Landscape Perspectives on Biological Control





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Biological Control

Use of natural enemies to keep unwanted pest populations low



Types of Biological Control

- **Classical:** introduction of non-native natural enemy to control a pest population.
- Augmentative: periodically increase natural enemy population with an artificially reared release.
- Conservation: maintain or enhance existing natural enemy populations.





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Natural Enemy Needs

Alternate host/prey

Shelter

Moderated microclimates In-season refuges Overwintering sites

Food

Nectar Pollen Sap, honeydew







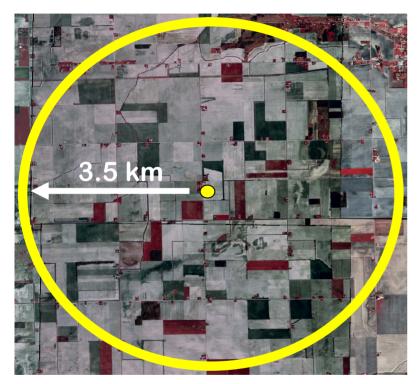
Michigan Landscapes - Complex



Michigan Landscapes - Simplified



Landscape Effects Study

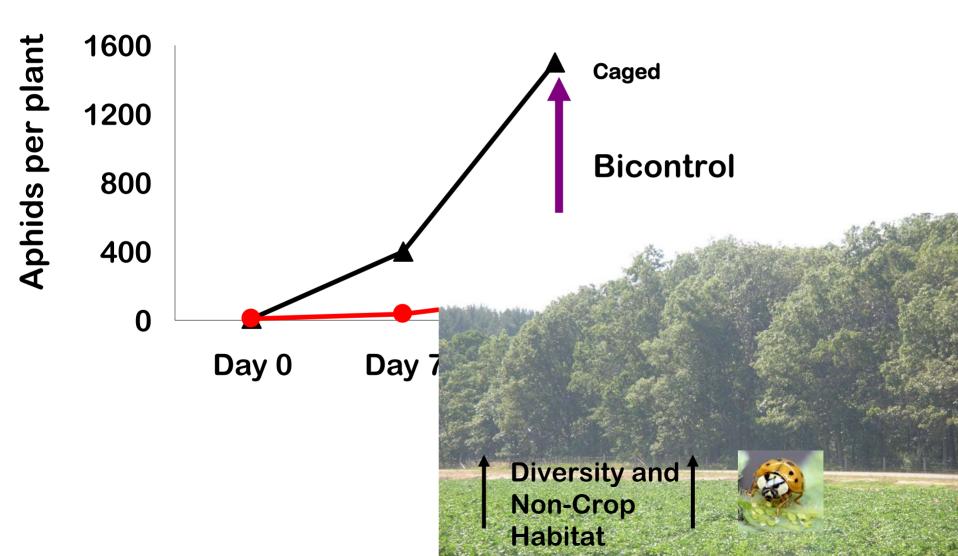


Gardiner et al. *in review*





Landscape Effects Biocontrol



How to Increase Biocontrol?

Increase diversity and non-crop habitat with floral resources

Native MI perennials are more attractive than commonly recommended plants





Plants to Use to Attract Beneficials

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Attracting Beneficial Insects with Native Flowering Plants

Anna Fiedler, Julianna Tuell, Rufus Isaacs, and Doug Landis Department of Entomology, Michigan State University



MICHICAN STATE

http://nativeplants.msu.edu

Common name	Scientific name	Natural	Bees	МАУ	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	
L wild strawberry	Encoria strainiana	**	+	and a	Joan	Jon	AUGUST	OFFICABLE	OCTOBER	
2. golden Alexandera	Zizia aurea	224	**	1.00						
5. Canada anemone	Anemone canadenais	+++	Ĵ.				Native	Flowering	Plants th	at Attrac
4. penstemon/hairy heardtongue	Penalmon Mesatax	**	**				Native Flowering Plants that Attra Beneficial Insects			
i. angelica	Angelica atropurpares	11+	10					Benenci	al insects	5
. cow parato	Bencinen maximum	111	4		_					
. and coreopsis/lanceleal tickseed		+++	+							The bloom periods sh
. shrubby cinquefuil	Potestilla fraticona	+++	+				6		-	for the native pressa are for 2-year-old pla
. Indian hemp	Apocynum cannabhum	***	*							growing in full son in in Ingham County.
). Late figwort	Screphalante mentlandice	**	**				-			Michigan Rives tim
L swamp milkweed	Ascleptas incurnota	**	**							Incutions. All plants.
L. Culver's root	Veronicastrum strginicum	**	***							antive to the porth of Dailed States, many
3. yellow coastlower	Rottbida pinnata	***	**							asthe to the sorters Status. Check with is
a sodding wild eases	Alltan cemsum	*	**					1		anneurona lo delocui Cher ana matima la yu
5. meadowsweet	Spinne albe	***	**							
5. yellow giant hyssop	Agastache nepeloides	**	***							
7. horsemint/spotted beebalm	Monarda punctata	***	**							1
8. Missouri irouwed	Wernande méssarrice	**	**	Key:						Project GRD
9. cup plant	Silphian perfolician	***	***	*	good					AGRICULTU
), pale Indian plantain	Catalla attrp/ac/bila	**	**	**	better					DIPERIMENT ST
L. boneset	Expativitien perfoliation	***	**							MICHIGANS
2. blue lobelia	Lobella siphilitica	***	***				1.1			EXTENS
3. pale-leaved sunflower	Hellonthus strumoous	***	**							
 Riddell's goldenrod 	Solidago riddellit	***	***	Earthy Martin						www.tpen.com
5. New England aster	Aster novue-angliae	***	**	Tellow area at	portad. lowin p-mit Alicom.				plants/hone l	
5. sasooth aster	Aster lacets	++	++							

How Effective Will Floral Strips Be?





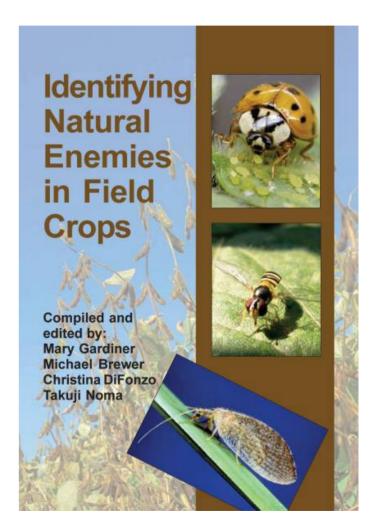
Conclusions

Diversity and non-crop habitat are important

Increase both by planting floral habitat

Several native plants are highly attractive

New study will test effects on biocontrol



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http://nativeplants.msu.edu