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KEYWORDS: Stingless bee, physicochemical parameter, Chanthaburi Province

INTRODUCTION

Stingless bee (Sb) keeping has been widely practiced in many countries such as Brazil [9], Guatemala, Mexico, Venezuela [5] and Thailand. The bee has been raised mostly to promote flower pollination and as the consequence, Sb honey and its propolis are the main products obtained. Interest in Sb honey is expressed by local residents, tourist centers, gift shops and health food shops that want to promote it as native food and the demand is expected to grow rapidly. Hence, Sb honey is economically viable bee products that can be of significant importance to local communities and/or industry. Sb honey has long been consumed as food due to its high proportion of monosaccharides and other minor compounds including protein, organic acids, vitamins, flavonoids and acetylcholine [11]. In addition, honey has been reported to possess bioactivities useful in traditional or alternative medicine. For example, honey was reported to have wound healing [6], anti-proliferative [7], anti-bacterial [8], anti-diabetic [2], anti-inflammatory [1], and anti-plasmodial activities [10]. In Thailand, it has been reported that the composition and quality of Thai Sb honey differ from European ones [3].

Scant knowledges are available concerning the quality of Thai Sb honey, which is not included in the International Standard for Honey (CODEX, 2001). Generally, several parameters (moisture content, pH, free acidity, total acidity, nitrogen content and diastase value) are used to determine the quality of honey. The chemical composition also dictates the grades and the market values of honey, which can be classified according to their physicochemical parameter such as moisture content, hydroxymethylfurfural (HMF), diastase activity and pH into Grade A (14-16% moisture content), B (17-18%), C (19-21%), or D (>21%) [12]. In order to set the quality standard for Thai Sb honey, it is necessary to assess the quality of available Sb honey in the markets. In addition, several factors such as botanical, geographical and insect species variation can also affect the quality of honey. Therefore, this research work was primarily focused on the determination of basic physicochemical properties of Thai Sb honey collected in Chanthaburi Province, Thailand, as the baseline information for further standard establishment.

MATERIAL AND METHODS

Honey samples Three types of stingless bee honey (*Trigonalaeviceps* Smith, *Trigona sp.* and *Trigonapagdenis* Schwarz) were collected from a mangosteen garden in Chanthaburi Province located in the eastern part of Thailand. The samples were preserved at 11 to -21 °C in the dropping bottle and analysed as soon as they arrived in the laboratory.

Physicochemical analysis The chemical analysis was performed according to the official method prescribed by the Association of Official Analytical Chemists [4], including the determination of pH, diastase activity, moisture content, reducing sugars content, ash content, total acidity, electrical conductivity, HMF content and insoluble matter content. Nitrogen content was measured by the Kjeldahl method [4].

Analysis of data The mean values of each parameter were computed and analysed by using one way ANOVA analysis. Statistical significance was assessed as $p < 0.05$.

RESULTS AND DISCUSSION

The basic parameters obtained from three types of Sb honey were shown to be similar. All samples were relatively very slightly acidic, which likely to inhibit the growth of microorganism. Their total sugar contents (Brix) were 82.67-84.50% and their nitrogen contents were relatively high (136.40-178.70 g/kg). In contrast, their low ash values (0.14-0.22g/100g) indicated the cleanliness of the samples. Their mean values of physicochemical parameters were significantly different at $p \leq 0.05$ (Table 1).

Table 1 Physicochemical characteristics of honey samples from 3 types of stingless bee

Physicochemical parameters	<i>Trigonalaeviceps</i> Smith	<i>Trigona</i> sp.	<i>Trigonapagdenis</i> Schwarz
pH	3.44± 0.06	3.35±0.03	4.01±0.01
Total acidity (Eq/kg)	50.83±3.81	78.14±2.89	20.00±2.50
Diastase activity (Dn)	13.64±0.00	16.67±0.00	11.11±0.00
Electrical conductivity (mS/cm)	0.57± 0.00	0.57±0.00	0.45±0.00
Moisture (%)	15.73±1.28	13.26±0.46	14.66±0.30
Brix (%)	82.67±1.04	84.50±0.50	83.77±0.40
Ash content (g/100g)	0.14±0.00	0.20±0.00	0.22±0.00
HMF (mg/kg)	3.32±0.00	3.18±0.00	3.97±0.00
Nitrogen (g/1kg)	178.70±0.00	173.80±0.00	136.40±0.00
Reducing sugars (%)	27.37±0.20	29.34±0.35	41.64±0.12
Insoluble matter (%)	0.03±0.00	0.11±0.00	1.75±0.00

Remark: Data are shown as the mean ± S.D. and are derived from triplicate experiments

CONCLUSION

This is the first comparative study on various parameters among three types of Sb honey found in Thailand. These findings would be basic information for establishing the standard of Sb honey and would also be useful to the stingless bee keepers in order to improve their product.

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