

Supplementing Floral Resources in Cucurbits to Support Wild Pollinators



Kristal M. Watrous, Mark Otieno,
C. Sheena Sidhu, Cory Stanley-Stahr,
Rachael Troyer, Shelby J. Fleischer



Cucurbits



- Diverse group
 - Squash, melons, cucumbers, watermelon
- Floral morphology variable
- Reproductive systems

Reproductive Systems



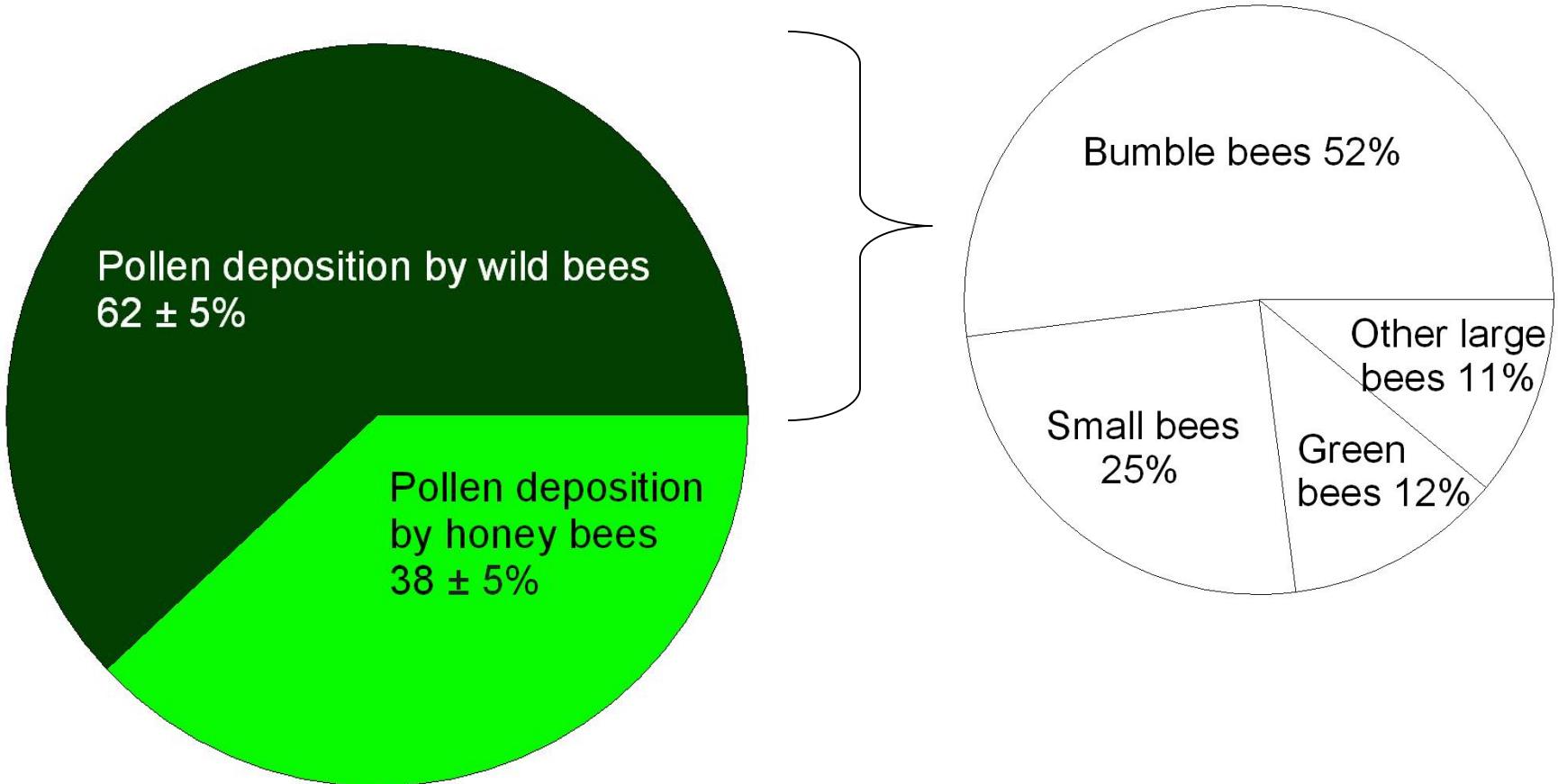
Female



Male



Documented floral visitors



Mean \pm SE across NJ, PA Watermelon farms

Integrated Crop Pollination

- Baseline information
 - Who pollinates the crop?
 - Strategy to support pollinators



Crop Rotation

- Long rotation cycle
- Other crops are poor bee resources



Crop Rotation

- Long rotation cycle



USDA-ARS-PIRU

Crop Rotation

- Long rotation cycle
- Other crops are poor bee resources



Florida Watermelons



- Fresh market, seedless
- 20-100 acres

Florida Watermelons



Main pollinators:

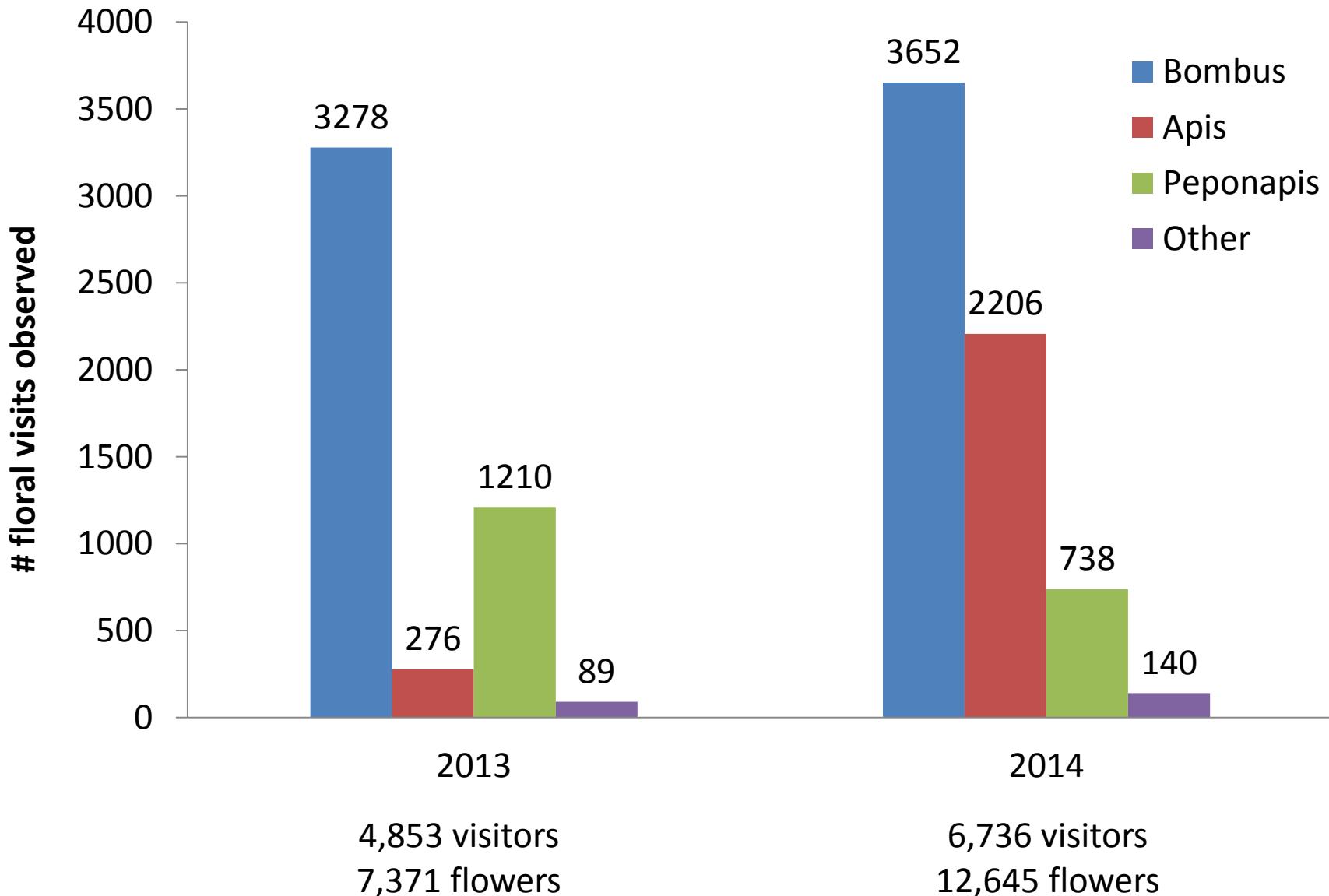
- *Apis mellifera*
- Halictids:
Agapostemon
Halictus
Lasioglossum
- bombyliid flies
- scoliid wasps



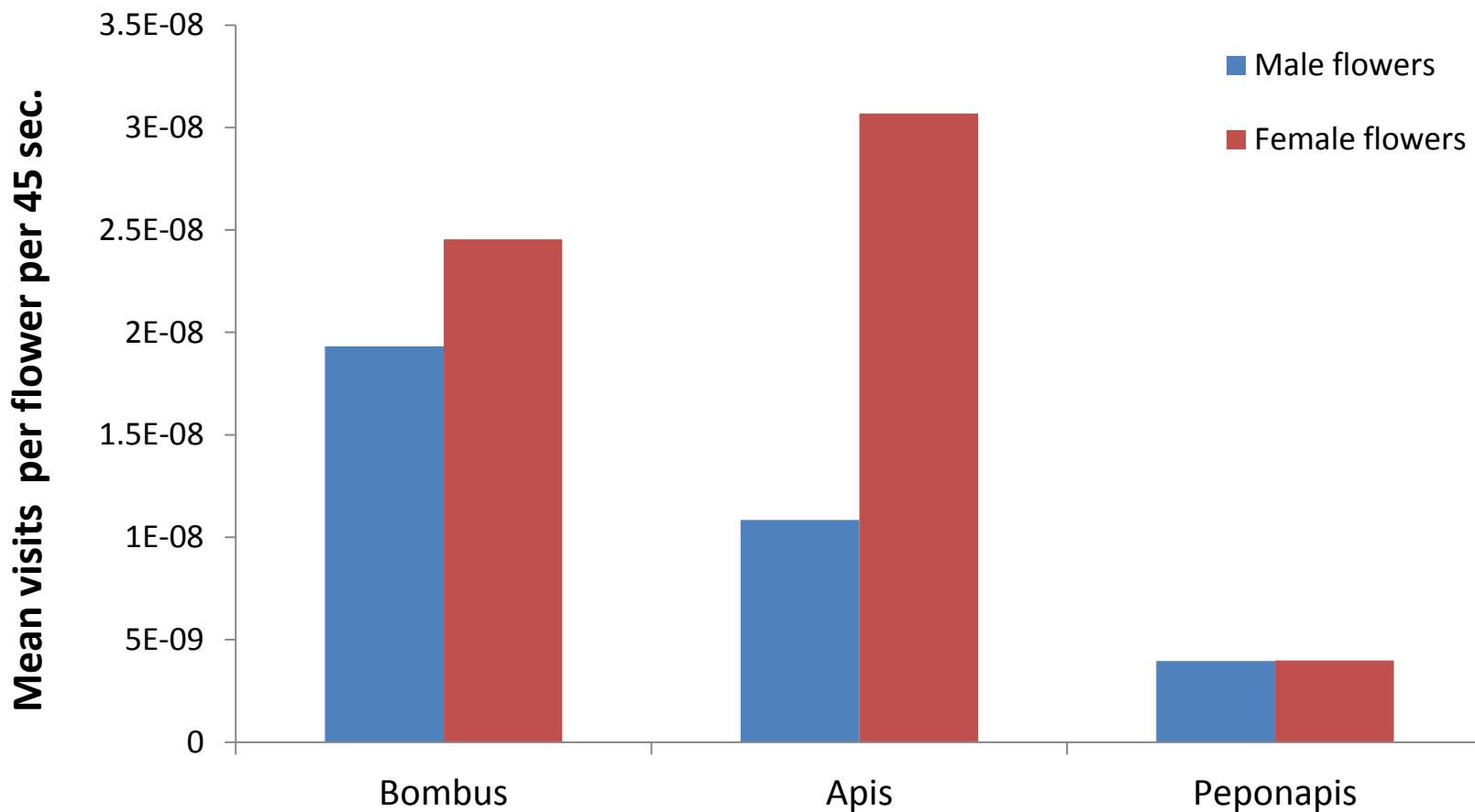
Who visits
flowers in large
pumpkin fields
in Pennsylvania?



Who visits PA pumpkin flowers?



2014 Visitation Rates



Bombus impatiens

- Deposit 3X more pollen per visit than *Apis*
- Contact the stigma more often than *Apis*
- Fewer visits required for pollination
- Active on cool, cloudy days
- Available commercially

Artz, Hsu & Nault (2011) Environ. Entomol.
Artz & Nault (2011) J. Econ. Entomol.

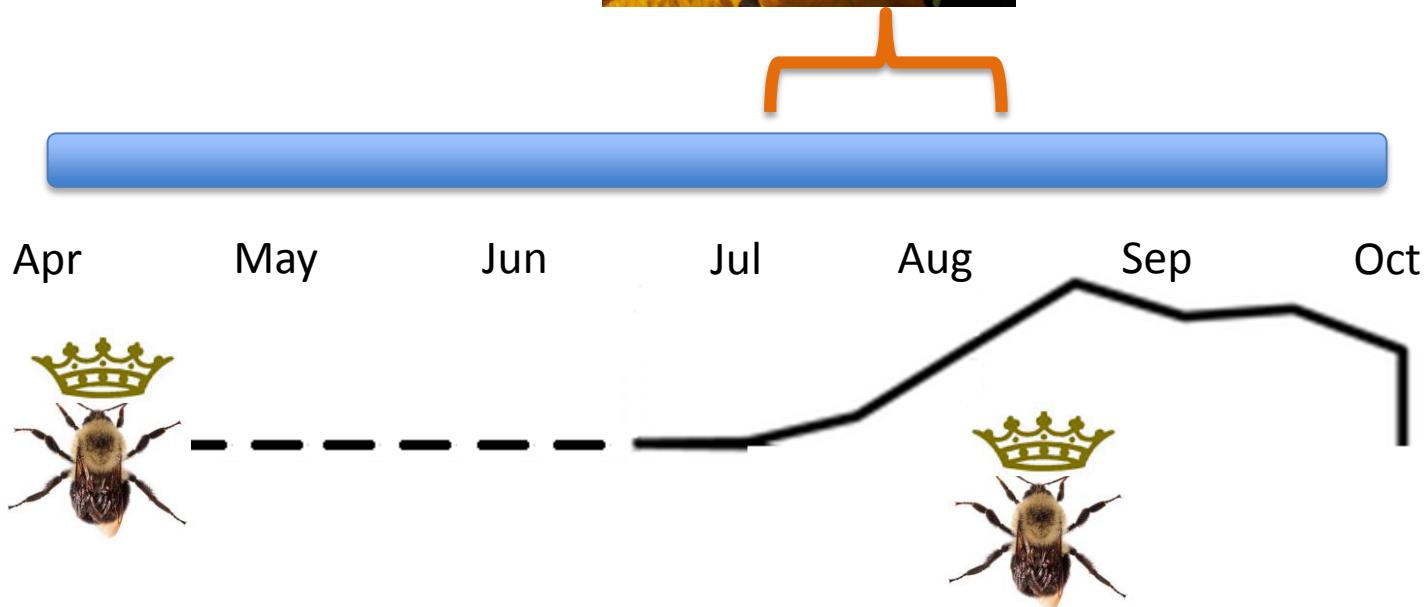
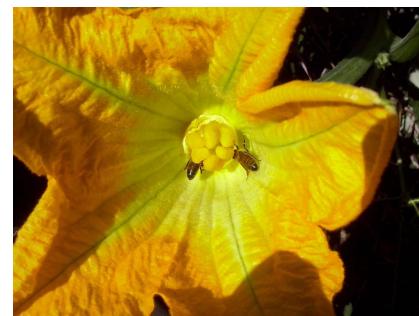


Bee Support

- Floral Provisioning
 - Assumes crop pollinators also use FP resources
 - FP won't compete with the crop



Phenology in PA



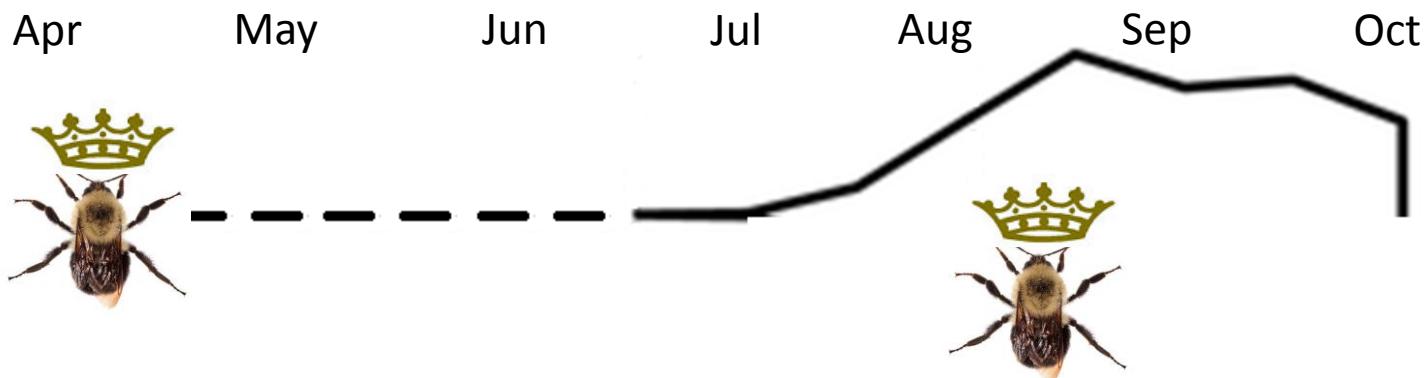
Phenology in PA



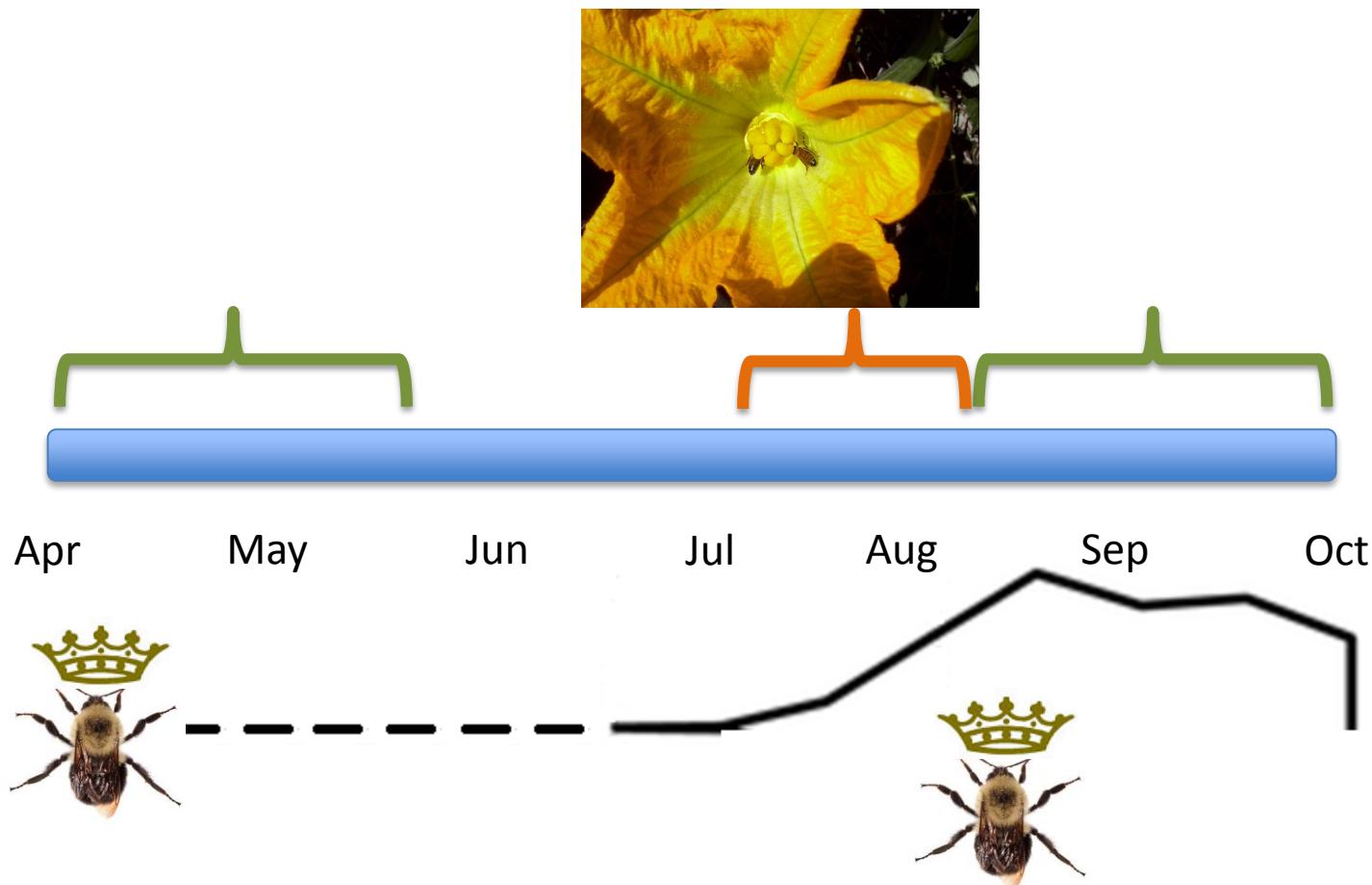
Columbia Magazine,
Billy Joe Fudge



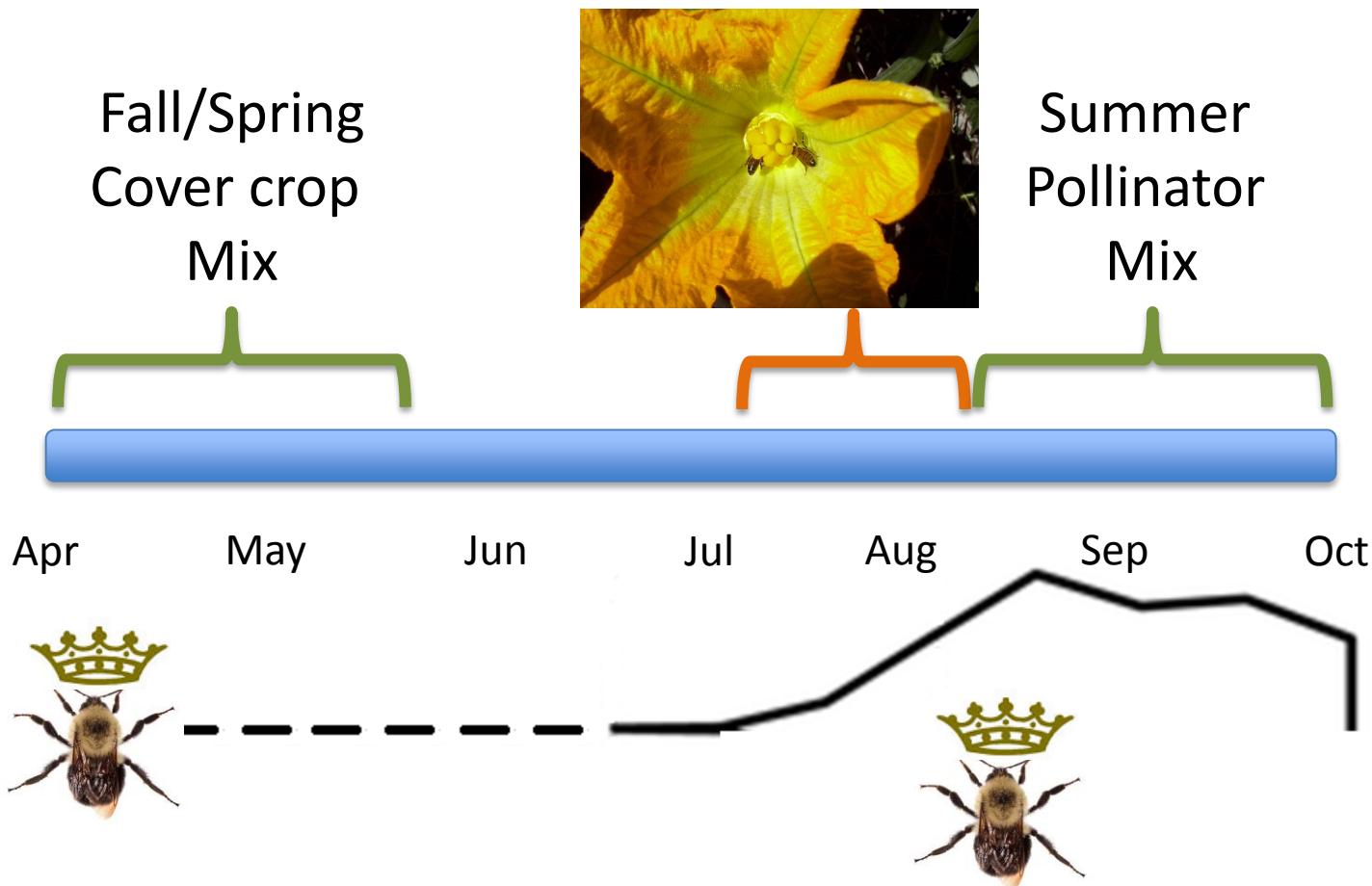
Rachael Troyer



Phenology in PA



Phenology in PA



Seed Mix Development



GreatPlainsAg.com



Summer Pollinator Mix

- Buckwheat
- Mustard
- Phacelia
- Sunflower
- Sunn hemp
- Cowpeas



Summer Pollinator Mix

- Buckwheat
- Mustard
- Phacelia
- Sunflower
- Sunn hemp
- Cowpeas



Summer Pollinator Mix

- Buckwheat
- Mustard
- Phacelia
- Sunflower
- Sunn hemp
- Cowpeas



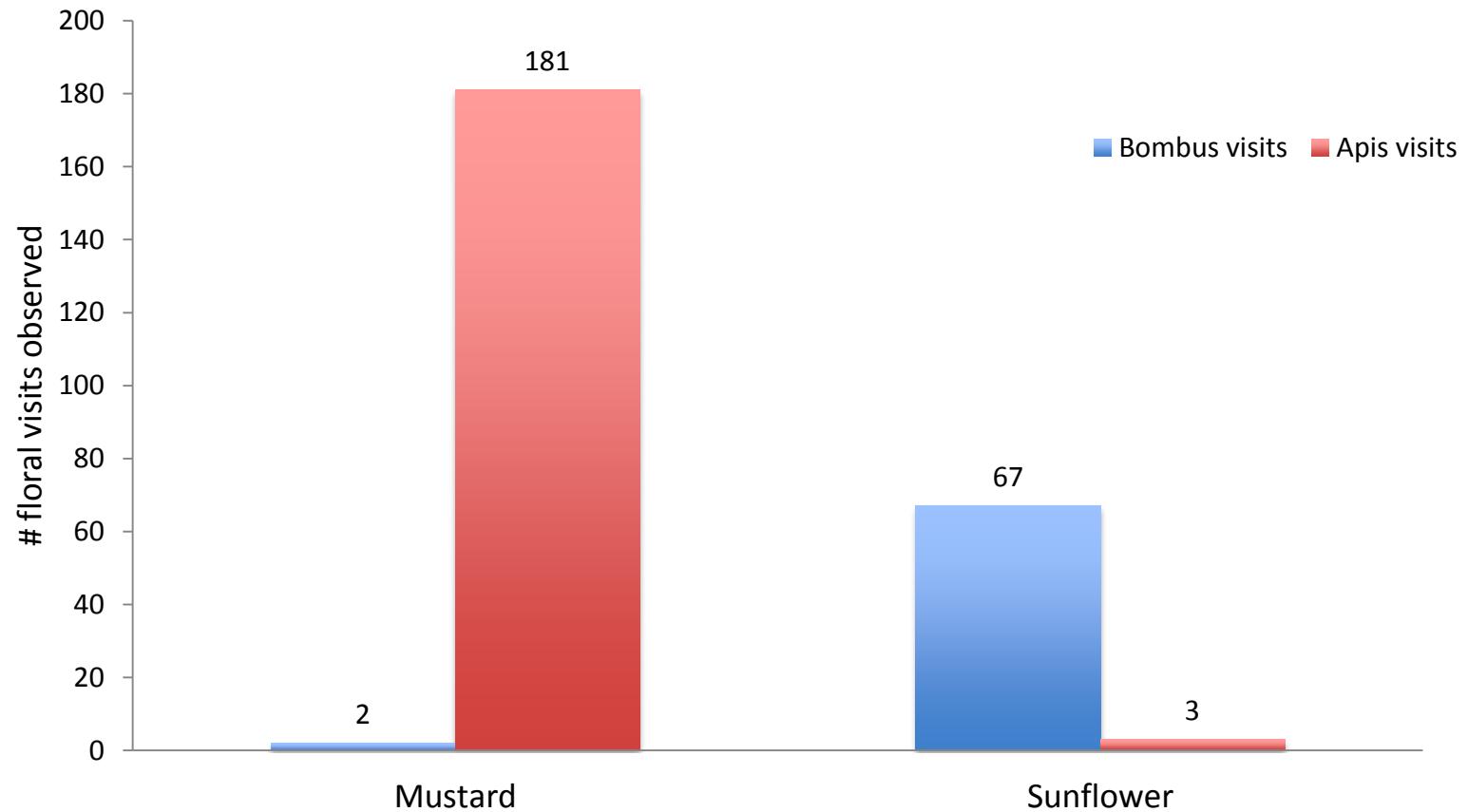
Summer Pollinator Mix

- Buckwheat
- Mustard
- Phacelia
- Sunflower
- Sunn hemp
- Cowpeas

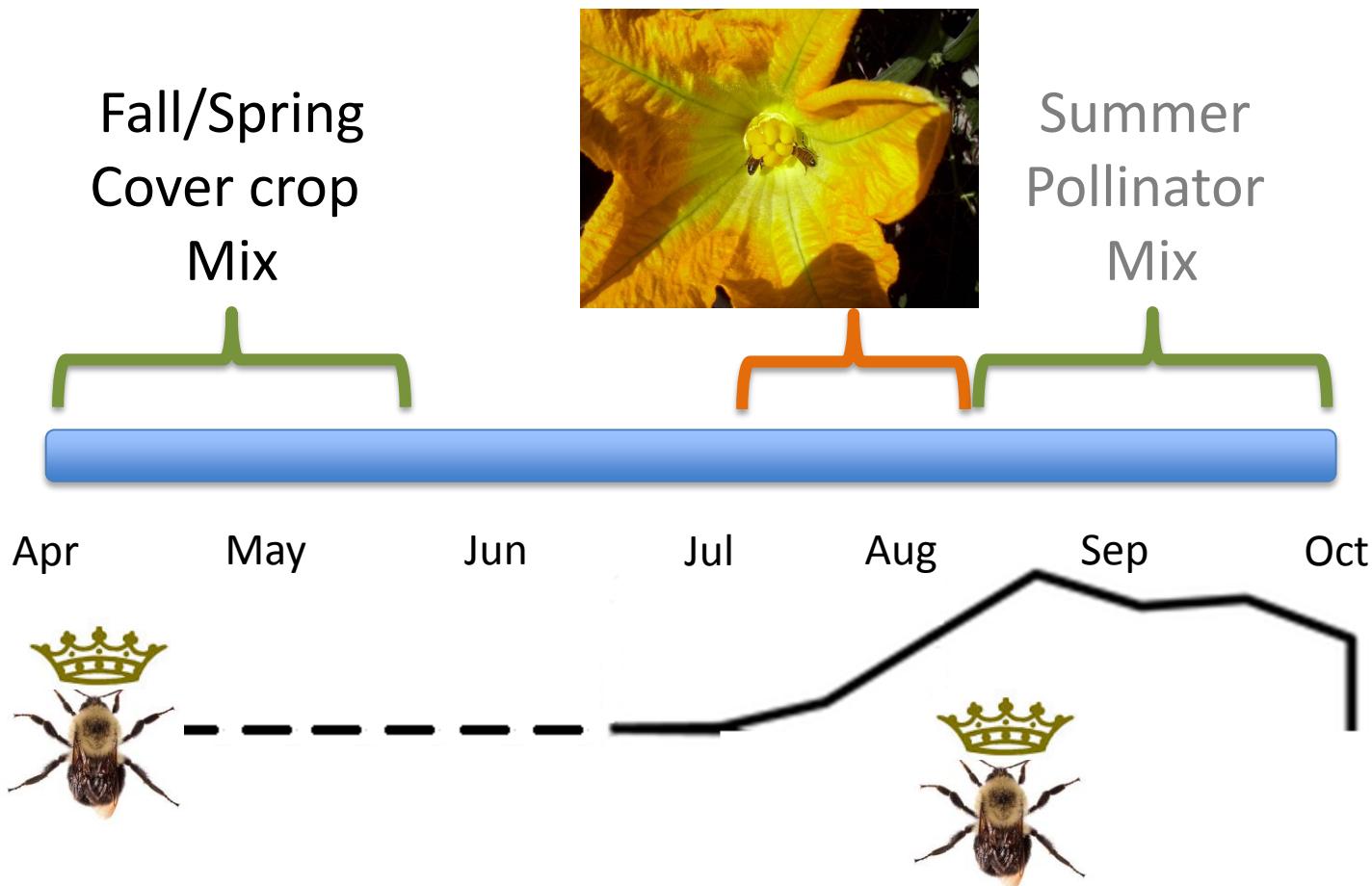




Summer Pollinator Mix



Phenology in PA



Fall-Spring Cover Crop

- Canola
- Crimson clover
- Hairy vetch
- Austrian winter pea
- Oats (nurse crop)



Pennsylvania FP

- Rotation working
- Pumpkin producers adapting mix
- NRCS, Extension



Florida FP



Amada44 [CC-BY-SA-3.0]

Coreopsis basalis



DanielCD [CC-BY-SA-3.0]

Gaillardia pulchella



Bob Peterson [CC-BY-SA-2.0]

Chamaecrista fasciculata

Floral Provisioning in Cucurbits



Floral Provisioning in Cucurbits



Floral Provisioning in Cucurbits



Acknowledgments

- Dave Biddinger & Fruit Research crew
- Dave Wilson, King Agriseed
- Charlie White, Penn State Extension

PENNSTATE



UF | UNIVERSITY of
FLORIDA



Questions?



M. Sid Kelly