Low-Lignin Alfalfa Research in Michigan

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Upper Peninsula Dairy Meeting
Stephenson, MI
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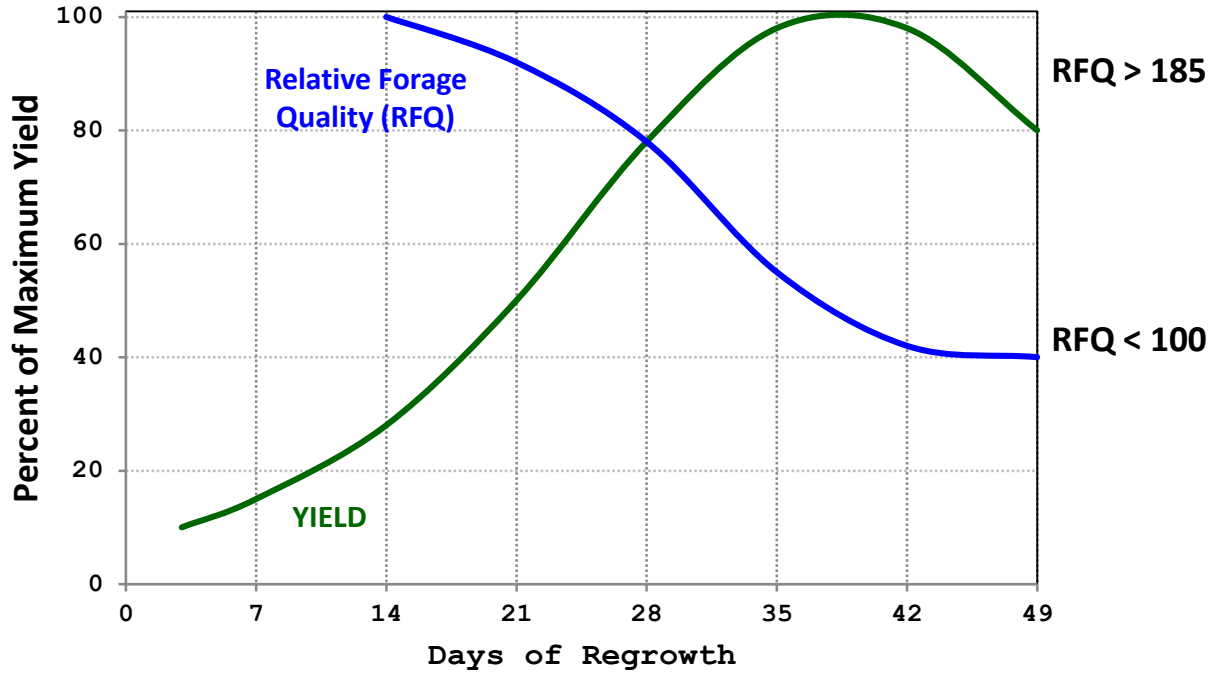

The yield – quality tradeoff in forages

As yield goes up, nutritive quality goes down because mature forage contains more lignin than interferes with digestibility

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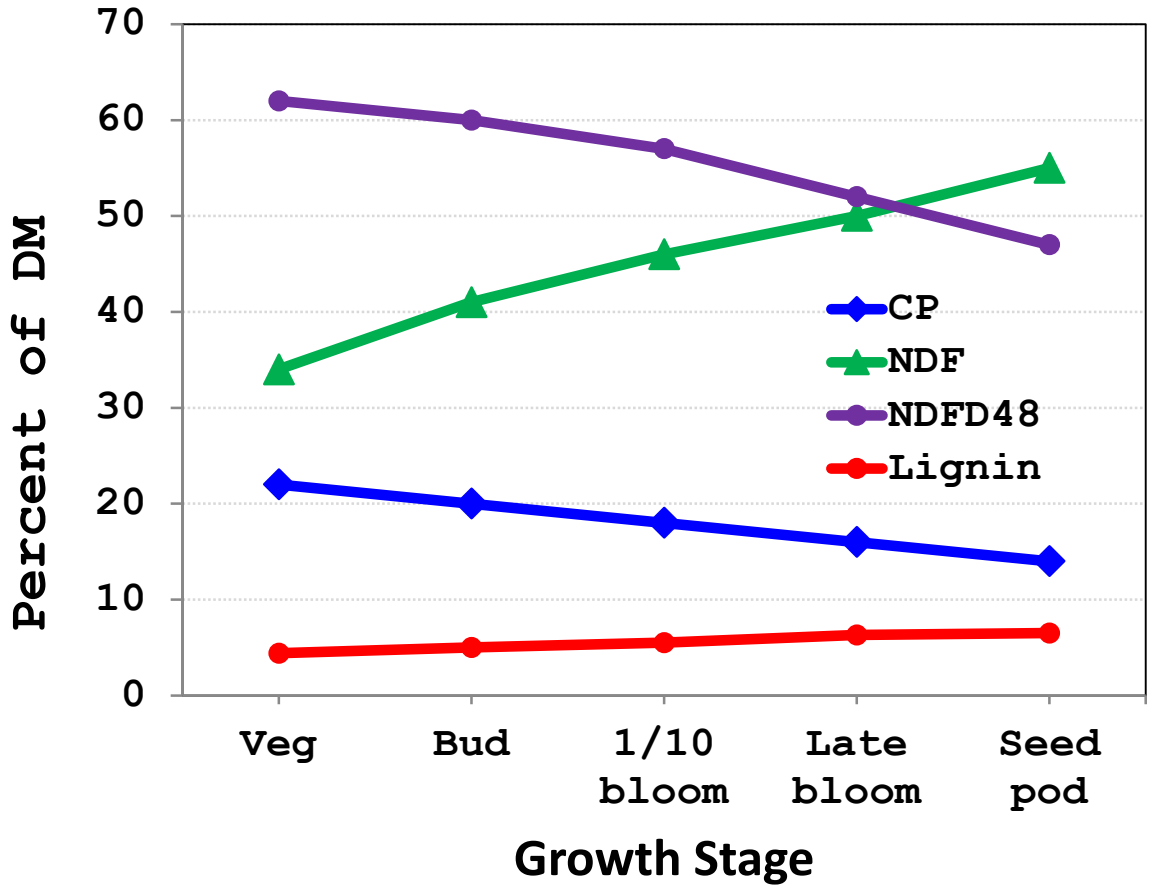
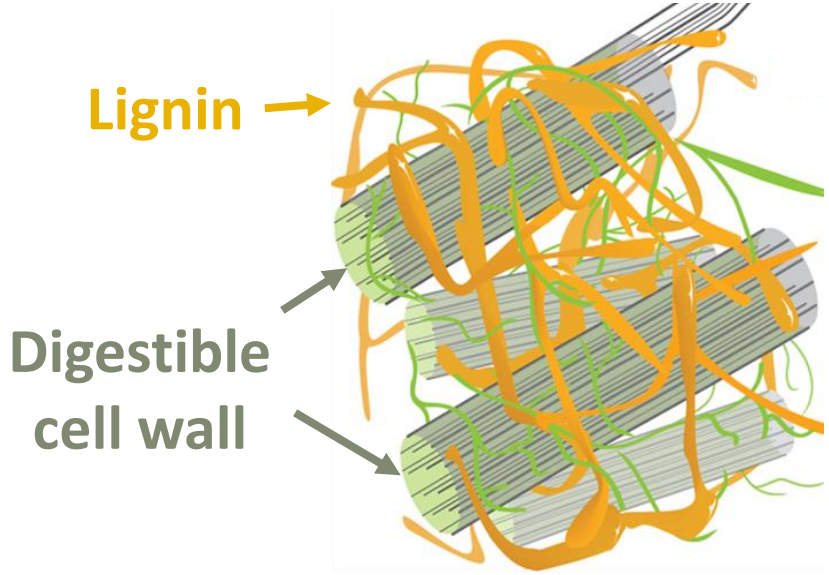
Why Does Quality Decrease with Maturity?





Alfalfa contains 5-14% lignin in cell walls, mostly in stems

Lignin % increases with maturity
Stem proportion increases with maturity

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How can we reduce lignin in alfalfa?

1. Cut at younger/earlier stage of maturity
2. Conventional plant breeding, selecting for:
   - More leaf and/or less stem
   - Less cell wall (NDF, ADF, lignin)
   - Greater cell wall digestibility
   - Varieties identified in name as HQ, Q, D, HD, or HiGest
3. Genetic modification to reduce lignin synthesis (HarvXtra)

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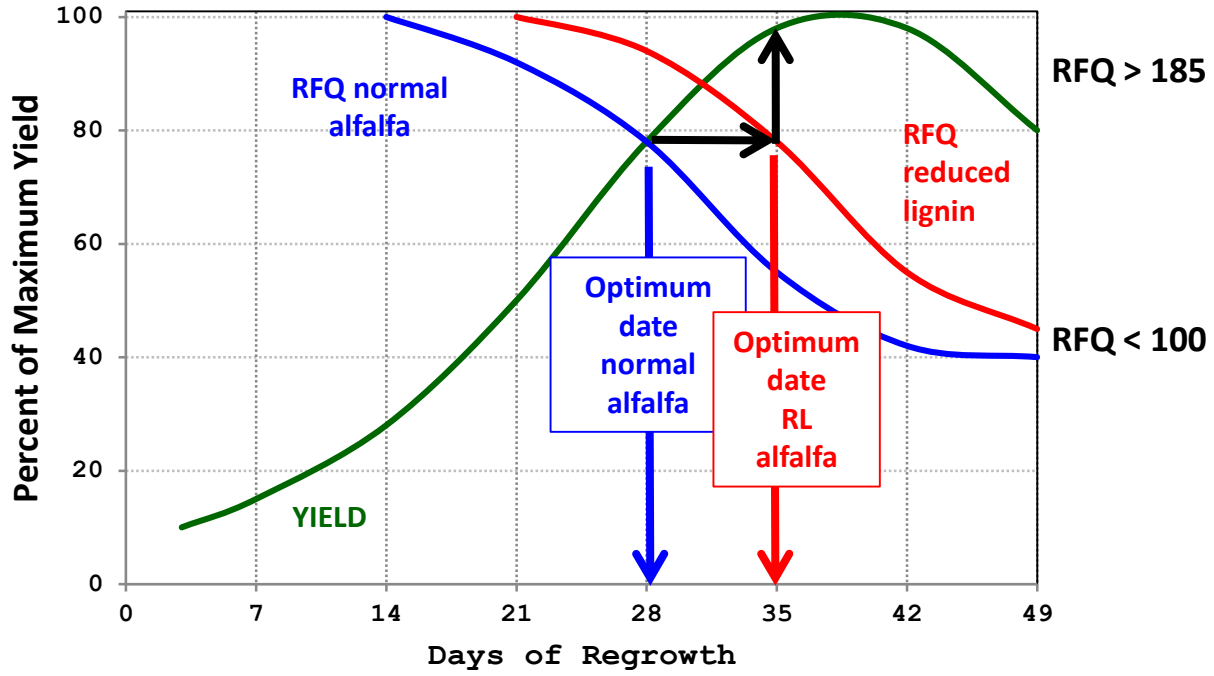


Theoretical Reduced Lignin Advantage

Premium quality?

Higher yield with similar quality?

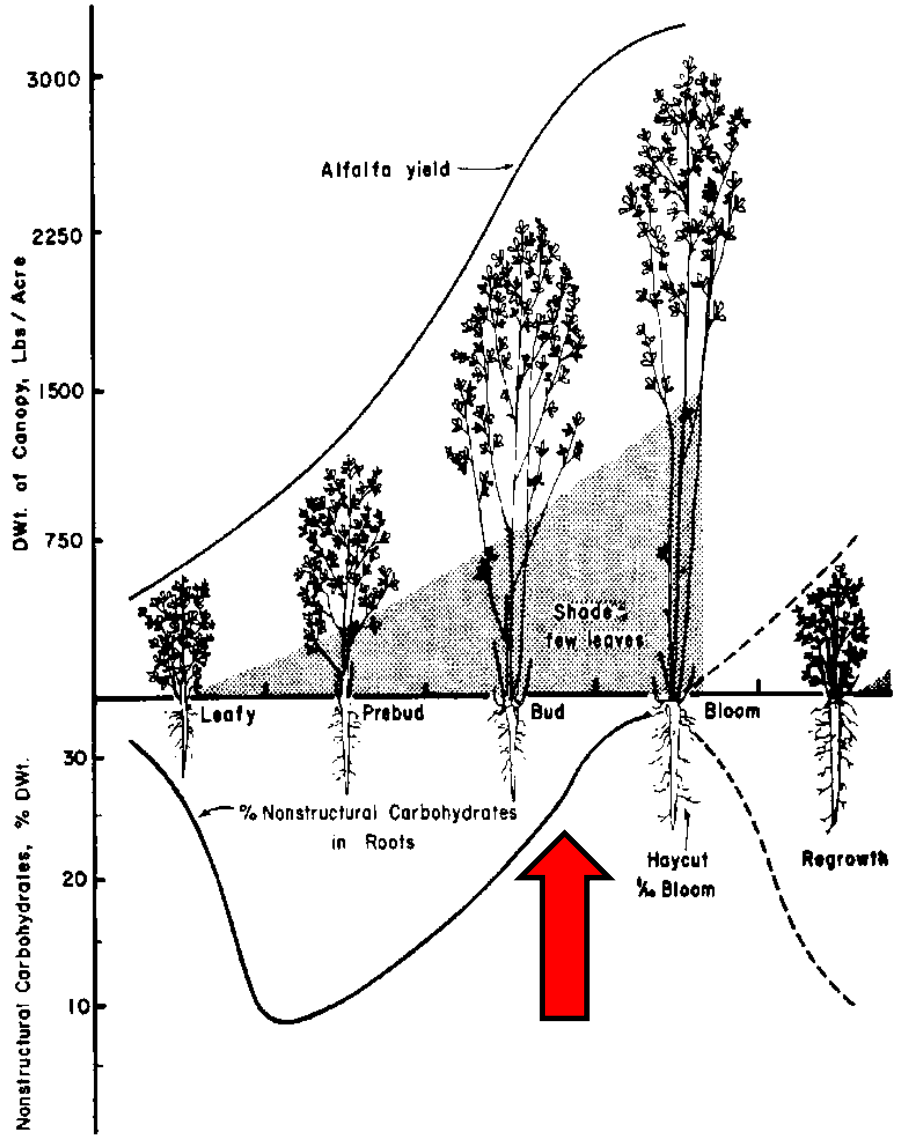
Fewer harvests with better persistence?

Greater flexibility on harvest dates (8-11 days)?

How is Persistence Involved?

Cutting alfalfa at bud stage for optimum quality prevents complete recharge of root carbohydrates

Reduced persistence



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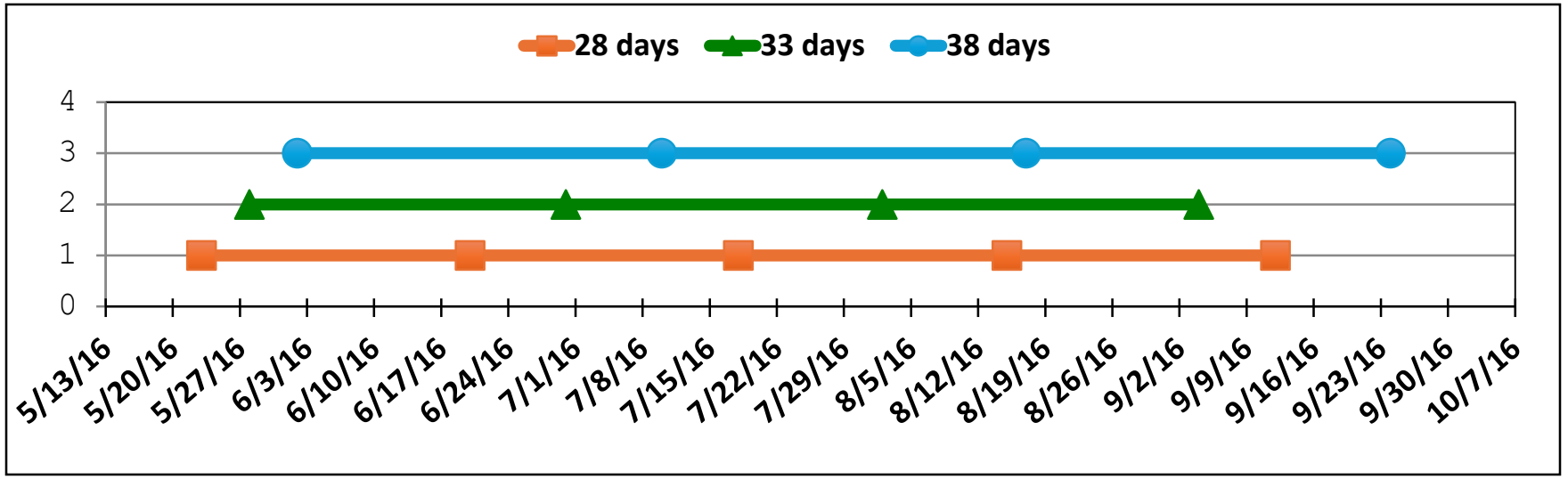
Alfalfa persistence improves because:

longer harvest intervals mean more time for root replenishment,

and fewer harvests means less traffic over field.



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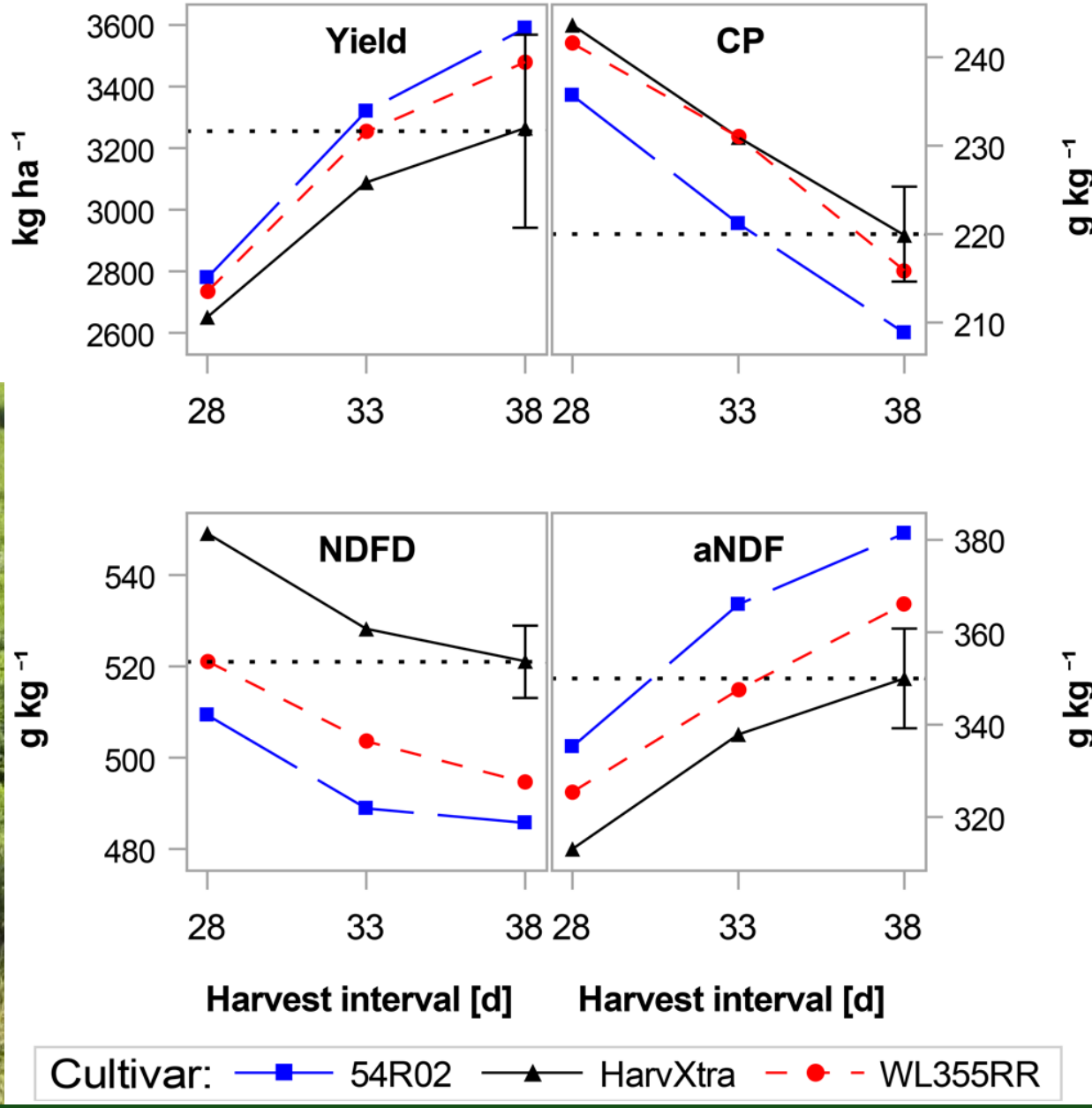
The "Six-State" Study

OH, MI, PA, WI, CA, KS

Seeding year 2015

One production year 2016



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Management Strategies for HarvXtra

Option 1 - Manage for fewer cuttings

- Same or better yield, same quality, better persistence, longer stand life
- Reduced harvest cost

Option 2 - Manage for greater quality

- Cut at the usual late bud stage and take advantage of maximum digestibility in best case scenario
- Provides flexibility to preserve acceptable quality in case of weather delays

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Evaluating Reduced Lignin & High-Quality Alfalfa Varieties in Michigan

Kim Cassida, Phil Kaatz, Monica Jean, and James DeDecker

Project GREEEN

Objective: Evaluate how *commercially available* reduced lignin/high quality varieties respond to harvest schedules in short and long growing seasons

Design

- **Two sites (East Lansing, Chatham)**
- **Fall seeding followed by 3 production years**
- **Randomized complete block design, 4 replications/site**
- **Main plot treatment: harvested every 28, 35, or 42 days**
- **Subplot treatment: 6 commercial varieties varying in quality**

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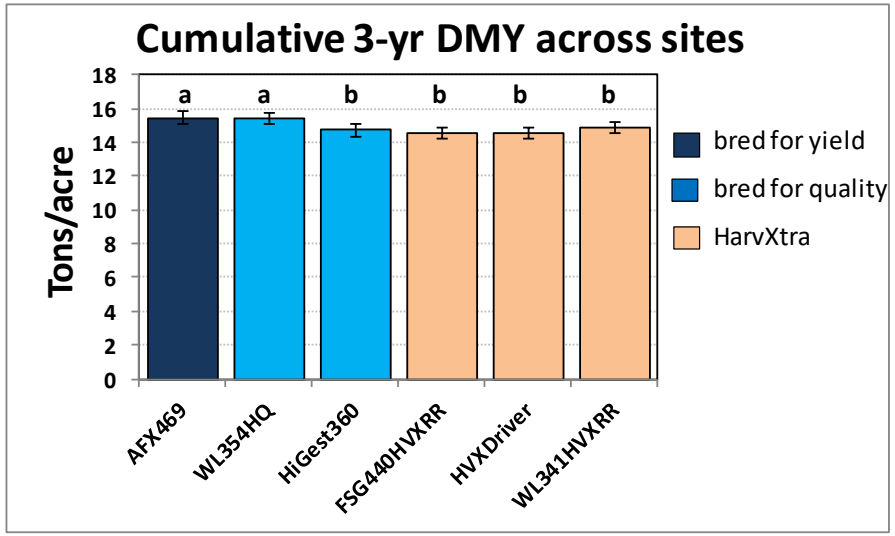
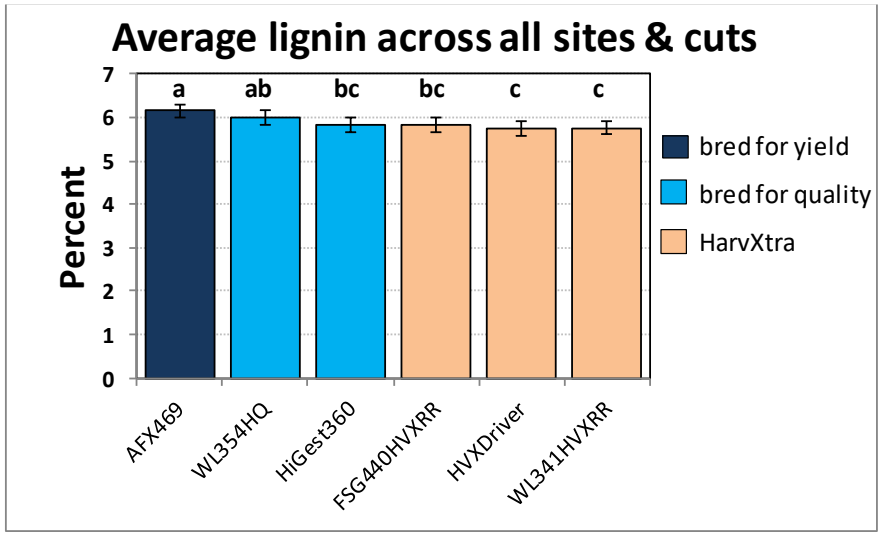
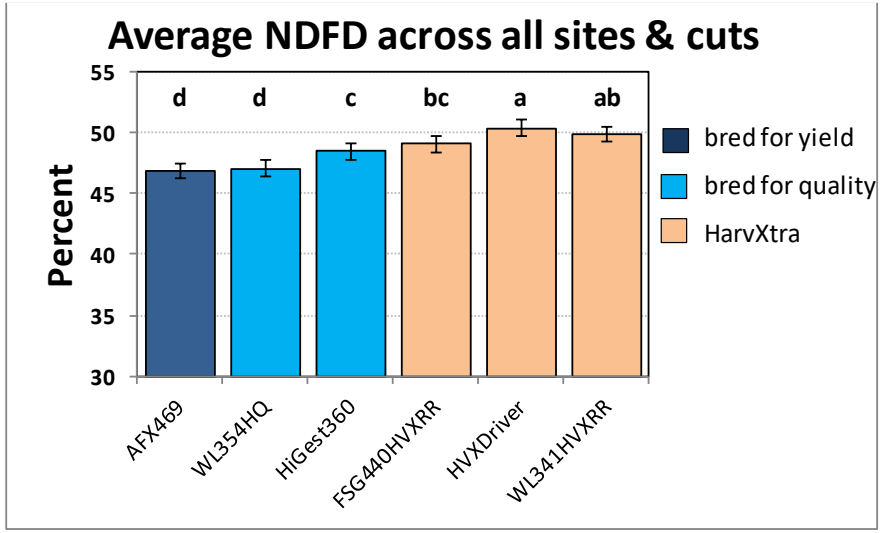
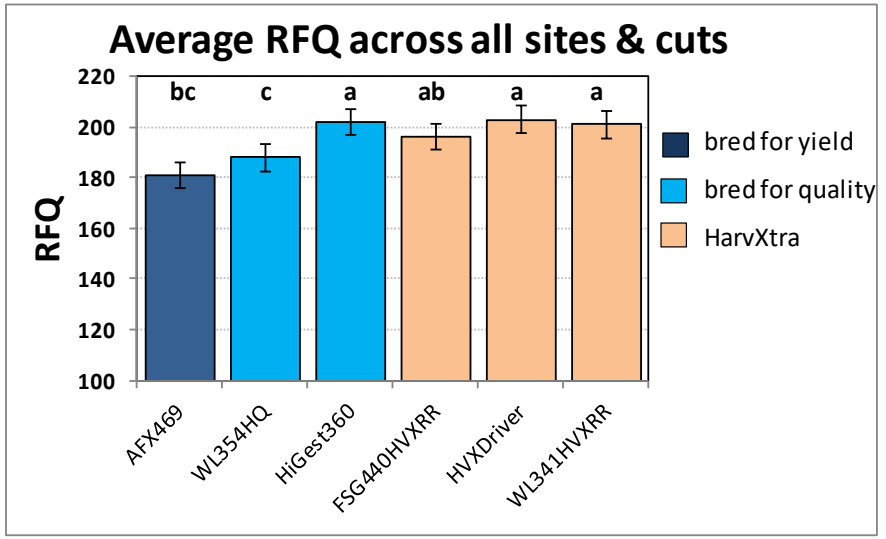
Alfalfa Variety Yield and Nutritive Value Across Cuttings & Sites









HarvXtra generally had less lignin and better NDFD and RFQ than conventionally bred WL354HQ, but less yield

Conventionally bred HiGest 360 was similar to at least one of the HarvXtra varieties for all quality measures, with similar yields

There were no interactions of variety with site or harvest schedule

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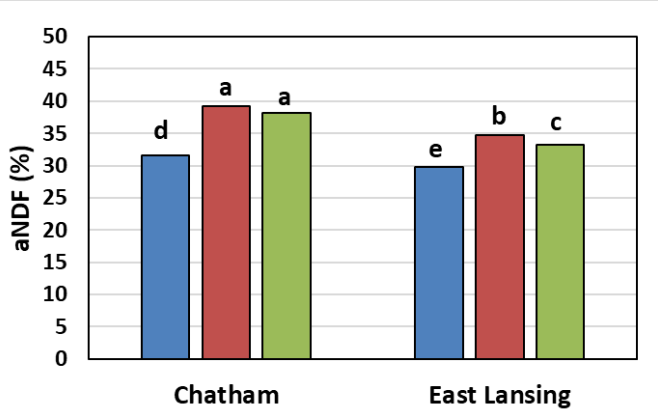

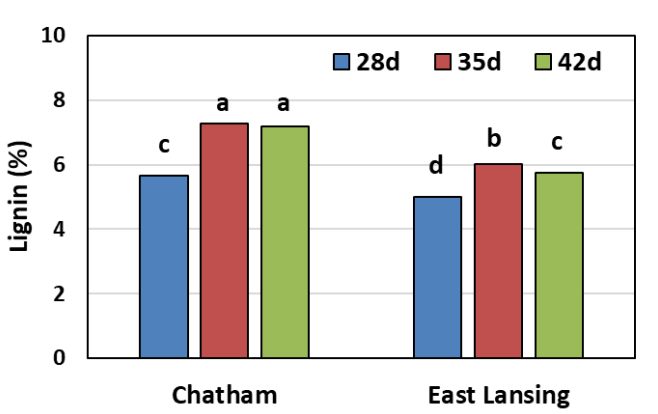

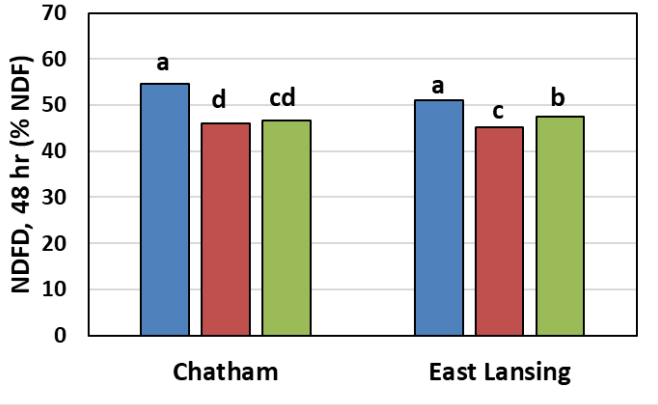

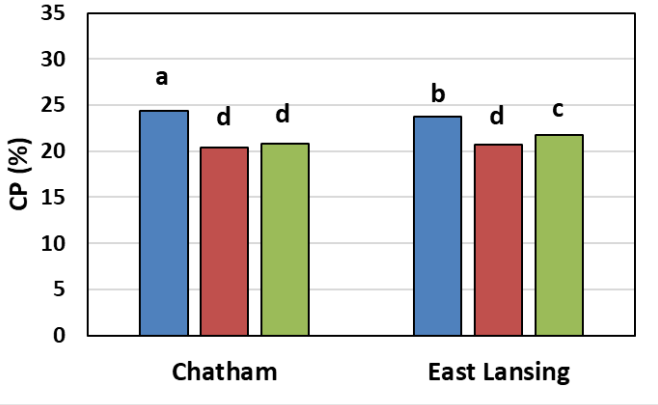

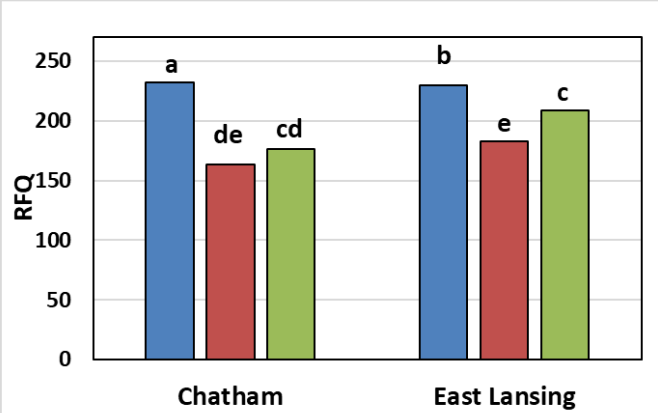

Alfalfa Quality Responded Differently to Harvest Schedules across Sites

Same pattern was seen for all measures

All quality values stayed in acceptable ranges

<u>Chatham</u>

- **28 d quality was better than 35 or 42 d**

<u>East Lansing</u>

- **28 d quality was better than 35 d, with 42 d intermediate**

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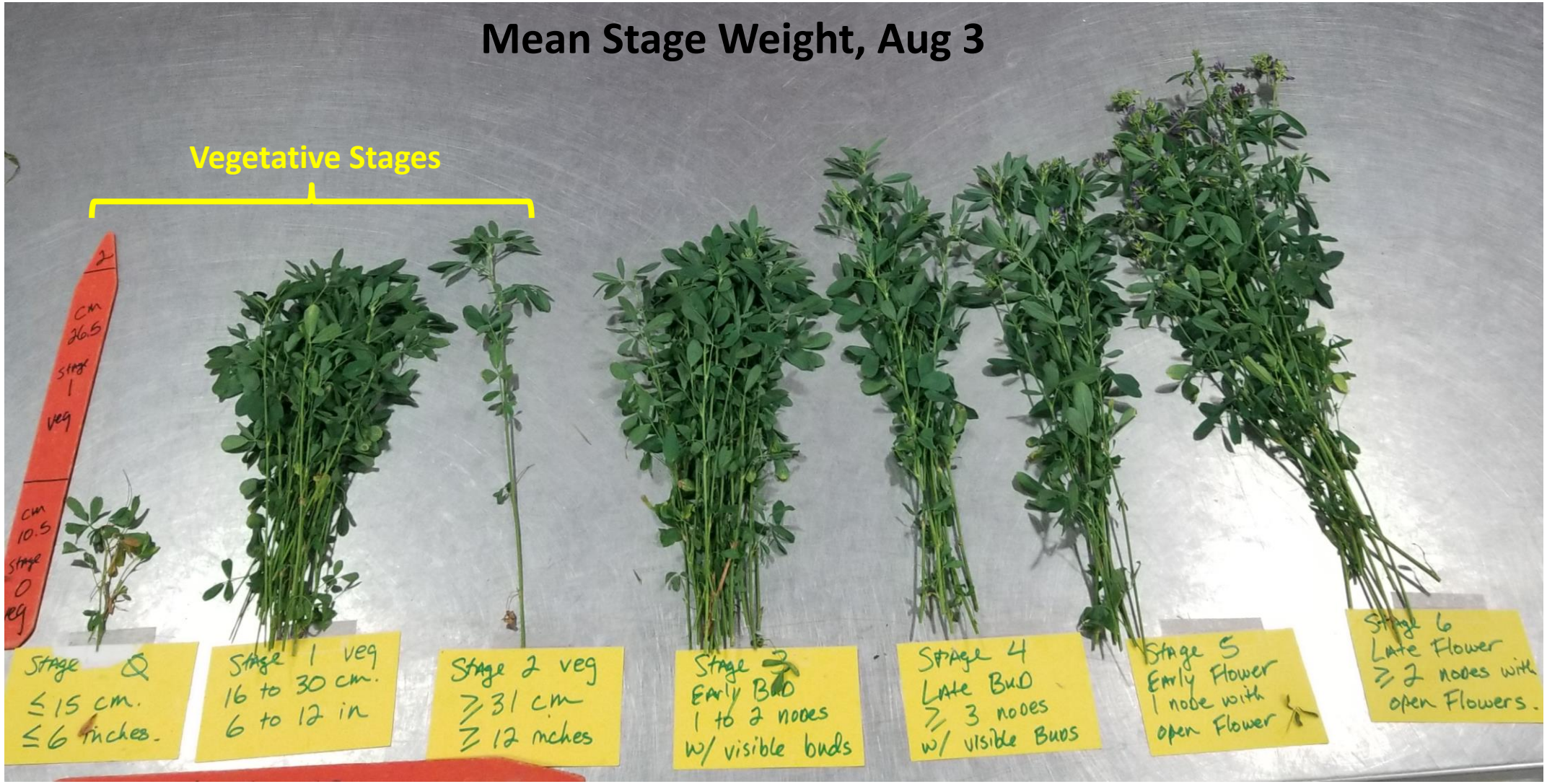

Mid and late summer cuttings in East Lansing often had unexpectedly large number of vegetative shoots on extended harvest schedules which may have improved quality of longer harvest intervals

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Conclusions

- Over a three-year stand life, extended harvest schedules improved alfalfa yield and decreased quality for all varieties in both southern and northern Michigan.
- The HarvXtra trait enhanced forage quality at both sites compared to a high-yield variety but was not always better for individual constituents than conventionally bred high-quality varieties.
- Side by side variety testing is still needed to quantify relative yield of alfalfa varieties even when biotechnology traits are present.
- Adding forage quality measurement to alfalfa variety testing would allow direct comparison of variety quality.
- Higher cost of reduced lignin seed must be weighed against the advantages!

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Take the 2026 Forage Extension Needs Assessment!




The MSU Extension Forage Team is surveying Michigan forage producers / grazers and professionals to assess industry needs.

bit.ly/forageneeds

- This feedback helps improve existing programs and create new ones.
- All responses remain confidential.

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Welcome to the MSU Forage Connection

This web site is the homepage for the MSU Forage Research Program and an information hub for forage production and use in Michigan and the Great Lakes region.

Forages are the third most valuable agronomic crop in Michigan, encompassing over 3.5 million acres dedicated to permanent hay and haylage, and a variable acreage devoted to annual forage and pasture crops. In addition to traditional use as stored or grazed livestock feed, forage crops improve soil health via use in crop rotations or as cover crops, are a vital link in preserving water quality, and provide biofuels. Forage crops thus have a direct or indirect connection to many facets of Michigan agriculture and to ecosystem services that affect all residents.

We hope you will enjoy exploring these connections through this website.

- 2019 Michigan Forage Variety Test Report
- 2019 Michigan Cover Crop Variety Test
- 2019 Michigan Corn Varieties Compared (includes corn silage)
- 2019 MSU Weed Control Guide

Selecting forage species and mixtures for hayfields and pastures may seem overwhelming. Let our new MSU Extension bulletin help you make decisions. Click on the photo to download the bulletin.

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U.P. Pesticide Applicator Training & Exams

MSU Extension and MDARD will offer Pesticide Applicator Training and Exams in the Upper Peninsula on April 1st, 2026. The program includes a core manual review (RUP credits), lunch and MDARD exams (Full training & exam participation required). Core exams (private and commercial) will be offered by MDARD, while commercial category exams will be available onsite through Bay College Testing Services.

Wednesday, April 1st, 2026 – Bay College in Escanaba, MI

Who: Pesticide applicators seeking MDARD exam prep, administration and/or RUP recertification credits

What: A four-hour core manual review, followed by lunch and MDARD exams

When: Wednesday, April 1st, 2026

- Core Manual review 8:00am – 12:00pm
- Lunch 12:00pm – 12:30pm
- MDARD core exams (included), and/or commercial category exams scheduled independently with Metro Institute at Bay College Testing Services 12:30pm – 4:00pm

Where: Core Manual review and MDARD core exams at Bay College, Joseph Heirman Univ. Center (JHUC), Ball Room 952 – 2001 N Lincoln Rd; Escanaba, MI 49829 – Parking Lot A

MDARD commercial category exams at Bay Testing Services, Student Success Center (HUB) Rm. 876 – 2001 N Lincoln Rd; Escanaba, MI 49829

Why: MDARD exam prep, exam administration, and/or RUP recertification credits

Registration:

I) Register online for the **Core Manual review and MDARD core exams** at https://www.canr.msu.edu/events/rupreview-core-testing-apr-1-2026-escanaba.

Private applicators register for I only. Commercial applicators register for I and II

II) Schedule and pay for **MDARD commercial category exams** separately online at http://michigan.metrosignup.com, selecting the Escanaba, Bay de Noc College, location and April 1st date, 12:30pm – 4:00pm ET

Category exams at Bay Testing services must be booked online at least 48 hrs in advance!

Accommodations for persons with disabilities may be requested by contacting the event contact James DeDecker two weeks before the start of the event at dedecke5@msu.edu. Requests received after this date will be honored whenever possible.

Main Effect of Alfalfa Variety

Two-year total dry yield and average forage quality across all sites and cuttings

	Total DMY (ton/A)	aNDF (%)	NDFD, 48 hr (% NDF)	Lignin (%)	CP (%)	RFQ (%)
AFX469	15.41 a	35.9 a	46.6 c	6.43 a	21.3 c	184 c
WL354HQ	15.40 a	34.9 ab	49.8 a	6.28 ab	21.9 b	192 bc
HiGest 360	14.73 b	33.7 b	48.2 b	6.07 bc	22.6 a	206 a
FSG 440HVXRR	14.86 b	34.2 b	49.0 b	6.08 bc	22.0 b	200 ab
HVX Driver	14.54 b	34.0 b	50.2 a	6.02 c	22.0 b	206 a
WL341HVXRR	14.53 b	33.9 b	49.8 a	6.02 c	22.1 b	205 a

abc Means within columns with different letters are different ($P < 0.05$)

No interactions between variety and site or harvest schedule

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