimed to study the antimicrobial activity of polyfloral types of honey. It was concluded that 50 percent concentration of antimicrobial activity was found in all samples. Honey samples from urban beekeepers showed good performance in comparing from samples of retail stores. Results from consumer research found that honey is mainly used for food and as medicine during the winter season. Honey healing awareness for consumers was high (ninety seven percent), one third of respondents were not able to find out any good examples, and eleven percent found antibacterial activity.

Georgina et.al (2009) aimed to make a strategy for consumers purchase habits for honey in Hungary. It was concluded that different types of honey is produced and mostly traditional acacia and flower honey is being consumed. From the results of analysis of variables it was found that there is significant difference in different groups; essential requirement for purchase of honey is quality, price, kind of honey and quality of package. Consumers buy honey mostly from hypermarkets or from producers.

Šedík et. al. (2018) aimed to study generation marketing for developing strategies for honey marketing. Results showed that there are significant differences among generations in terms of preferences, consumption and purchase. Generations of consumers needed promotional tools for their promotion strategies, beekeepers must form event marketing like excursion to apiaries, observation of hives, honey festivals. It was also concluded that there is difference among four age cohorts/generations regarding preference for honey, consumption and purchase behaviour.

Monika et. al. (2021) aimed to study the habits, attitudes and opinions of consumers for honey. It was concluded that thirty seven percent of respondents take honey once in seven days. Seventy two percent of respondents buy honey from producers only and seventy three percent of respondents do not buy honey from specialised stores. It was also concluded that for attitudes of consumers towards honey was that eighty four percent of respondents consume honey for its health benefits, eighty three percent of respondents consume honey for general quality and seventy percent of respondents consume honey for its nutritional value. It was also concluded for consumer opinions regarding quality of honey was that sixty seven percent of respondents agreed that the quality of honey is related to by taste, sixty six percent of respondents agreed that the quality of honey is related to aroma and sixty four percent of respondents agreed that the quality of honey is related to texture.

Adam et.al. (2013). aimed to study the essential factors regarding consumers honey buying behaviour. It was concluded that honey can be used for nutritional, taste, prophylactic, and medicinal purposes. Consumer buying plan for honey is related to financial condition of the household. While choosing variety of honey psychological and social determinants plays important role. Results showed that 1.32 kg is average annual per capita consumption of honey. Honey consumption rates ranged from 0.0660 to 0.4000 kilogram/person/month. Sixty percent of respondents indicated that price of honey is high.

Titanilla et. al. (2020) aimed to analyse the consumer behaviour for honey. It was concluded that consumer prefer to buy honey directly or indirectly from the producer only. Mainly consumers prefer to buy honey whose brand, producer name and certification marks are displayed on packing. Awareness of the certification marks is must for consumers for making honey buying decisions.

Jelena et. al. (2020) aimed to study the consumers awareness regarding organic and local honey and to identify factors which contributed to predict consumers willingness to pay (WTP) regarding organic and local honey. It was concluded that consumers willingness to pay is more for organic honey. The consumer's good monthly income motives his willingness to pay for organic honey, there is positive influence of higher level of education on willingness to pay for local honey. The attributes like the environment and nutritional properties of honey has positive influence on the consumers' willingness to pay for local honey.

Michael et. al (1990) aimed to study the worker honey bees response to main disturbance of the colony by flying across the assailants and stinging. It was concluded that defenders had an open ended age distribution same as that of the forager. Results of behavioural and genetic evidence showed that defenders and foragers are individual groups of old worker. It was also concluded that defenders had few worn wings which suggests low flying behaviour.

Zhi-Yong et. al. (1996) aimed to analyse the worker honey bees age at which it begin foraging and to study the variation regarding various colony conditions. It was concluded that temporal division of labor of foraging is delayed by colony age demography. Results demonstrated that plasticity regarding age relating to division of labor among honey bee colonies less controlled by social factors.

Beshers et. al. (2001) aimed to analyse the honey bee division of labor. It was concluded that honey bees division of labor could be presented by an intrinsic process and inhibiting of development by socially interacting within the workers colony. Two processes could explain the main features of honey bee polyethism was the correlation among the age and the task performances, the age of workers forages and variation of age between hives, by balancing the workers allocation towards hive tasks and foraging

Magal et. al. (2020) aimed for developing a model of honey bee colony collapse considering the deterioration of forager bees by pesticide sprayed in the environment. It was concluded that model quantified the colony collapses by two important properties of honey bee colony that are failure to

return to hive due to pesticide spray on crops and the strength of bees among the total bee population that return to the sites visited. If the total population fell down from the critical threshold level because of foragers failing to return home then colony collapses.

Bariyah (2020) aimed to make an economic development model for the border region by combining present natural resources, and outside help to create employment avenue. It was concluded that Jagoi Village consisted of fifty percent by farmers, thirty percent by menial laborers, seventeen percent by the traders, two percent by the civil servants and one percent by taxi drivers. Huge region forest was cutted by loggers which converted into oil palm plantation.

Michael et. al.(1998) aimed to determine the cues development in the natural environment. It was concluded that cue development is required to match in between genetic sources and the guards at the entrance of the hives. Results also showed that a fit model for cue development is must that should rely on the usage of nesting materials.

Dupont et. al.(2021) aimed to study the honey bee colony model. It was concluded that climatic variables and presence of flora resources is must for honey bee colony development. Results also showed that bee population, breeding is good when climatic conditions are flora are good. The density in colonies showed regular growth during good flora.

Annika et. al. (2019) aimed to study the beehive model and their sub models. The results showed that beginning behaviour of colony drives the simulated colony dynamics during the initial weeks, on the other hand the impact is replaced by the intensity of forage activity. The hive observation and landscape characteristics showed that the proportionally short exposure phase with comparison to the post exposure phase lasted for large number of months.

Kaspar (2007) aimed to estimate the breeding value for the honey bees. It was concluded that there is negative genetic correlation among the queens and worker bees towards honey production. Best Linear Unbiased Prediction (BLUP)-Animal Model was adapted. This method considers maternal (queen) effects using all available records of relatives and weights these so as to obtain the most accurate prediction of the genotype. It simultaneously considers environmental effects, genetic merit of mates and contemporarily tested colonies, and estimates the breeding values for queen and worker effects on colony traits for each queen.

Magal et. al. (2019) aimed to develop a model for honey bee colony collapse due to pesticides in the environment. Results shows that fraction is quite high, the hive falls below the required threshold population size which leads to quick disintegration. Honey bee colony collapse disorder (CCD) is major ecological and agricultural problem. The pesticides roles in CCD is very controversial, and the pesticides usage stopping had been proposed and opposed in scientific researches and governmental legislations.

Guadalupe et. al. (2018) aimed to study the application of tools which helps to design commercialized strategy for micro-enterprises of beekeepers with the focus towards generation of profits. It was concluded that size of the products which is not according to the demands of the consumer, is not in important point for sale. Inadequate administration of resources is due to no standardization and no documentary of records.

Alyssa (2011) aimed to analyse the usage of honey and bee larvae in hominin diets. It was concluded that usage honey and bee larvae provides energy, supplementing meat and plant foods. The tendency to look and exploit beehives by using stone tools is an innovation that allows early Homo for nutritionally compete other species. By Usage of the convergent evidences of honeys and larvaes consumptions by the nonhuman-primates, history and forage population, and artistic representation by Upper Paleolithic rock art.

Iwona et. al. (2017) aimed to analyse the consumer behaviour and curiosity regarding honey and its products. The results showed that honey consumptions by poles many times/month. Major motive for honey usage was health advantages, culinary uses, taste and habits. Results also showed that consumers purchase honey from apiaries and open-air market. Major factor kept in mind of consumer at the time purchase was type of honey, price and colour. Honey was mainly used for consumption for sandwich spread and sweetener. Very low application of honey includes medicinal and cosmetic usage. Consumers behaviours in honey market is differentiated by socio-demographic characteristics, own assessment of nutritional value and education.

Svetlana et. al (2019) aimed to study the parameters that motivates of honey consumption, consumers buying behaviour and to identify define the consumers profiles. It was concluded that major motivation to consume honey was taste of honey and the mind setup that its a nutritious food. Results of the chi-squared test indicated that there is a a lot variation within the countries with respect to demographic and economic characteristic, trends, and tendencies regarding consumption of honey.

Pocol (2011) aimed to identify the consumer behaviour towards honey consumption in Romania. Results showed that honey consumption satisfy various needs such nutritional food, good for health and good taste. Results also showed that honey consumption in Romania is being associated with a middle to highest level of welfare. Fifty percent of honey production in Romania is being sold out in international markets but still the profits are low because poor wholesale market. The strategies should be made keeping in mind to increase the quality of honey and on good positioning in the retailer markets and on improvement on the products image in the market.

Mohsen et. al (2009) aimed to analyse the effects of honey towards weight of body and few blood biochemical indice of diabetics subjects. It was concluded that after doing adjustments regarding baselines values, there was not much difference in the fasting blood sugar among both groups. Weight of body, full level of cholesterol, less-density lipoprotein-cholesterol showed declining trend ( $P = 0.000$ ) and huge-density lipoproteincholesterol increases significantly ( $P < 0.01$ ) among honey group. The results also showed that two months consuming honey provides good effects on weight of body weight and lipids of blood for diabetics patients.

Nazmul et. al (2013) aimed to study nutrition and medicinal parameters for honey. It was concluded that honey may be contaminated by heavy metals like arsenic, mercury and cadmium. It was also reported that honey consumption is not safe when honey is collected from plants of *Datura* plants), flowers of belladonna and plants of *Hyoscamus niger* (from Hungary), *Serjania* *lethalis* (fromBrazil), *Gelsemiumsempervirens* (from the American Southwest), *Kalmia latifolia*, *Tripetalia paniculata* and *Ledum palustre*. It was also concluded that poison by consuming honey depends on the levels of toxins and most common symptoms are dizzy, very much nausea, excess vomits, convulsion, severe headache, palpitations or even death.

Muhammad et al. (2012) aimed to analyse effects of insertion of honey in the biochemical parameters for male Wister albino rats. It was concluded that the regular usage of honey had positive and negative effects towards weight of body weight, biochemical parameters and hematologicals parameters.

Chala et. al. (2012) aimed to analyse opportunities and challenges of beekeeping. Results showed that opportunities regarding beekeeping were presence of a lot of honeybee population, presence of flora, huge resources of water, experience of beekeeping and practicing and socio-

economic values for honey. It was also concluded that the main challenges for beekeeping were less knowledge, existence of pest and predator, shortage of bee forage, pesticides poison, shortage of beekeeping equipments and material.

Shakib et. al. (2016) aimed to analyse the factors for the modified box hive acceptance by beekeepers entrepreneur; and to study the financial advantages by accepting modified box hive . Results showed that following factors motivate the beekeepers for adopting modified box were credit for beekeeper, knowledge of beekeeper, education level of family. The average annual productivity of colony for modern was  $8.64 \pm 5.54$  kg honey per colony per annum and average annual productivities of colony for traditional hive was  $3.89 \pm 2.52$  kg honey per colony per annum. It was also concluded that the average yearly earning from beekeeping was dollar sixty eight thousand approx

Risper (2015) aimed to analyse the productivity and operations of variety of honey processed products in the markets of Baringo County of Kenya. It was concluded that majority of beekeepers get less price in the market by selling honey in raw form which leads to poverty and limits beekeepers to low production because less capital to expand their business. Beekeepers who processed the honey products get good price.

Famuyide et. al. (2014) aimed to study the economics and production of honey Oyo State. It was concluded that twenty six percent of beekeepers were females while seventy four percent were males, it shows that honey production is dominated by males. R2 value of 0.5948 explained that sixty percent of dependence of variables, overall P – value of 0.00 indicated that the level of significance for explanatory variable by one percent. Positivity of coefficient of education levels reveals that better the education, good will be productivity and good will be management.

Onwubuya et. al. (2013) aimed to analyse beekeeping profession as a means to increase household income. It was concluded that honey production constraints were shortage of money for making hives (seventy one percent), lack of storage (sixty percent), extreme weather for quantities (sixty percent) and qualities (forty three percent) of honey made, lack of processing infrastructure for honey (forty six percent), poor availability for latest harvesting technique (fifty percent). Proper usage of funds and extracting machines will lead to enhance the production of honey which will lead to increase to individual income.

Schweitzer et. al. (2013) aimed to study the effect of climatic conditions for countries vegetation by producing honey. It was concluded that linear regression analysis results showed poor positive correlation among production of honey and temperature (eighteen percent), rain (eight percent) and speed of winds (two percent). Positive correlation between production of honey and rain, temperature mean and speed of wind. The most suitable temperature for honeybees ranges from 25°C to 35°C.

Agatha (2012) aimed to study the apiary structure. It was concluded that fifty one percent of apiaries had around fifty and hundred bee family, sample level average size of bee families was sixty five. Honey production average was 1.760.54 kg per apiary. Approximately forty percent apiary obtains eleven to twenty kg per bee family and five percent has fifty to sixty kg per bee family. Gross production of honey in sample level was sixty five thousand kg and beekeeper total income was four lac and seventy seven thousand Lei. Income average per apiary was twelve thousand Lei means one hundred ninety seven Lei per bee family.

Addis et. al. (2016) aimed to analyse the production system of honey, challenge, opportunity and quality of honey. Results showed that Honey yield was 77.55kg from traditional method, production from transitional method was 81.84kg, and from frame hive was 186.18kg. Average honey yield from traditional beekeeping systems was  $7.20 \pm 0.23$  kg per year, average yield from transitional beekeeping systems was  $14.70 \pm 0.62$ kg per year and average production from frame hive was  $3.38 \pm 0.73$  kg per year. Most of the samples of honey within the limits of international acceptable range and also of national standards.

Chala et. al. (2013) aimed to analyse production and market system of honey. Results showed that the respondents mean age was forty year which shows that it is an workable age. Ninety two percent of beekeepers which experience of five years were males. The honey yield per year per colony were  $7.20 \pm 0.23$  for traditional hives,  $14.70 \pm 0.62$  for transitional hives and  $23.38 \pm 0.73$ kg for moveable frame hives. It was also concluded that honey yield per hive/year was highest for moveable frame hive. So it is recommended that beekeepers should use moveable frame hives to have growth in production of honey and in income also.

Halil et. al. (2007) aimed to determine the factors which affect honey production. It was concluded that factors that affect production of honey were consumption of honey/person, beehives, financial status of producers and export value of honey. Major problem in beekeeping is refining of honey. Organisations should aims towards providing

publication and training sessions for beekeeping. Association, chamber and productivity and sales cooperatives should be organised in apiculture.

Tesfaye et. al. (2007) aimed to identify the constraint and opportunities of beekeeping. Results showed that seventy nine percent respondent didn't control swarming while fourteen percent of respondents controlled swarming by cutting down and removal of some of the parts of brood combs. Honey production average annually was thirty five kg per year per colony. Eighty three percent of producers sell their honey in homes mostly for marriage functions while the remaining of honey was sold to middle merchants. The selling price of honey ranges from 1.17 to 2.94 US dollars per kg.

Noor et. al. (2013) aimed to study the effect on quality, antioxidants activities, colours and viscosity of honey by high-pressure processing. It was concluded that in the when there is no heat, treated samples by antioxidant activity of high-pressure processing shows that thirty percent without any change in color. At higher temperatures antioxidant activities were found. When it is processed for fifteen minutes at the temperature of seventy degree centigrade its colour gets degraded. Results showed by using high-pressure processing at ambient temperature on honey its quality better.

Maria et. al. (2009) aimed to find source of micro-organism in honey. It was concluded that when honey is in its vegetative state it can metabolise carbohydrate contents, amino-acid content and pollens content which can cause organoleptic change.

Hana et. al. (2021) aims to collect reviews present for the use of old and latest food processing technology regarding honey's decontamination and storage of honey. Results showed that safety issue for applying is honey's possibility of being contaminated by bacteria and fungi spore. It was also concluded that second factor that makes honey challenging depends on its very high sugars contents which leads to the making of hydroxymethylfurfural (HMF). Modern processing technology had been employed to enhance its safety and qualities for raw honey.

Mihaela et. al. (2009) aims to analyse and assess hazards which occurs when honey gets processed. Results shows that penicilliums, aspergilluses, absidias, rhizpuss and fusariums were present in moulds in normal range. Poor hygienic conditions while handling and storing raw honey leads to microbiological contaminations. Perfect managing systems for foods safety will ensure less monitoring and controlled condition at various stages of processing of honey.

Aurore et.al. (2012) aims to visualize, learn and memory of honey bees in traditional animals model. It was concluded that honey bees perceives, learns and memorizes colors, shape and pattern when the visuals cue were joined with sucrose. Bees colour visions are trichromatic in nature which is linked to photoreceptor types which peaks in the UV, blue, and green regions of spectrum. The latest discovery linked for the perspective of accessing the honey bees brains of the harness bee during which it perceives and learns visuals cue and try to find new avenues for comprehension towards the neutrality of substrates.

Sirca et. al. (2018) aimed to analyse the use of Geothermal water for processing of honey. Results shows that processing of honey by geothermal energy is a new trend for societies benefits . The treatment processes of honey were done in two stages. In the 1<sup>st</sup> stage, treatment of honey was done for twenty four hours at a temperature of fifty degree centigrade. In the second stage treatment process was done at seventy five degree centigrade. When the two stages gets completed, deactivation of enzymes is done which results in purification of honey.

Shakib et. al. (2016) aims to analyse the adoption of modern box hive and its financial advantages. Results showed that that up to date knowledge, qualification of individual, adaptation for new things and trainings influences bee keepers for adopting modern box hive. The average annual productivity of colony from modern hive was  $8.64 \pm 5.54$  kilogram honey per colony per annum and from traditional hive was  $3.89 \pm 2.52$  kilogram honey per colony per annum. Average yearly earnings of individual by doing beekeeping business was dollar sixty eight thousand.

Musa et. al. (2014) aimed to examine to do profit analysis of old honey production methods. It was concluded that sixty eight percent of beekeeping business is dominated by males in Kebbi State, Nigeria. Seventy percent beepers were married. Most of beekeepers were educated, fourteen percent of beekeepers do beekeeping subsidiary business. Forty two percent of beekeepers were having one to five years of experience beekeeping. The financial analysis results shows that variable cost is approx N three thousand eight hundred which is sixty nine percent of the overall cost of production of honey , fixed cost was None thousand seven hundred which is thirty percent of the overall cost of production of honey . The overall business of production of honey was N twenty seven thousand eight hundred only.

Abere et. al. (2012) aimed to do analysis of production, supply chain and marketability of honey in Ogun State. Results of socio economic variables analysis showed

that sixty four percent of the respondents were males members and thirty six percent of respondents were females. Sixty two percent of respondents belong to Christianity on the other hand thirty six percent of respondents belong to Muslims community and two percent none of the belong none of the Christianity and Muslim religions. Most of the respondents were thirty to forty years range. Four percent beekeepers were unmarried and ninety percent of beekeepers were married. Fourteen percent of beekeepers follow old method of beekeeping and eighty six percent of beekeepers follow latest method of doing beekeeping.

Agatha (2012) aimed to study the apiaries structure and its relationship with production of honey. Results revealed that fifty one percent of apiaries had fifty to hundred bee families and average size at testing level was sixty five bee families. Honey production average was one thousand seven hundred sixty per kg per apiary. Forty percent of apiaries gets eleven to twelve kg per bee family and five percent gets fifty to sixty kg per bee family. Overall production of honey at testing level was sixty five thousand one hundred forty kg and total beekeepers earning was Lei four lac seventy seven thousand . Average earning per apiary was Lei twelve thousand eight hundred ninety two only which means Lei one hundred ninety seven per bee family.

Ikechi et. al.(2020) aimed to examine the socio economic characters of marketing of honey and to analyse profits of beekeepers. It was concluded that sixty eight percent of the marketers were females, ninety two percent did education and thirty nine percent were within the age of thirty one to forty. Forty eight percent of respondents had family members in the range from one to five persons.

Adedeji et. al. (2016) aims to do the profit analysis of production of honey in Esan North East LGA of Edo State Nigeria. It was concluded that ninety eight percent of respondent were male, hundred percent respondent were married person and educated. Seventy six percent respondent had below five years of expertise in the field. Net profits were N fifty eight thousand eight hundred sixty four of individual beekeeper. Results also showed that major constraints of production of honey were price of hives, shortage of finances, cause of weather and shortage of flowering plants .

Kassa et. al. (2017) aimed to study the value chain of honey in Kaffa and Sheka zones of Southern Ethiopia. It was concluded that value chain actors of honey were input supplier, producer, cooperative, local collector, wholesaler , retailer, processor and consumer. Honey value chain supporter were offices of district livestock and fishery, unions of honey, agro-Industry of apinec, agro- industry of Beza mar,

honey development industry of Shekanordic. It was also concluded that major share of marketing of honey goes through producer to collector to wholesaler to retailer and to consumer.

Alireza et. al. (2017) aimed to study network design model of global supply chain for honey on global and quality issues. It was concluded that network design model concentrates on quality of product and its effect on demand. Results from Numerical analysis shows that the proposed robust model provided appropriate solution by showing less risk for the decision making agencies.

Titanilla et. al. (2020) aim to find out the major characteristics of consumers preferences while buying honey in Hungary. It was concluded that people tend to buy honey products directly or indirectly from the honey producers.

Abebe et. al. (2016) aimed to study the impact of performance and wellbeing of beekeepers participation in contracts and marketing cooperatives. It was concluded that beekeepers gets positive production and economical benefits through contract engagement. Beekeepers which are under contract scheme make more white honey which fulfilled the demands of processor, buyer and consumer. The results of contracting leads to better production because of good access latest technologies and skilled transfer.

#### IV. CONCLUSION

Beekeeping is a low investment business. Just few days training is required to start a beekeeping business. It helps the rural youth to be self employed. The byproducts of honey can be sold in the local and international level.

- The main challenges of beekeeping were poor knowledge, pest and predator presence, shortage of bee forage, pesticide poisoning, absconding, lack of beekeeping equipment and materials
- Constraints of beekeeping shortage of beekeeping equipment's, less number of bee colony, huge price of modern hive, Pests and predators, shortage of training, lack of bee forage, less quantity of water and absconding
- Good yield, ease for inspection, and quality of honey are the main advantages, while high cost, the need for high skill, and access to technology are the major detriments to the adoption of improved beekeeping technology
- Most important enablers perceived by respondents about beekeeping were economic enablers, followed by physical, health related and agricultural

- The main incentives for honey consumption were: health benefits, a wide range of culinary uses, flavour and habits.
- honey is mostly used as food (sweetener in beverages, ingredient in the recipe, or direct consumption) and as medicine mainly during the winter period
- honey is consumed for its health benefits, general quality and nutritional value and believe that it has a beneficial effect on the immune system and contains bioactive compounds
- The cost of hive, lack of fund, absconding of bees, and effect of weather infestation and lack of flowering plants were the major problems encountered in honey production

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