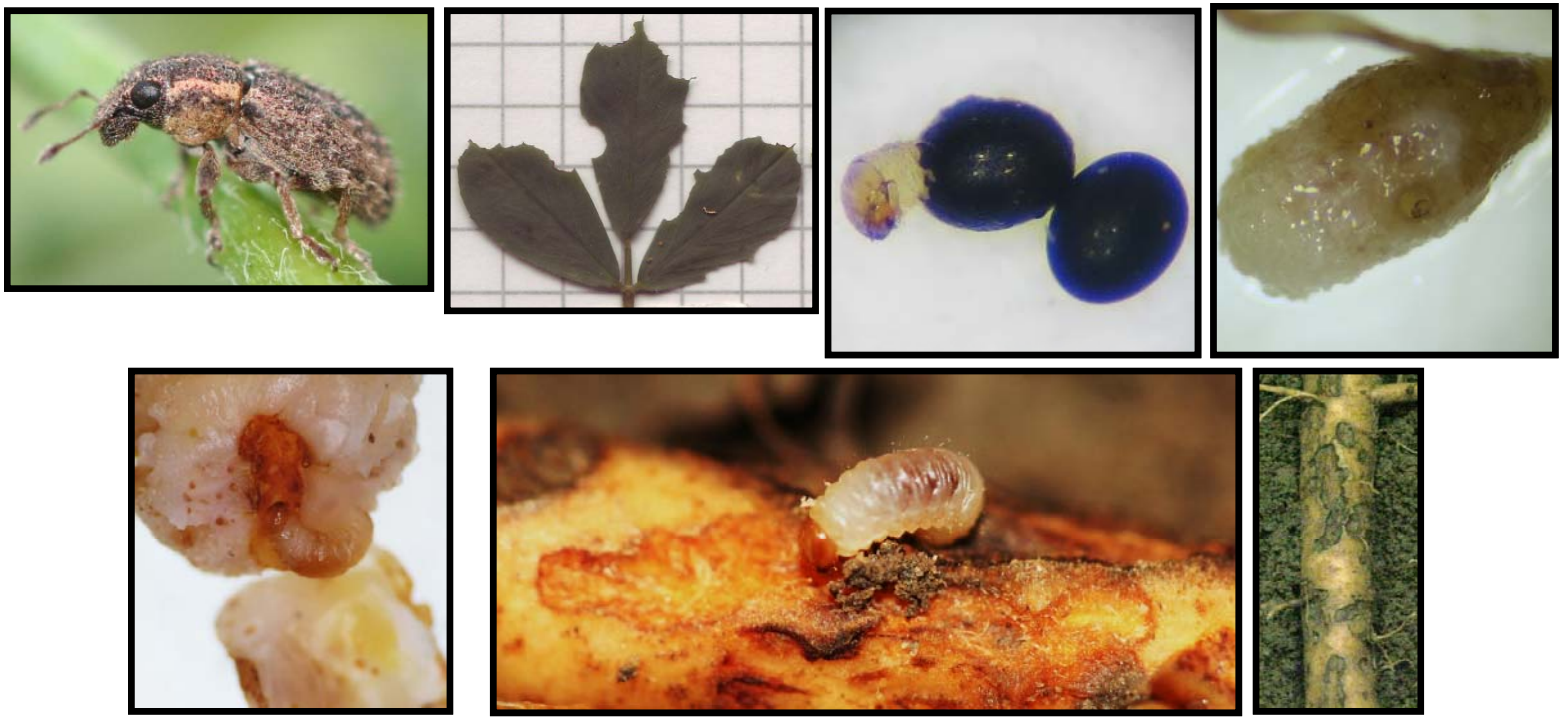
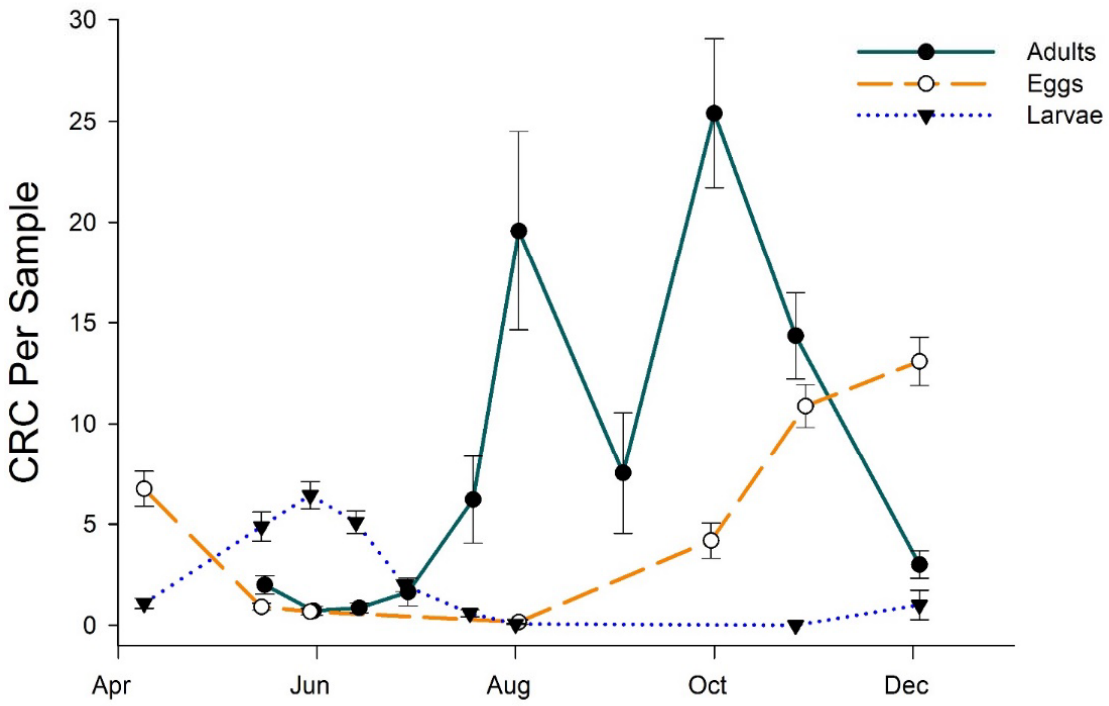
Increasing Preventive and Curative Options for Clover Root Curculio Management in Western Alfalfa

Ricardo Ramirez, PhD
Utah State University

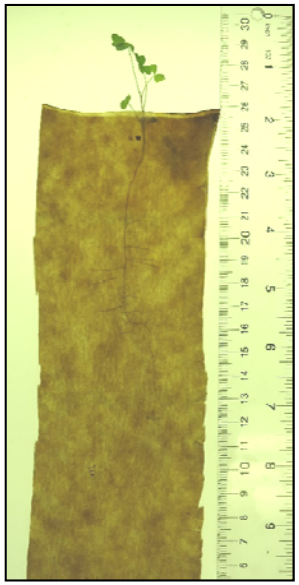


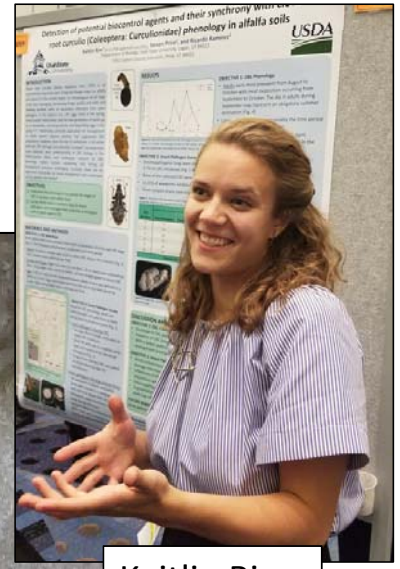
Obj 1. Determine the life-history of CRC



- Eggs primarily deposited in the fall.
- Larvae peak in late-May to mid-June.
- Currently sampling in Idaho and California.

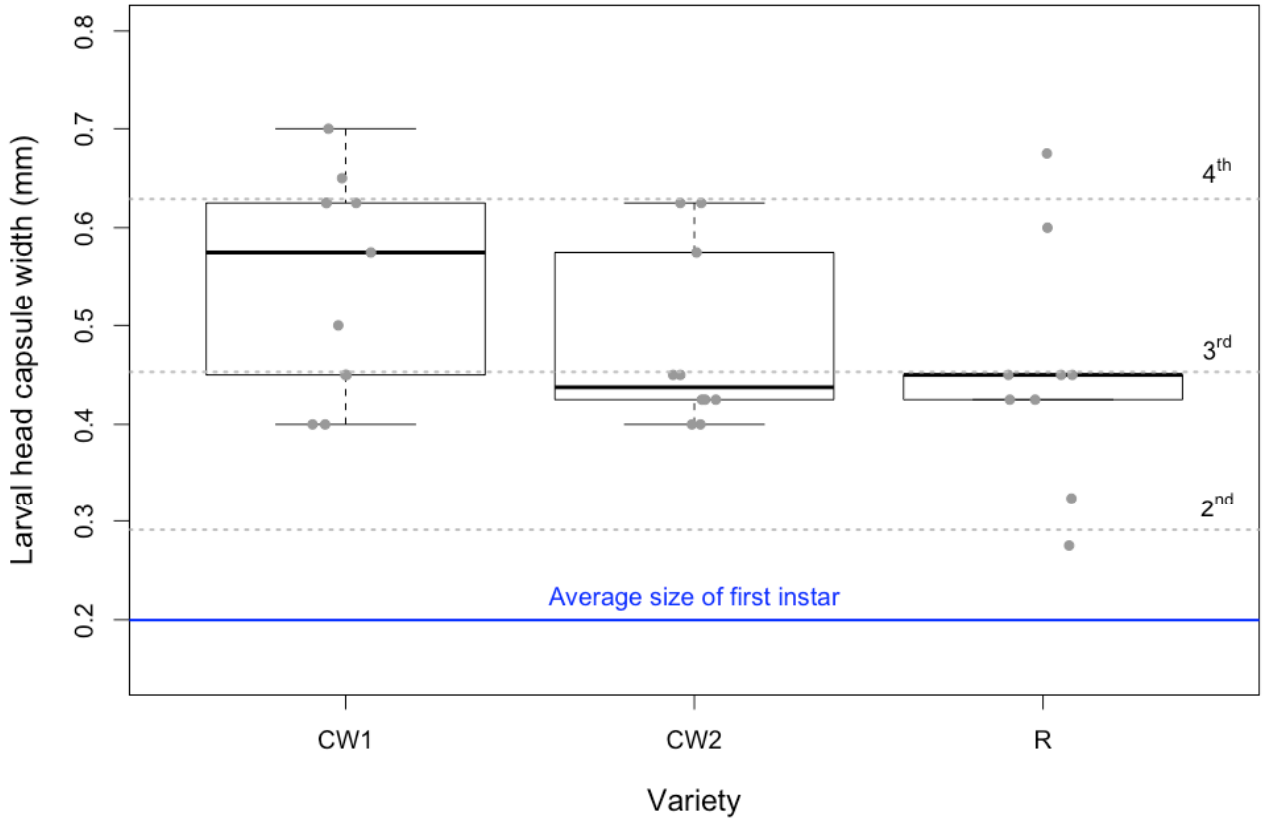
Obj. 2 Evaluation of host plant resistance for CRC





Kaitlin Rim
MS student

Some varieties may slow CRC development…



Obj.3. Evaluate soil active pesticides against CRC

- 2 application timings targeted at larvae

1. Untreated Check

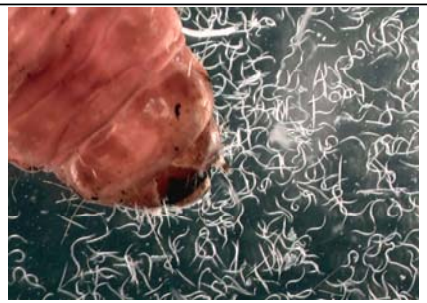
2. Systemic insecticide

SIVANTO prime

3. *Bt-galleriae*

grubGONE!G

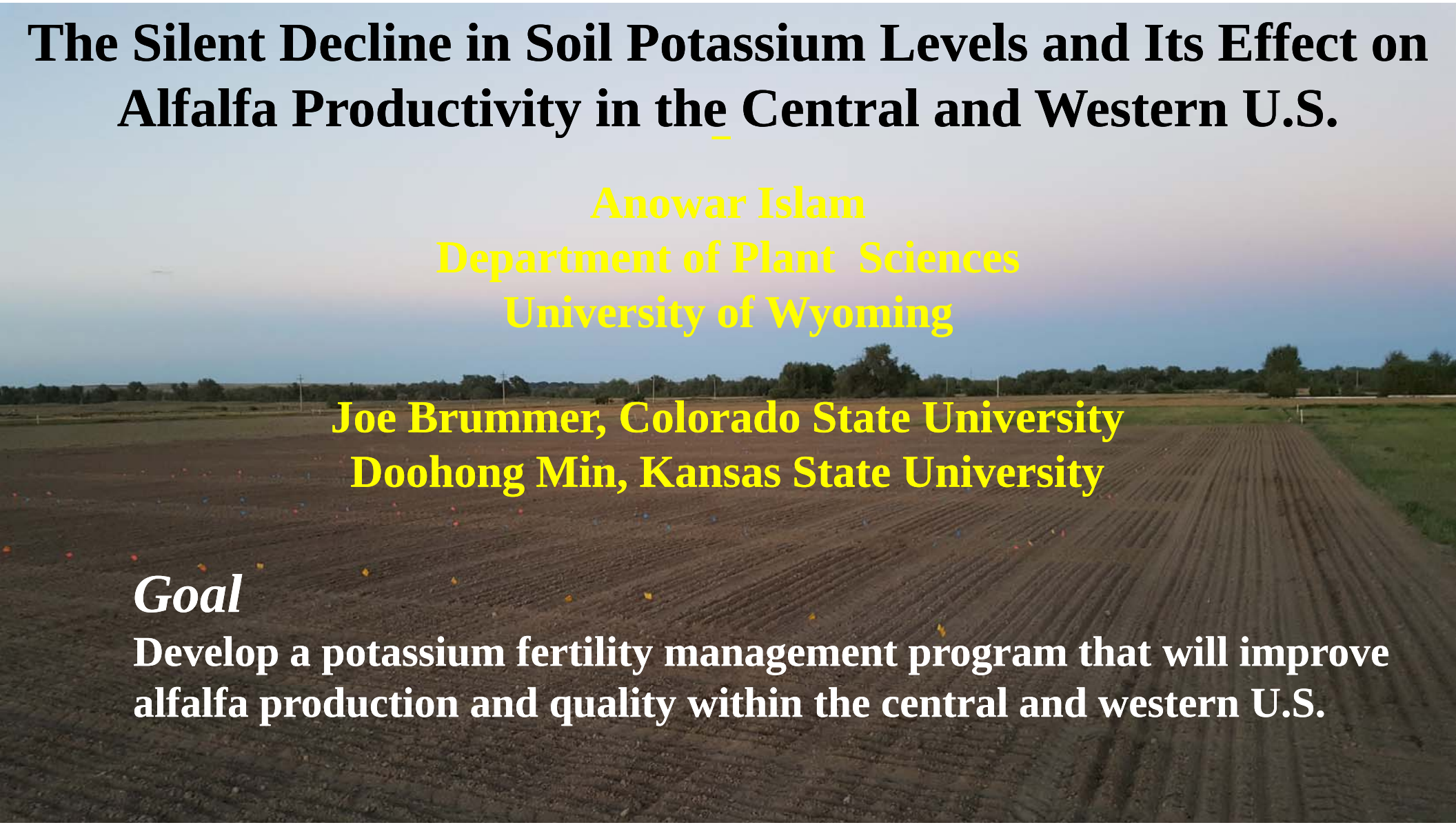
4. Entomopathogenic Nematodes



The Silent Decline in Soil Potassium Levels and Its Effect on Alfalfa Productivity in the Central and Western U.S.

Anowar Islam
Department of Plant Sciences
University of Wyoming

Joe Brummer, Colorado State University
Doohong Min, Kansas State University



Goal

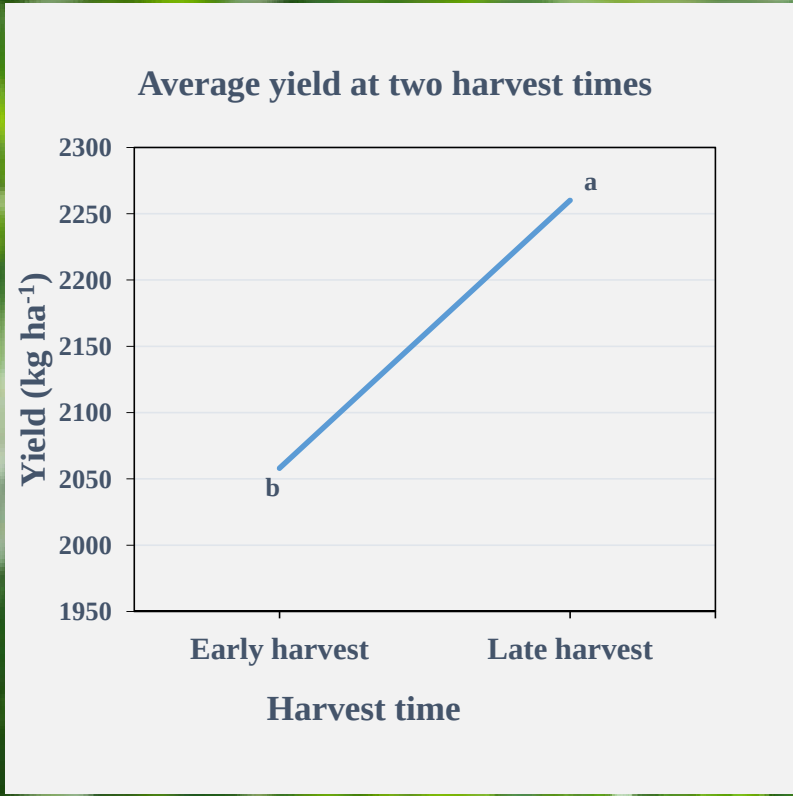
Develop a potassium fertility management program that will improve alfalfa production and quality within the central and western U.S.

Methods and Procedures

- Experimental site (WY, CO, and KS)
  - James C. Hageman Sustainable Agriculture Research and Extension Center (SAREC), Lingle, WY
- Treatments
  - 4 K rates: (0, 56, 112, and 168 kg K_2O ha^{-1})
  - 2 cultivars: “Hi-Gest 360” (reduced lignin) and “AFX 457” (conventional)
  - 2 harvest times
    - Early harvest (late bud to early [10%] bloom) and late harvest (7 days after early harvest)
- Experimental design
  - Factorial arrangement in randomized complete block design
  - 4 replications
- Planting
  - Date: Sept 8, 2016; Seeding rate: 22 kg PLS ha^{-1}
- 4 harvests in 2017

	Early	Late
▪	Harvest 1: May 30	June 6
▪	Harvest 2: July 10	July 17
▪	Harvest 3: August 18	August 25
▪	Harvest 4: September 29	October 6

Forage Yield



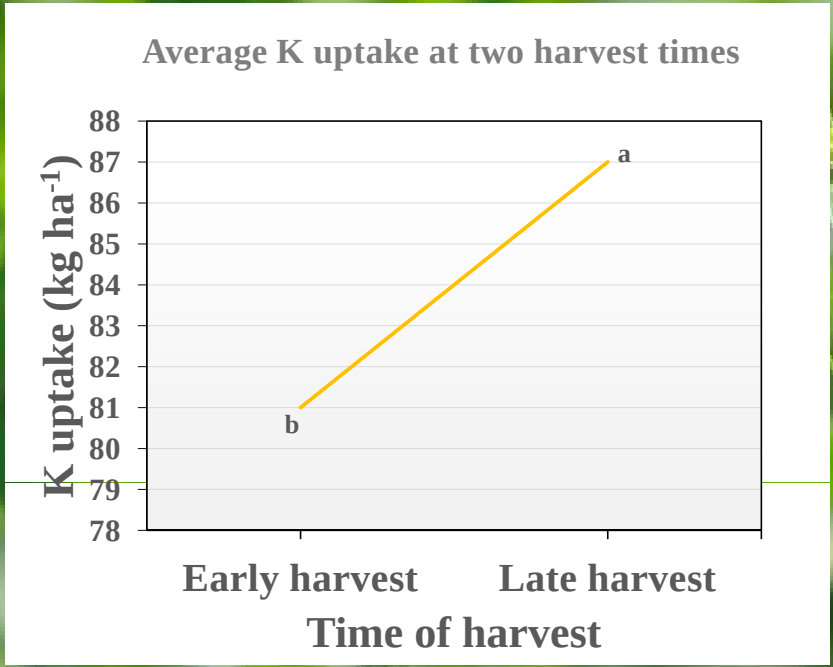
K effect on cultivar at different harvest

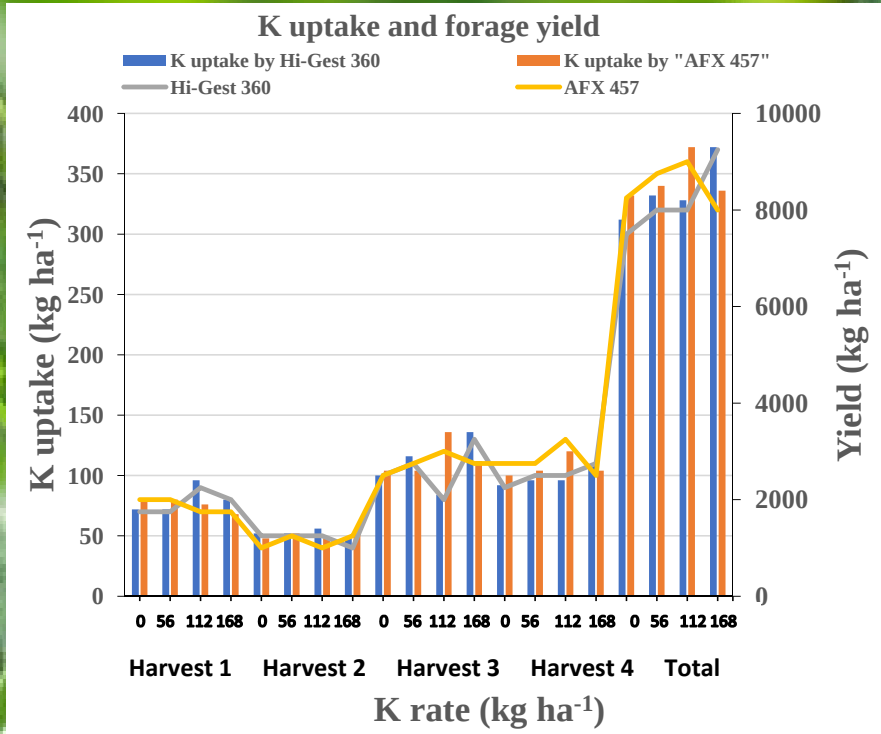
Treatment	Hi-Gest 360					AFX 457				
K_2O	‡ 1	2	3	4	Total	1	2	3	4	Total
					kg ha $^{-1}$					
0	1603b†	1158b	2227c	2048c	6947c	1781a	1069b	2316c	2227c	7393c
56	1603b	1158b	2583b	2138b	7393b	1781a	1158a	2316c	2316b	7571b
112	2049a	1247a	1870d	2138b	7304b	1692b	1069b	2850a	2672a	**8283a**
168	1870ab	1069c	3028a	2405a	**8283a**	1514c	1158a	2494b	2361b	7482b
Mean	1781	1158	2427	2182	**7491**	1692	1114	2494	2383	**7682**

Forage Nutritive Value

K_2O (kg ha^{-1})	CP	ADF	NDF	TDN	RFV
			g kg^{-1}		
0	271	256	310	738	209
56	271	256	310	738	209
112	274	253	306	742	213
168	271	258	310	736	209
Means	272	256	309	739	210
LSD(0.05)	7.65	7.85	9.15	8.74	7.94

Potassium Uptake and Forage Yield





Summary

- K application affected forage yield at different harvests but not forage nutritive value
- Moderate level of K is needed for a high yield of AFX 457; high level of K is needed for similar yield of Hi-Gest 360
- K uptake by alfalfa was high - Translated into high yield

Re-Establishing IPM Recommendations for Aphids in Alfalfa Hay in the Low Desert

- **Pea aphid**, *Acyrthosiphon pisum*
- **Blue alfalfa aphid**, *Acyrthosiphon kondoi*
- **Cowpea aphid**, *Aphis craccivora*
- **Spotted alfalfa aphid**, *Therioaphis maculata*

Ayman Mostafa, PhD
University of Arizona College of Agriculture & Life Sciences
Cooperative Extension
Field Crops

Stem vs. Sweep net sampling

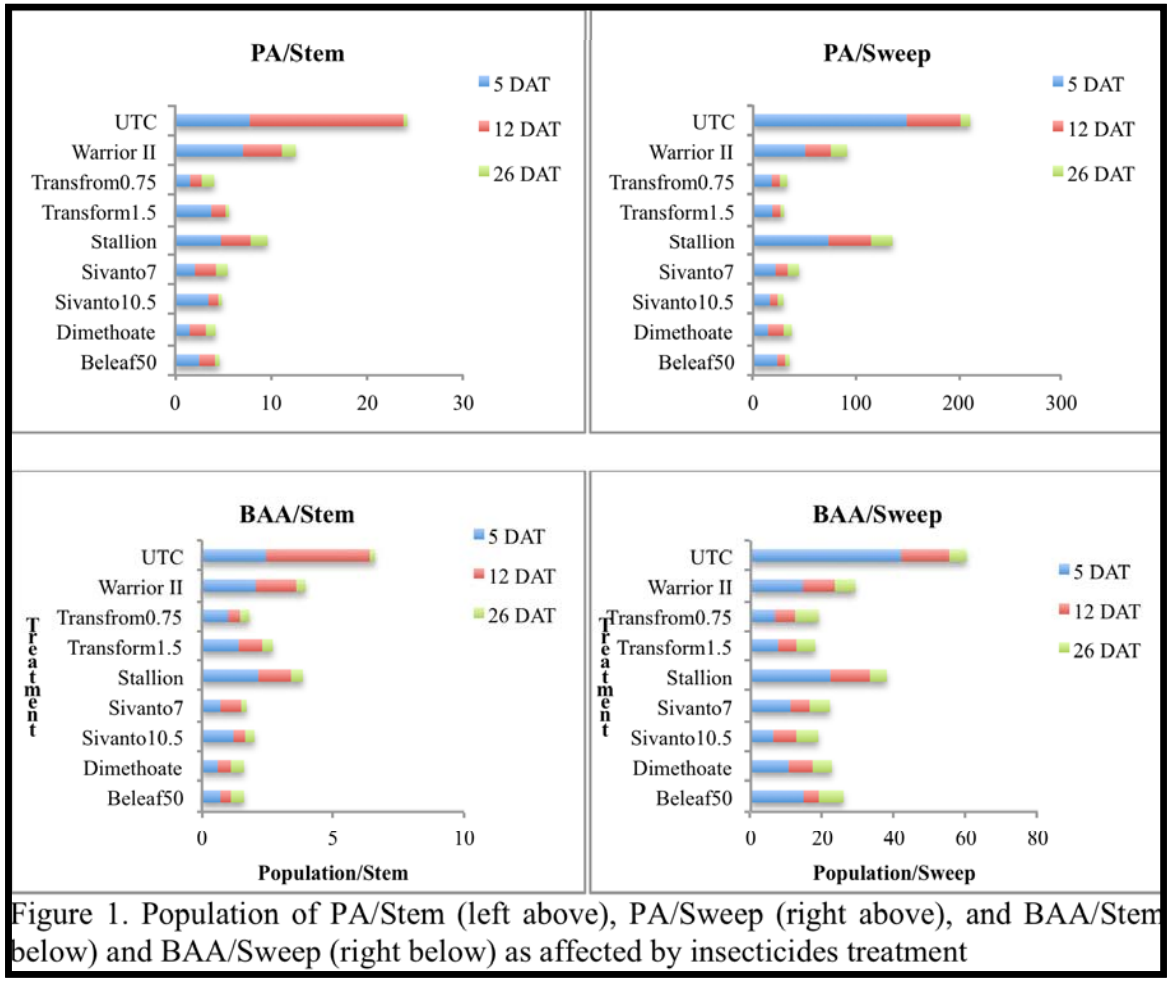
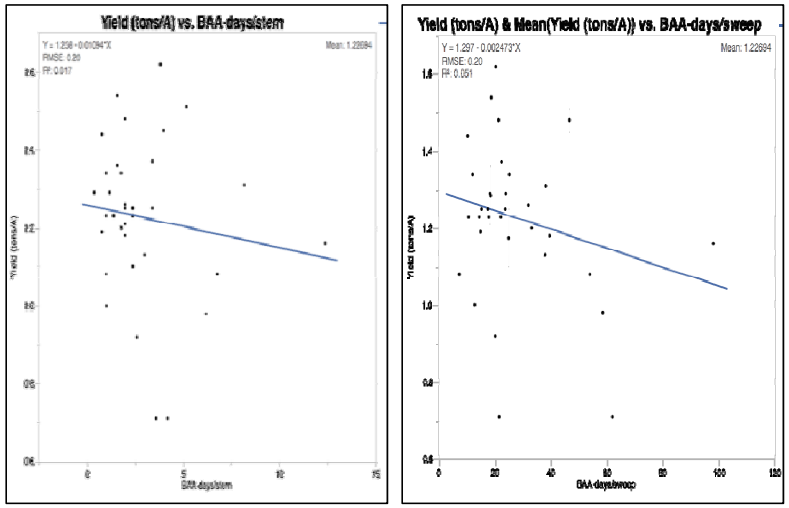


Figure 1. Population of PA/Stem (left above), PA/Sweep (right above), and BAA/Stem (left below) and BAA/Sweep (right below) as affected by insecticides treatment

Alfalfa Dry matter Yield in relation to cumulative Blue Alfalfa Aphid (BAA)/stem (right) and BAA/Sweep (left)

Y = 1.258-0.01094X
R2 = 0.017

Y = 1.297-0.002473X
R2 = 0.051



Alfalfa Dry matter Yield in relation to cumulative Pea Aphid (PA)/stem (right) and BAA/Sweep (left)

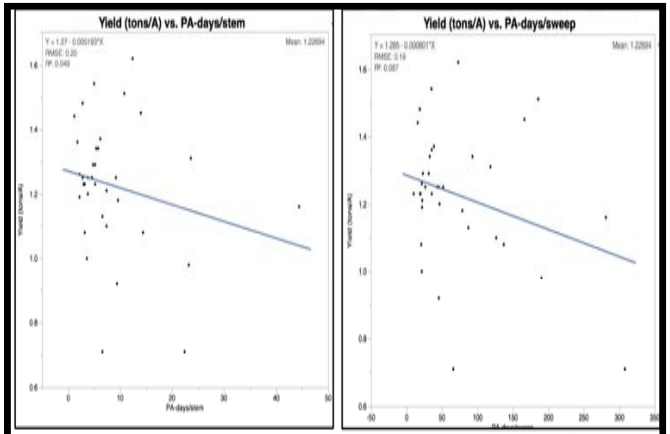
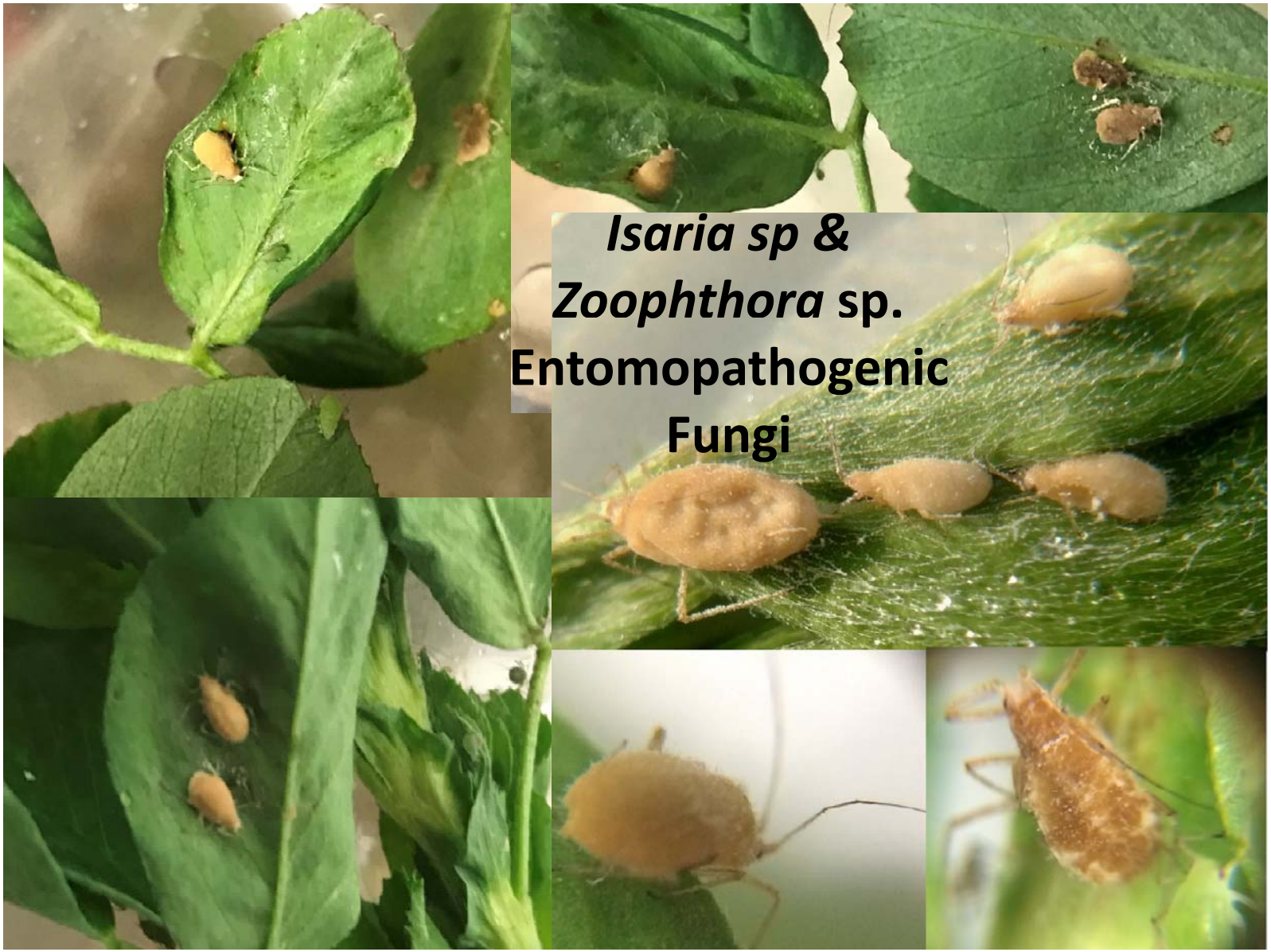
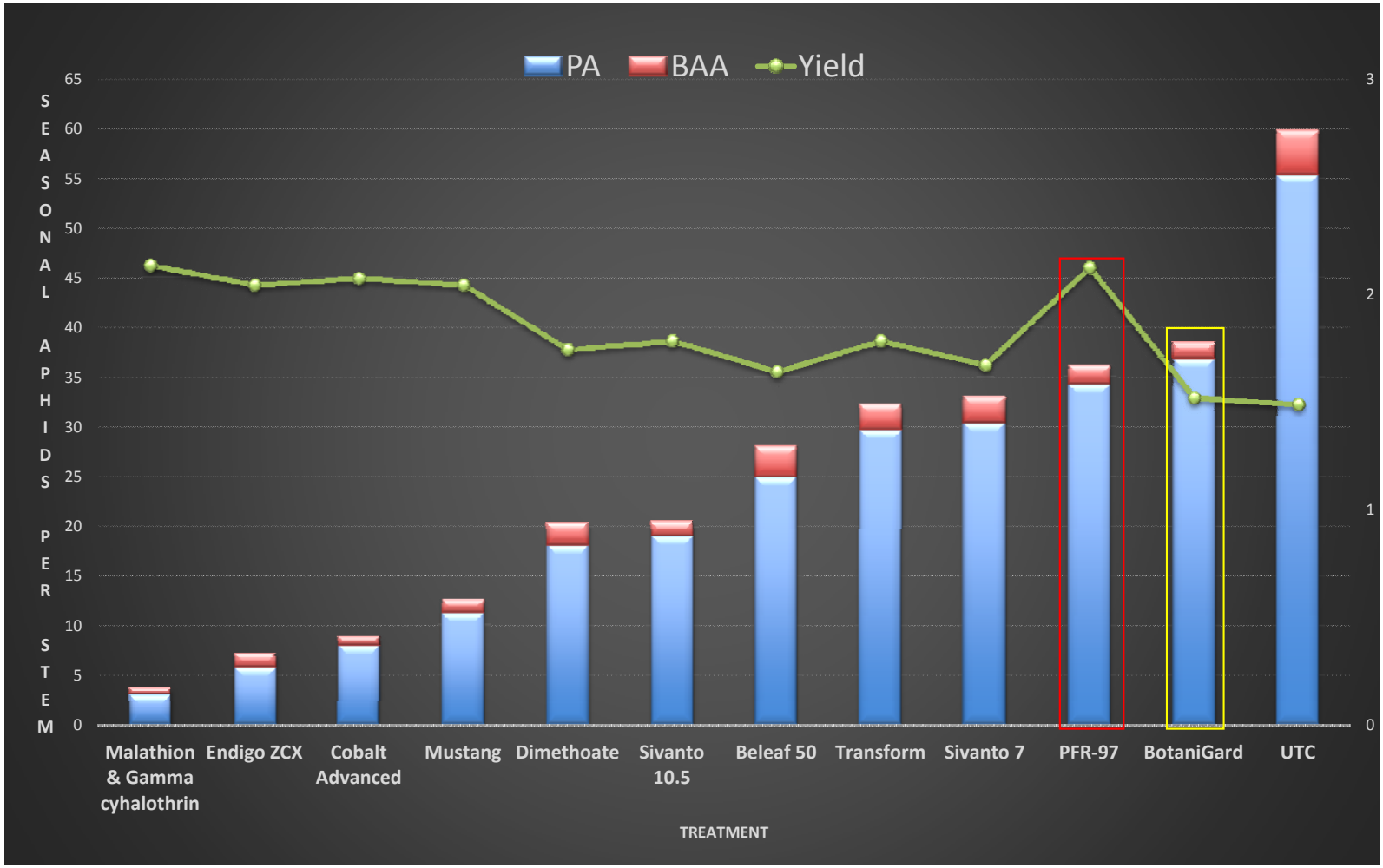
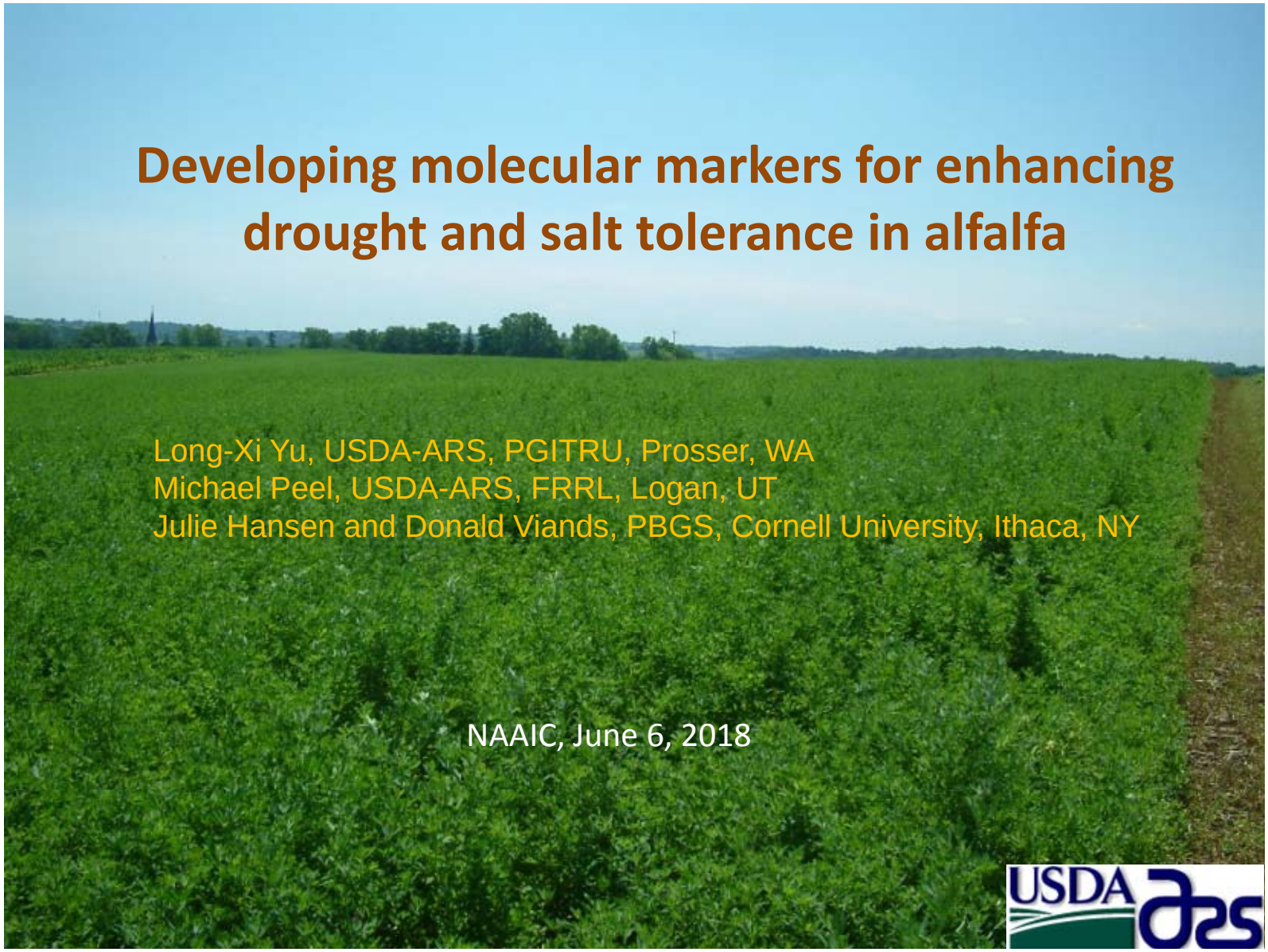


Figure 3. Alfalfa Dry matter Yield in relation to cumulative Pea Aphid (PA)/stem (right) 1.27-0.005193x, RMSE = 0.20, R^2 = 0.049, and per sweep (left) Y = 1.285-0.000801x, RM 0.19, R^2 = 0.0087


Isaria sp &
Zoophthora sp.
Entomopathogenic
Fungi

Aphid Populations/Stem *vs* Yield (ton/A) for 2017 Efficacy Study





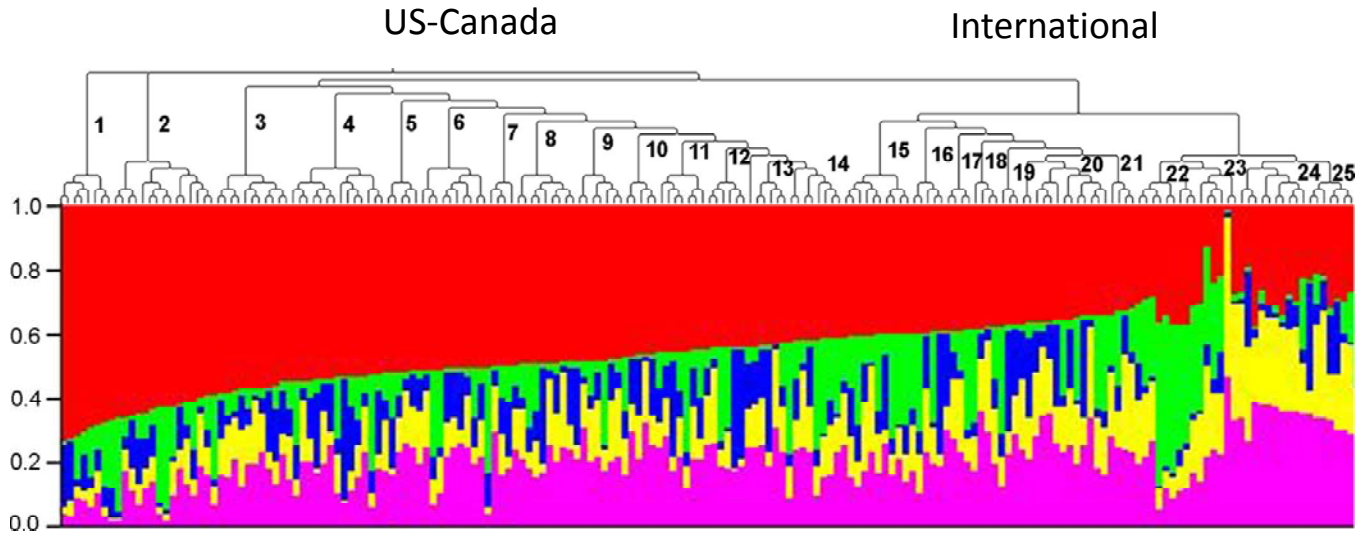
Developing molecular markers for enhancing drought and salt tolerance in alfalfa

Long-Xi Yu, USDA-ARS, PGITRU, Prosser, WA
Michael Peel, USDA-ARS, FRRL, Logan, UT
Julie Hansen and Donald Viands, PBGS, Cornell University, Ithaca, NY

NAAIC, June 6, 2018

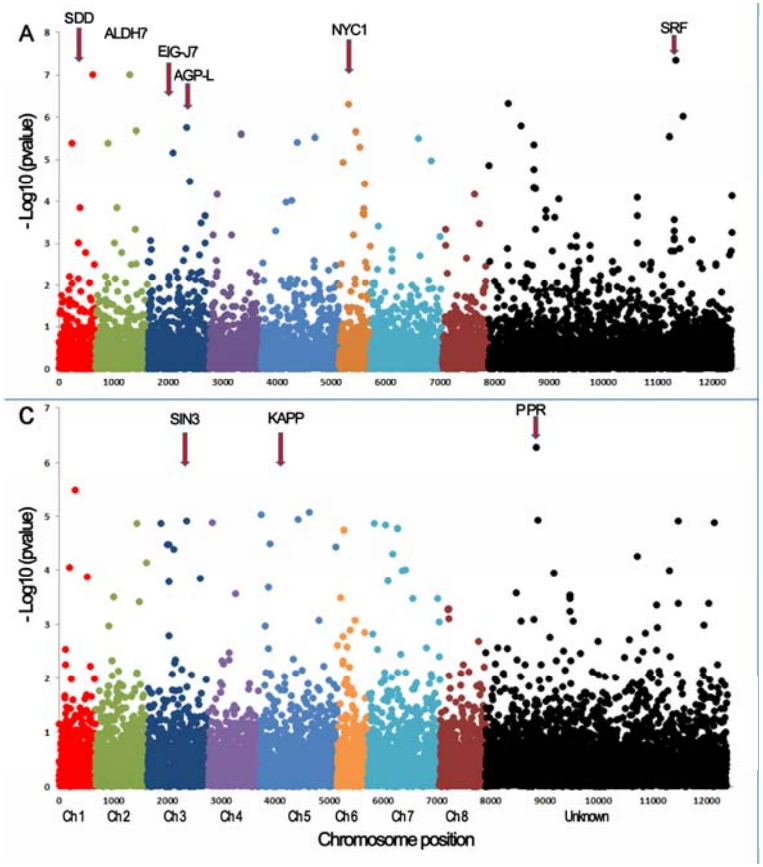
200 alfalfa accessions for drought tolerance have been evaluated in the field and greenhouse in Prosser in 2013 -2017

Breeding populations have been evaluating for salt tolerance in the CoPI, Dr. Mike Peel's group, Logan, UT



Zhang et al. 2017 Genet Res & Crop Evol

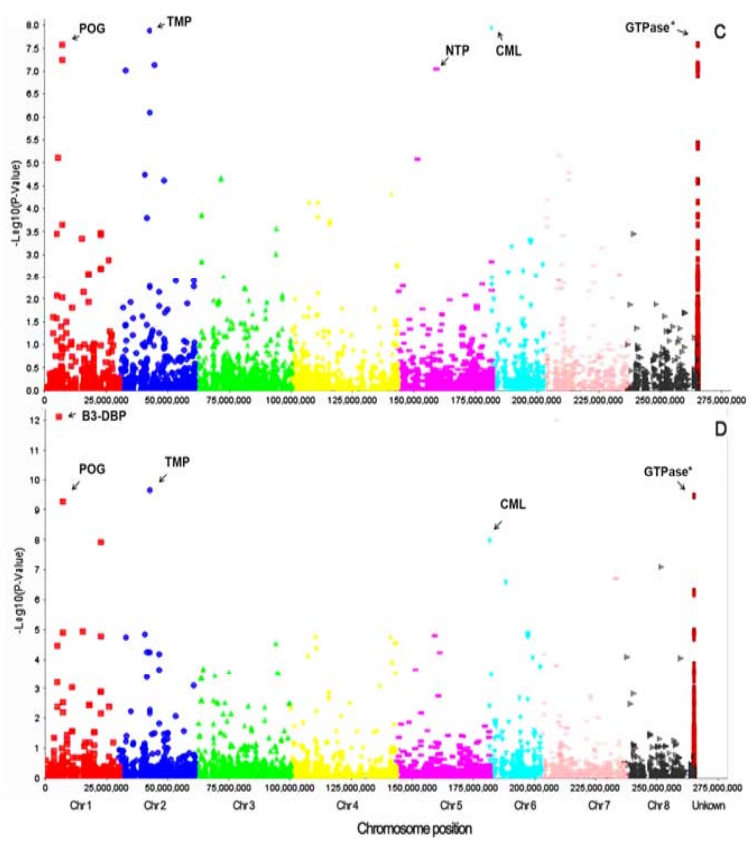
Markers and linked candidate genes for drought/Salt tolerance identified by GWAS



Drought resistance trait loci

A, DRI; B, RWC

Zhang et al. (2015) PloS One



Salt resistance germination loci

C, 0.75% NaCl; D, 1.0% NaCl

Yu et al. (2016) Frontier Plant Sci.

DEVELOPING AN ALFALFA HAY EXPORT MARKET IN THE HUMID EASTERN UNITED STATES

- Majority of hay exported is produced in arid western United States
- Ideal conditions for the production of high quality alfalfa hay
- Alfalfa production is highly dependent on irrigation
- Increasing competition for water from higher value crops and urban areas
- Production systems in humid eastern United States are rain fed

To evaluate the impact of preservatives on the stability of hay containerized in the humid eastern United States.

USDA NIFA
United States Department of Agriculture
National Institute of Food and Agriculture

University of Kentucky
College of Agriculture, Food and Environment

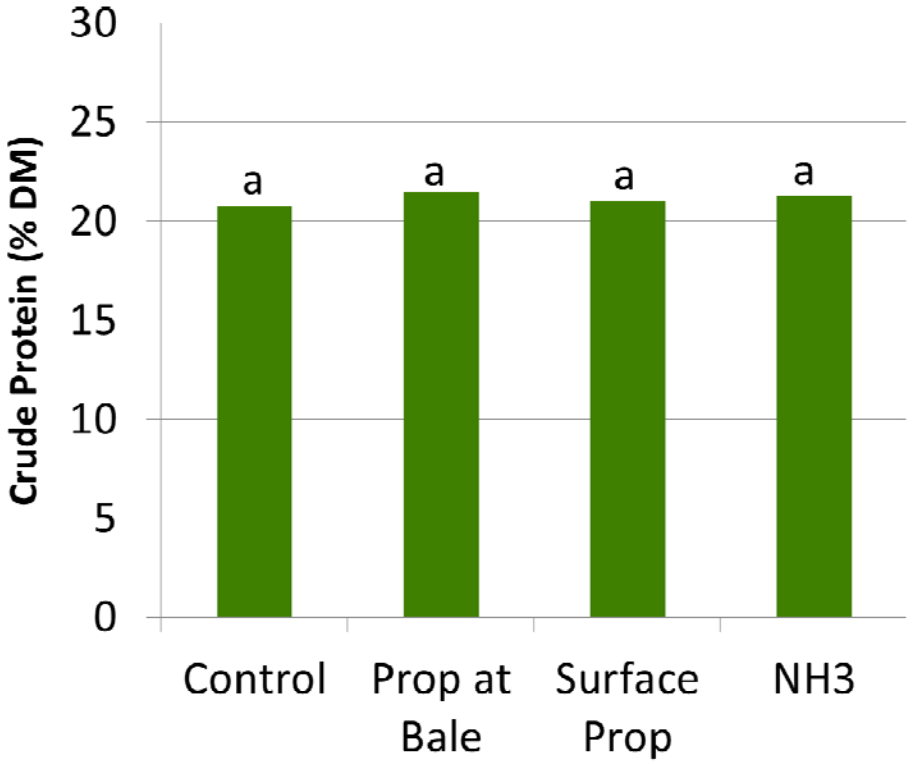
Treatments and Methods

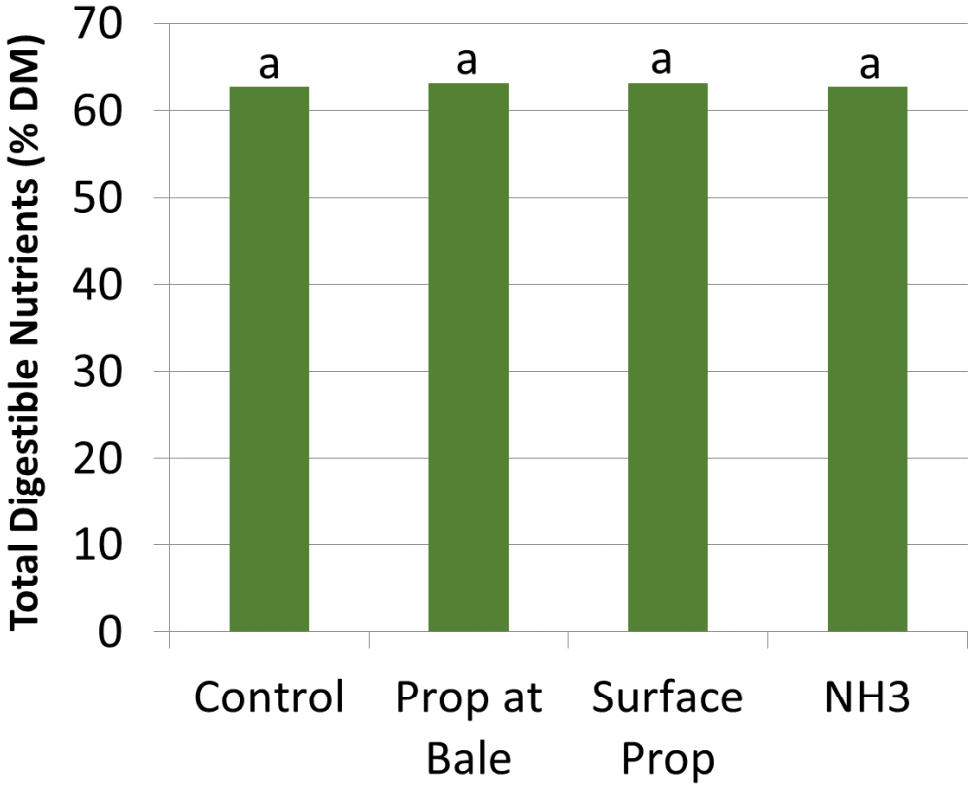
- Control
  - Double compressed bale
- Treatment One
  - Double compressed + 5 lb/ton propionic acid at harvest
- Treatment Two
  - Treatment one + 0.0075 lb/bale propionic acid surface applied at containerization
- Treatment Three
  - Treatment one + 3 lb/ton DM Ammonia (NH_3) fumigation at storage

Double compressing bales to density of 25 lb/sq ft.

Loading containers, surface applying propionic acid, ammoniating loaded containers.

Post Containerization Crude Protein and Total Digestible Nutrients





Mold spore count per gram Feeding risks and cautions

********** Air-dried

Under 500,000 ..... Relatively low count

0.5 to 1 million ..... Relatively safe

1 to 2 million ..... Discount energy (x.95)

Feed with caution

2 to 3 million ..... Discount energy (x.95)

Closely observe animals and performance

3 to 5 million ..... Discount energy (x.95)

Dilute with other feeds; Observe closely

Over 5 million ..... Discontinue feeding

Summary and Conclusions

- Ability to produce good quality alfalfa hay
  - Lack in presentation
  - Managing rainfall at harvest
  - Preservatives at harvest
- No treatment required <14% moisture
  - Nutritive value maintained
  - Mold presence below thresholds
- Additional research
  - High moisture hay
  - Mixed forages
  - Market development and logistics
- Incorporation into cropping systems

Nutritive value and forage accumulation of alfalfa and alfalfa-mixtures as influenced by forage management

Dr. Renata Nave

Assistant Professor – Forage Systems and Management

University of Tennessee

North American Alfalfa Improvement Conference
AFRP Lightning Presentation
June, 6 2018

Objective and Hypothesis

- **Objective:**

Evaluate accumulation and nutritive value of alfalfa and alfalfa-mixtures in different harvest intervals

- **Hypothesis:**

Adjusting the intervals = optimum relationship between production and nutritive value.

Material & Methods

- **Four harvest intervals**

T1 (21 days harvest)

T2 (28 days harvest)

T3 (35 days harvest)

T4 (42 days harvest)

- **Three species combinations**

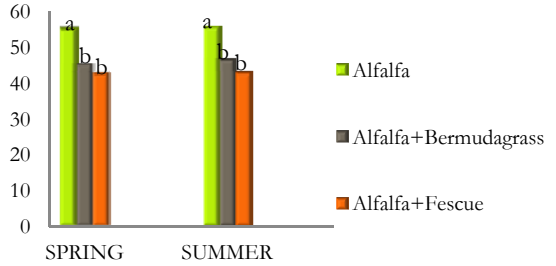
Alfalfa

Alfalfa + Tall fescue

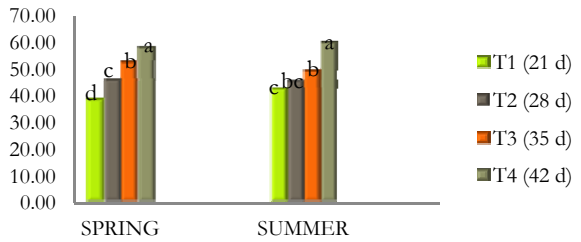
Alfalfa + Bermudagrass

- **Total: 12 treatments**

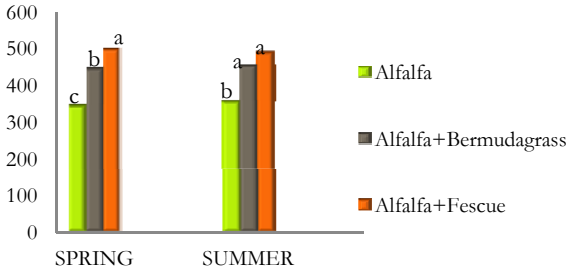
Lignin concentration by species (g/kg)



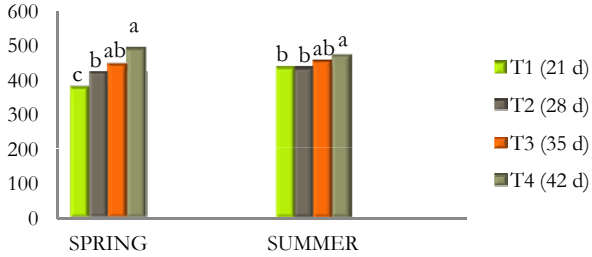
Lignin concentration by treatment (g/kg)



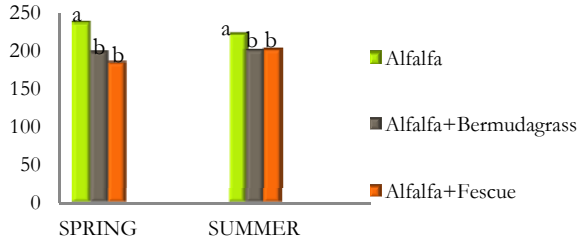
NDF concentration by species (g/kg)



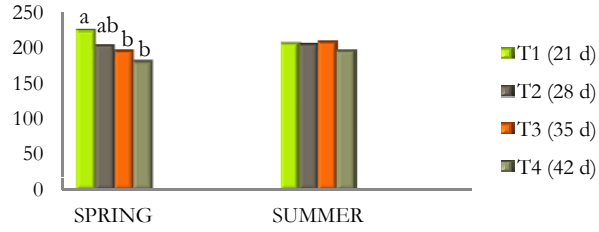
NDF concentration by treatment (g/kg)



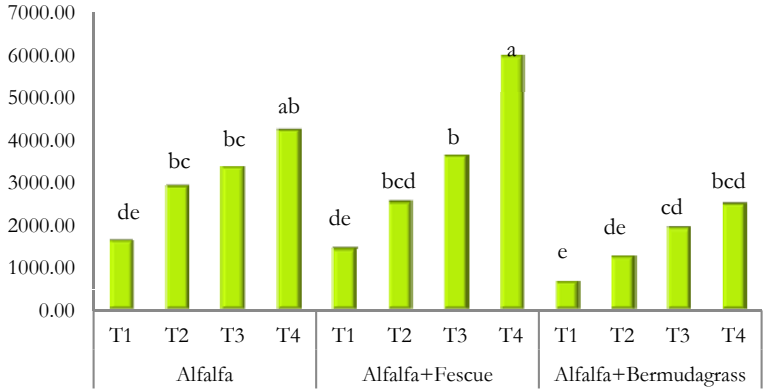
CP concentration by species (g/kg)



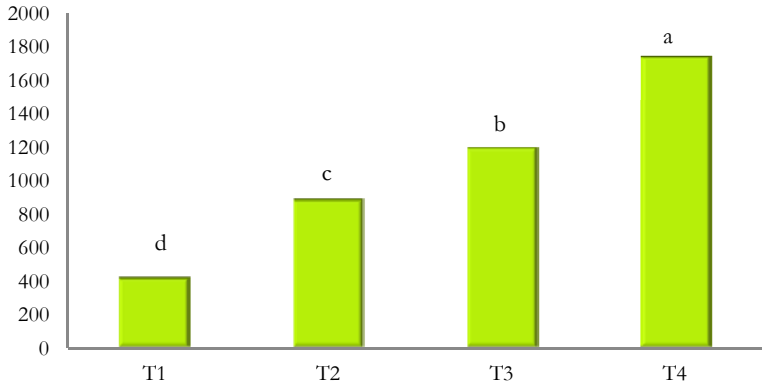
CP concentration by treatment (g/kg)



Forage Mass (kg/ha) - SPRING



Forage Mass (kg/ha) - SUMMER



Conclusion

- Decisions based on species and harvesting intervals are mostly important during spring.
- Nutritive value does not change when mixing alfalfa with a cool or warm-season grass, and as summer approaches, advanced maturity does not impact crude protein content.
- Adjusting harvesting intervals during spring can increase forage mass produced, especially in cool-season forages.