The Cultivation of Local Bees in Beekeeper Group "Sarining Trigona Pertiwi" in Bongkasa Pertiwi Village, Badung Regency

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Abstract. Cultivation of local stingless bees has a good prospect job for the local community in Badung Regency, Bali to survive their life during Covid 19. It has a good potency to develop related tourism. The purpose of this research is to study the real condition of the cultivation of local stingless bees in the beekeeper group of Sarining Trigona Pertiwi. The description method is used to analyze this data that collected from 22 respondent who joined in the group. The results of the analysis showed that the beekeeper group of Sarining Trigona Pertiwi has 22 members, and every member has a different of number colonies and total colony every group between 40 to 233 bee colonies. Most of the bee cultivated is local bee namely Tetragonula Laevicep and Tetragonula Itama. The Tetragonula Itama has a higher yield of honeybee than Tetragonula Laevicep but the price of the colony the Tetragonula Itama is more expensive. All members in that group still cultivate the local bee with the conventional method with less adoption of technology, skill, knowledge and there is no mentoring and training from the government and stakeholders. This method due to the production and quality of the honeybee is still lowered especially the color and taste inconsistency.

Keywords: Local Bees; Cultivation, Quality; Sarining Trigona Pertiwi Group

1 Introduction

The development of stingless beekeeping is one the alternative job can do by the people in Badung regency Bali to survive in their life during Covid-19. The local stingless bee species in Badung Regency especially in "Sarining Trigona Pertiwi" group are mostly Tetragonula Laeviceps and Tetragonula Itama usually Balinese people called "Kela-Kela" honeybee although there are many kinds of stingless bee such as T. Terminata, T. Torasika, and T. Biroi these stingless bees are limited available.

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The environment and vegetation in Bongkasa Pertiwi village are favorable for the growth of the local stingless bees. However, the number of vegetation is very various and natural so this condition can affect the quality and sustainability of the honey production. The optimum temperature for the local bee is around 26oC [1].

Honey, in most cases, is widely used as a food ingredient [2]. Due to its natural properties with medical importance, people have used it for healthcare reasons [3]. The demand for honey continues with an increased usage yet the number of beekeepers remains the same. For some reason, others may have shifted to other industries or other forms of livelihood which led to one of the critical issues in the beekeeping industry: the unstable supply of honey. One factor that could probably discourage people from raising bees is the sting that it can cause to beekeepers.

In Indonesia, there is a growing interest in stingless bees because of their high profitability [4]. Stingless bee honey contains more than 200 constituents such as vitamins, acids, minerals, enzymes [5]. fructose, and glucose [6]. It has anti-inflammatory, antimicrobial, antioxidant, anticancer, and antiseptic, immune-boosting properties [7]. According to [8] due to its high degree of bioactive compounds [9], [10], [11], [12].

The quality and nutritional value of honey vary depending on the bee species, geographical floral origin, season, environmental factors, and treatment of beekeepers [13]. Honey has a lot of nutritional content and some chemical compounds that have antioxidant activity. Some chemical components have an antioxidant activity such as ascorbic acid, flavonoids, phenolic acid, carotenoid derivatives, amino acid, proteins, pollen, pigments, and enzyme (glucose oxidase and catalase) [14]. In Indonesia, honey's authenticity is a major concern among consumers and industries [13], [15], [16], [17].

Cultivation of local stingless bees in Badung regency has a good prospect and can use as an alternative job and will increase in the future. Hence, needs research to study the condition of the cultivation method of local bees in the beekeeper group of "Sarining Trigona Pertiwi" in Badung Regency, Bali.

2 Research Methods

The research location is in the beekeeper group of "Sarining Trigona Pertiwi" which has 22 members. Every member has a different number of the colony around 40 to 233 bee colonies. The total colony in that group is 470 colonies. Most of the colonies are Tetragonula Laivicep and Tetragonula Itama both are stingless bee types. This research was conducted from August to October 2021.

The method used is the descriptive method with a qualitative approach. The technique of collecting data used surveys, interviews with questionnaires, and documentation [18]. The samples used in this research are 22 respondents consist of a leader and members of the beekeeper in Sarining Trigona Pertiwi group using the purposive sampling method.

There are two kinds of data obtained consists of primer and secondary data. Primary data is data obtained directly from the research location through deep interviews with informants related to research problems, and also through direct observation of the research objects. Meanwhile, secondary data is data obtained in the form of numbers and descriptions. In this study, secondary data required include the literature relevant to the research title. The data were analyzed used as a descriptive method with a qualitative approach.

3 Results and Discussion

Bongkasa Pertiwi Village and Sarining Trigona Pertiwi Group

Bongkasa Pertiwi is one village in Abiansemal district Badung regency Bali. This classified is a new village in Badung regency and built-in year 2019. Bongkasa Pertiwi village is located on the north side of Carangsari village on the south side of Bongkasa village in the east Kedewatan village and the west side of Taman village. This village around 25.3 km from Denpasar is the capital of Bali province. Bongkasa Pertiwi village has a total population of 2600 people consisting of 1299 males and 1301 females in the year 2019 [19]. Most of the population of 1557 person are the worker who has 18-56 years old. Many sectors contribute to economic development in Bongkasa Pertiwi village, the sector includes agriculture, plantation, livestock, handmade, small micro-business and there is no economic income from forestry area. According to the total population, about 175 families work in the agriculture sector, 91 families in livestock, and 90 families work in plantation fields.

Based on data from the Bongkasa Pertiwi village office in 2019, there is no data available of beekeeper population yet and also in agriculture and related institution in Badung regency. This is to be a problem to guidance, mentoring, and providing training for the beekeeper. The reason is probably due to the number of the beekeeper is still limited and a new job for the local people. In the Bongkasa Pertiwi village, there is one group of a beekeeper is "Sarining Trigona Pertiwi" group. This group built-in 2020 is a new beekeeper group that consists of 22 members who have a colony of bees between 40-227 colonies. The total colony of bees is 470 colonies with a different type of bees. The local bees they cultivated are abundant of stingless bees including Tetragonula Laevicep and Tetragonula Itama. These bees in Bali have a local name and they call " Kela-kela".

Both stingless bees Tetragonula Laevicep and Tetragonula Itama are the main bees that cultivate by the farmers in Bongkasa Pertiwi village. There are differences in the cultivation of both bees that cultivation of Tetragonula Itama is more expensive invest than Tetragonula Laevicep but the production of honey is higher due to the farmers in Bongkasa Pertiwi is mostly cultivated of Tetragonula Laevicep. In Bali province, the price of colony Tetragonula Laevicep is around 250.000 rupiah, but Tetragonula Itama is 1.500.000 rupiah per colony. For growing both bees need some vegetation as food for the bees. There are much vegetation in the beekeeper group area namely coconut, mangosteen, mango, Xanthos semon, "air mata pengantin", etc. This vegetation producing of nectar, resin, and propolis as a food resource for the bees to produce honeybee. The important factor that influences the foraging behavior of Tetragonula Laeviceps is food source availability [20]. The quality and quantity of the honeybee produced depend on the type of vegetation.

Development of Local bees Cultivation in Bongkasa Pertiwi Village

There are many locations of local bees' cultivation in Bali but the population is limited and the distribution is not similar. In Badung regency where this research is done has few beekeeper groups and most of the local bees cultivate is stingless bees type namely Tetragonula Laevicep and Tetragonula Itama. Based on the environment, elevation, and vegetation condition the growing cultivation in Bongkasa Pertiwi Village has a good potency to increase in the future. Furthermore, the local office government provides strong support and facilitates the beekeeper group to improve their bee's cultivation. The "Sarining Trigona Pertiwi" is the only group that located and developed in Bongkasa Pertiwi village. This beekeeper has a plan for collaborating with some stakeholders to improve and increase the productivity of honeybee, quality, knowledge, the skill of the beekeeper through conducting training, adopting technology, and increase market access.

The limited beekeeper number in Badung regency is probably due to the cultivation of the honeybee is not easy to do by beekeepers need skill and experience for growing and maintenance the honeybee, which needs some requirements such as feed for honeybee with enough quantity and more varieties as well as continuously available. In other to grow the bee needs water resources, good quality of human resources, has an optimum temperature for growing the local bees, etc. On the other hand, the cultivation of stingless bees in Badung regency is not to be the main job but mostly as an alternative job.

In Bali, the "Kela-Kela" honeybee can grow well with an elevation of ± 800 m above sea level but not find in 1000 m above sea level [21]. The increasing elevation will increase the relative humidity and decreasing the temperature. According to [20], the activity of Tetragonula Laeviceps was influenced by temperature and relative humidity. The activity of the bees will be limited and decrease with increasing of relative humidity and lowering of temperature. Elevation has a significant correlation with temperature and humidity that can affect food availability and the quality of honeybees [22]. The production of the honeybee is influenced by food availability.

The Opportunity and Challenges of Beekeeping Development in Badung Regency

Badung regency is one Regency of Bali province that has many interesting places as an object that visited by a lot of tourists from domestic and international. Most of the gross domestic income is obtained from the tourism sector and due to many people works in that sector. For many years Badung Regency focuses its economic development on supporting the tourism sector and growing of the north Badung and south of Badung is not balance. The tourism development in the north of Badung is slower than south of Badung. The north of Badung regency has more advantages in the agriculture sector but unfortunately, this sector is not growing past yet.

Since COVID-19 the government of Bali province and also Badung Regency starting to balance both sector tourism and agriculture to grow for supporting the economic development of Bali and Badung regency. Moreover, the agriculture sector will be created as the main foundation of Bali province's development. Increasing of agriculture sector in the north of Badung regency is a good policy to develop and improve the economic income level for the people especially those who lost their jobs in the tourism sector due to the COVID-19 pandemic.

Environmental factor in Badung regency is a favor for local bees' cultivation, elevation, vegetation, a human resource available and local official village has strong support for developing of the local bees cultivation especially in Bongkasa Pertiwi Village. This village also has a good potency in the tourism field that can support and grow simultaneously. Based on the survey, there are some beekeepers found in Badung Regency namely "Sarining Trigona Pertiwi", "Sari Madu Sedana", and "Etno Bali". All of the beekeepers cultivate local bees such as Trigonula Laevicep.

This bee is a stingless bee that can be adapted to the local environment, multiflora and the colony price is cheaper than the other stingless bees is Trigonula Itama but the production is lower about 30 ml per colony otherwise the Trigonula Itama can produce 150 ml per colony, but the price is more expensive than local bees. Both bees can grow well in Badung regency especially in Bongkasa Pertiwi village where the Beekeeper of "Sarining Trigona Pertiwi" is located. The farmers prefer to cultivate the local bee in Trigonula Laevicep in the area because the investment capital is cheaper although the production is lower the Trigonula Itami also has a good prospect to cultivate when they have more capital.

Based on the result showed that farmers that have 180 colonies Trigonula Laevicep can produce 5 liters of honeybee per month and 6 liters per month from 40 colonies of Trigonula Itama. The total production of a honeybee is 11 liter per month when the price of honeybee Is

1000 rupiah per 1 ml so the farmers can get an income of 11 million rupiahs per month. The increase of total colonies will increase their income. This is to be one of the good alternative jobs for people during the COVID-19 pandemic.

Cultivation of stingless bees in Badung regency is a new alternative job for in the rural community and not growing yet. The research showed that many challenges were found in the beekeeper group during cultivating the local bees such as there is no intervention technology of bee's cultivation, low skill, no training, lack of marketing strategy, no product innovation, uncontrol of honeybee quality, and inconsistency of honeybee quality.

On the other hand, the local government and related institutions were not guidance and mentoring the beekeeper yet. According to [23] many of the beekeepers are marginal farmers and consider beekeeping as a sideline job only. They lack financial resources and technical capacity to create new products. This is what limits them from utilizing other high-value products of stingless bees. The honey, for instance, is usually sold raw and unprocessed, and they do not even bother to pasteurize it. They give less importance to other bee products that, if processed, would give them more income. The lack of knowledge of value-adding would have been the reason for such action. Product marketing and promotion of stingless bee products and by-products are weak. Products developed are of few kinds, limited in supply, and with poor packaging.

4 Conclusion

This research found that Badung regency has high potency for developing stingless beekeeping in the future. The number of cultivation local bees is limited and most of local bees cultivation by the farmers is Trigonula Laevicev but the other bees are Trigonula Itama also cultivated in some beekeeper group. Both bees can grow well in Bongkasa Pertiwi village with the natural environment, vegetation, and conventional cultivation method. The cultivation of local bees in Bongkasa Pertiwi village can give good additional income for the family if do it seriously but the job is still an alternative job for the rural community. The quality of honeybee produced is still low and inconsistent with the color indicator.

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