Pollinator Diversity at Red Clover (*Trifolium pratense*) and Common Milkweed (*Asclepias syriaca*)

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Background Information

- Plants that bloom at the same time frequently share pollinators (Carvalheiro *et al.* 2014)
- Two plants that share pollinators can sometimes compete for pollinators or one plant can facilitate the other in increasing pollinator visitation (Carvalheiro *et al.* 2014)

Vocabulary

- Native = naturally occurring in the area
- Non-native = introduced outside of natural range
  - *Not all non-natives are invasives
- Naturalized plant = non-native plant that reproduces and maintains itself without human help
- Richness = number of species
- Diversity = variety and relative abundance

Vocabulary - Continued

- Competition - in this context, *competition* means that pollinators are drawn away from one plant species by the presence of a different plant species (Carvalheiro *et al.* 2014)
- Facilitation - in this context, *facilitation* means pollinator visitation to a plant species is increased by the presence of a different plant species (Carvalheiro *et al.* 2014)

Questions

- Does the richness of aerial insect pollinators on each study species (red clover or common milkweed) differ when the species is isolated from the other study species vs. found in a plot with the other study species?
- Do red clover and common milkweed compete for pollinators or facilitate each other in attracting pollinators?

Study Site and Organisms

- Study site: A managed meadow at Cliffdale Farm
- Red Clover (*Trifolium pratense*)
  - Non-native/naturalized, herbaceous perennial
  - Native range: Eurasia and northern Africa
  - Many types of insects visit the flowers
  - Blooming period: late spring - mid-summer

Study Site and Organisms - Continued

- Common milkweed (*Asclepias syriaca*)
  - Native, herbaceous perennial
  - Many types of insects visit the flowers
  - Blooming period: early summer - mid-summer

Hypothesis

As plant species with overlapping blooming seasons, red clover (*Trifolium pratense*) and common milkweed (*Asclepias syriaca*), share pollinators. Therefore red clover influences the richness of pollinators that visit common milkweed and common milkweed influences the richness of pollinators that visit red clover.

Methods

- Independent variable: whether the species (red clover or common milkweed) is isolated from or found with the other study species (red clover or common milkweed)
- Response variable: richness of aerial insect pollinators

Methods - Continued

- One (1) one-meter by one-meter plot of each of the three treatments (total of 3 plots) - measured with quadrat
- Similar sunlight at each plot
- At least 6 meters between each plot (Herron-Sweet *et al*. 2016)

Methods - Continued

- Keep still for two minutes before observation period
- While observing, be as still as possible
- Observe each plot for two observation periods of ten minutes each
  - Count each aerial pollinator visit (see insect landing on or hovering over a flower)
  - Do not count insects that are already on flowers before observation time begins (did not see them land)

The study site: A managed meadow at Cliffdale Farm

- Full sun
- Herbaceous plants

Methods - Plots

1. Red clover (RC) only plot (At least about 6 m from common milkweed)
    a. ~50% red clover cover
    b. 0% common milkweed cover

Methods - Plots

2. Common milkweed (CMW) only plot (At least about 6 m from red clover)

   a. ~25-50% common milkweed cover
   b. 0% red clover cover

Methods - Plots

3. Mixed Flowers (MF) plot: Red clover and common milkweed

MF1 Plot

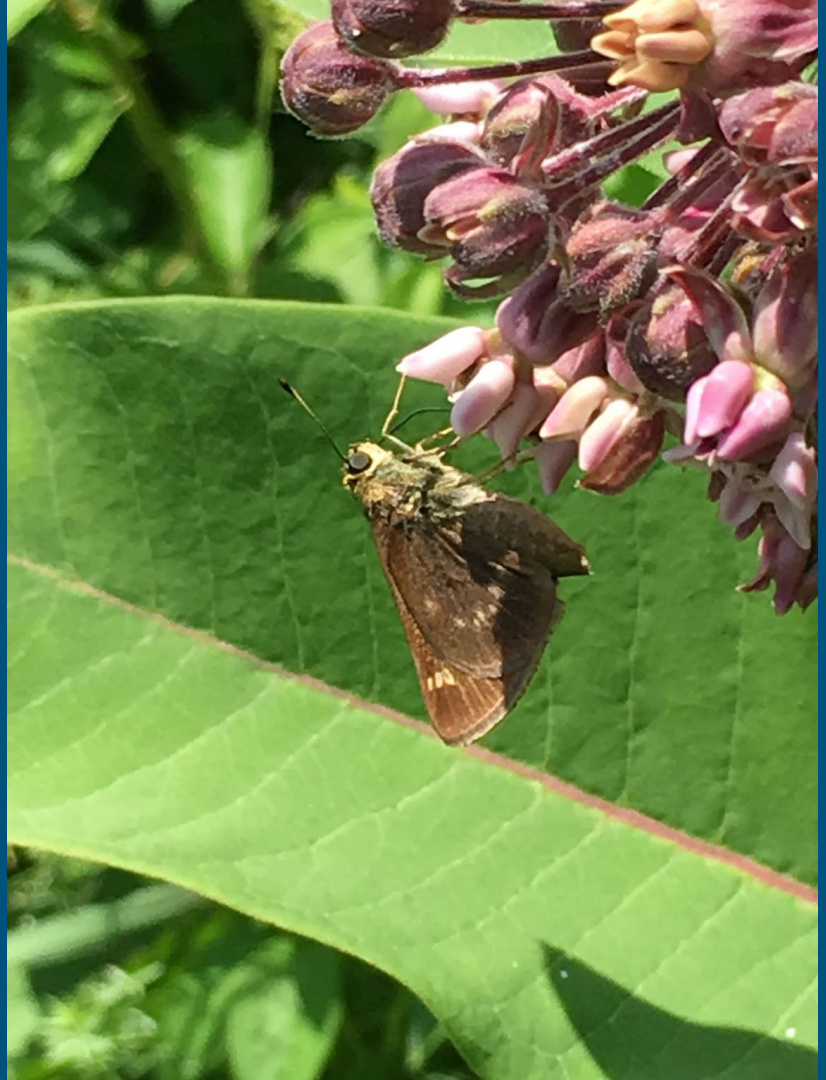
~25-50% red clover cover

~10-25% common milkweed cover

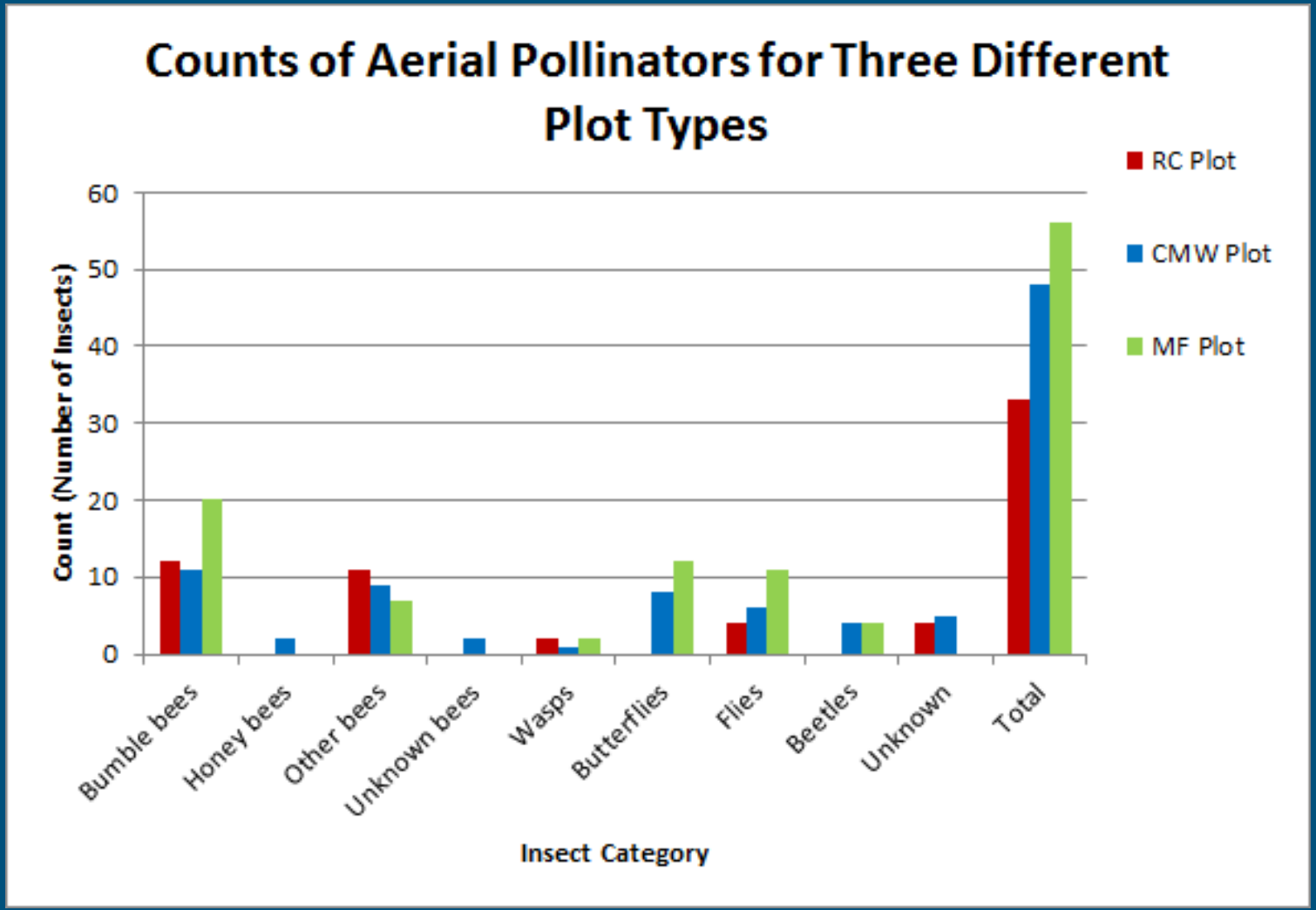
MF2 Plot

~25-50% red clover cover

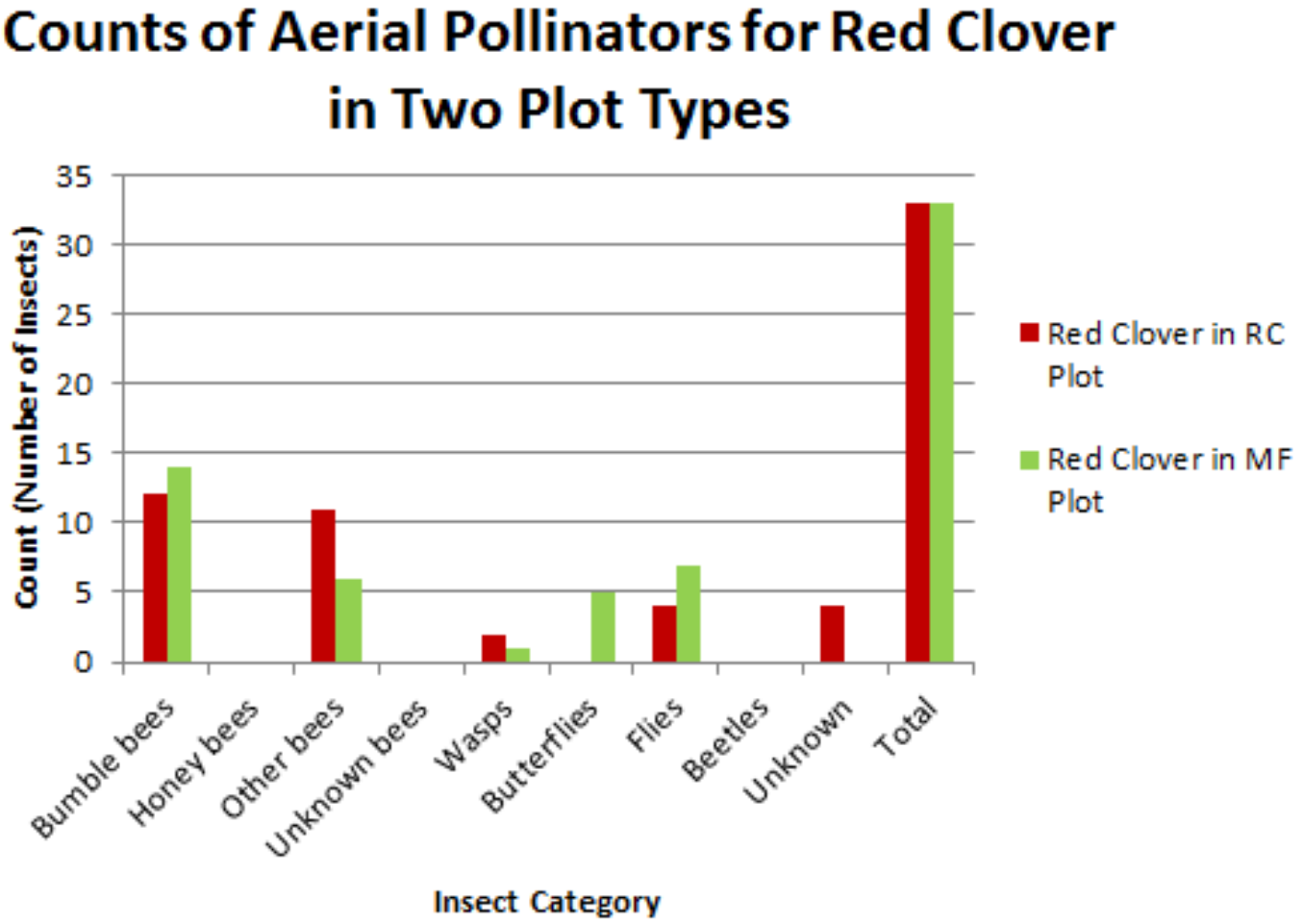
~10-25% common milkweed cover



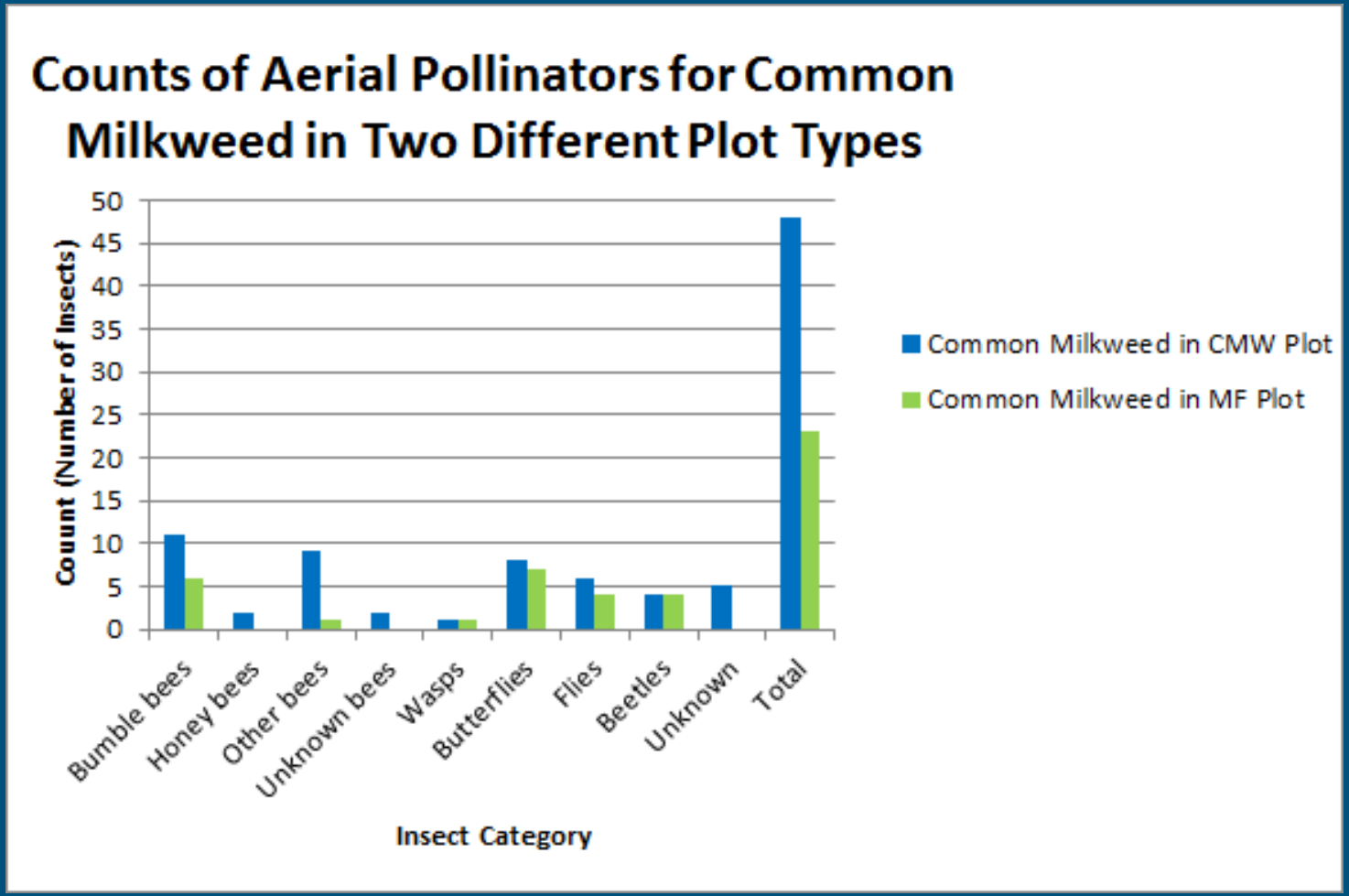
Results


Counts of Aerial Pollinators for Three Different Plot Types
RC Plot
CMW Plot
MF Plot
Count (Number of Insects)
60
50
40
30
20
10
0
Bumble bees
Honey bees
Other bees
Unknown bees
Wasps
Butterflies
Flies
Beetles
Unknown
Total
Insect Category

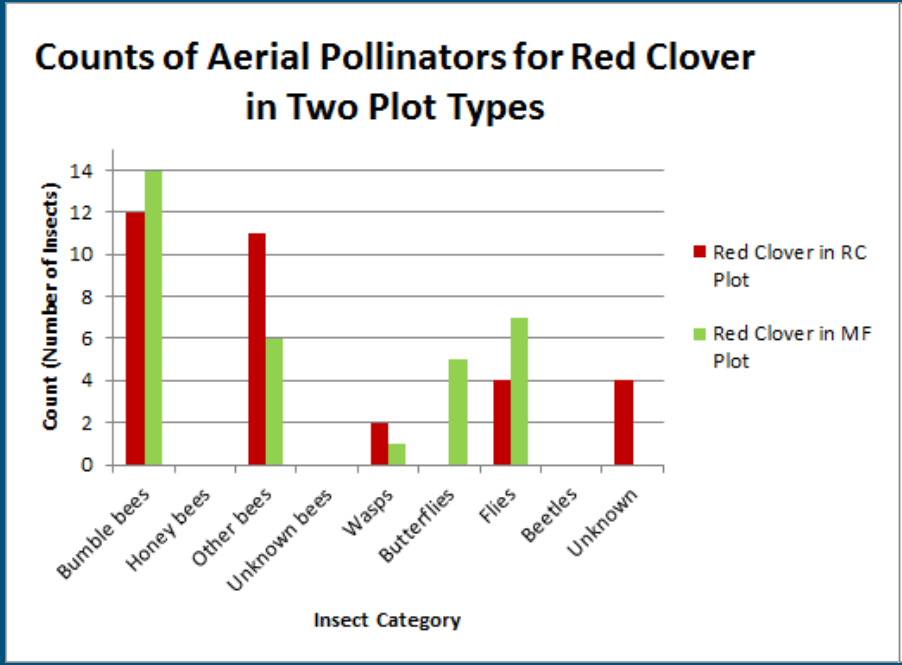
Results

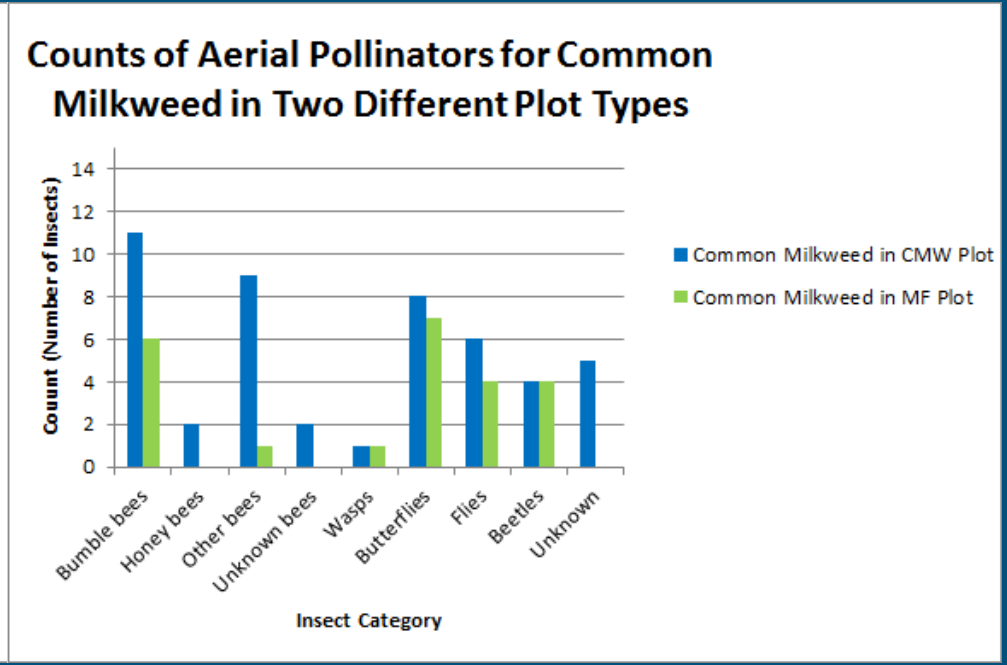

Counts of Aerial Pollinators for Red Clover in Two Plot Types
Count (Number of Insects)
35
30
25
20
15
10
5
0
Bumble bees
Honey bees
Other bees
Unknown bees
Wasps
Butterflies
Flies
Beetles
Unknown
Total
Insect Category
Red Clover in RC Plot
Red Clover in MF Plot

Results


Counts of Aerial Pollinators for Common Milkweed in Two Different Plot Types
Count (Number of Insects)
50
45
40
35
30
25
20
15
10
5
0
Bumble bees
Honey bees
Other bees
Unknown bees
Wasps
Butterflies
Flies
Beetles
Unknown
Total
Insect Category
Common Milkweed in CMW Plot
Common Milkweed in MF Plot

Results


Counts of Aerial Pollinators for Red Clover in Two Plot Types
Count (Number of Insects)
14
12
10
8
6
4
2
0
Bumble bees
Honey bees
Other bees
Unknown bees
Wasps
Butterflies
Flies
Beetles
Unknown
Insect Category
Red Clover in RC Plot
Red Clover in MF Plot


Counts of Aerial Pollinators for Common Milkweed in Two Different Plot Types
Couunt (Number of Insects)
14
12
10
8
6
4
2
0
Bumble bees
Honey bees
Other bees
Unknown bees
Wasps
Butterflies
Flies
Beetles
Unknown
Insect Category
Common Milkweed in CMW Plot
Common Milkweed in MF Plot

Discussion / Conclusions

- Research on pollinator behavior relevant today
- Relationship between plot types appears to vary between each pollinator group studied
- Richness of species not very affected by varying plot type
- Interesting suggestions in data (butterflies on red clover, decreases in pollinator counts on common milkweed from CMW to MF plot, totals), but not conclusive evidence

Discussion / Conclusions - Continued

- Problems encountered
  - Wilting flowers
  - Had to switch MF plot on last day of observations due to very wilted milkweed flowers
  - Time constraint
- Future research
  - Repeat on larger scale - more plots, more trials
  - Investigate with more specific taxonomic categories
  - Does the presence of common milkweed cause more butterflies to visit red clover?
  - Is facilitation and/or competition occurring here?

Discussion / Conclusions - Continued

- Relationships between each plot type appeared to be dependent on the pollinator category
- More research is necessary to draw more solid conclusions for my questions

Acknowledgements

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