

AN ABSTRACT OF THE THESIS OF

Melissa A. McKenney for the degree of Honors Baccalaureate of Science in BioResource Research presented on May 21, 2010. Title: Native bees, honeybees and pollination in Oregon cranberries

Abstract approved:

Sujaya Rao

Farmers rely almost exclusively on the imported European honeybee (*Apis mellifera* L.) for fruit and vegetable crop pollination services. The recent decline in honeybee health has underscored the danger of relying on a single species to provide vital services. Increasing pollinator biodiversity with native bees may provide biological insurance against the decline of any particular species. By examining cropping systems, it is possible to determine which native bees are providing pollination services and then augment habitat to increase their numbers or attempt domestication. In this study, we examined the native bee populations in the cranberry growing area of southern coastal Oregon in order to determine if native bees play a significant role in cranberry pollination. This two-year study surveyed four farms across a 22 km north-south gradient. At least 27 bee species were observed during cranberry bloom (mid-May to late June), of which five were observed foraging on the cranberry flowers. The imported European honeybee and bumble bees (*Bombus* spp.) comprised 99.7% of foragers. While honeybees and bumble bees foraged at comparable wind speeds, *Bombus* spp. foraged at significantly lower average temperatures ($P < 0.0001$). Both honeybees and bumble bees collected cranberry pollen while foraging, but 37.2% of honeybees were observed nectar-robbing (collecting nectar but no pollen) versus only 11.3% of bumble bees. Bumble bees in general, and the western yellow-faced bumble bee (*Bombus vosnesenskii* Radoszkowski) in particular, are abundant native pollinators of cranberry, and may provide adequate pollination for small Oregon cranberry farms. Conservation of bumble bee habitat and development of managed colonies will help maintain pollination services.

Key Words: pollination, *Bombus*, *Bombus vosnesenskii*, *Apis mellifera*, *Vaccinium macrocarpon*

Corresponding e-mail address: mckennem@onid.orst.edu

© Copyright by Melissa A. McKenney
June 1, 2010
All Rights Reserved

Native bees, honeybees and pollination in Oregon cranberries

by

Melissa A. McKenney

A PROJECT

submitted to

Oregon State University

University Honors College

in partial fulfillment of
the requirements of the
degree of

Honors Baccalaureate of Science in BioResource Research, Pest Biology and
Management Option (Honors Associate)

Presented May 21, 2010
Commencement 12 June 2010

Honors Baccalaureate of Science in BioResource Research project of Melissa A. McKenney presented on May 21, 2010

APPROVED:

Mentor, representing Crop and Soil Science

Co-Mentor, representing Crop and Soil Science

Committee Member, Director of BioResource Research

Dean, University Honors College

I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Melissa A. McKenney, Author

ACKNOWLEDGEMENTS

I would like to acknowledge a few of the wonderful people without whose assistance this project would not have been possible. My gratitude is firstly due to Linda White, the Coos Co. extension agent who allowed me to stay with her while conducting research on the weekends and assisted with plant identification. I am grateful to have worked with the Oregon cranberry grower community, particularly Knute Anderson, Bob Donaldson, Ted McKenzie, and Bob Nelson, all of whom allowed me onto their properties to conduct research. On campus, I thank Dr. Richard Halse, the OSU herbarium director, for providing identifications for plant samples brought back from the coast. I also thank Kimberly Skyrn for the creation of the new guidelines for the acetolysis procedure which allowed me to process and identify my pollen samples. I extend my gratitude to the URISC Scholarship and DeLoach Work Scholarship for providing funding for my thesis research. Finally, I would like to acknowledge Wanda Crannell, my advisor, and my committee members, Sujaya Rao, William Stephen, and Kate Field, for their guidance and hard work.

TABLE OF CONTENTS

	Page
INTRODUCTION	1
Problem Definition	1
Research Objectives	2
MATERIALS AND METHODS	3
Study Sites	3
Estimation of of Native Bee Diversity and Abundance	3
Foraging Behavior of Bees	4
Pollen Load Analysis	4
RESULTS	6
Estimation of of Native Bee Diversity and Abundance	7
Foraging Behavior of Bees	7
Pollen Analysis	8
DISCUSSION	9
BIBLIOGRAPHY.....	15
APPENDICES	17
Appendix A Description of Research Sites	21
Appendix B Pollen Reference Collection	21
Appendix C Copyright Release Form	27

LIST OF TABLES AND FIGURES

Table	Page
1 Diversity of bee fauna trapped in Oregon cranberry from 2008 – 2009.	12
2 Multivariate logistic model correlating honeybee and bumble bee foraging to abiotic factors.	12
 Figure	 Page
1 Fluorescent blue vane trap used for assessment of native bee biodiversity.	13
2 Seasonal presence of common native bee genera across four Oregon cranberry sites in 2008.	13
3 Distribution of bee foragers with respect to temperature.	14
4 Pollen grains from the family Ericaceae.	14