Identifying Key Pollen and Nectar Resources for Vermont Honey Bees

Brianna Borch
Mentor: Dr. Samantha Alger
Department of Plant and Soil Sciences, UVM

Acknowledgements

Project Funders

Vermont Beekeepers Association

Julie Simon Munro and the William E. Simon Foundation

The Vermont Bee Lab

Beekeepers

Chas Mraz

Jeff Battaglini and Lesley Weisbrot

Mike Palmer

Zachary Suddaby

Acknowledgements

Special Thanks:

PI: Samantha Alger

Data Analyst: Phillip Alexander Burnham

Research Assistants

Sydney Miller
Annelise Holland
Natalie Connor
Emily Wanzer
Maddie Burke
Jonna Greene

TABLE OF CONTENTS

01

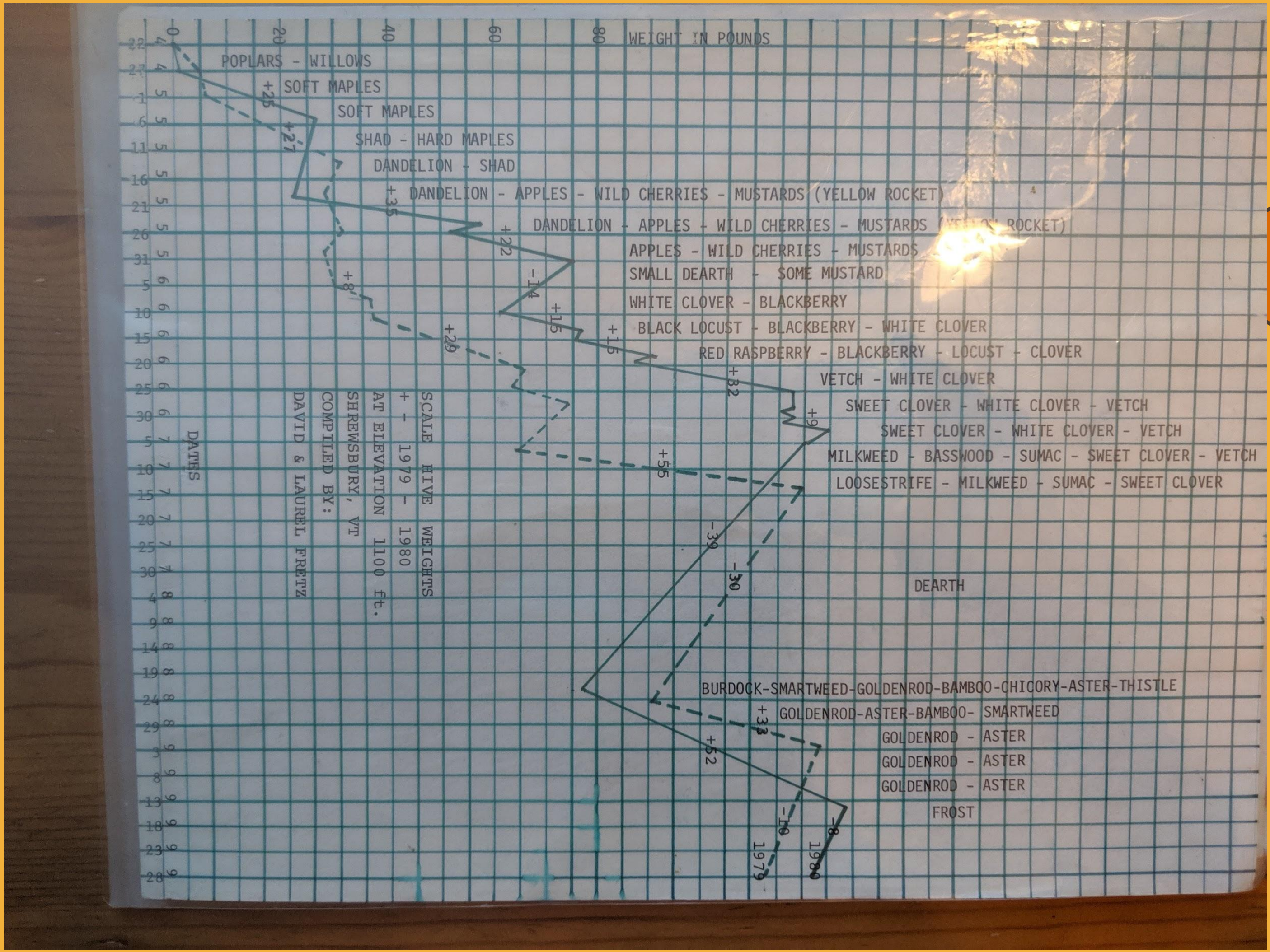
Research Question + Methods

Research Questions

Which plants are VT honey bees relying on for nectar and pollen throughout the growing season?

Why?

- To understand the full breadth of important pollen/nectar sources bees rely on in Vermont throughout the growing season

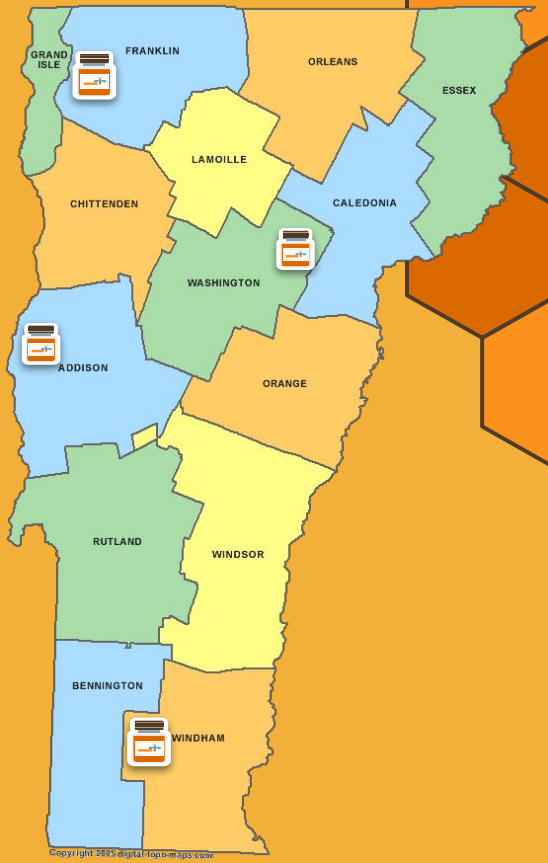

WEIGHT IN POUNDS
0
20
40
60
80
POPLARS - WILLOWS
SOFT MAPLES
SOFT MAPLES
SHAD - HARD MAPLES
DANDELION - SHAD
DANDELION - APPLES - WILD CHERRIES - MUSTARDS (YELLOW ROCKET)
DANDELION - APPLES - WILD CHERRIES - MUSTARDS
ROCKET)
APPLES - WILD CHERRIES - MUSTARDS
SMALL DEARTH - SOME MUSTARD
WHITE CLOVER - BLACKBERRY
BLACK LOCUST - BLACKBERRY - WHITE CLOVER
RED RASPBERRY - BLACKBERRY - LOCUST - CLOVER
VETCH - WHITE CLOVER
SWEET CLOVER - WHITE CLOVER - VETCH
SWEET CLOVER - WHITE CLOVER - VETCH
MILKWEED - BASSWOOD - SUMAC - SWEET CLOVER - VETCH
LOOSESTRIFE - MILKWEED - SUMAC - SWEET CLOVER
DEARTH
BURDOCK-SMARTWEED-GOLDENROD-BAMBOO-CHICORY-ASTER-THISTLE
GOLDENROD-ASTER-BAMBOO- SMARTWEED
GOLDENROD - ASTER
GOLDENROD - ASTER
GOLDENROD - ASTER
FROST
+25
+27
+35
+22
-14
+15
+15
+32
+9
+8
+29
+55
-39
-30
+33
+52
-10
-8
1979
1980
DATES
SCALE HIVE WEIGHTS
+ - 1979 - 1980
AT ELEVATION 1100 ft.
SHREWSBURY, VT
COMPILED BY:
DAVID & LAUREL FRETZ

Why?

- To build towards a ‘fingerprint’ of Vermont honey to which we can compare imported honey

Methods: Data Collection

- Four sample apiaries throughout Vermont. Locations: Wardsboro, Addison, Cabot, Swanton
- Nectar, pollen, and flower samples collected from each yard every month from May through August/ September, with the exception of Cabot which did not get sampled until June.
- Hives weighed every month at each yard to track nectar flow with the exception of Cabot.



Pollen Collection

Photo Source: https://www.beeculture.com/bee-pollen-overview/

Photo source:
https://www.researchgate.net/figure/Grid-on-a-pollen-trap_fig8_256472351

Nectar Collection

Hive Weighing

Photo Source: https://www.betterbee.com/monitors/broodminder-report.asp

Flower Survey

Methods: Sample Analysis

- DNA Analysis of nectar and pollen samples
  - Identified to plant family level, some to genus and species

02

Results

Plant DNA Overall Results

- Pollen: 37 plant families detected
- Nectar: 64 plant families detected
- 34 plant families common to both pollen and nectar

Site A: Wardsboro, VT

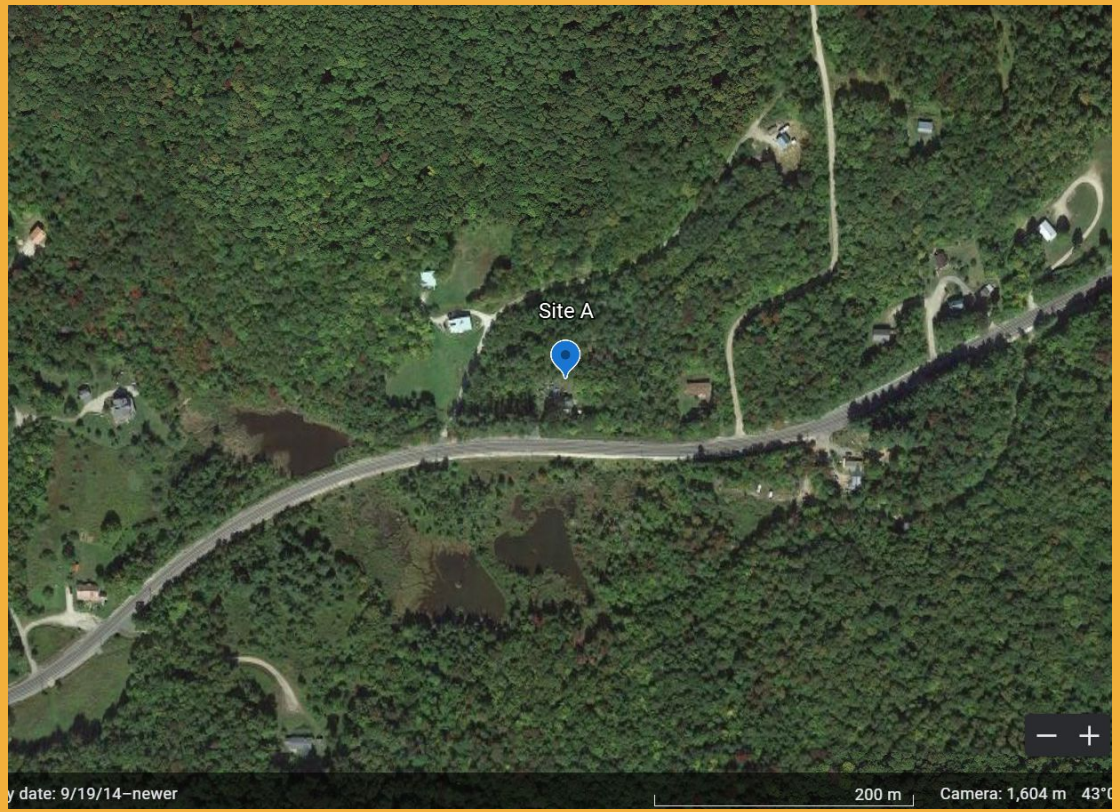
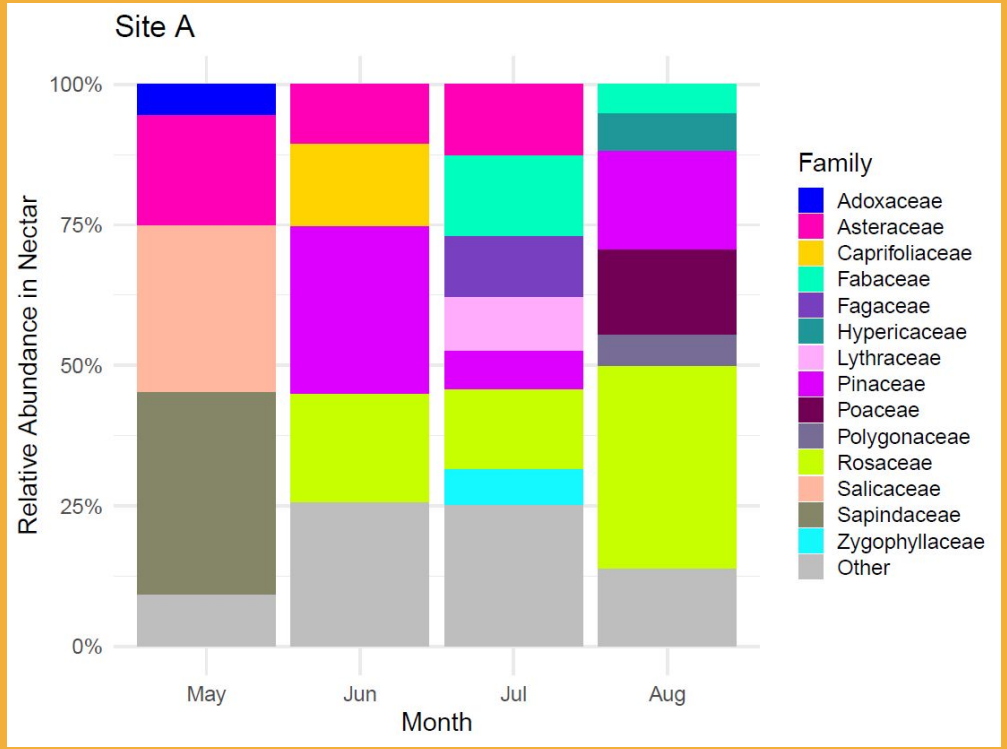
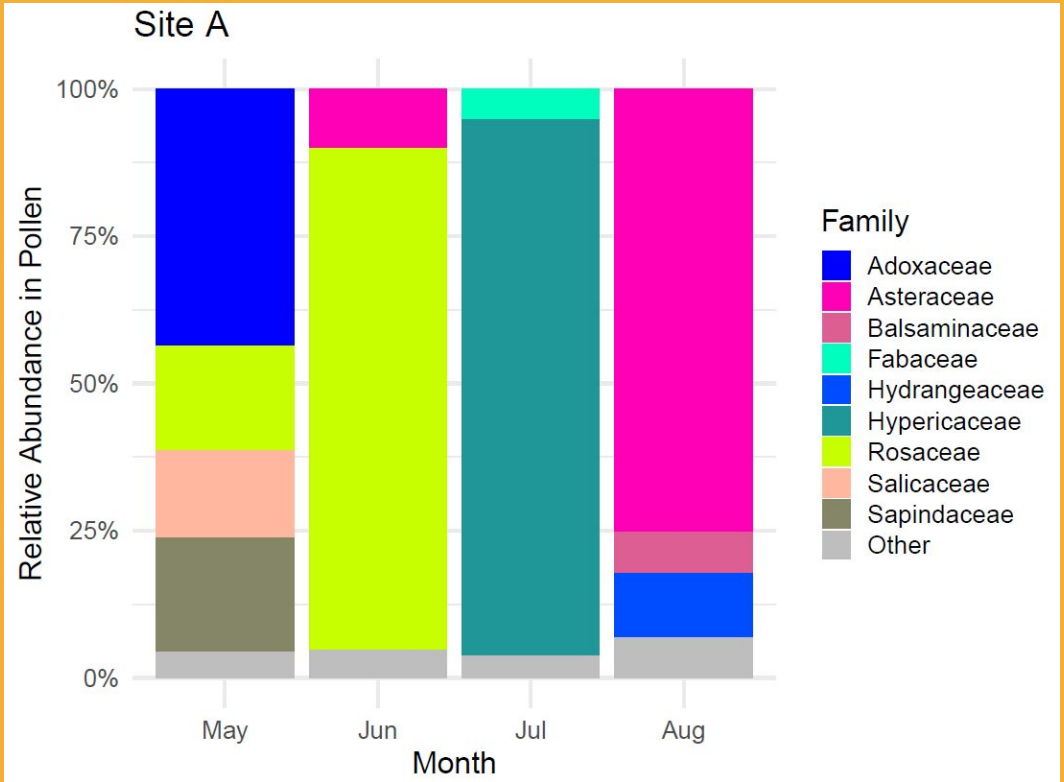


Photo Source: Google Earth

Site A Nectar: Wardsboro, VT



Site A Pollen: Wardsboro, VT



Nectar vs. Pollen: Stark Differences

- Less diversity in pollen sample- more reliance on specific plant families
- Hypericaceae minimally present/ not present in July nectar sample but dominate July pollen sample
- Rosaceae and Asteraceae dominate in pollen samples as well but are more evenly distributed in nectar samples

Site B: Addison, VT

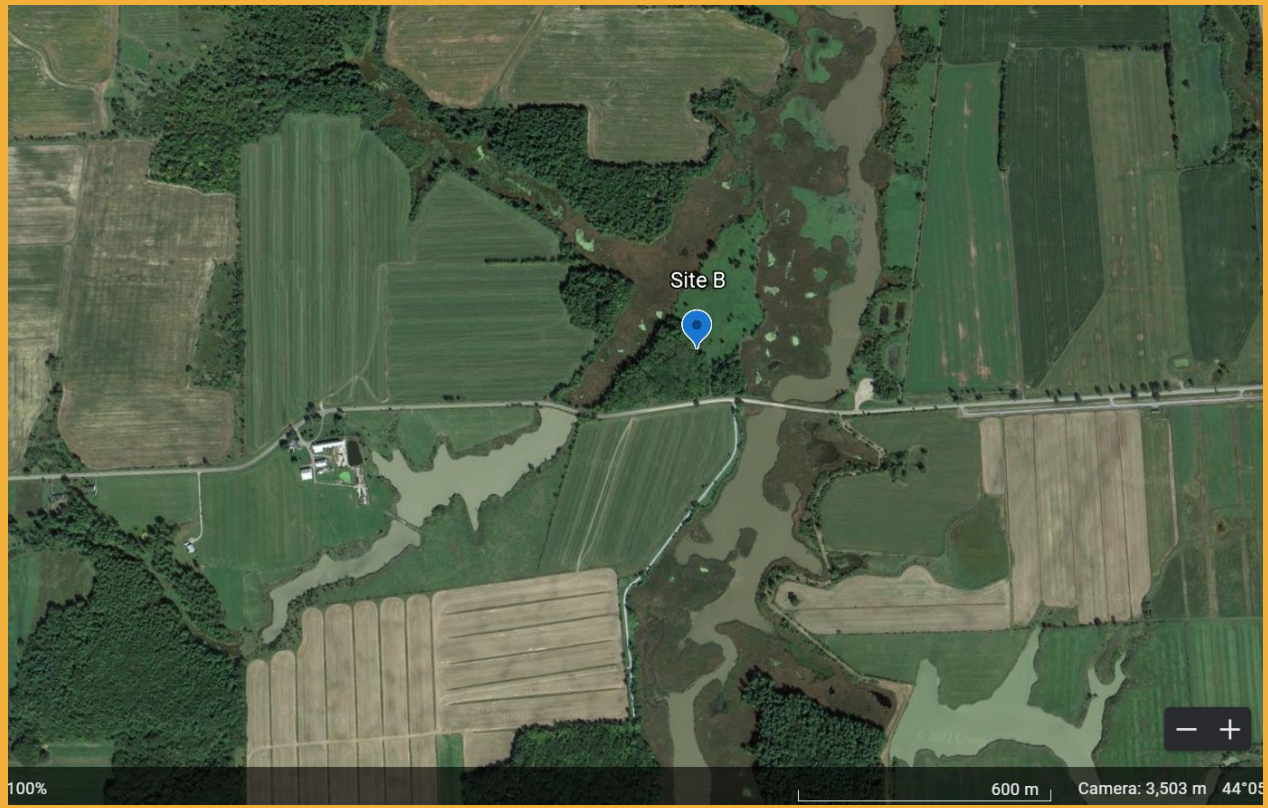


Photo Source: Google Earth

Site B Nectar: Addison, VT

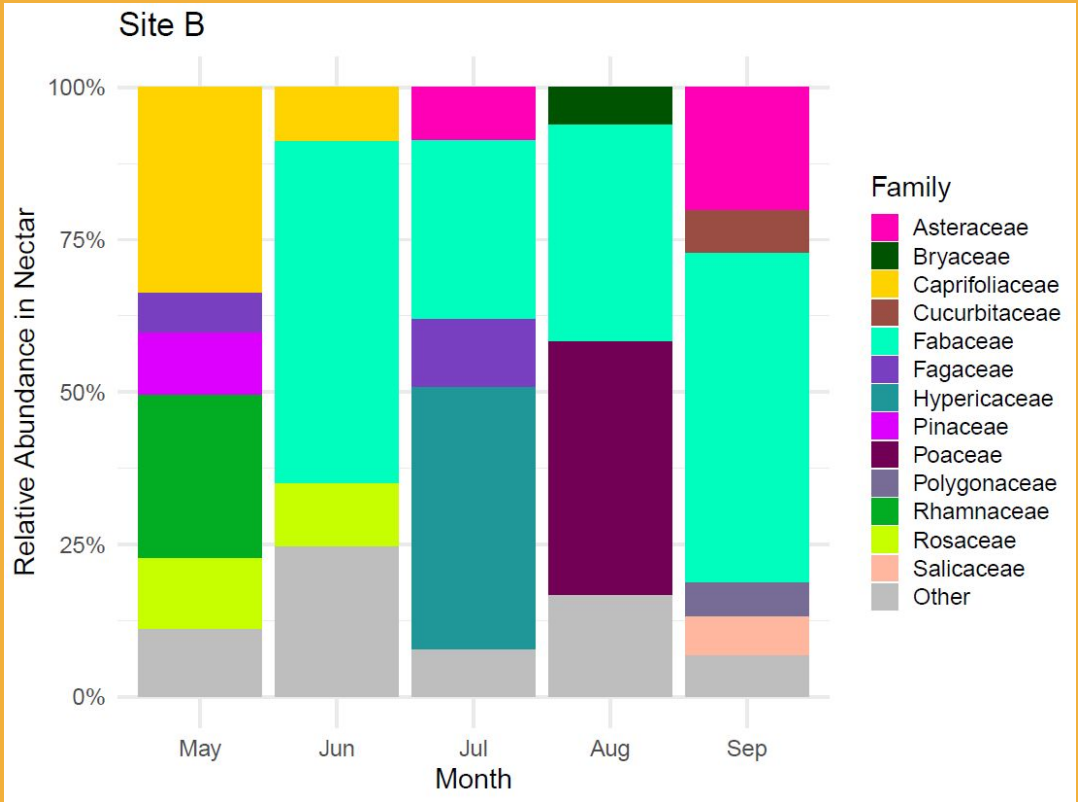
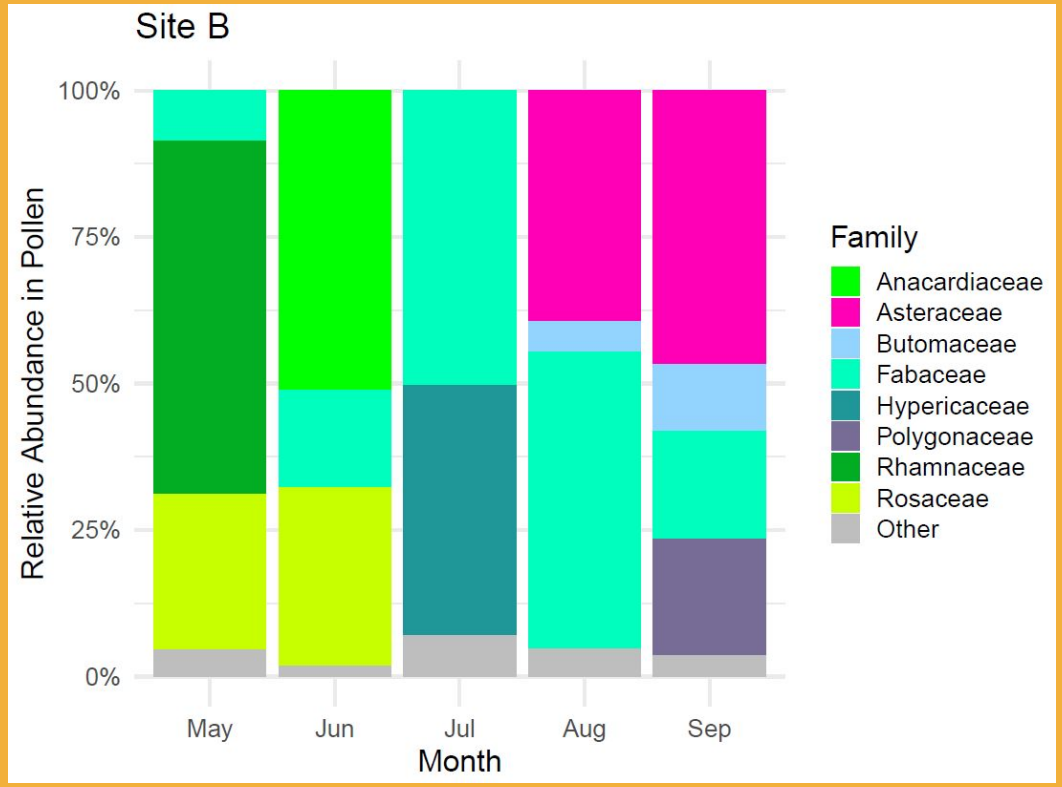


Photo Source: Google Earth

Site B Pollen: Addison, VT



Site C: Swanton, VT

Photo Source: Google Earth

Site C: Swanton, VT

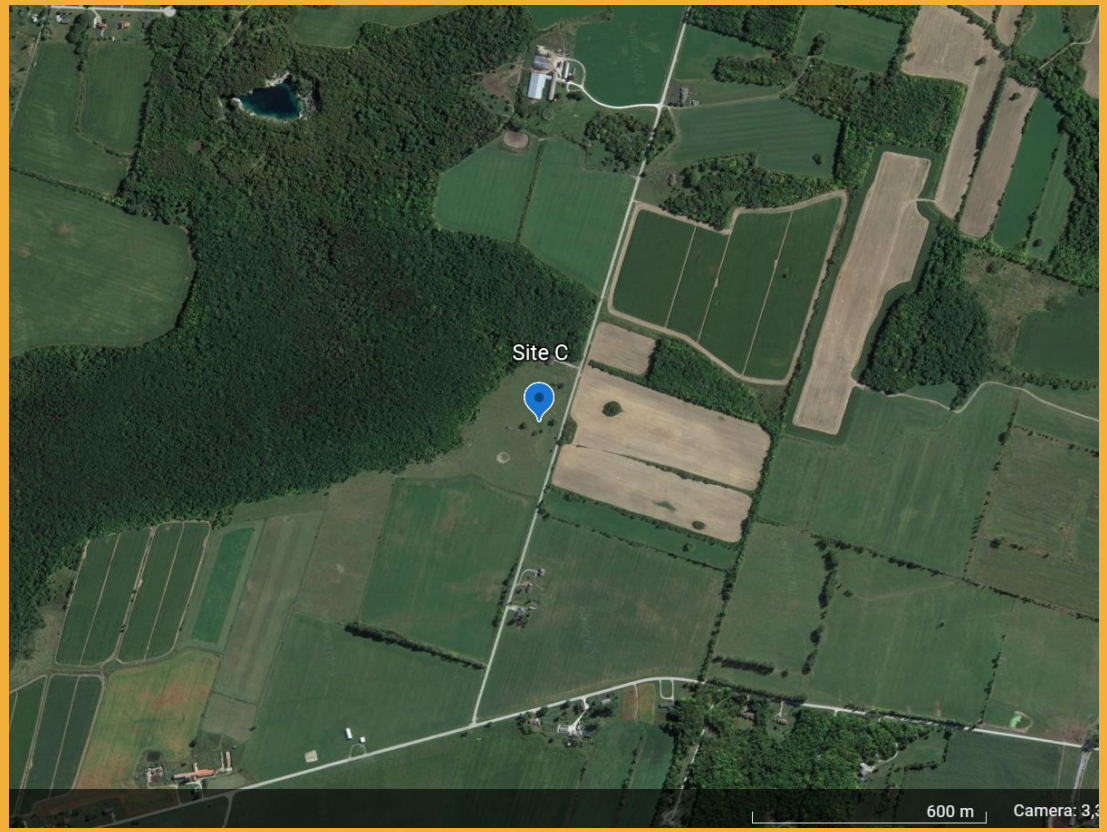


Photo Source: Google Earth

Site C Nectar: Swanton, VT

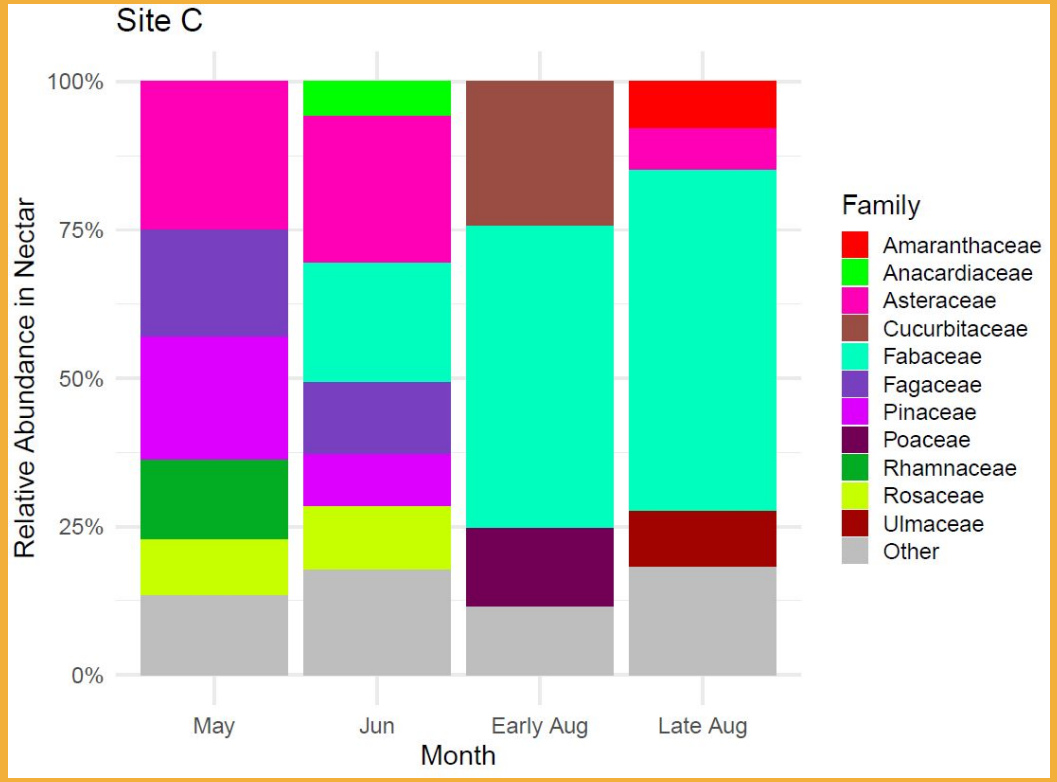
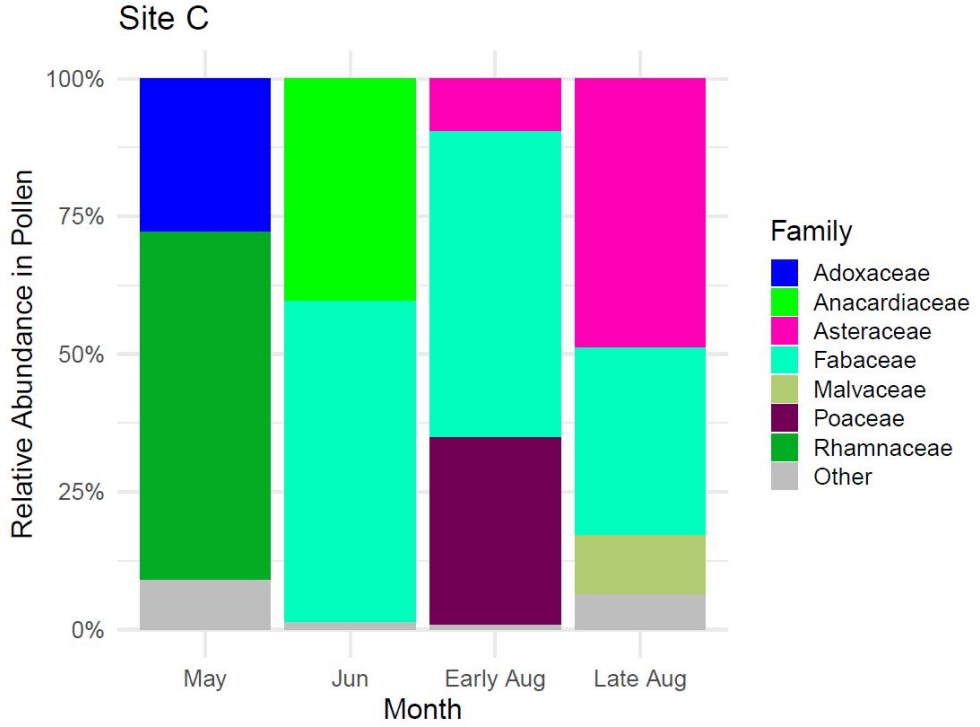


Photo Source: Google Earth

Site C Pollen: Swanton, VT



Site D: Cabot, VT

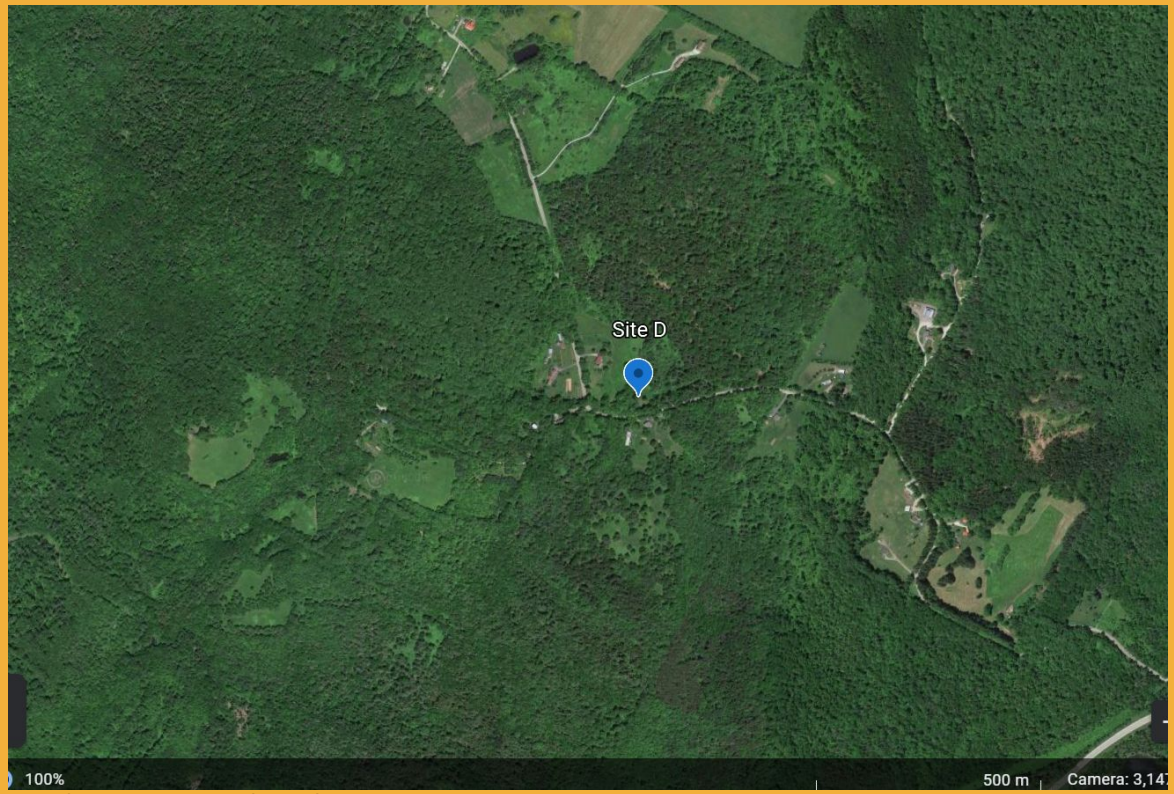


Photo Source: Google Earth

Site D Nectar: Cabot, VT

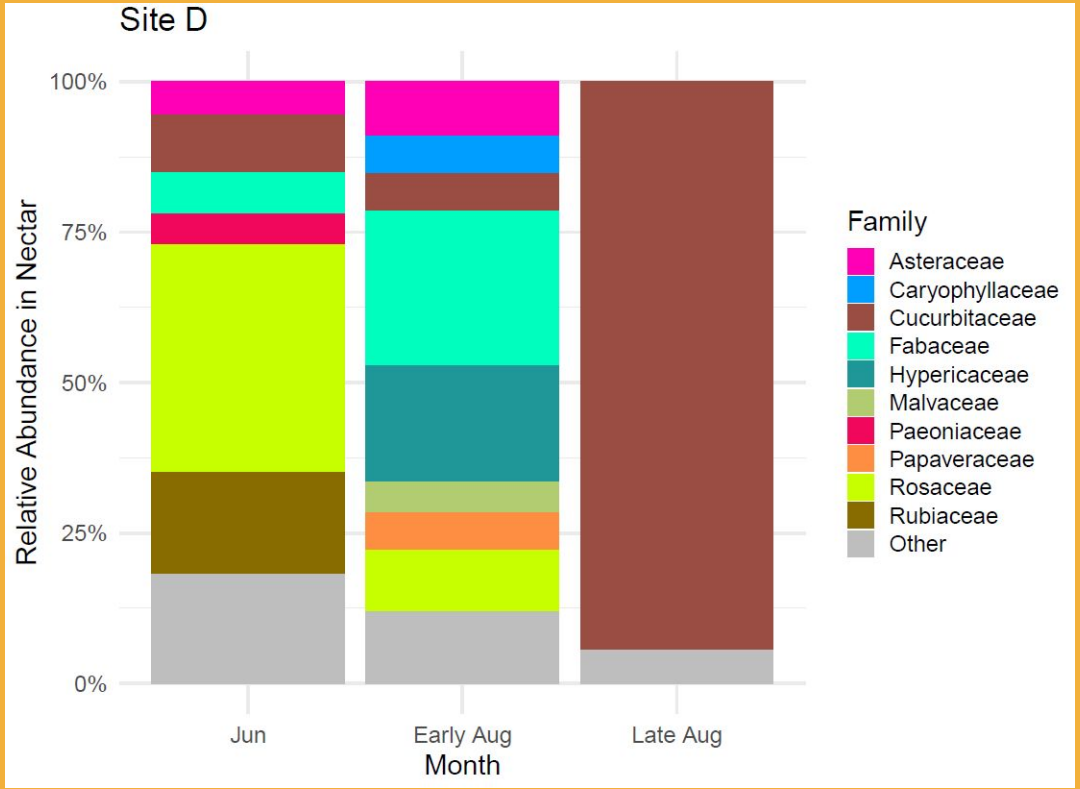
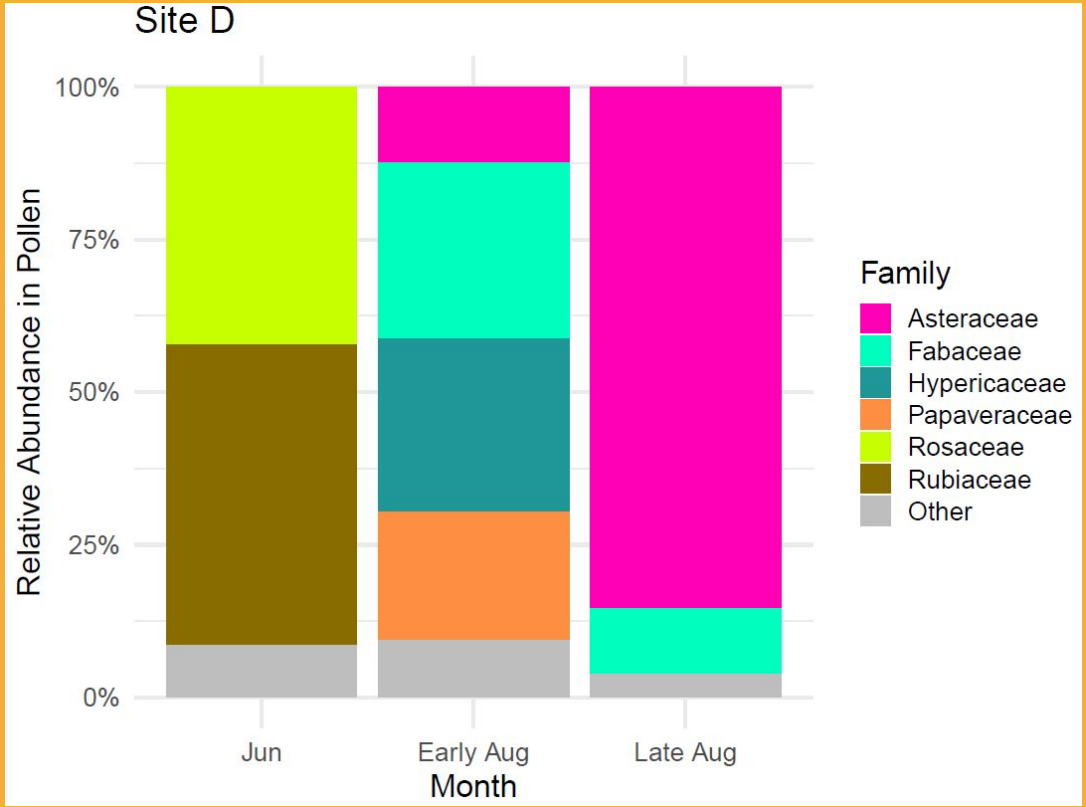
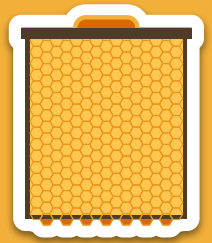


Photo Source: Google Earth

Site D Pollen: Cabot, VT



In Summary



Honeybees rely on great diversity of resources for their nectar and pollen

Families that are largely important between all sites are asteraceae, rosaceae, and fabaceae

Bees are exposed to a wide number of pesticides that may have interacting effects

More diversity appears in nectar samples

There are big differences between sites

03

Next Steps

Making Data Available

- Interactive beekeeper resource
- Forage recommendations

Developing a Fingerprint

- Working with a plant geneticist at Trinity College to further refine our DNA sequence data to develop a more accurate fingerprint of VT honey

Investigating moss dispersal

- Moss DNA was found in nectar samples!
- Are bees mediating moss spore dispersal?
- Is it ‘accidental’ or are bees eating moss spores?

Thanks for listening!

THANKS!

Do you have any questions?

bborch@uvm.edu
salger@uvm.edu

CREDITS: This presentation template was created by **Slidesgo**, including icons by **Flaticon** and infographics & images by **Freepik**