

## **The Nature of Honey – the effect of terroir on flavour, texture, and colour**

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### **Summary**

The purpose of this study was to determine whether terroir would affect the flavour, texture, and colour of honey. Four bee yards were selected, and the four major honey plants within a three-kilometre radius of the hives were identified. The characteristics of the honey produced by these plants was then determined. The study concluded that each bee yard should produce a honey with its own unique characteristics.

**Keywords** honey; terroir; nectar; unifloral; multi-floral; floral source; provenance; soil; vegetation

### **Introduction**

Honey is most often identified by floral source – unifloral honeys, such as buckwheat, are prized for their unique colour and flavour. Honey can also be categorized by colour using the Pfund Scale, or by the season in which it was harvested. Rarely is it identified by its provenance.

Terroir describes the character of food as influenced by the place where it is produced – in essence, the unique taste of a place. This concept is used extensively in the wine industry, however other foods – Roquefort cheese and Basmati rice, for example – are also inextricably linked to their place of origin.

The character of honey is also affected by the environment and flora of its place of origin. France's Miel d'Alsace and Italy's Miele della Lunigianasome carry Geographical Indications that certify their provenance. Tupelo honey comes only from the banks of the Apalachicola and Ochlockonee rivers in the southeastern US. It has been recognized as distinctive and endangered by Slow Food's Ark of Taste.

In his *Survey of American Honeys*, honey expert Jonathan White noted that alfalfa honey from Southern California was darker, stronger in flavour, and more prone to granulation than alfalfa honey produced in the Rocky Mountain region. Many factors contribute to this difference in character.

Variation in nectar source is the primary factor, however the sugar concentration of nectar is affected by weather and climate (Shuell, 1952). A lack of rain reduces nectar yields, thereby increasing sugar concentration (Shuell & Shivas, 1953). Sunlight, humidity, temperature, precipitation, and the makeup of soil also affect nectar composition (Gonnet, 1971).

The combination of floral diversity, season and environment cause a variation in the composition, concentration, and profiles of the phenolics in honey (Marshall et al., 2014). And, because worker bees in any given hive collect different proportions of nectar from different floral sources, no two honeys will taste exactly the same (Persanno & Bogdanov, 2004).

This assignment will explore whether honey produced in four bee yards in Prince Edward County (map 1), would differ in flavour, colour and aroma based on the major honey plants growing in each area.

### **Material and methods**

Four bee yards (map 2) were evaluated. Since location is key to the flavour and colour of honey (Ballot Flurin, 2009), available yards were selected based on quality of forage, as well as difference in forage as compared to other bee yards in the study. Only the four main honey plants in each area were analyzed.

The Black Creek bee yard (map 3) is located in a valley on the north shore of the Black River, close to an organic vegetable farm, heritage grain growers, and a lavender farm. The Gravelly Bay bee yard (map 4) is situated in the most remote and uncultivated part of the County, with acres of scrubland and wildflowers. The area around the Wicked Point bee yard (map 5) is primarily planted in alfalfa hay, with field margins of trees and wildflowers. The Waupoos bee yard (map 6) is set in a 5-acre blueberry field near apple orchards and a large pumpkin field, with hollyhocks lining the roadside.

Information on the flora of the area was obtained through personal observation and discussion with landowners. Quality of forage for honey was determined using the reference books *Plants for Beekeeping* by Jane Ramsey and *The Honey Connoisseur* by Marina Marchese and Kim Flottum, and by consulting the online floral calendar created by the Canadian Pollination Initiative ([newsite.pollinator.ca](http://newsite.pollinator.ca)).

Notes were made about bloom time, value of nectar for honey, and characteristics such as flavour, colour and granulation. Honey potential, when available, was also noted – this number represents the potential quantity of honey (in kg/ha) that could be produced over a season (Crane, 1976). Ratings range from 1 (0-25kg), 2 (26-50kg), 3 (51-100kg), 4 (101-200kg), 5 (201-500kg) to 6 (greater than 500kg).

## Results

### Black Creek Bee Yard (table 1)

Sugar concentration of raspberry (*Rubus* spp.) nectar ranges from 12-49%. It blooms early spring through late summer and has a honey potential of 3. Honey is light in colour with a delicate flavour and slow granulation. Mustards (*Brassica* spp.) have a nectar sugar concentration of 51.5%, and a honey potential of 2. They bloom late spring through early fall, and produce a light coloured honey that granulates rapidly. Buckwheat (*Fagopyrum esculentum*) blooms in midsummer, and nectar is highly concentrated during the first half of the bloom period. Its honey potential is 3/5, and honey is dark with a coarse grain and a strong, bitter flavour. Lavender's (*Lavandula angustifolia*) nectar sugar concentration is 14-33%, and its honey potential is 3. The honey is white to golden with a buttery texture and delicate flavour.

### Gravelly Bay Bee Yard (table 2)

Staghorn sumac (*Rhus typhoon*) has a honey potential of 2/3 and a nectar sugar concentration of 33-53%. Blooming early to mid-summer, it produces an amber-coloured honey that is initially bitter but mellows with age. Sweet yellow clover (*Melilotus officinalis*) begins to bloom in early summer and continues until fall. With a nectar sugar concentration of up to 52% and a honey potential of 4, it produces an amber-coloured honey with fine, rapid granulation and a peppery vanilla flavour. Goldenrod (*Solidago* spp.) blooms in mid-summer and produces a deep, golden honey with a thick consistency that granulates quickly and has a strong, pleasant flavour. Its nectar sugar concentration is 31.4%, and its honey potential is 4/5. Chicory (*Cichorium intybus*) blooms mid-summer through early fall and produces a yellowish-green honey that tastes of coffee. It has a nectar sugar concentration of 32.6% and a honey potential of 3.

### Wicked Point Bee Yard (table 3)

Maple trees (*Acer* spp.) begin blooming in March. Maple's honey potential is 4/5, and the honey is pale amber, sometimes with a tinge of green. It slowly develops a fine grain. Birdsfoot trefoil (*Lotus corniculatus*) has a honey potential of 2 and a nectar sugar content of 14-41%. It blooms from early to late summer. Honey is light green, granulates rapidly, and tastes like clover honey. The fields of alfalfa (*Medicago sativa*) bloom from early summer through early fall. The nectar sugar concentration ranges

from 15-64%, and the honey potential is 5. Thistles (*Cirsium* spp.) bloom in the area from summer through fall, and have a honey potential of 3. The honey is light in colour with a good flavour.

#### Waupoos Bee Yard (table 4)

Apple trees (*Malus* spp.) bloom in early spring and have a nectar sugar concentration of 50.3% and a honey potential of 1/2. Honey is light yellow with a fruity taste, and granulates quickly to a soft texture. Highbush blueberries (*Vaccinium corymbosum*) bloom early to mid-summer, producing nectar with a honey potential of 4/5. Honey is light amber to medium yellow, buttery smooth, and tastes of blueberries. Pumpkins (*Cucurbita* spp.) bloom throughout mid-summer. The nectar is abundant, but the number of blossoms per plant is small. The honey is dark in colour with a flavour of pumpkin or squash. Hollyhocks (*Alcea rosea*) have a nectar sugar concentration of 33.7% and honey potential of 4 (but they are not planted in sufficient numbers here to reach that potential). They bloom summer through early fall.

#### **Discussion**

Based on the different honey plants that grow around each yard, and the different characteristics of the resulting honeys, the conclusion is that each bee yard should produce a slightly different honey, and that the honey from the early and late harvests should also differ within each bee yard.

Black Creek's mid-summer harvest should be light and delicate. Buckwheat, which is grown only certain years to improve the soil, should produce a honey that is dark with a coarse grain and strong flavour. In years when the lavender dominates, the honey should be pale and smooth, with a milder taste.

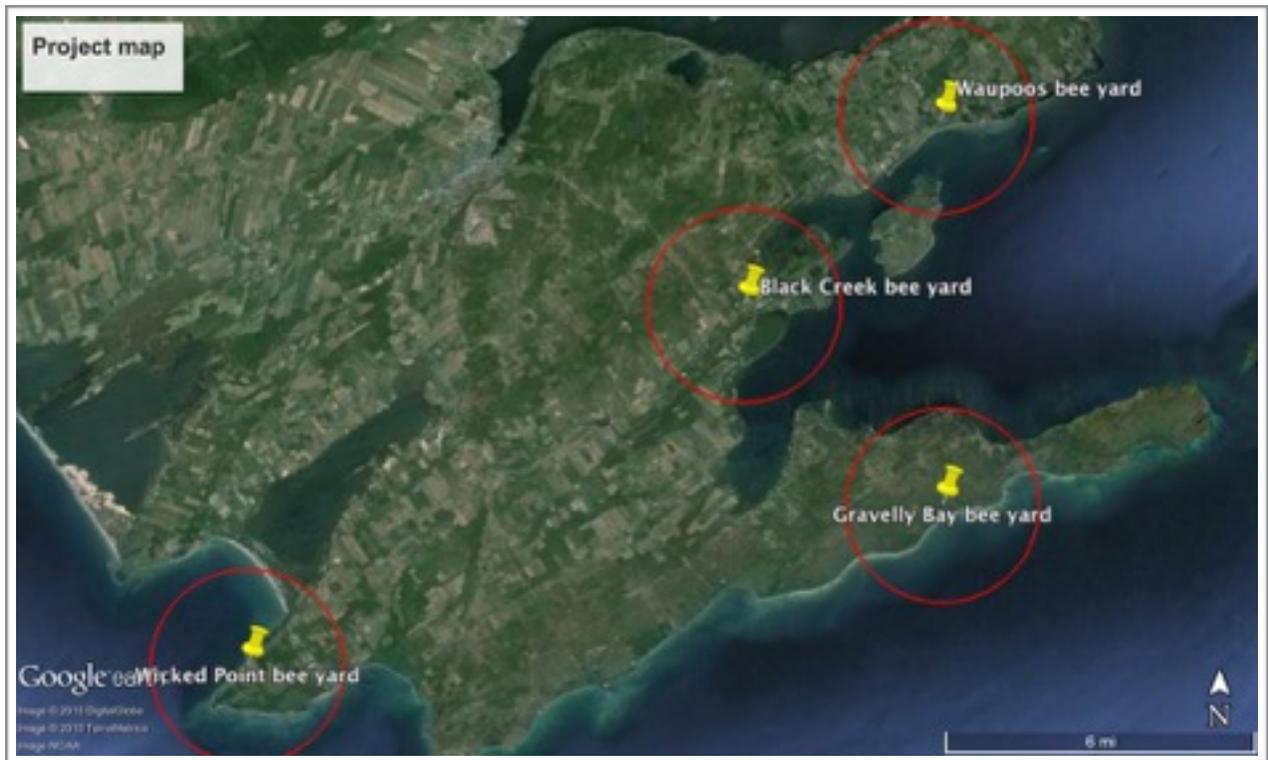
Gravelly Bay should produce a mid-summer harvest that is amber in colour with a fine granulation and bitter notes, and flavours of vanilla. The fall harvest should be yellow-green to orange-gold with a woody, spicy flavour that has notes of coffee in it.

Honey from maple nectar is used in the colony's spring buildup, but if a surplus occurs, Wicked Point should produce an early-summer harvest that is pale green with medium granulation. With only a brief alfalfa flow before it's cut for hay, the fall harvest should be light amber with a woody, grassy flavour.

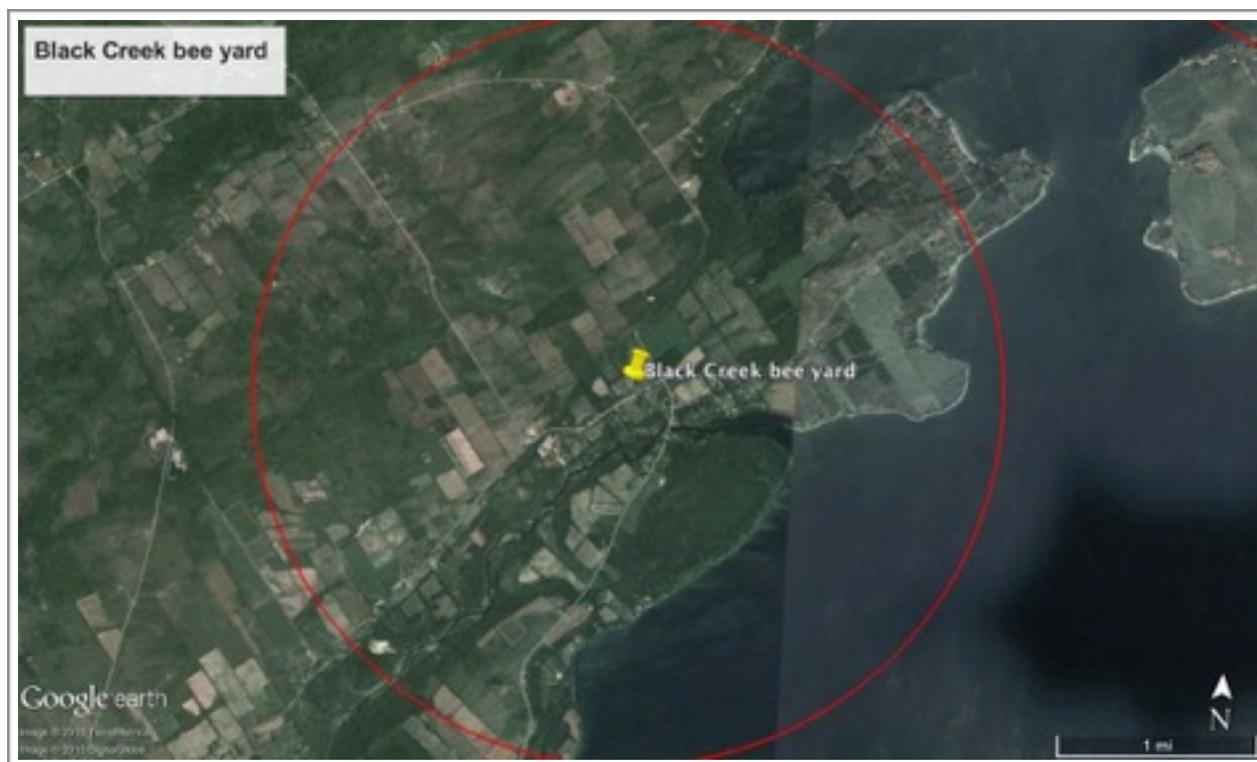
Apple nectar will not reach its full potential because blossoms are reduced in commercial orchards, however spring honey from Waupoos should be light straw yellow with a soft grain and delicate, fruity flavour. A later harvest should be dark with a buttery texture and floral taste with notes of blueberry.



Map 1 – study area



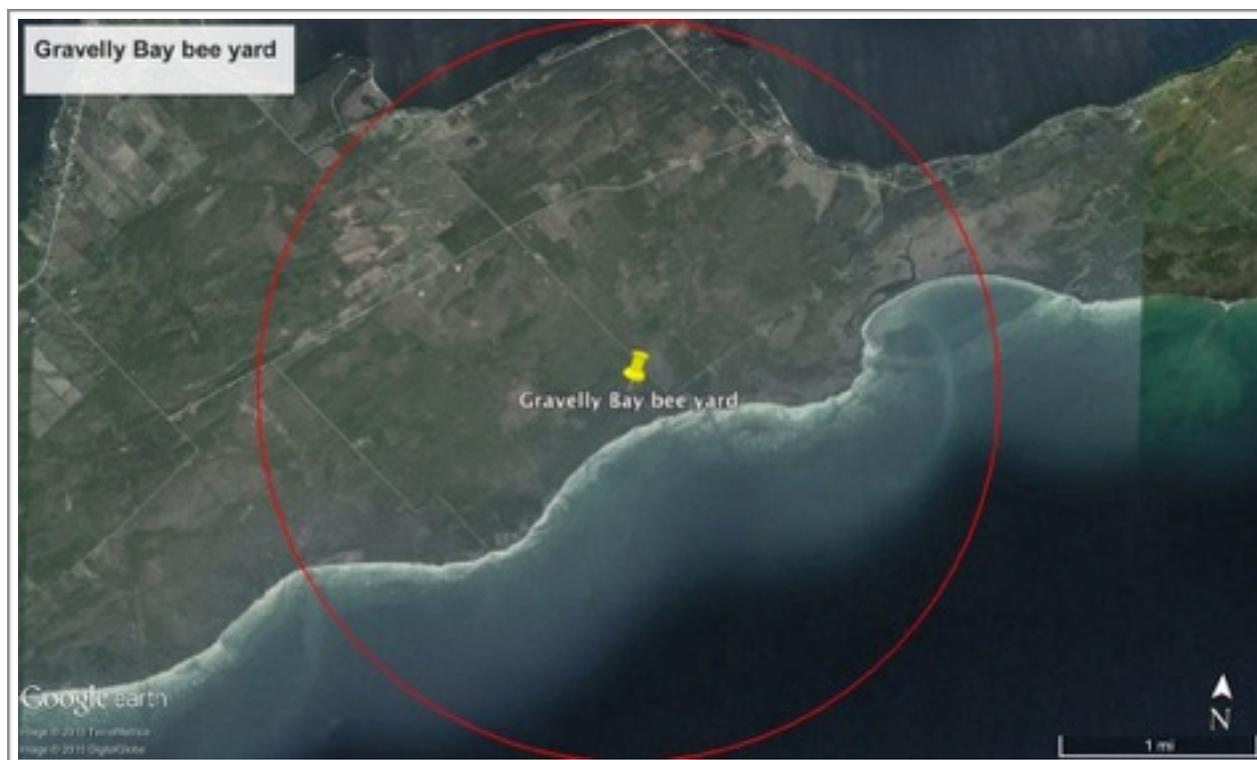
Map 2 – project map



Map 3 – Black Creek bee yard – forage area

Common name	Buckwheat	Lavender	Mustard	Raspberry
Latin name	<i>Fagopyrum esculentum</i>	<i>Lavandula angustifolia</i>	<i>Brassica</i> spp.	<i>Rubus</i> spp.
Nectar	70% of sugar secreted in first half of flowering	14-33% sugar concentration	51.5% sugar concentration	12-49% sugar concentration
Pollen	High protein, low yield		Highly nutritious, excellent protein	
Honey Potential	3/5	3	2	3
Blooms	July-August	July-September	June-September	June-August
Honey Colour	Dark brown to reddish or black	White to golden	Light	Light
Texture & Granulation	Thick texture with coarse grain	Very smooth texture, fine grain	Rapid	Slow
Flavour & Aroma	Strong, intense, bitter, malty, toasted	Floral, camphor, vanilla, delicate		Delicate

Table 1 – Black Creek bee yard – main honey plants



Map 4 – Gravelly Bay bee yard – forage area

Common name	Sweet yellow clover	Chicory	Goldenrod	Staghorn sumac
Latin name	<i>Melilotus officinalis</i>	<i>Cichorium intybus</i>	<i>Solidago</i> spp.	<i>Rhus typhina</i>
Nectar	up to 52% sugar concentration	32.6% sugar concentration	31.4% sugar concentration	33-53% sugar concentration
Pollen	Dark yellow	Good source		Important source
Honey Potential	4	3	4/5	2/3
Blooms	June-September	July-September	July-August	June-July
Honey Colour	Amber	Yellowish-green	Orange-gold	Amber
Texture & Granulation	Buttery texture, rapid & fine grain		Granulates quickly to thick paste	
Flavour & Aroma	Slightly peppery, aromas of vanilla and beeswax	Pleasant, coffee/ chicory	Strong, woody, floral, spicy	Bitter when fresh, but mellows with age

Table 2 – Gravelly Bay bee yard – main honey plants



Map 5 – Wicked Point bee yard – forage area

Common name	Birds foot trefoil	Maple	Alfalfa	Thistle
Latin name	<i>Lotus corniculatus</i>	<i>Acer</i> spp.	<i>Medicago sativa</i>	<i>Cirsium</i> spp.
Nectar	14-41% sugar concentration		15-64% sugar concentration	
Pollen	Light grey to light brown	Abundant in some	Avoided	Good source
Honey Potential	2	4/5	5	3
Blooms	June-August	March-late May	June-September	July-October
Honey Colour	Light green	Used mainly for colony buildup; pale amber, sometimes greenish	Light amber	Light (Comprable to <i>Tilia</i> honey)
Granulation	Rapid	Slow, fine		
Flavour & Aroma	Heavy body, flavour like clover	Unremarkable	Mild, grassy, woody, floral	Good

Table 3 – Wicked Point bee yard – main honey plants



Map 6 – Waupoos bee yard – forage area

Common name	Pumpkin	Apple	Blueberry	Hollyhock
Latin name	<i>Cucurbita</i> spp.	<i>Malus</i> spp.	<i>Vaccinium corymbosum</i>	<i>Alcea rosea</i>
Nectar	Abundant nectar, but few blossoms per plant	50.3% sugar concentration	Abundant	33.7% sugar concentration
Pollen		Attractive		Attractive, abundant
Honey Potential		1/2	4/5	4
Blooms	July-August	late April-late May	June-July	July-September
Honey Colour	Dark	Light straw yellow	Light amber to medium yellow	
Granulation		Quick; soft, fine grains	Buttery and smooth	
Flavour & Aroma	Reminiscent of squash	Delicate, fine, fruity	Blueberry, floral	

Table 4 – Waupoos bee yard – main honey plants

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