

KY State Apiarist Report, 2018





Partridge Pea nectary, by
T.C. Davis, 2014

Nectar: the basic raw product of honey

- Glucose (Dextrose), 31%
- Fructose (Levulose), 38%
- Sucrose 1%
- Water 50-80%
- Amino Acids, Proteins
- Organic Oils
- Pollen
- Organic Acids

Ripening Nectar to Honey

Nectar

- 50-80%
Water
- Sugars:
Sucrose +
Invertase

Honey

- 16-18%
Water
- Sugars:
Glucose+
Fructose

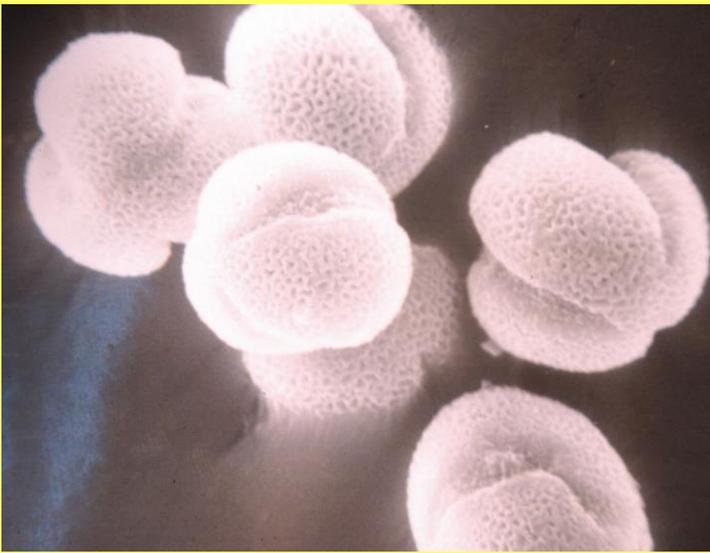
CARBOHYDRATES (SUGARS)

- ✳ 85-95% carbohydrates in honey are glucose and fructose (dextrose and laevulose)
- ✳ More fructose than glucose in most honeys (exceptions like rapeseed and dandelion).
- ✳ Disaccharides like sucrose make up difference, at least 11 others, some rare.



Honey Varietals Differ

- Aroma
- Flavor
- Color
- Density
- Chemical Composition
- Granulations Characteristics
(tupelo rarely crystallizes,
canola will crystallize in frame,
etc.)



Monofloral or unifloral Honey is honey that is derived from primarily a single source of nectar. Palynologists confirm sourced-honey by counting pollen grains. Unifloral honey must have at least 46% of one pollen.

If you make a claim, be prepared to prove it.



WARNING

- Honey Frames should be 80-90% Capped
- Be aware of Prevailing Humidity when harvesting
- Remove Honey Supers **Prior** to Treatment for Mites, etc.

Tips for Honey Harvest

- Warm Honey Combs Extract much easier than Cold Combs
- Remove Additional Moisture
- Use Fans or a Dehumidifier to lower humidity
- When using an electric knife, be aware of the temperature
- Melted wax will change the flavor and/or color of honey

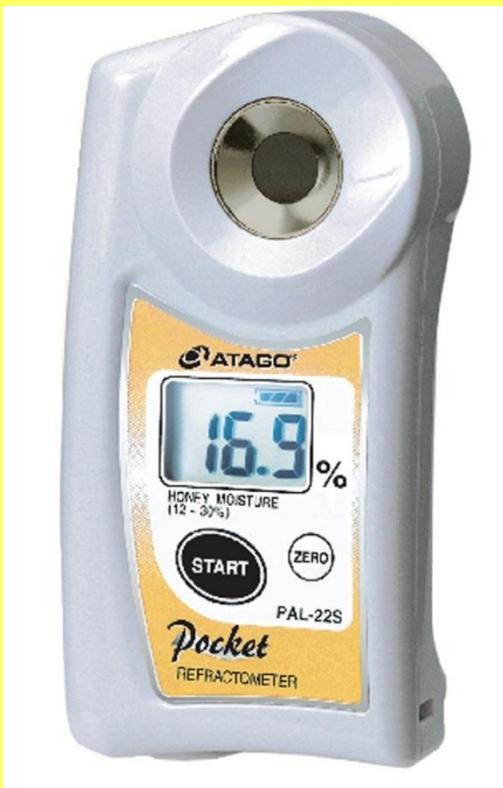
More Tips for Honey Harvest

- The acids of honey react with many metals including steel and zinc used for galvanizing
- Galvanized Extractors and tanks should be lined with protective material approved for food use
- Use lubricants approved by USDA in uncapping equipment and extractors

HONEY will
absorb bad
odors and
flavors rapidly
if foreign
materials are
not strained
out

Final Product

- Well strained
- Low in Moisture
- Free from Foreign Flavors and Impurities
- **TEST** for humidity





Honey Crystallization

- Honey Composition
- Storage Conditions
- Heating
- Filtering

CRYSTALLIZATION AND TEMPERATURE

- ★ Crystallization is most rapid at 57°F (14°C)
- ★ Honey with a low moisture content crystallizes faster at 58 - 59°F (15°C)
- ★ Few honeys crystallize above 60°F (16°C)
- ★ Below 50°F crystallization greatly retarded
- ★ Below 40°F almost no crystals
- ★ Below 30°F no crystallization
- ★ *On average, 57°F is the critical granulation temperature*

Nuclei and Crystallization

- ★ Honey with air bubbles, pollen, or other particulate crystallize quicker.
- ★ Dust and other particles can act as nuclei for crystals.
- ★ Storing supers wet can lead to finely crystallized honey the next year.
- ★ Honeys run through a honey pump granulate faster and form finer crystals than others.
- ★ A minimum of 5% and a maximum of 15% by weight, starter to liquid honey is used for creamed honey. Small crystals are desirable.



Excess Heat to Reliquify Crystallized Honey

- Drives off Natural Volatile Flavors
- Chemically Breaks Down Fructose
- Darkens Honey

Honey Fermentation

- Honey is hygroscopic (absorbs moisture)
- Yeasts and sugars
- Alcohol and Carbon Dioxide
- Alcohol and Oxygen
- Acetic Acid and Water

FERMENTATION OF HONEY

- ★ Osmophilic (sugar-tolerant) yeast are responsible.
- ★ Also important is moisture content, storage temperature, granulation and favorable ash and nitrogen content.
- ★ Numerous strains of the yeast have been isolated from fermenting honey.
- ★ Yeast may come from nectar, body of the bee, apiary soil, honey house air and equipment.
- ★ Fermentation after granulation because removal of crystals from solution increases moisture, liquid phase.

<i>Moisture Content</i>	<i>Fermentation</i>
<17%	safe regardless of count
17.1-18.0%	safe, yeast <1000/g
18.1-19%	safe, yeast <10/g
19.1-20%	safe, yeast <1/g
above 20.0%	always danger

- Most natural honey fermentation in storage occurs after granulation, the removal of glucose hydrate crystals leaves a higher moisture phase

Table 17. YEASTS ISOLATED FROM HONEY

Type	Reference
<i>Nematospora ashbya gossypii</i>	Aoyagi & Oryu, 1968
<i>Saccharomyces bisporus</i>	Aoyagi & Oryu, 1968
<i>Saccharomyces torulosus</i>	Aoyagi & Oryu, 1968
<i>Schizosaccharomyces octosporus</i>	Lochhead & Farrell, 1931
<i>Schwanniomyces occidentilis</i>	Aoyagi & Oryu, 1968
<i>Torula mellis</i>	Fabian & Quinet, 1928
<i>Zygosaccharomyces barkeri</i>	Lochhead & Heron, 1929
<i>Zygosaccharomyces japonicus</i>	Aoyagi & Oryu, 1968
<i>Zygosaccharomyces mellis</i>	Fabian & Quinet, 1928
<i>Zygosaccharomyces mellis acidi</i>	Richter, 1912
<i>Zygosaccharomyces nussbaumeri</i>	Lochhead & Heron, 1929
<i>Zygosaccharomyces priorianus</i>	Fabian & Quinet, 1928
<i>Zygosaccharomyces richteri</i>	Lochhead & Heron, 1929
IN RIPENING HONEY	
<i>Torulopsis magnoliae</i>	Ruiz-Argüeso & Rodriguez-Navarro, 1975
<i>Saccharomyces mellis</i>	Ruiz-Argüeso & Rodriguez-Navarro, 1975
<i>Torulopsis stellata</i>	Ruiz-Argüeso & Rodriguez-Navarro, 1975
<i>Torulopsis apicola</i>	Ruiz-Argüeso & Rodriguez-Navarro, 1975

Selling Honey

- The word “honey” must be largest word on the label
- Name, address, postal zip code
- “Packed by”, “Distributed by” can be indicators that honey is not local
- “Net weight” in both pounds and/or ounces and grams; honey is heavier than water
- 8-oz of honey weighs 12-oz compared to water.



Cracker's honey



Fayette County
Kentucky Spring

Net Wt. 16 oz.
(454 g)

location

Pounds and grams

Address label is on back of jar

KY Department of Food Safety

- Questions about how to build a honey house, labels, etc.
- <http://chfs.ky.gov/NR/rdonlyres/975F0C12-A5CB-4961-8D0E-6BE2E938AA7D/0/LabelingRequirementsforCommercialProcessors.pdf>

Marketing Tips

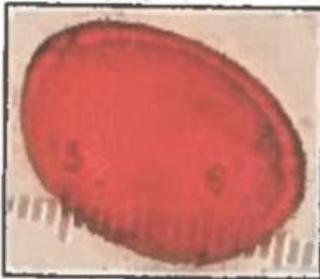
- “Local” sells more bottles than “organic”
- People are willing to spend more for regional varieties
- Red labels outsell any other color
- Perfect “triple-green” product:
 - a. looks good,
 - b. tastes good,
 - c. is good for you
- Get an analysis of your honey

**Relative Pollen Count of the Honey Sample
Table 1**

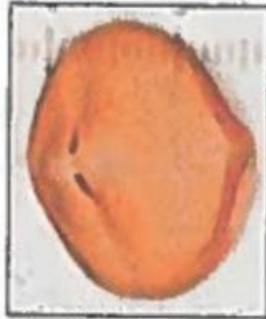
Horn Honey Sample

		%
POLLEN TAXA		
<i>Acer</i> (maple)	42	17.3%
<i>Aesculus</i> (horse chestnut)	3	1.2%
ASTERACEAE (dandelion-type)	3	1.2%
ASTERACEAE (ragweed-type)	1	0.4%
ASTERACEAE (sunflower-type)	1	0.4%
BRASSICACEAE (mustard family)	6	2.5%
CARYOPHYLLACEAE	2	0.8%
<i>Castanea</i> (chestnut, chinkapin)	3	1.2%
CYPERACEAE (sedge)	1	0.4%
<i>Fraxinus</i> (ash)	5	2.1%
<i>Juglans</i> (walnut)	1	0.4%
<i>Liriodendron</i> (tulip tree)	1	0.4%
<i>Magnolia</i> (magnolia)	1	0.4%
<i>Malus</i> (apple)	4	1.6%
<i>Melilotus</i> (clover)	4	1.6%
<i>Myrica</i> (wax myrtle)	0	0.0%
<i>Nyssa</i> (gum)	2	0.8%
<i>Phacelia</i> (scorpion weed)	39	16.0%
<i>Prunus</i> (plum, peach, cherry)	6	2.5%
<i>Quercus</i> (oak)	2	0.8%
RANUNCULACEAE (buttercups)	0	0.0%
<i>Rhus</i> (sumac, poison ivy)	25	10.3%
<i>Robinia</i> (locust)	1	0.4%
ROSACEAE (rose family)	59	24.3%
<i>Rubus</i> (blackberry, dewberry)	3	1.2%
<i>Salix</i> (willow)	25	10.3%
Unknown pollen	3	1.2%
Totals	243	100.0%
Lycopodium spores counted	59	
Pollen conc. per 10 grams of honey	76,536	

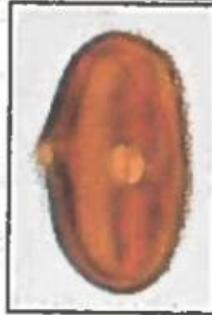
Jen O'Keefe's EKY pollens (1 of 3 pages)



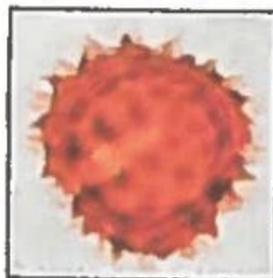
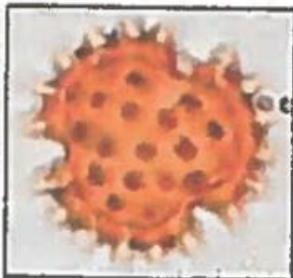
Carya sp. (Hickory, Pecan)



Cornus sp. (Dogwood)



Daucus carota (Queen
Anne's Lace)



High-spine Asteraceae:
Echinacea -type (Purple
Coneflower)

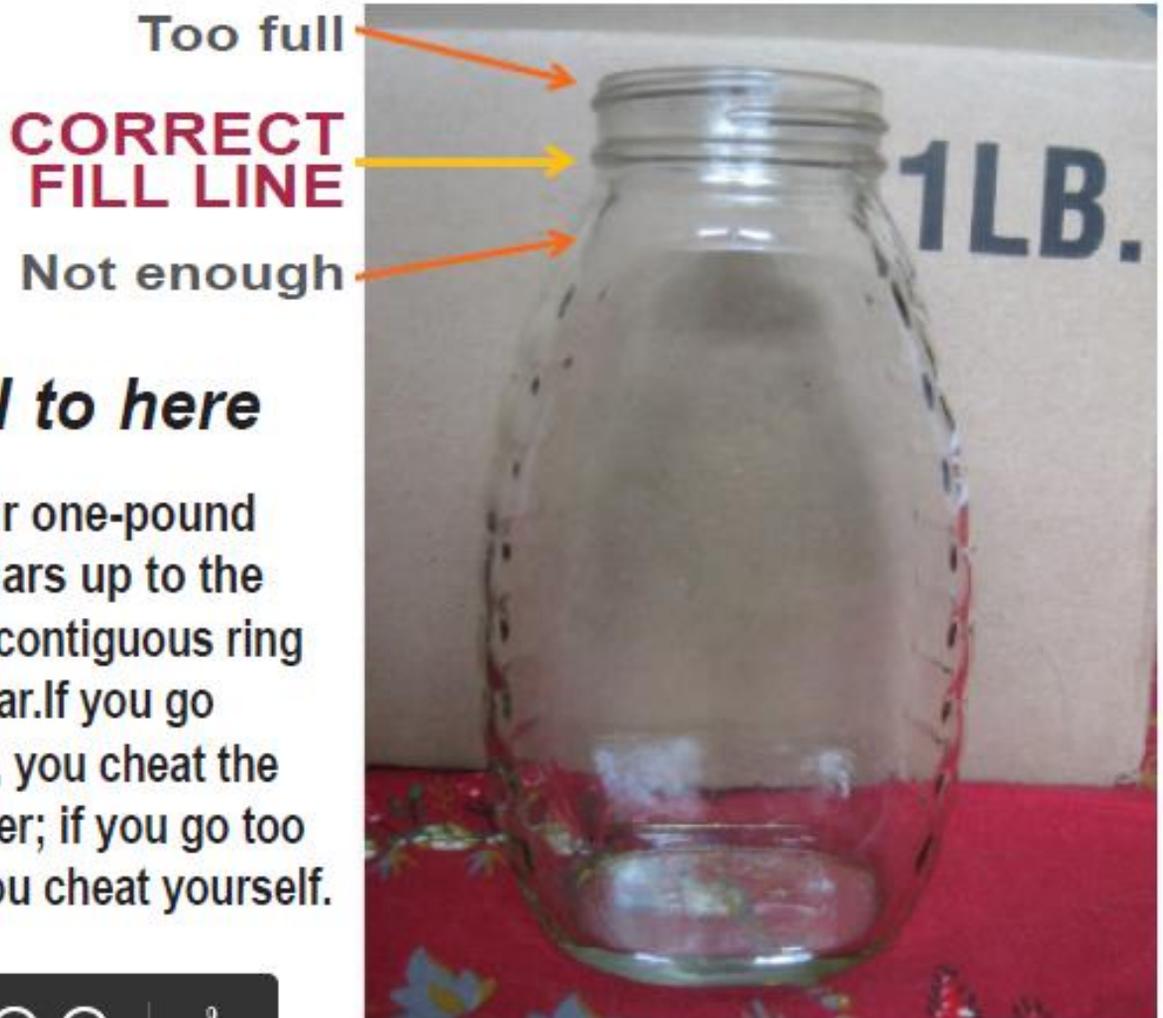
Honey Analysis

- Dr. Jen O'Keefe (Morehead State U) will accept up to eight samples per month
- Do not filter samples
- The per-sample charge for the analysis and report is \$80. Please allow one month for responses.
- **Send samples to Dr. O'Keefe at 404-A Lappin Hall, Earth and Space Sciences Dept., Morehead State University, Morehead, KY 40351.**

2014 University of Delaware Marketing Study comparing local, national and international honeys

- With no info, consumers are willing to pay 20 percent (.98 cents) more for local honey, and 10 percent (.48cents) more for a jar of U.S. honey compared to international honey
- With info on label about risks of contaminated international honey, consumers were willing to pay 57 percent (\$2.78) more for local honey
- With info about pollination benefits, consumers were willing to pay 22 percent (\$1.07) more for local honey
- Information about allergy benefits had no change on consumers' willingness to pay

Correct Fill Line



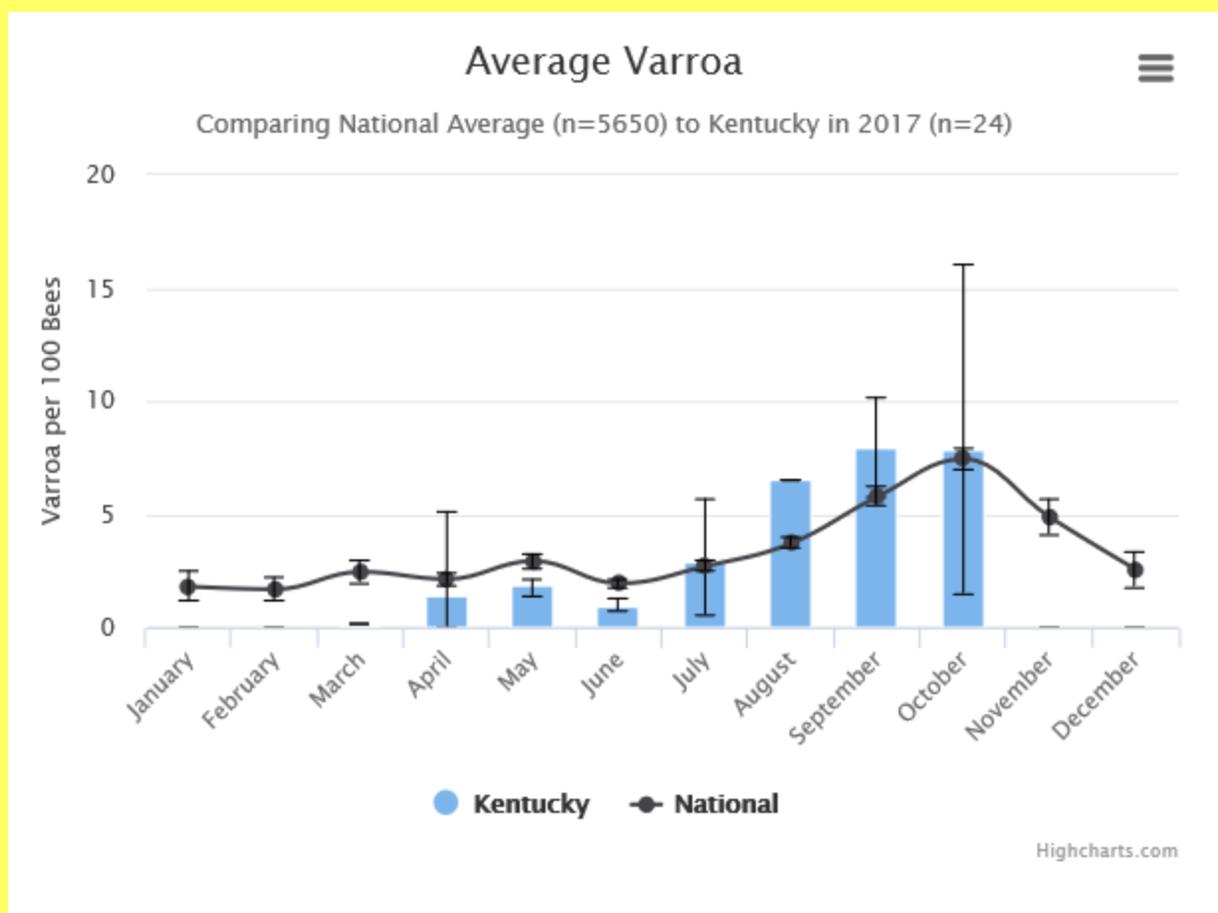
Fill to here

Fill your one-pound honey jars up to the middle contiguous ring on the jar. If you go too low, you cheat the customer; if you go too high, you cheat yourself.

Honey is the Tip of the Iceberg for Food Contaminants

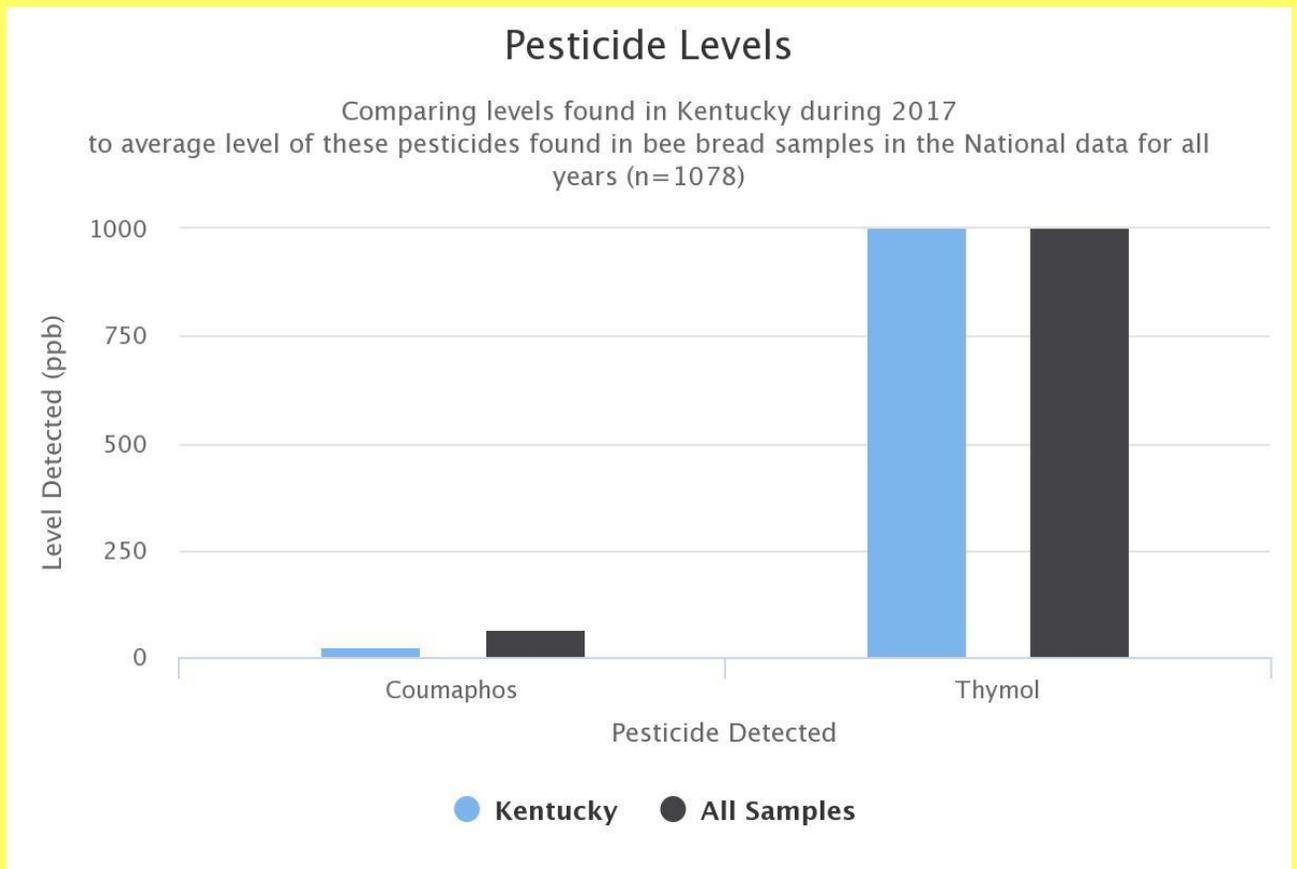
- US beekeepers produce 160 million pounds of honey
- US imports approximately 400 million pounds of honey
- A lot of that honey has contaminants
- Still no federal honey standard to define honey
- 21 states have a honey definition, but to what end?
- KSBA working on Honey Certification Program. Will unveil KSBA Summer Meeting

Bee Informed Partnership--KY



https://bip2.beeinformed.org/reports/state_reports/state_report/?year=2017&state=KY

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Chemicals Found in 10 Samples of Pollen, USDA 2016

- 3 of 10 samples had no ag chemicals
- 6 of 7 samples had trace amounts of 2,4 Dimethylphenyl formamide (Apivar)
- Acetamiprid—neonic (trace amounts in 1 sample), used primarily in apples
- Acetachlor—trace amounts in 1 sample
- Atrazine—2 samples had trace amounts
- Boscalid—1 sample had trace amounts
- Captan—fungicide, 1 sample
- Carbendazim—1 sample had trace amounts
- Clothianidin—neonicotinoid, 3 samples (1 had trace amounts)
- Fenbuconazole—fungicide, 1 sample, trace
- Fluopyram—1 sample, trace
- Novaluron—1 sample, trace
- Pyraclostrobin—Fungicide, 1 sample, trace
- Tebuconazole—Fungicide, 1 sample, trace
- Thymol—beekeeper-applied insecticide, 3 Samples had significant levels

BIP Survey--KY

Table1: Sample Details. Threshold of 3 mites per 100 bees and 1 millions spores per bee are highlighted red. If pesticide results are available, the sample type is given (examples: Bee Bread or Wax), then the pesticides found and level detected.

Month	County	Varroa per 100 Bees	Million Spores per Bee	ABPV	BQCV	CBPV	DWV	IAPV	KBV	LSV2	SBPV	VDV	Pesticides (ppb)
March	Metcalfe	0.08	0.0	-		-	below 30 th	below 30 th	-	60 th		-	
April	Nelson	5.09	0.0	-		-	50 th	-	-	80 th		-	Bee Bread, No Detections
April	Rockcastle	0.86	0.0	-		-	-	-	-	90 th		-	Bee Bread, Coumaphos (26.0), Thymol (1150.0)
April	Scott	0.0	0.1	-		below 30 th	below 30 th	30 th	-	60 th		-	Bee Bread, No Detections
April	Warren	0.38	0.0	-		-	below 30 th	-	-	-		-	Bee Bread, No Detections
April	Washington	0.65	0.0	-		-	30 th	-	-	50 th		-	
May	Boyd	2.07	0.0	30 th		-	50 th	-	-	-		-	
May	Kenton	2.08	0.3	-		-	30 th	-	-	60 th		-	
May	Marshall	1.39	0.0	-		-	-	-	-	60 th		-	
June	Clay	1.25	0.0	-		-	below 30 th	-	-	-		-	
June	Marshall	0.72	0.0	-		-	-	-	-	below 30 th		-	
June	Trigg	0.97	0.0	-		-	30 th	60 th	-	70 th		below 30 th	
July	Bullitt	4.25	0.05	-		-	30 th	-	-	-		below 30 th	
July	Madison	2.15	0.15	-		-	below 30 th	-	-	-		below 30 th	
July	Madison	2.50	0.0	-		-	below 30 th	-	-	60 th		below 30 th	

https://bip2.beeinformed.org/reports/state_reports/state_report/?year=2017&state=KY

Acknowledgements

- Clarence Collison, retired from Mississippi State
- Ray McDonnell, South East KY Community College
- Debbie Delaney, U of Delaware,
- “Interdisciplinary study shows honey producers how to market their product”
<http://www.udel.edu/udaily/2014/sep/honey-producers-091113.html>
- Jen O’Keefe, Morehead State

Thank You!

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