

## NE SARE Partnership Grant: **Enhancing Nectar Production with Clover - Innovative Methods to Utilize White and Alsike Clover in Vermont Hay Fields**



**Partners:**  
Sid Bosworth, UVM Extension  
Plant and Soil Sci. Dept.  
Charles Mraz,  
Champlain Valley Apiaries  
Art Huestis  
Dairy Farmer, Bridport  
Tom Duclos  
Livestock Farmer, Weybridge  
... and the bees, of course!



### Background

- The Champlain Valley has a long history of dairy and beekeeping
- Historically, hay crops have provided an abundance of flowers for bees
- But hay practices have steadily changed over the past 20 to 30 years resulting in fewer floral resources



**Situation in the Champlain Valley today:**

- **Most dairy farmers have increased their intensity of hay crop cutting practices resulting in no to very little bloom from legume hay crops such as alfalfa or clover.**
- **Larger machinery means quicker cutting of vast acres of land.**
- **There has also been a steady decline in legume hay crop acres replaced by pure stands of grass**



**The goal of this project was to incorporate flowering clovers in our hay crops that could provide sustained flower production during the critical summer period without negatively affecting hay yield and nutritional value.**





**Bee-Friendly Hay and Pastures**

**White Clover**



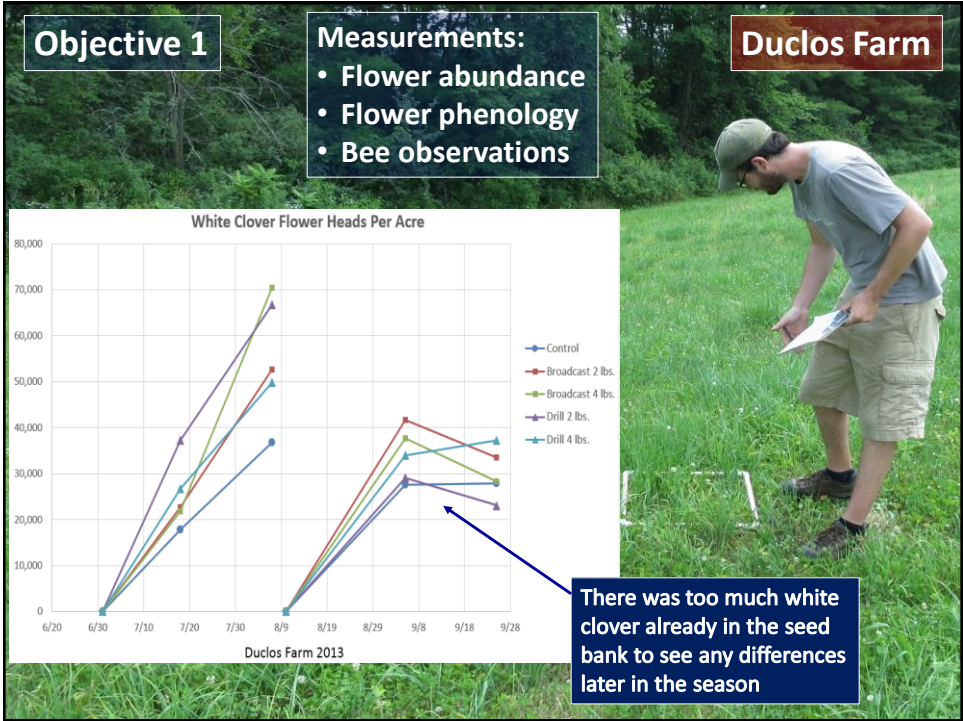
- Quickest to initiate bloom after defoliation
- Continual flush of blooms
- Considered an excellent honey plant by beekeepers

**Bee-Friendly Hay and Pastures**

**Alsike Clover**



- Historically used in New England hay mixtures
- Adapted to wet areas
- Considered an excellent honey plant by beekeepers





The second objective was to test the feasibility of improving floral resources by growing mixtures of various early maturing clovers with alfalfa managed for hay and allowed to bloom in mid to late summer.

**Treatments**

Species/Varieties

- ‘Pinnacle’ White Clover
- ‘Crusade’ White Clover
- Alsike Clover
- Pure alfalfa

Clover Seeding Rates

- 2 lbs. per acre
- 4 lbs. per acre

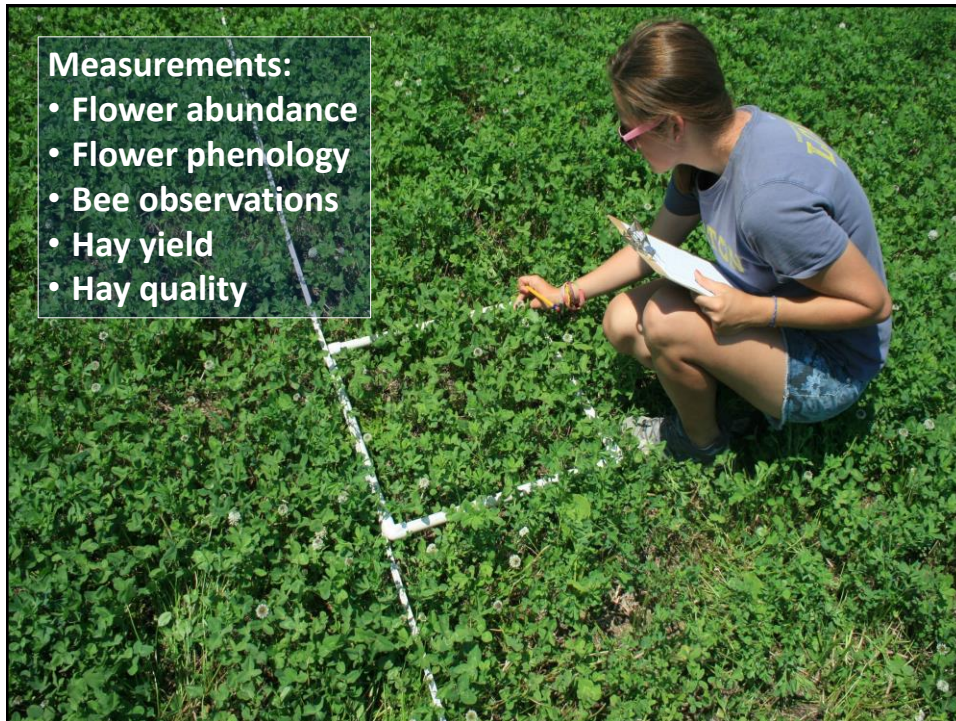
Heustis Farm, Bridport, VT

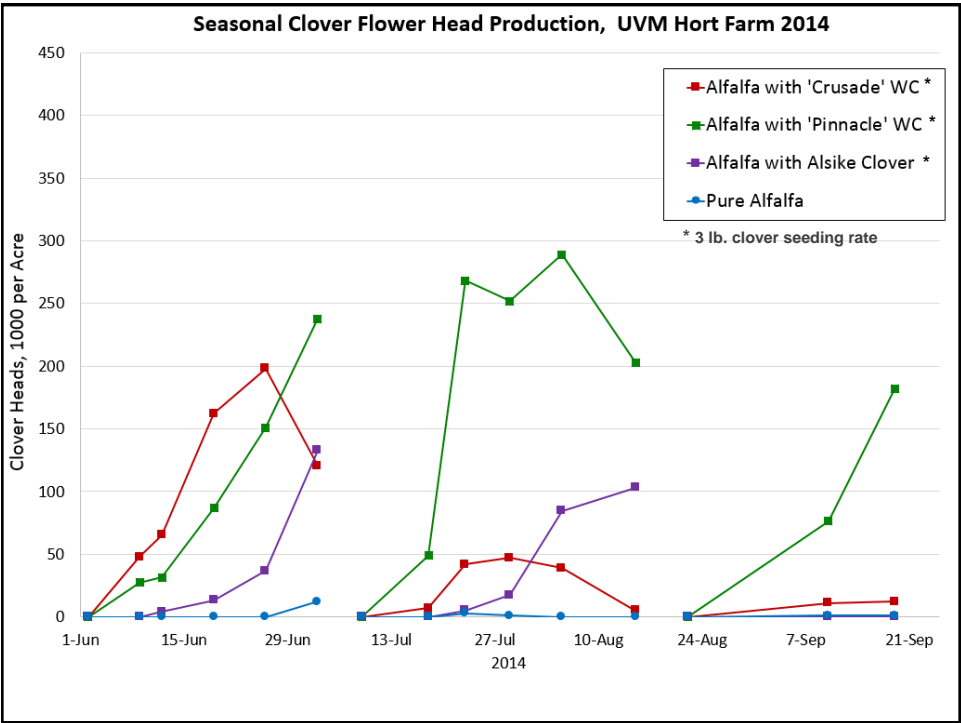
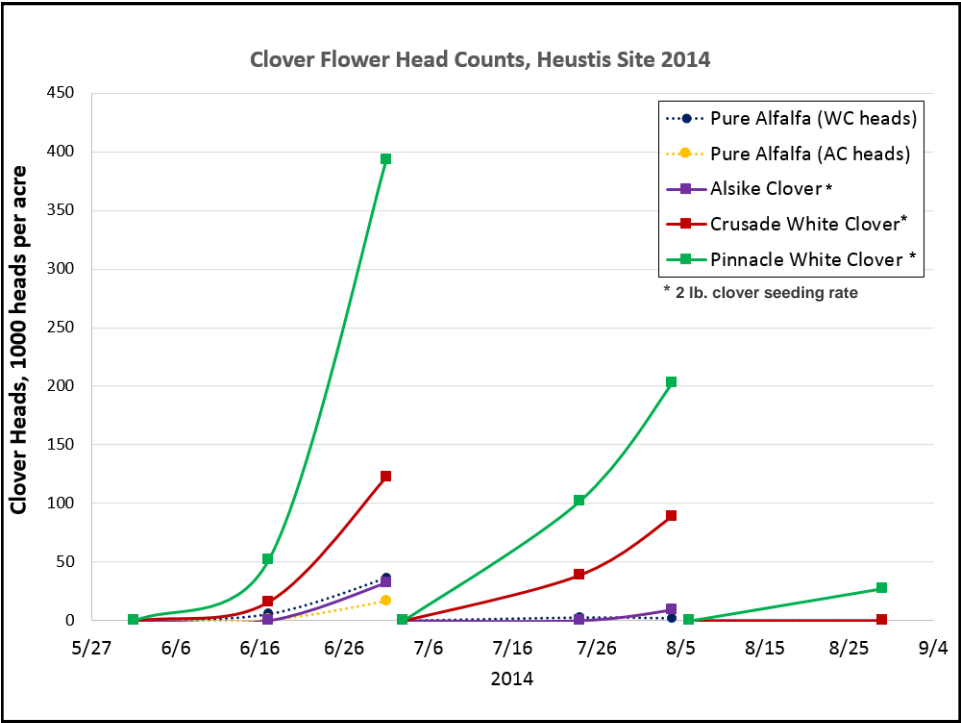
The second objective was tested at both the Heustis farm (in large strips) and the University of Vermont Horticultural Research Farm (in small plots).

Treatments		Sd Rate
Trt No	Trt Mix	lb/a
1	Alfalfa	20
2	Alfalfa	15
	Crusade White Clover	3
3	Alfalfa	12
	Crusade White Clover	5
4	Alfalfa	15
	Pinnacle White Clover	3
5	Alfalfa	12
	Pinnacle White Clover	5
6	Alfalfa	15
	Alsike Clover	3
7	Alfalfa	12
	Alsike Clover	5
8	Alfalfa	15
	Crusade WC	1
	Pinnacle WC	1
	Alsike Clover	1
9	Alfalfa	12
	Crusade WC	2
	Pinnacle WC	2
	Alsike Clover	2

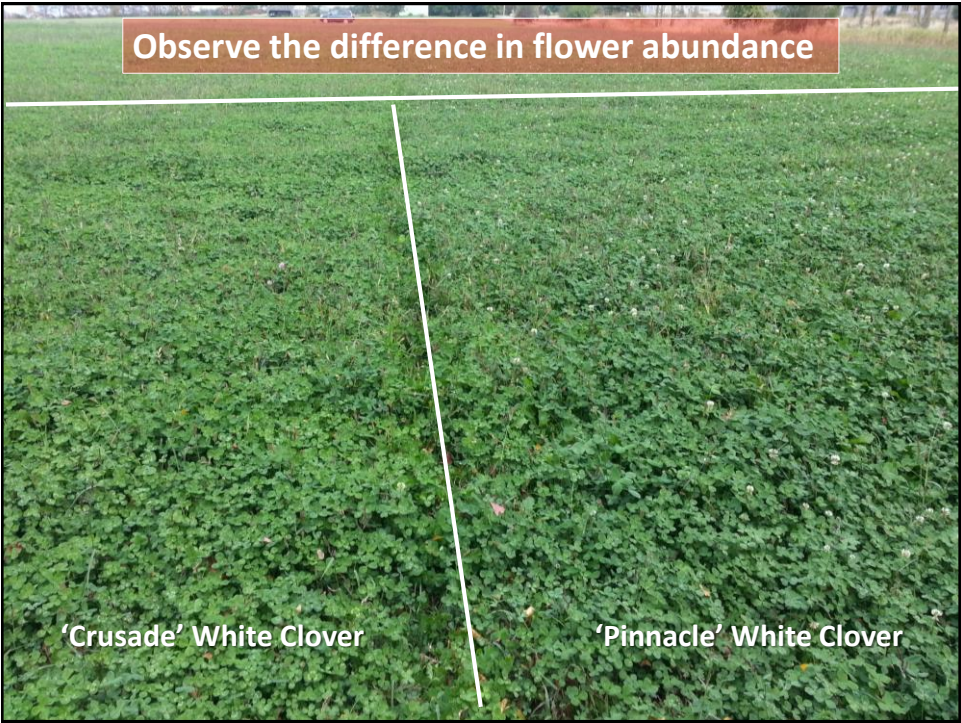
UVM Hort Farm











Objective 2

Yield and Botanical Composition at the UVM Hort Farm

Treatments		Seeding Rate	Total Seasonal		Botanical Composition					
Mixture Number	Species/Varieties		Dry Matter Yields		(8/17/2014)			(8/14/2015)		
			2014	2015	Alfalfa	Clover	Weeds	Alfalfa	Clover	Weeds
					% or cover			% or total dry matter		
			lb/a	tons DM/acre						
1	Alfalfa	20	3.7 ab	4.2 a	86%	0%	14%	93%	0%	7%
2	Alfalfa 'Crusade' White Clover	15 3	3.1 bc	3.6 ab	47%	39%	15%	78%	4%	17%
3	Alfalfa 'Crusade' White Clover	12 5	3.2 abc	3.8 ab	14%	69%	17%	61%	6%	33%
4	Alfalfa 'Pinnacle' White Clover	15 3	4.0 a	4.1 a	64%	27%	10%	77%	9%	14%
5	Alfalfa 'Pinnacle' White Clover	12 5	3.4 abc	3.7 ab	30%	62%	8%	66%	14%	20%
6	Alfalfa Alsike Clover	15 3	3.7 ab	4.2 a	62%	8%	30%	74%	5%	16%
7	Alfalfa Alsike Clover	12 5	3.8 ab	3.8 ab	53%	16%	31%	69%	3%	16%
8	Alfalfa Three-way mix	15 3	3.2 bc	4.2 a	60%	16%	23%	85%	4%	7%
9	Alfalfa Three-way mix	12 6	2.9 c	3.2 b	25%	66%	10%	35%	26%	39%

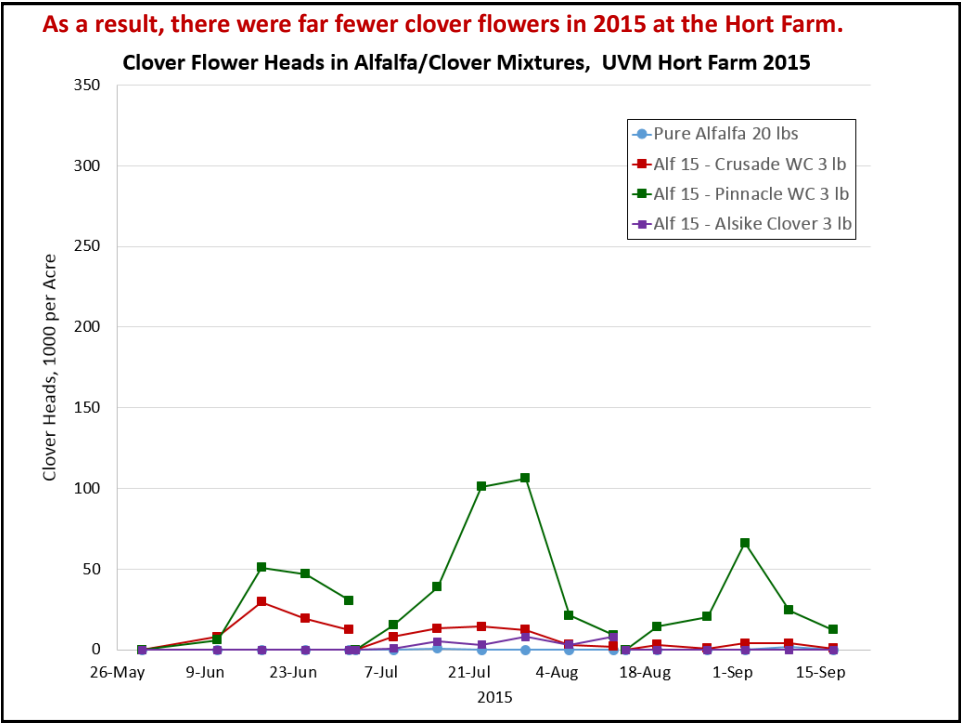
\*Yield means with the same letter are not significantly different (P<0.05)

Results: At a 3 lb. seeding rate, adding clover did not negatively impact overall yield compared to pure alfalfa. There was a higher reduction in alfalfa with the higher clover seeding rate.




Objective 2 Forage Quality of Clover/Alfalfa Mixtures, UVM Hort Farm								
Forage quality of selected clover/alfalfa treatments collected on 8/20/2014 at the Horticultural Research Farm								
Treatments			Forage Quality Parameters				Botanical Composition	
Mixture	Species/Varieties	Seeding						
Number		Rate	CP	ADF	NDF	NDFD <sub>48</sub>	Alfalfa	Clover
		lb/a	% of dm	% of dm	% of dm	% of NDF	% or total dry matter	
1	Alfalfa	20	21.5	29.4	38.7	41.4 c	100%	0%
2	Alfalfa	15	22.2	27.1	35.5	45.9 ab	76%	24%
	Crusade White Clover	3						
4	Alfalfa	15	21.9	27.4	35.5	47.7 a	69%	31%
	Pinnacle White Clover	3						
6	Alfalfa	15	21.0	29.3	38.8	42.3 bc	95%	5%
	Alsike Clover	3						
Significance*			n.s.	n.s.	n.s.	**		
*n.s. - not significantly different (P<0.05); ** - significantly different (P<0.01); means with the same letter are not different (P<0.05)								
CP - crude protein, ADF - acid detergent fiber, NDF - neutral detergent fiber, NDFD <sub>48</sub> - NDF digestibility with 48 hour incubation								
Results: At a 3 lb. seeding rate, adding clover did not negatively impact overall nutritional quality of the forage compared to pure alfalfa. In fact, NDF digestibility was higher with the white clover in the mixture compared to pure alfalfa or alfalfa/alsike clover mixture. The amount of alsike in the mixture was so low, it was essentially the same as the pure alfalfa.								







Website: <http://pss.uvm.edu/beecllover/>



The University of Vermont

UVM Home


Forage Legume Bee Project

Vermont Crops and Soils

UVM Extension Home

Forage Legume Bee Project

Providing information on utilizing forage legumes as a food resource for honeybees and native pollinators




A decline in honeybee populations in Vermont over the past few decades has been attributed to many factors including Varroa mites, disease, pesticide exposure, and a loss of nectar and pollen resources. Many beekeepers in Vermont have observed that the lack of nectar resources in the mid-to-late summer period is an important stressor on honeybees. Historically, as alfalfa hay is cut, it provides a late summer food resource for honeybees but these resources have declined over the years due to changes in legume hay crops and an increase in mowing frequency resulting in reduced bloom periods.

UVM Extension

Enhancing Nectar Production with Clover

Innovative Methods to Utilize Alsike and White Clover in Vermont Hay Fields


2013 - 2015



UVM Extension


Characteristics of Forage Legumes

2013 - 2015




The website posts updates, factsheets and research reports.

Outreach




5/08/15 The Vermont Honeybee and Other Po...



4:48 / 16:28

CC Settings YouTube



Sid.Bosworth@uvm.edu

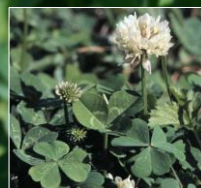
11

## Summary

- White clover was much more prolific at producing flowers compared to alsike clover.
- White clover would produce bloom within the first week to 10 days after regrowth and would continue to bloom until the next harvest.
- There were also differences in white clover cultivars probably due to their sensitivities to day length.
- Alsike clover flowers took longer to develop than white clover and took three weeks to get a significant population.
- Alfalfa yields nor quality were negatively impacted by the clover mix if the clover seeding rate was 3 lb./acre or less.
- At a 3 lb./acre rate, 'Pinnacle' white clover produced 200,000 to 288,000 flower heads per acre in the first full harvest year.

## What's Next

We want to look at diverse mixtures of legumes



Can we improve seasonal floral production and year to year stability