



Effects of Flower Diversity on Performance in *Megachile rotundata*

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Wallace Carver Fellowship; The World Food Prize and the USDA

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INTRODUCTION

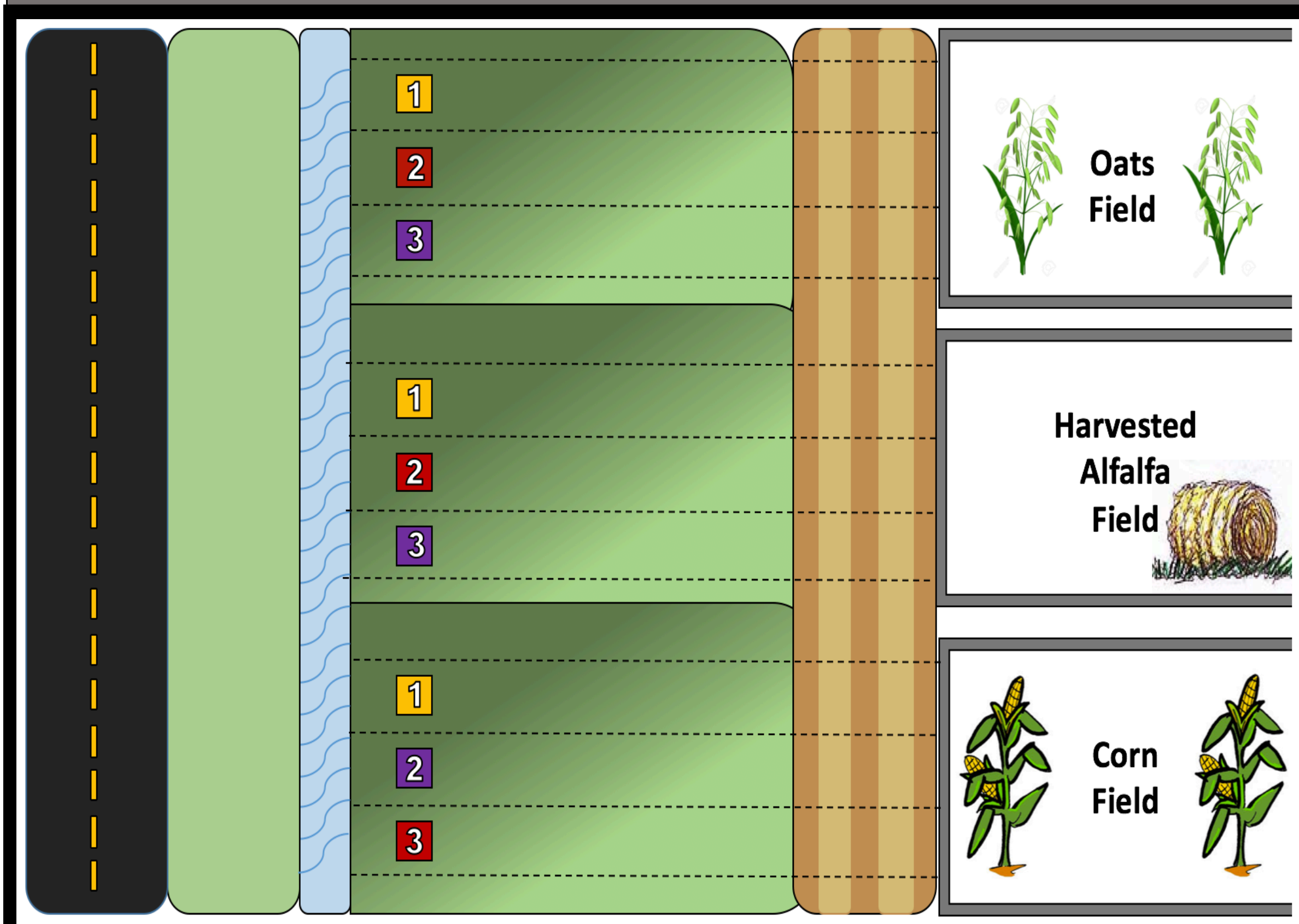
The alfalfa leaf cutting bee, *Megachile rotundata*, are extensively managed pollinating solitary bees. Even though these bees have tripled America's alfalfa production, farmers have had a hard time sustaining bees for the season. This has resulted in large imports of bees from Canada every year.

The main focus of this project was to determine if plant diversity in non-agricultural areas could increase the bees reproduction rates. Pollen, nectar, and leaves are the most important resources for a leaf cutter to reproduce. Since these three things can vary greatly between different plants, non-agricultural wildflower strips with varying diversity were selected for this experiment. **We hypothesize that areas with higher plant diversity will increase the reproduction rate of the alfalfa leaf cutting bee.**

METHODS

- ✿ Nest blocks were set up in a highly diverse ditch adjacent to three different crop fields
 - ✿ 3 boxes set up per field
 - ✿ 23 females and 10 males released per box
- ✿ Measurements:
 - ✿ **Plant Diversity**
 - ✿ **Brood Cell Counts**
 - ✿ Return Rates
 - ✿ Nest Box Behavior
 - ✿ Distances

EXPERIMENTAL DESIGN



RESULTS

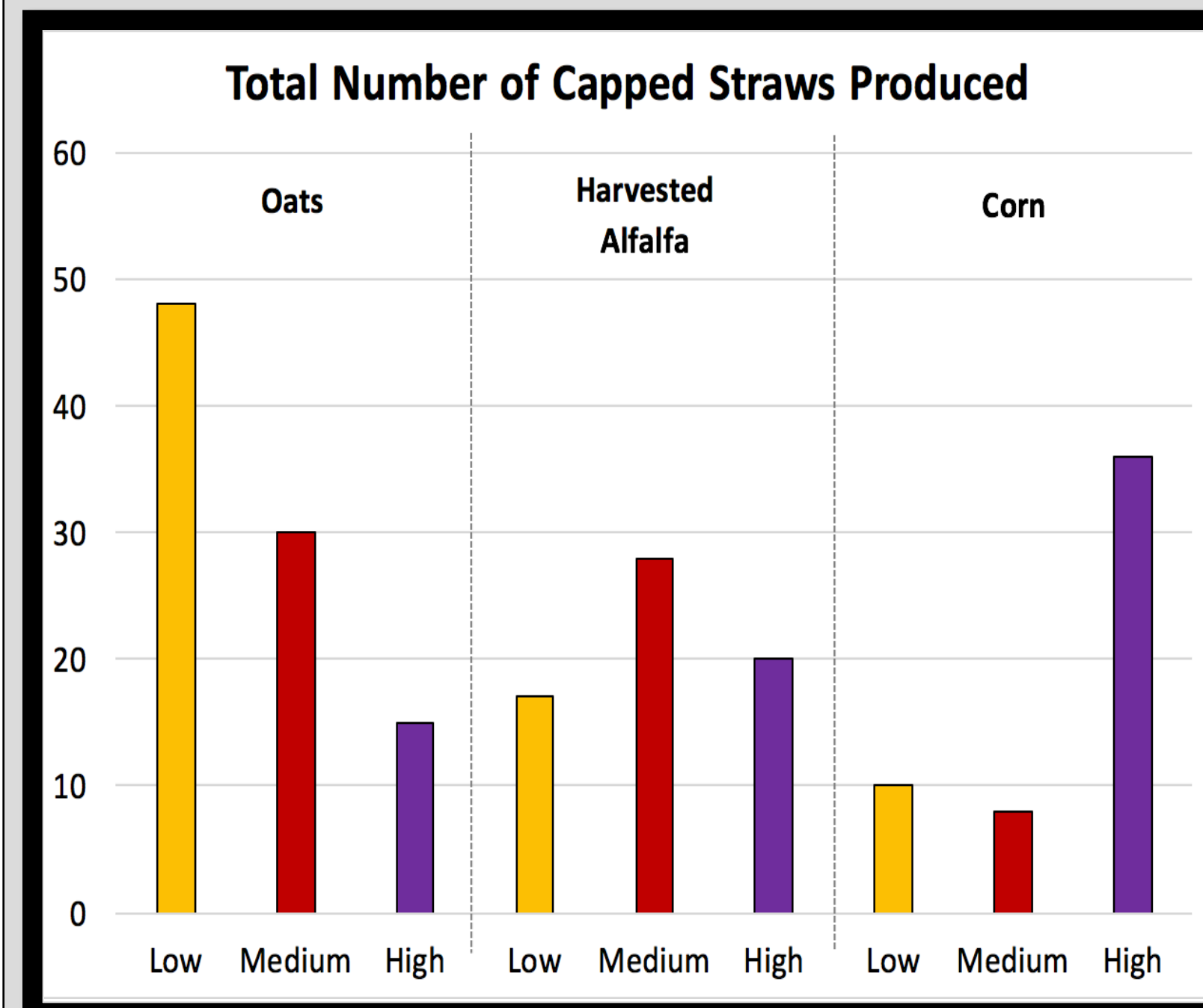


Figure 1: Total number of capped straws produced at each nest box grouped by adjacent field. A capped straw is defined as a cardboard straw that is completely sealed by leaves. These capped straws indicate offspring have been produced.

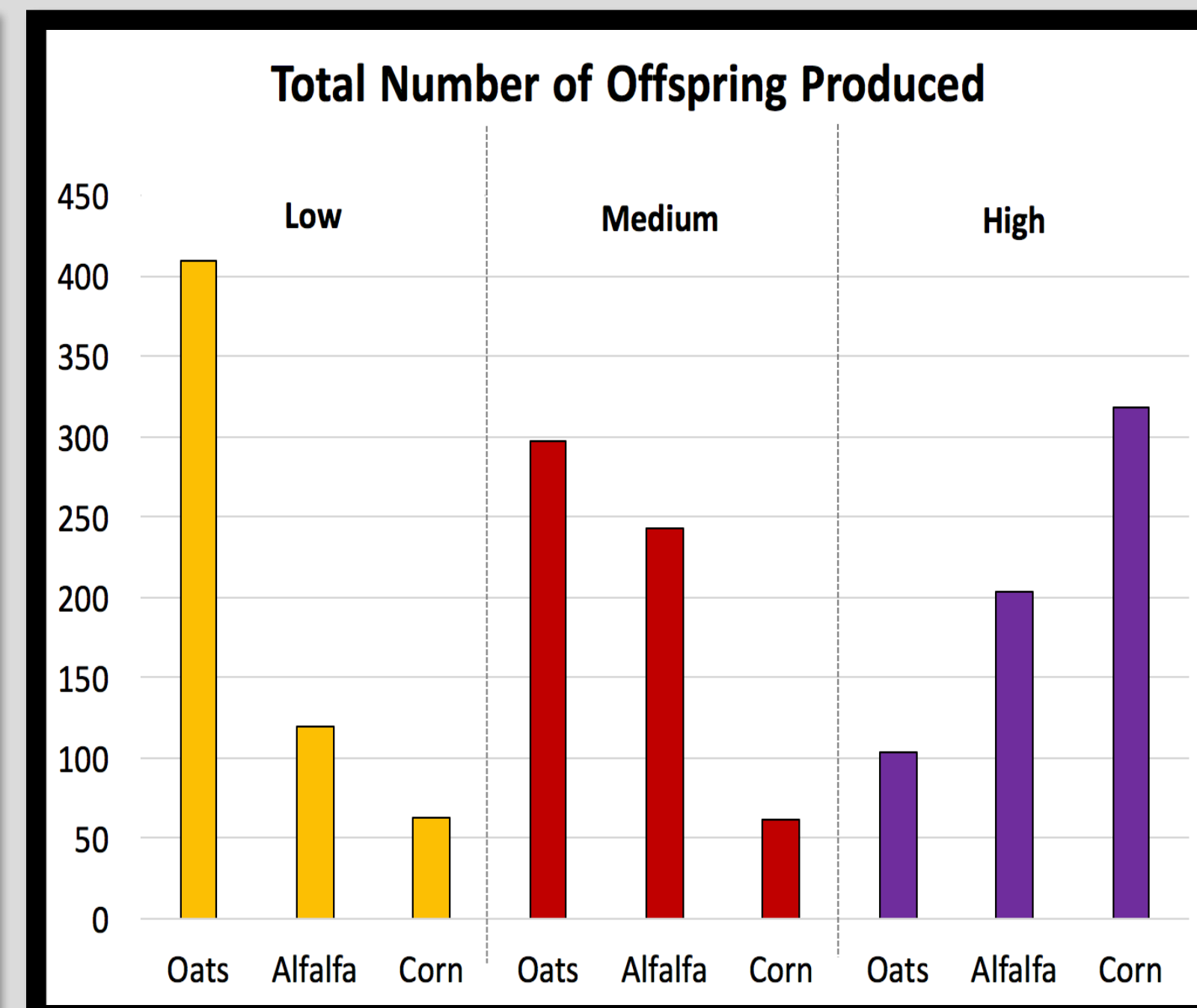


Figure 2: Total number of offspring produced in each nest box grouped by flower diversity. This number was determined by x-raying the capped straws and counting the number of pollen balls - a mixture of pollen and nectar that serves as the bee's first food source.

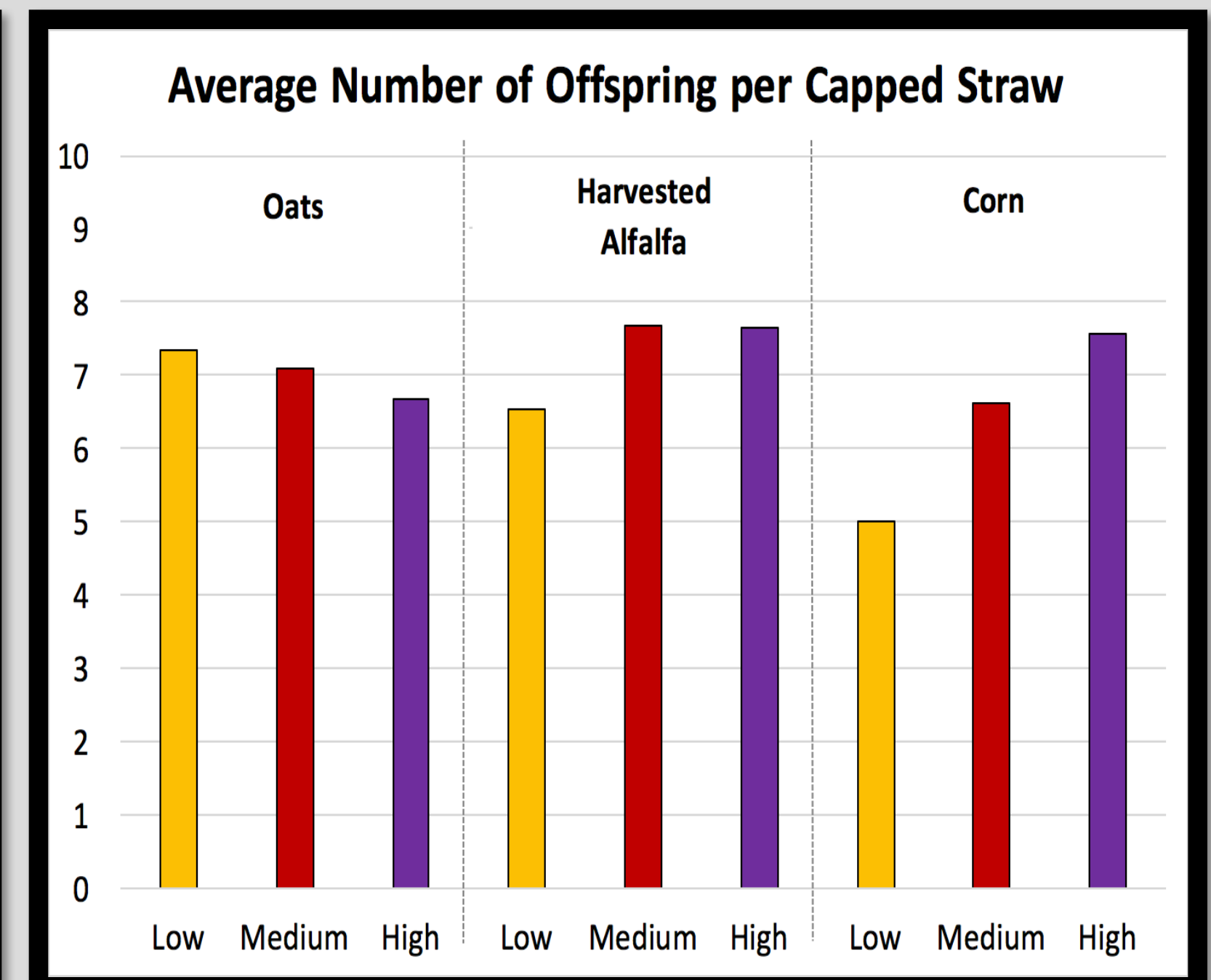


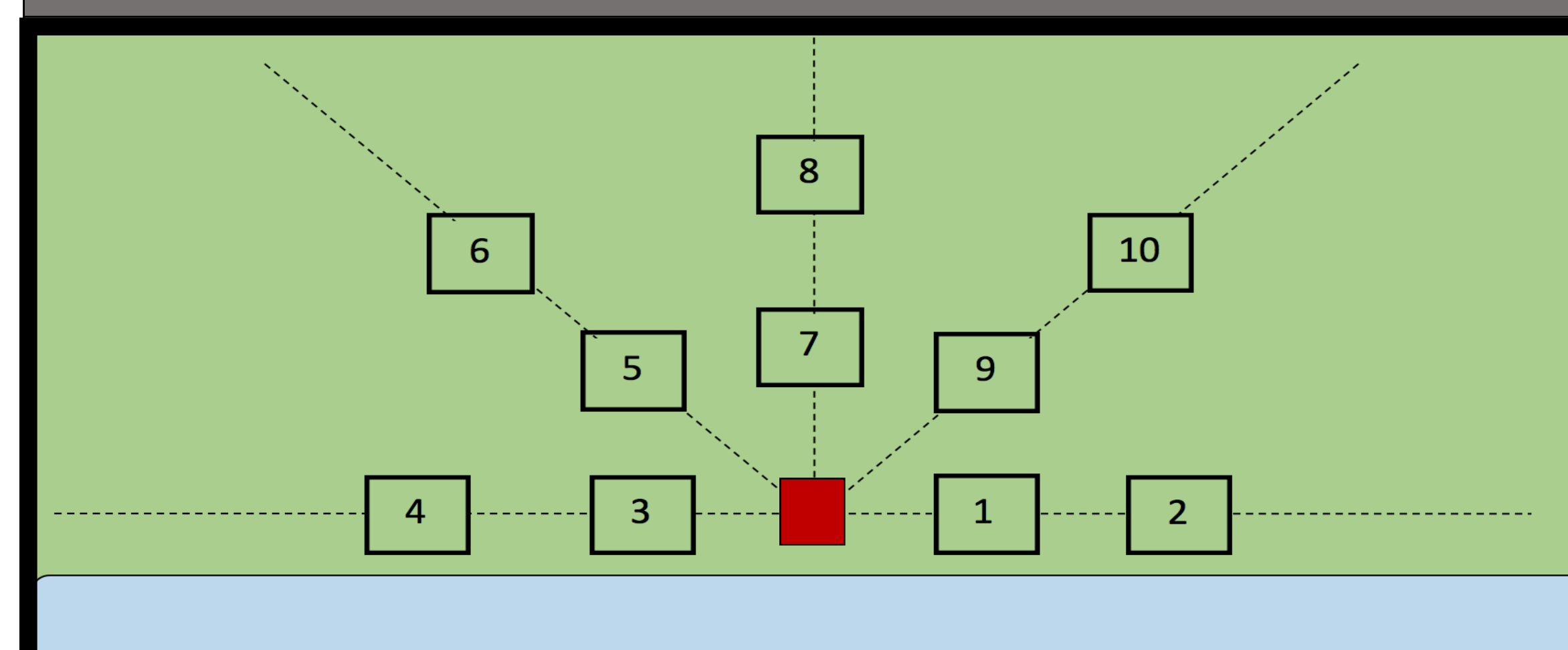
Figure 3: The average number of offspring produced per capped straw grouped by adjacent fields. A typical female will produce 7-8 offspring per straw, but ultimately she decides how many to produce leading to a variation between straws.

FLOWER DIVERSITY MEASUREMENTS

- ✿ 10 quadrants were thrown for each nest box
 - ✿ Recorded
 - ✿ Different species
 - ✿ Number of each species
 - ✿ Number of flowers
- ✿ Diversity was divided into three categories...

	Low (0-1 Species)	Medium (2-3 Species)	High (4+ Species)
Oats	1	2	3
Alfalfa	1	2	3
Corn	1	3	2

QUADRANT TRANSECT FOR ONE NEST BOX



CONCLUSION

In conclusion, the hypothesis was not supported by the data. The highest producer of offspring was the low diversity adjacent to the oats field (box 1). These results could be inconclusive due to the effects of the different adjacent fields.

As seen in Figure 2, flower diversity does not have a clear influence on the reproduction rate of alfalfa leaf cutters:

- ✿ Low diversity ranged from: 63 to 409 offspring
- ✿ Medium diversity ranged from: 61 to 297 offspring
- ✿ High diversity ranged from: 104 to 318 offspring

Future direction for this project would test which specific plants the bees are foraging on. This study would also need to be repeated to confidently say whether flower diversity or the adjacent fields have a larger affect on their reproduction rate.

ACKNOWLEDGEMENTS

I would like to give a special thanks to Rachel Mallinger for helping with the flower diversity measurements and George Yocum for discussing results with me. I would also like to say thank you to the World Food Prize for selecting me for this internship as well as the USDA-ARS Insect Cryobiology and Ecophysiology Lab for funding and giving me a project to work on this summer.