

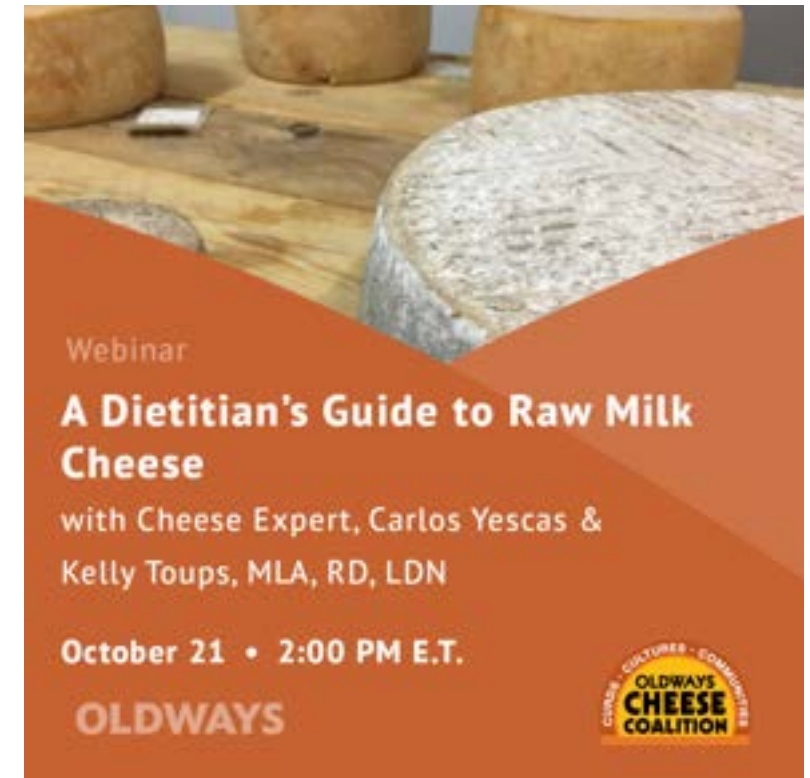
The Honey Effect: Honey Bees' Impact on Our Food Supply & Honey in the Mediterranean Diet

Moderator Dr. Barbara Lyle, Nutrition Scientist; M.S., Ph.D.
Danielle Downey, Executive Director of *Project Apis m.*
Dr. Francine Overcash, Ph.D., MPH, University of Minnesota


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NEXT WEBINAR (10/21):



Webinar
A Dietitian's Guide to Raw Milk Cheese
with Cheese Expert, Carlos Yescas & Kelly Toups, MLA, RD, LDN
October 21 • 2:00 PM E.T.
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The Honey Effect: Honey Bees' Impact on Our Food Supply & Honey in the Mediterranean Diet

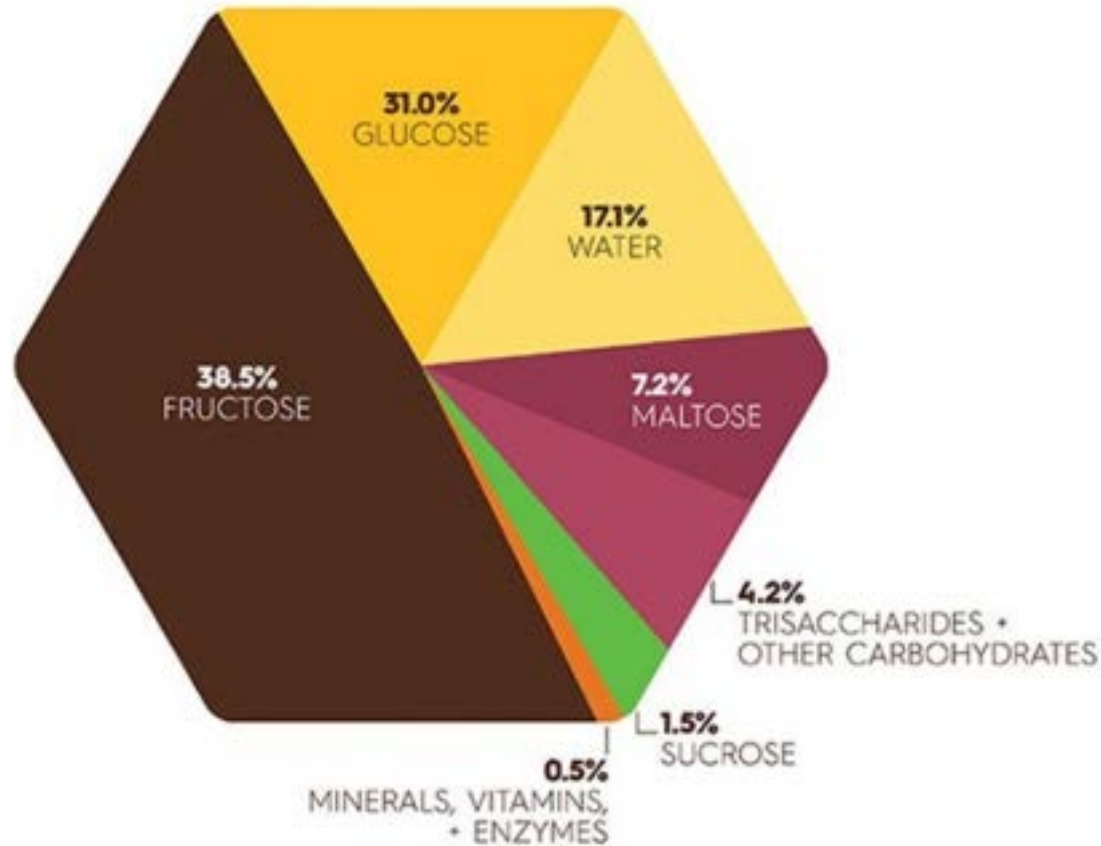
Moderator Dr. Barbara Lyle, Nutrition Scientist; M.S., Ph.D.
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Honey: An 8,000 Year Tradition



Honey Composition

HONEY'S NUTRITIONAL PROFILE



Nutrition Facts

16 servings per container

Serving size 1 Tbsp. (21g)

Amount per serving

Calories 60

% Daily Value*

Total Fat 0g 0%

Saturated Fat 0g 0%

Trans Fat 0g

Cholesterol 0mg 0%

Sodium 0mg 0%

Total Carbohydrate 17g 6%

Dietary Fiber 0g 0%

Total Sugars 17g

34%

Protein 0g

Vitamin D 0mcg 0%

Calcium 0mg 0%

Iron 0mg 0%

Potassium 0mg 0%

* The % Daily Value (DV) tells you how much a nutrient in a serving of food contributes to a daily diet. 2,000 calories a day is used for general nutrition advice.

Today You Will Learn

- The connection between eating honey and bee health
- The impact and importance of honey bees on agriculture
- How the current American diet aligns with a Mediterranean style diet
- Foods that pair with honey to help more Americans follow a Mediterranean style diet

Today's Speakers

- **Danielle Downey**
Project *Apis m.*
- **Dr. Francine Overcash**
University of Minnesota



Honey, Beekeeping & The Honey Bee's Impact

Danielle Downey

Executive Director

Project *Apis m.*

Apis mellifera (Apis m.)

noun | \ 'ā-pēs\

Western honey bee. A social bee domesticated for the honey it produces and as an essential pollinator of crops worldwide.

Conflict of Interest Disclosure

- Some of Danielle's Project *Apis m.* research is financially supported by the National Honey Board (NHB)
- No other conflicts to disclose

Key Takeaways

- Meet *Apis mellifera*, the bee who gives us honey and so much more!
- Many nuts, fruits and vegetables rely on honey bee pollination
- Pollination is an agricultural event
- Honey bees' job is critical, and the many stressors they face are increasing



Apis mellifera in the U.S., Abridged History

- Honey bees have been managed 8,000+ years
- *Apis mellifera* was brought to North America in 1622
- Commercial beekeeping
- Colony Collapse Disorder (CCD)
 - New research and methodical tracking of colony losses
 - Annual colony losses since CCD are consistently 32-45%



Pollination matters, for farmers, consumers and earth!

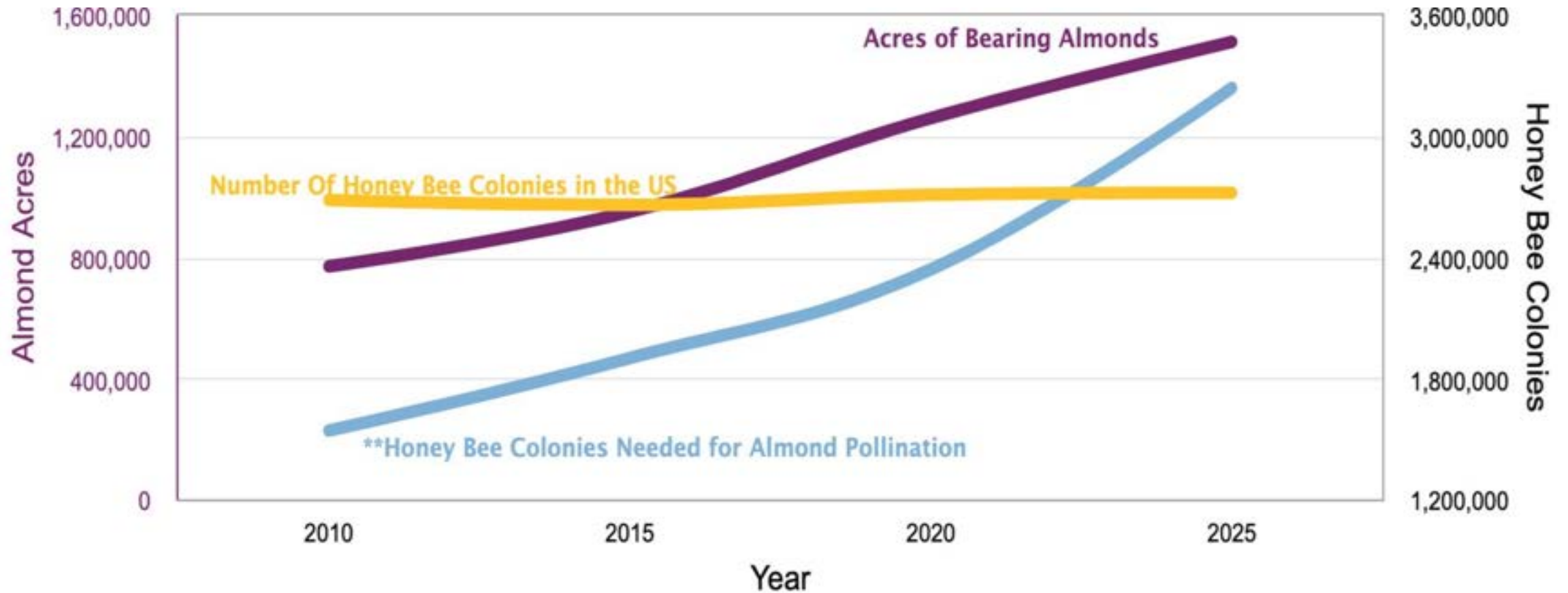
Bees are **important to the health of the planet and our food chain**, responsible for more than 35% of the foods we eat, pollinating more than **90 different crops**

- Earlier, larger, more symmetrical fruits
- Evidence for nutritional differences (apples, pears)
- Strawberries were heavier, had less malformations and reached higher commercial grades.
- Increased redness and reduced sugar–acid–ratios and were firmer, improving shelf life.



G Johnson, University of Delaware

Pollination is a Critical Agricultural Event



USDA NASS data, ** assumes 2 hives per acre

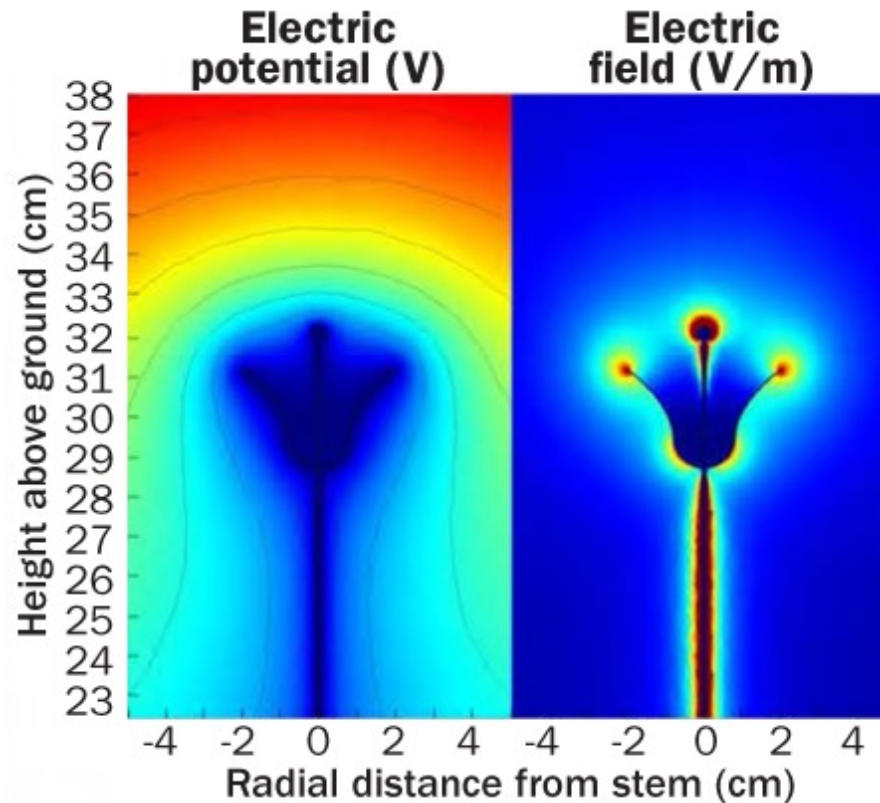
Many Plants Need Bees!

- Flowers use colors, patterns, scents, and architecture all designed to compete for pollination attention
- Plants produce nectar *to attract pollinators*



Flowers compete for pollinators

- UV patterns, electric fields, caffeine, and mimicry



Bees Pollinate Many Favorite Foods!

honey bees



KEEP THE FOOD WORLD BUZZING

Almonds
Cacao
Apples
Watermelon
Avocado
Cashew
Cherries
Papaya
Cucumbers
Garlic
Mango
Peppers
Pears
Artichoke
Pumpkin
Onion



Squash
Tomatoes
Radish
Vanilla
Blueberries
Kiwi
Cranberries
Herbs (spices)
Eggplants
Kale
Macadamia
Plums
Peaches
Apricots
Nectarines
Brussels Sprouts
Raspberries



Citrus
(orange, lemon,
grapefruit, tangerine)
Tea
Carrots
Broccoli
Blackberries
Coconut
Coffee
Cantaloupe
Honeydew
Cinnamon
Strawberry
Asparagus
Celery
Cauliflower

HONEY.COM

rediscover  goodness
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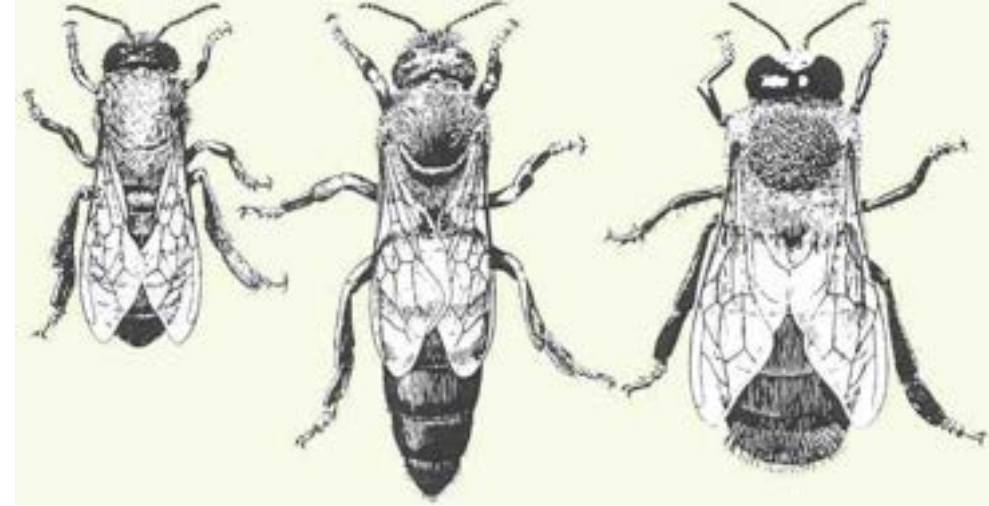
Why, and how do bees make honey?

- Bees get all they need from flowers.
- Protein is used to produce brood most of the year.
- Nectar is processed to be stored as honey.
- The worker bees are the only ones we see on flowers.



What's in the box?

- Honey bees are a 'superorganism'.
- Workers, drones and one queen, they have different jobs.
- Bees must produce honey to survive in winter.
- Beekeepers take the surplus and have selected stock that maximizes surplus honey.



Honey varies with the floral source

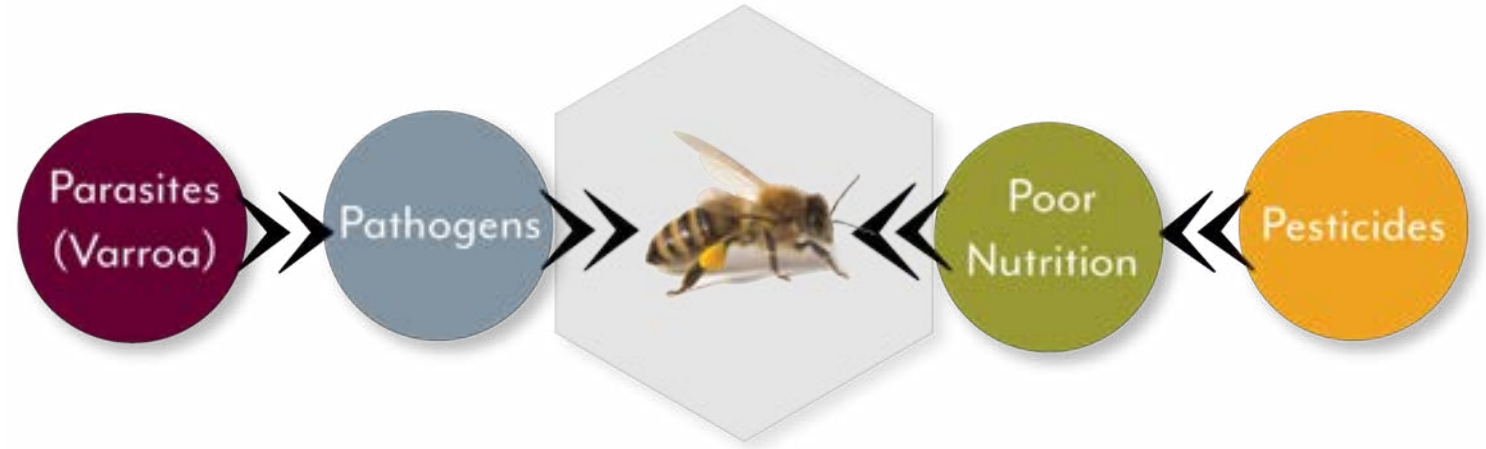
- Pollination rarely results in surplus honey production.
- Floral source determines a honey's unique profile.
- Use the [NHB honey locator](#) (*shown right*) to find different varietals all over the U.S.!



Bees are under a lot of pressure!

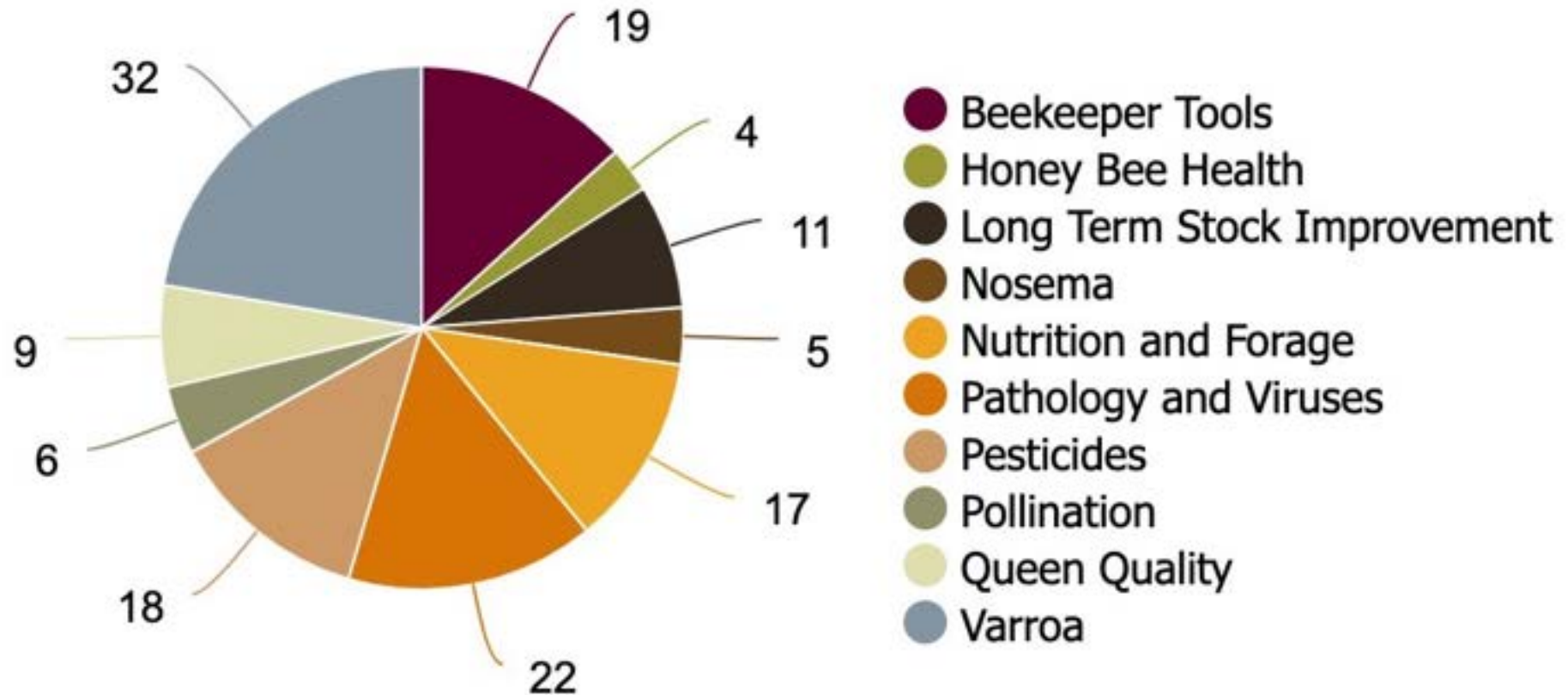
“The 4 P’s”

- Parasites
- Pathogens
- Pesticides
- Poor Nutrition



How are Project *Apis m.* and NHB helping?

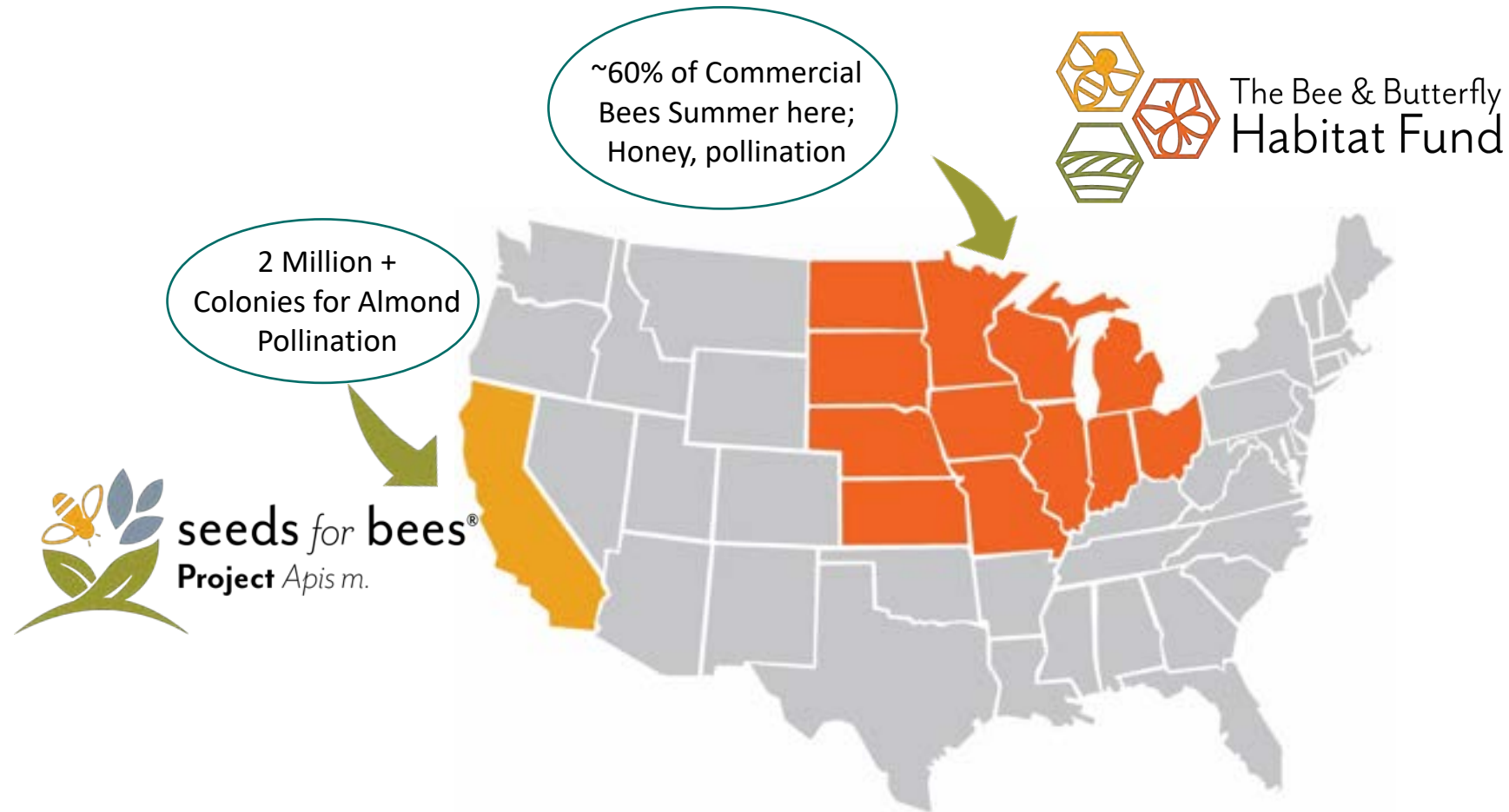
RESEARCH: 143 projects funded, over \$1.5M with NHB funding*



*The NHB commits 5% of its annual revenue to bee health research and has done so since 2008

Project *Apis m.* Forage programs

Strategic solutions where honey bees benefit most



How You & Your Shoppers Can Help

- Protect and invest in the landscape.
- Buy honey! It's a product of healthy bees, and a strong honey market allows beekeepers to invest in healthy bees.
- For more info, visit Project *Apis m.*:
<https://www.projectapism.org/>





Mediterranean Style Diet in America: Honey as a Helper

Dr. Francine Overcash, Ph.D., MPH,
University of Minnesota

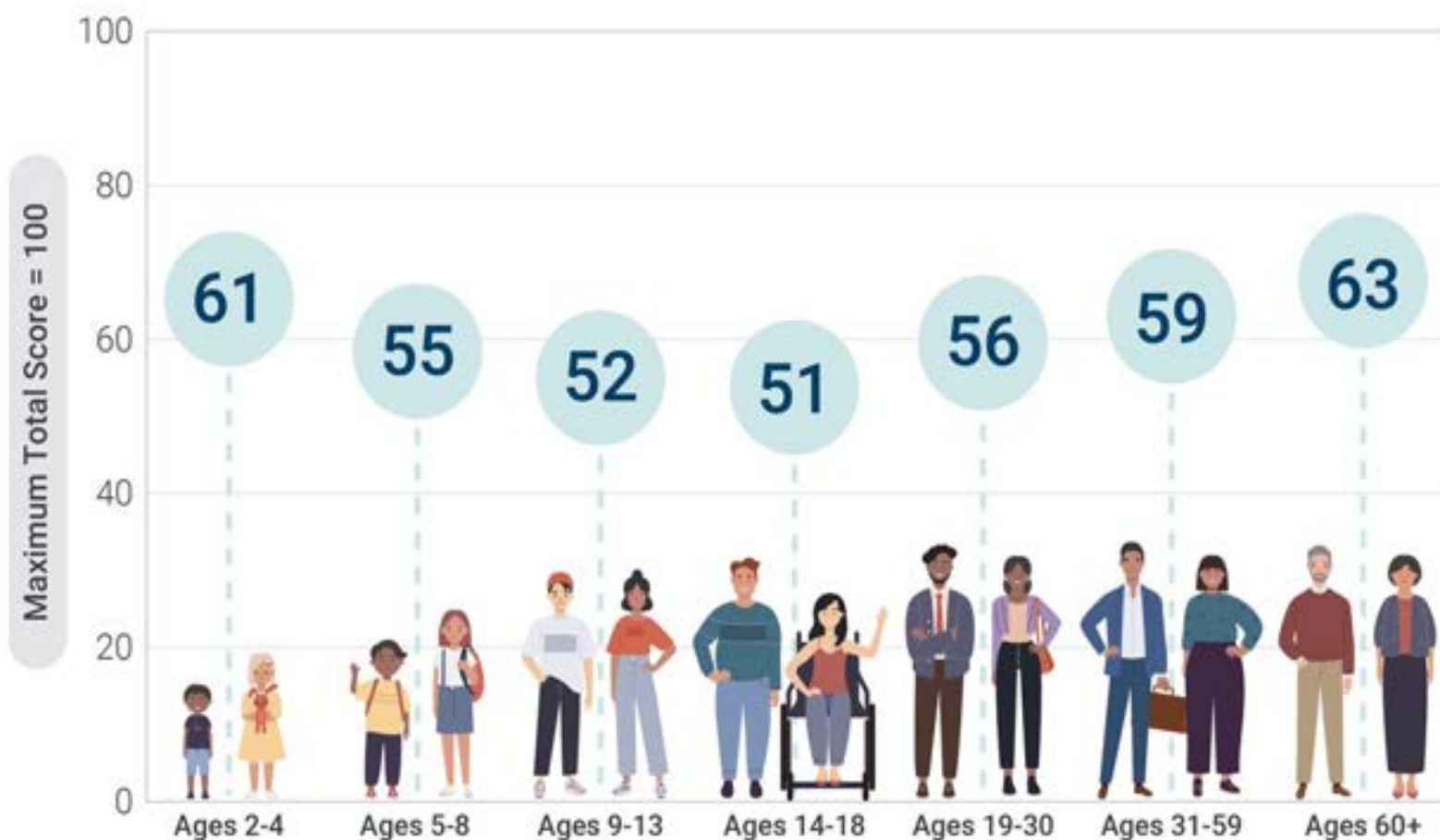
Conflict of Interest Disclosure

- Dr. Overcash's research shown here is financially supported by the National Honey Board
- No other conflicts to disclose

Most Americans do not meet the Dietary Guidelines at any age¹

Figure 1-4

Adherence of the U.S. Population to the *Dietary Guidelines* Across Life Stages, as Measured by Average Total Healthy Eating Index-2015 Scores



1.U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2020-2025 Dietary Guidelines for Americans. 8th Edition. Downloadable Graphics. Available at: <https://www.dietaryguidelines.gov/resources/downloadable-graphics>. Accessed on August 15, 2021.

Dietary Guidelines for Americans: Focus on Dietary Patterns

The 2020-2025 Dietary Guidelines for Americans² recommends three diet patterns to follow:

- Healthy U.S. Dietary Pattern
- Healthy Vegetarian
- **Healthy Mediterranean-Style Dietary Pattern**



2. U.S. Department of Health and Human Services and U.S. Department of Agriculture. 2020-2025 Dietary Guidelines for Americans. 8th Edition. Available at: https://www.dietaryguidelines.gov/sites/default/files/2020-12/Dietary_Guidelines_for_Americans_2020-2025.pdf. Accessed on June 12, 2021

Dietary Guidelines for Americans: Focus on Food Patterns



Dietary Guidelines for Americans: Focus on Food Patterns

- Compared to Healthy U.S. Style Pattern, the **Mediterranean-Style Pattern** is characterized by ...³

- ↑ Fruit
- ↑ Seafood
- ↑ Olive Oil
- ↓ Dairy



3. Dietary Guidelines Advisory Committee. 2020. Scientific Report of the 2020 Dietary Guidelines Advisory Committee: Advisory Report to the Secretary of Agriculture and the Secretary of Health and Human Services. U.S. Department of Agriculture, Agricultural Research Service, Washington, DC

Origin of the Mediterranean Diet



TIME Magazine Cover:
January 13, 1961

- Ancel Keys *7 Country Study* (1958)⁴
 - Italy, Greek Islands, Yugoslavia, the Netherlands, Finland, Japan, U.S.
 - First study to champion the cardioprotective effect of a Mediterranean style diet
 - Positive associations with health outcomes findings have sustained in the scientific literature⁵

4. Keys A, Mienotti A, Karvonen MJ, Aravanis C, Blackburn H, Buzina R, Djordjevic BS, Dontas AS, Fidanza F, Keys MH et al. The diet and 15-year death rate in the seven countries study. *Am. J. Epidemiol.* 1986.

5. Dinu M, Pagliai G, Casini A, Sofi F. Mediterranean diet and multiple health outcomes: An umbrella review of meta-analyses of observational studies and randomised trials. *European Journal of Clinical Nutrition.* 2018

Mediterranean Diet Pyramid

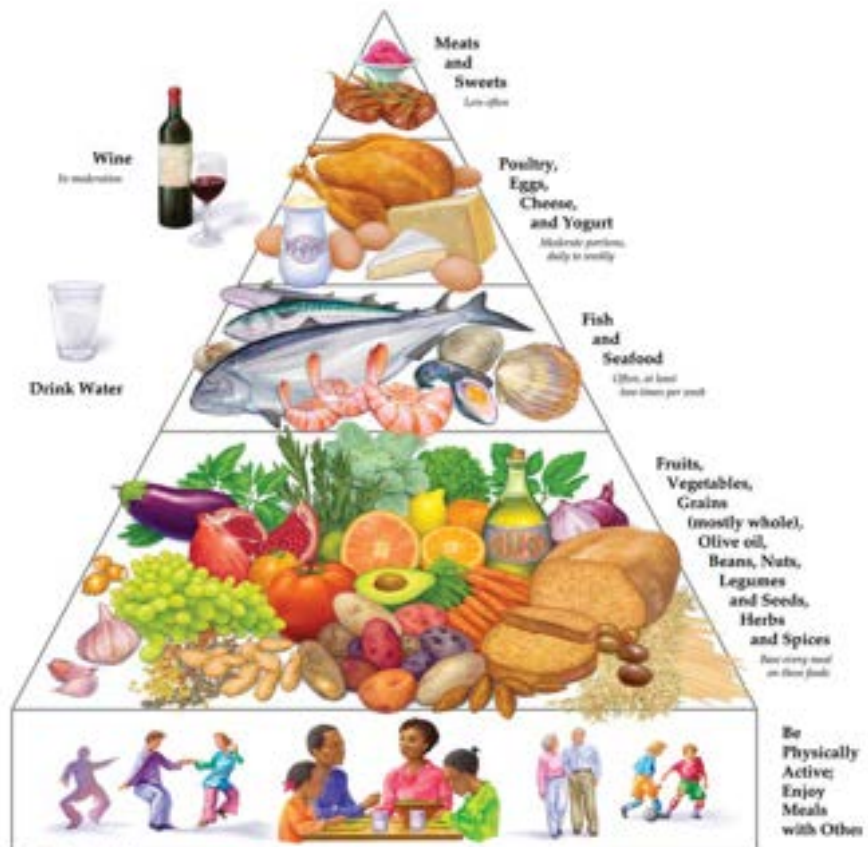


Illustration by George Mikellides
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Honey as a culinary tool to encourage a Mediterranean-Style Dietary Pattern

Honey has been used as a primary sweetener since ancient times⁶

Honey may make Mediterranean Diet foods more palatable and therefore increase frequency of consumption of key foods like fish, greens, whole grains and more



⁶ Crane E (1975) History of honey. In: Crane E (ed) Honey, a comprehensive survey. William Heinemann, London

Objective: Identify honey-food pairing recipes that promote alignment with a Mediterranean-style Dietary Pattern as recommended in the 2020-2025 *Dietary Guidelines for Americans*

Specific Aims:

1. Determine specific foods that may be most predicative of alignment to a Mediterranean-Style Dietary Pattern in the U.S.
2. Create honey-food pairings with foods identified to help the general U.S. population eat more of a Mediterranean style diet.



Dataset and Eligibility



National Health and Nutrition Examination Survey

- National Health and Nutrition Examination Survey (NHANES)⁷
 - Ongoing, public-access
 - Primary dataset that informs nutrition policy
- Eligibility
 - Participants 25-65 years of age with complete dietary data (2 reliable, 24-hr. dietary recalls)

7. Centers for Disease Control and Prevention NHANES Questionnaires, Datasets, and Related Documentation Available online: <https://wwwn.cdc.gov/nchs/nhanes/Default.aspx> (accessed on June 16, 2021).

Mediterranean-Style Diet Pattern Score⁸: Well Suited for American Population

- Developed by Harvard School of Public Health specifically for non-Mediterranean populations
- Advantages over previous MedD scoring indices:
 - Accounts for both traditional and non-traditional MedD foods
 - Accounts for recommended intake levels of each food vs. simple consumption of those foods



8. Rumawas, M.E.; Dwyer, J.T.; Mckeown, N.M.; Meigs, J.B.; Rogers, G.; Jacques, P.F. The development of the Mediterranean-Style Dietary Pattern Score and its application to the American diet in the Framingham Offspring Cohort. *J. Nutr.* 2009,

Mediterranean-Style Diet Pattern Score (MSDPS): Scoring Components⁹

Food Component	Criteria for Maximum Score of 10 [servings/week]	Score [points/serving]
Fish and other seafood	6	1.67
Poultry	4	2.5
Olives, legumes, and nuts	4	2.5
Potatoes and other starchy roots	3	3.33
Eggs	3	3.33
Sweets	3	3.33
Meat	1	10
Olive Oil	Use only olive oil	0 [for no use] 5 [olive oil + other oils]

Food Component	Criteria for Maximum Score of 10 [servings/day]	Score [points/serving]
Whole grains	8	1.25
Fruits	3	3.33
Vegetables	6	1.67
Dairy	2	5.0
Wine [Men]	3	3.3
Wine [Women]	1.5	6.7

8. Rumawas, M.E.; Dwyer, J.T.; Mckeown, N.M.; Meigs, J.B.; Rogers, G.; Jacques, P.F. The development of the Mediterranean-Style Dietary Pattern Score and its application to the American diet in the Framingham Offspring Cohort. *J. Nutr.* 2009,

Mediterranean-Style Diet Pattern Score: How to Calculate

$$\begin{aligned}
 &\text{Mediterranean-Style Dietary Pattern Score} = \left(\frac{\text{Sum of 13 Component Scores}}{130} \times 100 \right) \times \frac{\text{Energy from Foods from MedD pyramid}}{\text{Total Energy}} \\
 &\text{Example: } 46.5 = \left(\frac{[(7*10)+(1*6)+(1*0)+(2*5)+(1*2)+5]}{130} \times 100 \right) \times 65\% \text{ of total energy from MedD foods}
 \end{aligned}$$

Weighted proportion of energy intake from MedD foods
↓
Energy from Foods from MedD pyramid

Methods

HIGHER Med Diet
Style Adherence
(top 25% MSDPS)

vs.

General Population
Adherence
(Remaining eligible
participants)



**Inspire Consumers to
Eat Foods that
Promote
Mediterranean Style
Diets in the U.S**

Identify foods
recommended in the
Med Style Diet that
are under-consumed
even by those with
higher Med Diet Style
Adherence as a
starting point



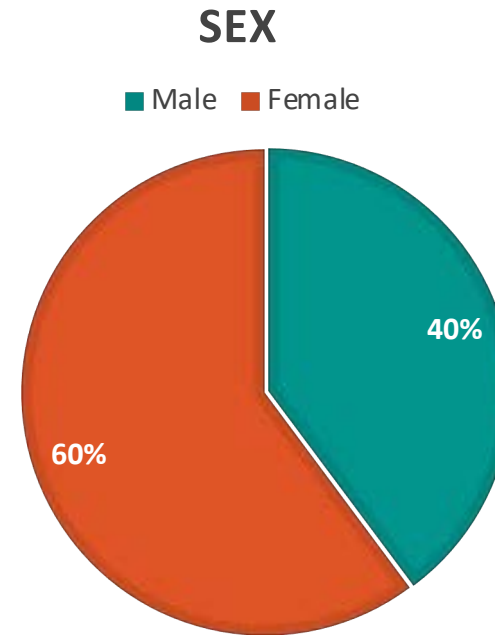
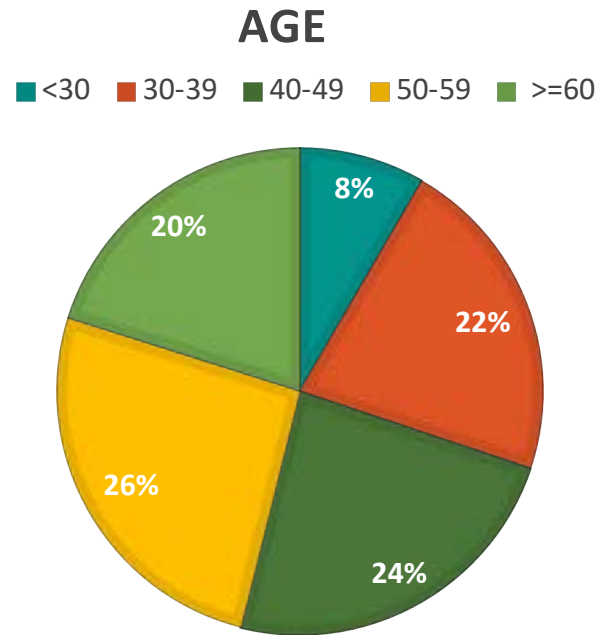
More in the future

Use dietary modeling
to assess potential
effect of replacing
comparable foods
with corresponding
honey – food pairings
among the general
population group.



What We Have Learned So Far

Demographics of Americans (n=4,452*) with a Higher Mediterranean-Style Diet Pattern Score

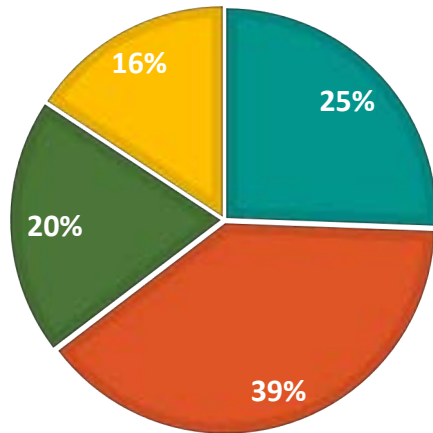


*Total Sample Size n=19,978

Demographics of Americans (n=4,452*) with a Higher Mediterranean-Style Diet Pattern Score

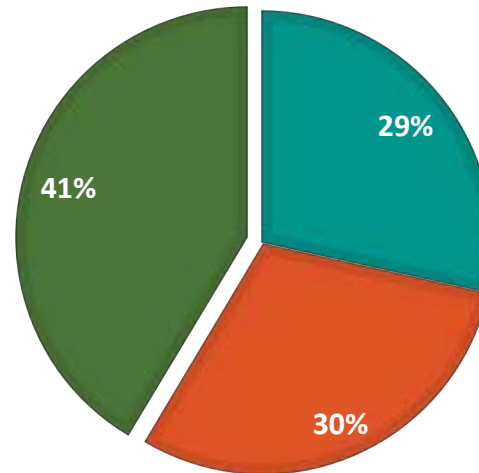
RACE/ETHNICITY

■ Mexican/Other Hispanic ■ Non-Hispanic White
■ Non-Hispanic Black ■ Multiple Race/Other



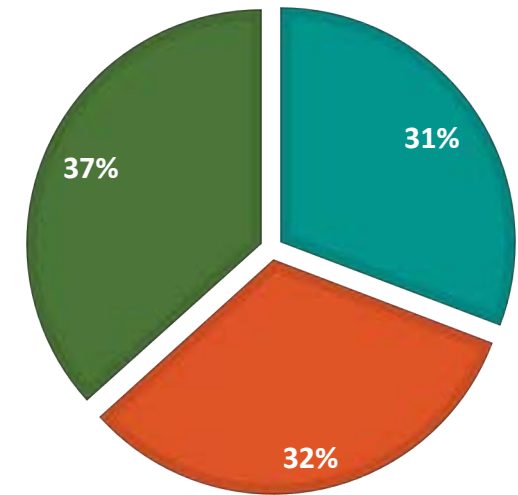
POVERTY-TO-INCOME RATIO

■ Low ■ Middle ■ High



BODY MASS INDEX

■ Underweight/Healthy Weight ■ Overweight ■ Obese



*Total Sample Size n=19,978

American Diets fall short of following a Mediterranean-Style Diet Pattern

	Top 25% of MSDPS	General Population
Mean MSDPS Score* (SE)	16.7 (0.09)	7.1 (0.05)
Number (%) who reported eating honey	316 (7.1%)	577 (3.7%)

*out of 100

Common Foods Consumed among Higher Mediterranean-Style Diet Pattern Scores



Foods That Could Help Increase Mediterranean-Style Diet Pattern Scores

- ***Increase*** any lean fish/shellfish (i.e., not fried)
- ***Increase*** any non-starchy vegetables
- ***Increase*** olive oil use

- ***Decrease*** red meats
- ***Decrease*** processed meats (packaged deli meats, hot dogs)
- ***Decrease*** white potatoes
- ***Decrease*** dairy (milks, cheeses)
- ***Decrease*** sodas, energy drinks



Simple Swaps to Increase Consumption of Mediterranean Foods



Honey is a Helper to Make Food Swaps Delicious



More to come ...

- Perform dietary modeling analysis to assess potential effect of replacing comparable foods with corresponding honey – food pairings

For example:

“Making these simple substitutions will help ___% of Americans eat more of the foods recommended as part of a Mediterranean-Style Diet Pattern.”

References

❖ **Danielle's slides:**

- Hünicken, P.L., Morales, C.L., García, N. *et al.* Insect Pollination, More than Plant Nutrition, Determines Yield Quantity and Quality in Apple and Pear. *Neotrop Entomol* **49**, 525–532 (2020). <https://doi.org/10.1007/s13744-020-00763-0>
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❖ **Francine's slides:**

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Thank you!

Questions?

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