Wallace Center
AT WINROCK INTERNATIONAL

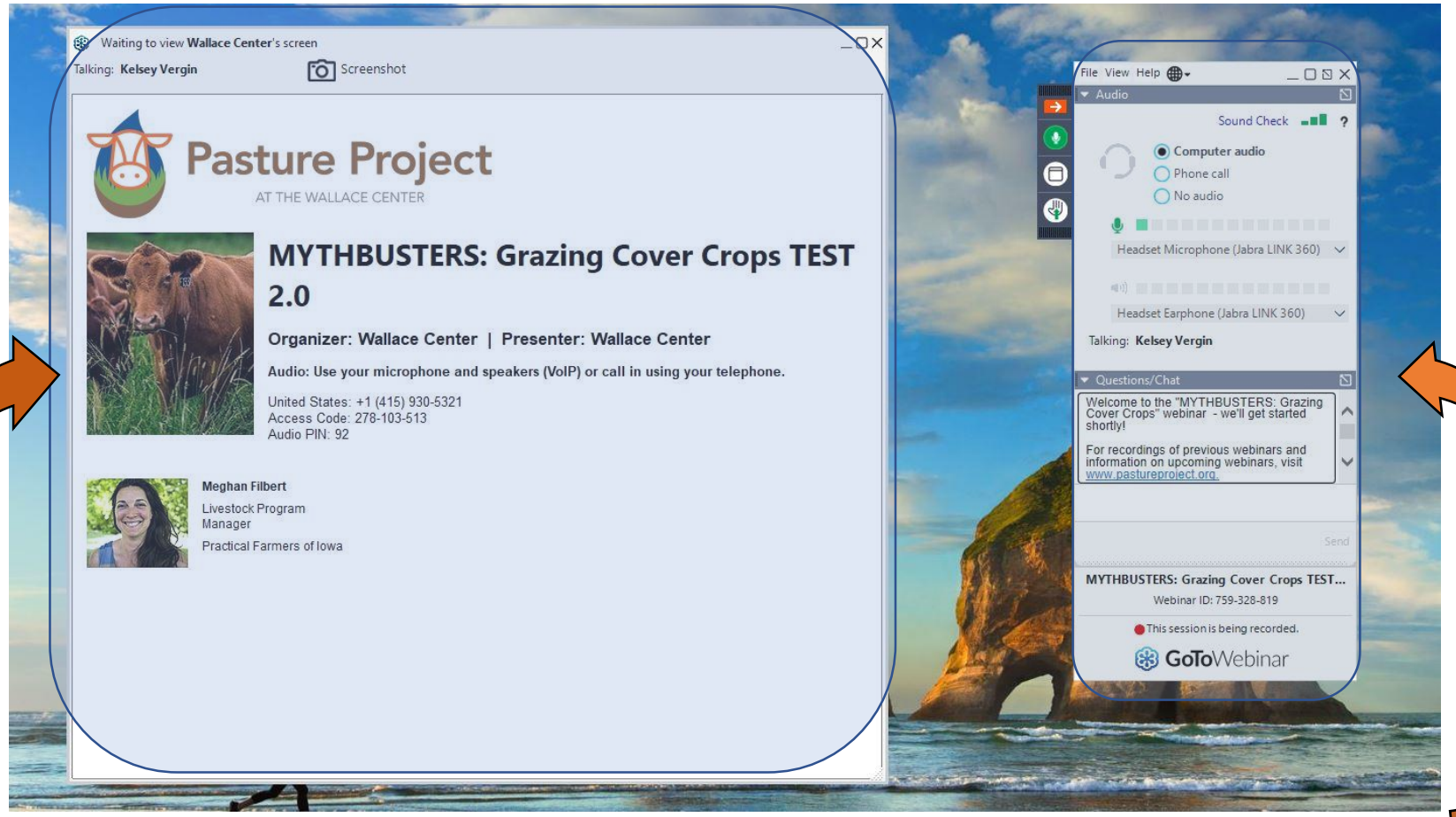
Pasture Project
AT THE WALLACE CENTER

HOW TO TREAT YOUR COVER CROP LIKE A CASH CROP

WITH DR. ANDREA BASCHE

- Tech Orientation
- Welcome & Introductions
- Presentation
- Q&A

Your Starting Screen



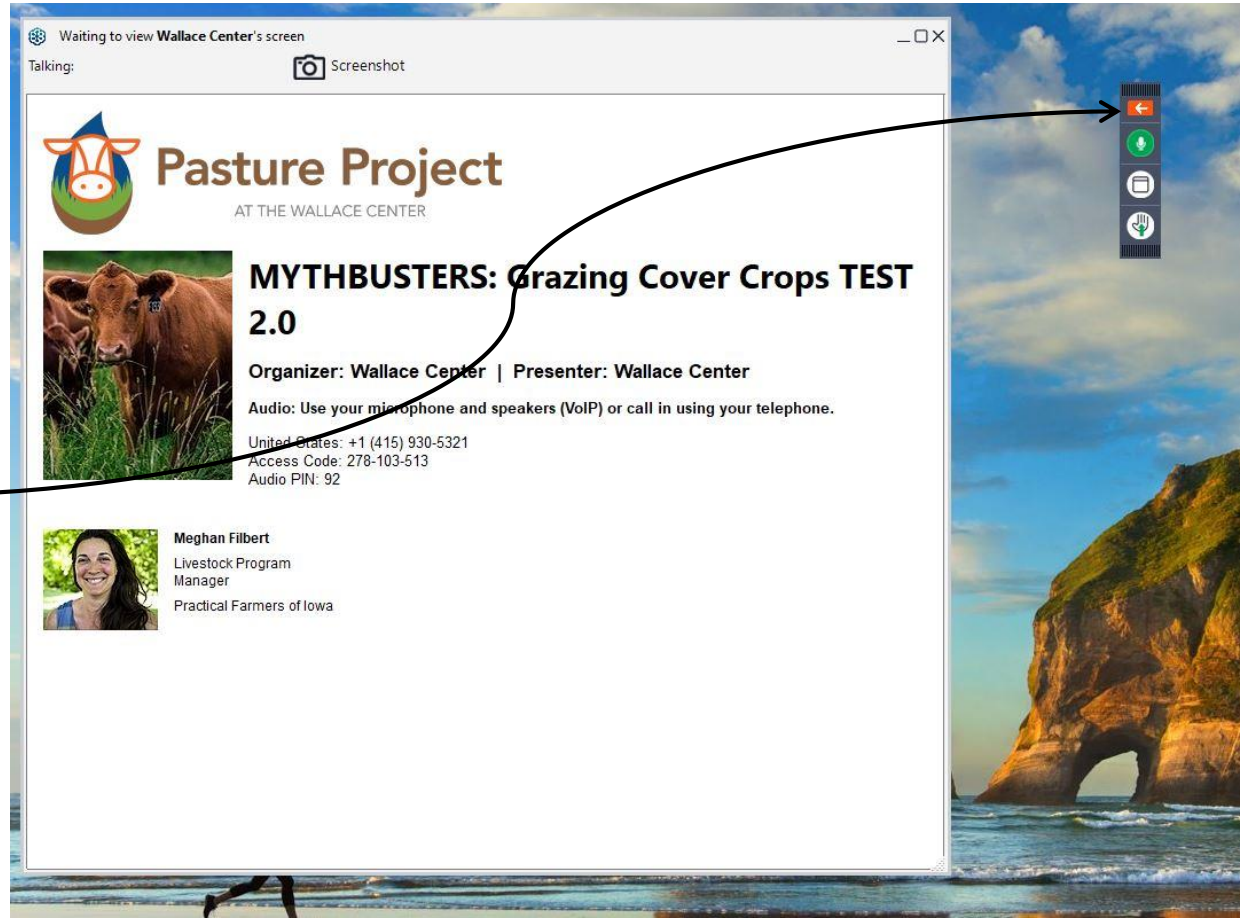
Presentation

Control Panel

Pasture Project
AT THE WALLACE CENTER

To Display Minimized Control Panel

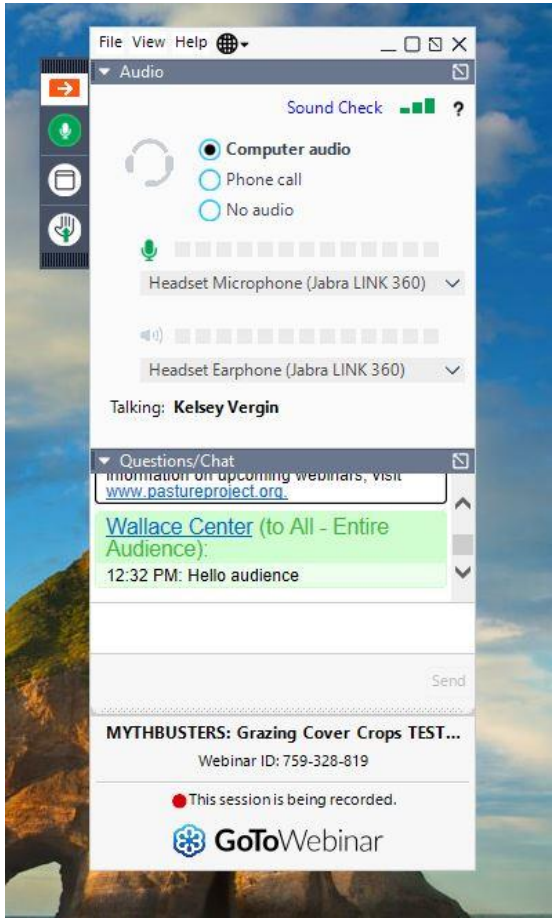
Click the orange arrow button



To Ask a Question

Type your question in the small box at the bottom of the Questions box.

Press “Send”!



What is the Pasture Project?

The Pasture Project works to advance and integrate regenerative grazing as a scalable, market-driven solution for building healthy soil, viable farms, and resilient communities in the Upper Midwest. Pasture Project is part of the Resilient Agriculture and Ecosystems initiative of the Wallace center at Winrock International.

www.pastureproject.org

Pasture Project
AT THE WALLACE CENTER

Register for upcoming webinars

Fix Your Mix-Using Management Goals to Create Diverse Cover Crop Seed Mixes

Thursday, July 23 (2:00-3:00pm CT)

Register: www.pastureproject.org/events

Audience Poll

Help us frame this webinar to address your particular needs by answering the following questions. Only available to those joining by computer – use your mouse to click answers on screen.

Your responses will be confidential – the Pasture Project never shares personal information.

Today's Presenter

Dr. Andrea Basche

University of Nebraska-Lincoln, Dept. of Agronomy and Horticulture

How to treat your cover crop like a cash crop

Andrea Basche, Ph.D.
University of Nebraska-Lincoln, Dept. of Agronomy and Horticulture
June 10, 2020

Pasture Project
AT THE WALLACE CENTER

AGRONOMY AND HORTICULTURE

Summary of crop management considerations from my 200-level undergraduate course

Management	Corn	Soybean	Wheat
Planting dates	When soil temperatures reach 50F – April into May	Earlier planting in April or May equates to more time for nodes to form (3.7 days/node)	Goal to acquire 400 growing degree units before December 31, typically early October depending on location
Crop varieties (maturity, other selection criteria)	Typically in NE >100-day comparative maturity length hybrids, are utilized depends on location and planting dates	Maturity groups are based on daylength required for onset of flowering/reproductive growth. In Southeast Nebraska typically maturity group 3.0 varieties are utilized and this decreases to 2.0 or less moving north and west across the state.	Variety selection is particularly critical for wheat especially in terms of disease resistance, lodging, quality characteristics
Row spacing	Typically 15 or 30 inch rows, want to optimize canopy capture of sunlight by the V8 growth stage. Not considered to be as critical for higher yield corn as other factors such as planting date or seeding rate	Typically 15 or 30 inch rows, weed pressure in soybean may favor narrower row spacing.	Commonly planted in 7.5 inch rows
Seeding rates	Depends on location, could have planting rates as low as 20k seeds/acre in non-irrigated/drier environment or as high as >40 seeds/acre in an irrigated/wetter environment. Consider balance of net returns at higher seeding rates.	Seeding rates range typically in Nebraska from 135-175k seeds/acre. Research has found that net returns are diminished after 125k seeds. May consider higher seeding rates at later planting dates.	Dependent upon planting timing. Could range from 1.2 million (earlier planting) to 1.8 million seeds/acre (later planting).
Fertilizer – N, P, K, pH	N rate dependent upon soil (organic matter, soil nitrate), expected yield, previous crop, fertilizer timing, price considerations. Phosphorus recommended levels based on critical value of 25 ppm (Bray-1 test) for continuous corn or 17 ppm following soybean. Rates depend on application method. Potassium threshold considered to be 125 ppm, no application needed if above that level. Lime recommended at pH < 5.5.	Typically N fertilizer is not applied to soybean. Inoculation is typically recommended on fields where a productive soybean crop has not been grown before. Phosphorus recommended levels based on critical value of 12 ppm (Bray-1 test). Potassium threshold for soybean also considered to be 125 ppm. Recommended optimal pH is 5.5-7.0.	Nitrogen based on regional recommendations, typically between 80-110 lbs. Phosphorus based on 25ppm Bray-1 threshold (similar to corn)*
Fertilizer timing	Fall, Spring (pre-plant), late spring/early summer (post-plant/in-season) or summer (applied with irrigation)	*	Apply most or all nitrogen as wheat “greens” up in February/March, later applications can improve protein content*
Residue management and tillage	Reduced to no-till has been found to have a neutral to positive effect on corn yields in the Western Corn Belt region	No till or reduced till typically has a neutral effect on soybean yield. No-till has been found to increase soybean yield in rainfed conditions or after a number of years.*	*
Most important determinants of high yield management	Weather, nitrogen, hybrid selection, previous crop/crop rotation, plant population/seeding rate, tillage, growth regulators	Variety selection, planting date, weed control, phosphorus fertility, crop rotation, row spacing, seeding rate, rye cover crop	Variety selection, Foliar fungicide, Row spacing, Planting date, Nutrient management, Seeding rate

*topics not discussed in detail in Agro 204

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Opportunities for optimizing or extending the cover crop growing season

- Interseeding or overseeding cover crops into standing corn or soybean, at vegetative growth stages (~June) or closer to harvest (Aug/Sept)
- Planting “green”: planting corn or soybean directly into a live cover crop and terminating it later
- Cover crops drilled after an earlier fall harvest due to earlier spring cash crop planting and/or shorter season varieties and/or different cash crops grown

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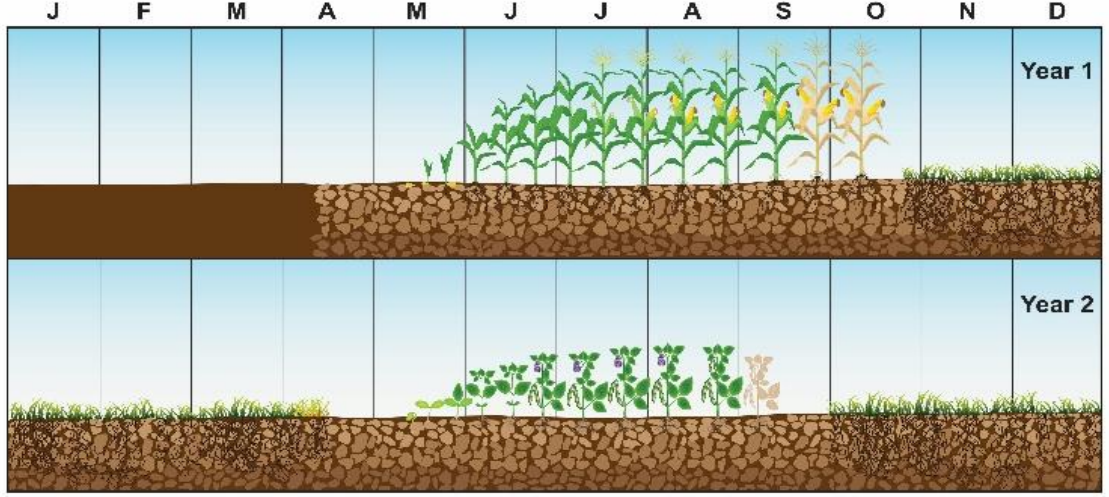
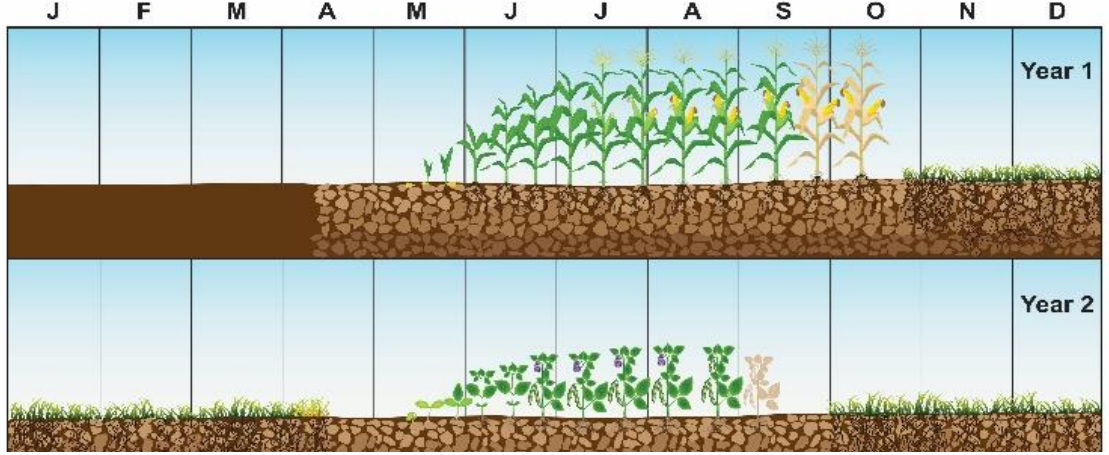
Field experiment and cover crop simulations

- Field data collected from 2015-2017 at South Central Ag Lab in Clay Center, Nebraska
- Varied corn maturity hybrids (early, medium and late season varieties) were grown before a winter rye cover crop at three different planting dates (April, May and June)
- Simulation modeling using the APSIM platform to extend these results in time and evaluate the impact of different seasons
- Questions:
  - How much difference does a shift in the variety selection or planting date have on yield?
  - How much additional cover crop growth can be expected over different seasons with earlier planting or later termination?

Chatterjee et al. In Revision. Simulating winter rye cover crop production under alternative management in a corn-soybean rotation. Agronomy Journal.



Late season varieties
110-115 day



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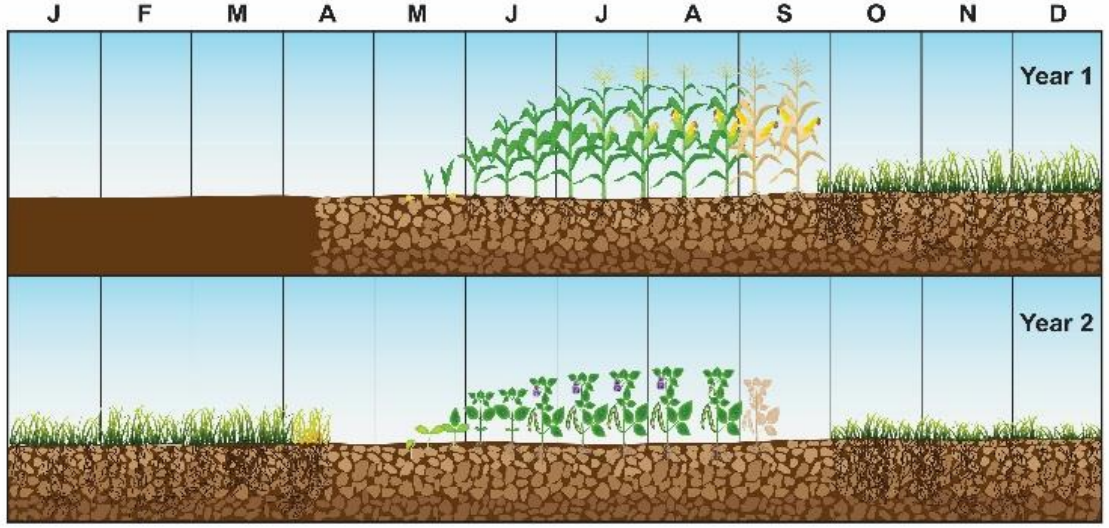
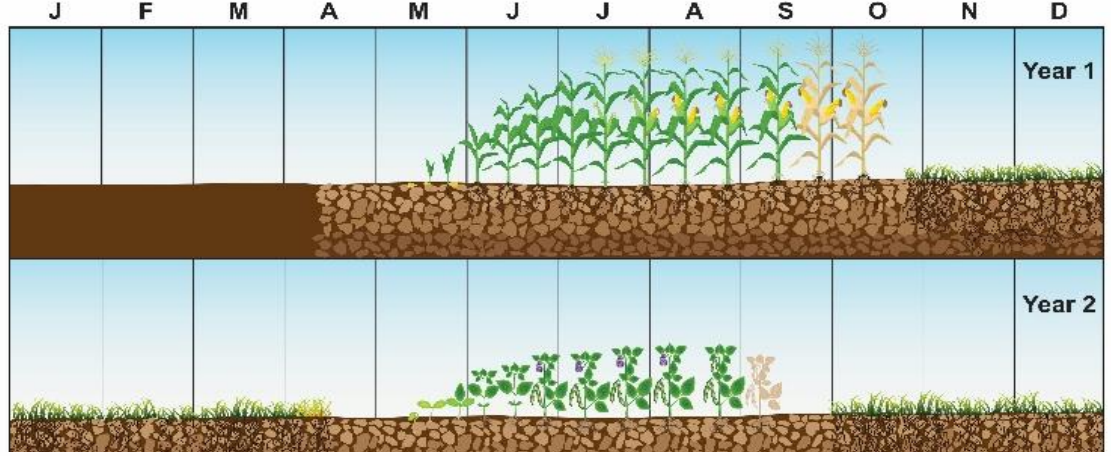


Medium season varieties
100-105 day



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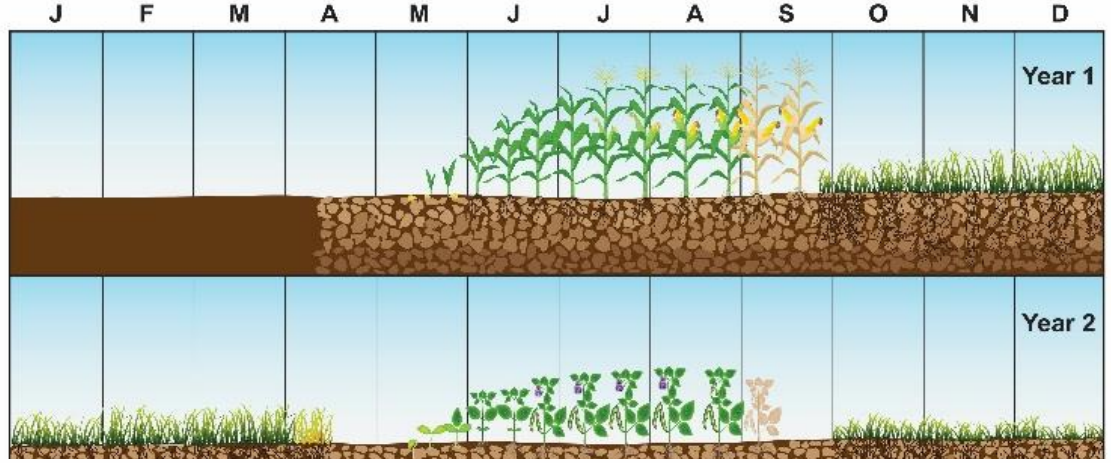

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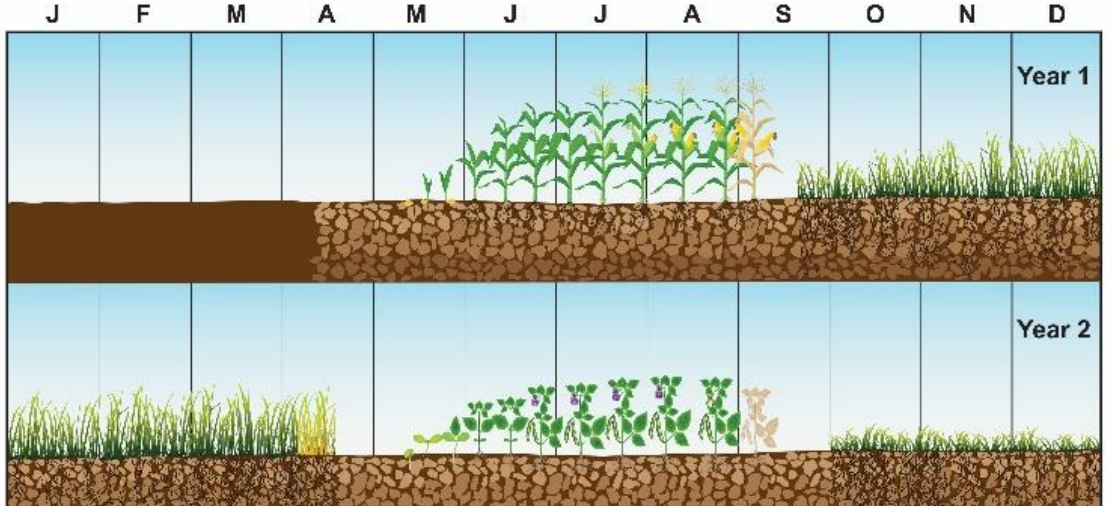
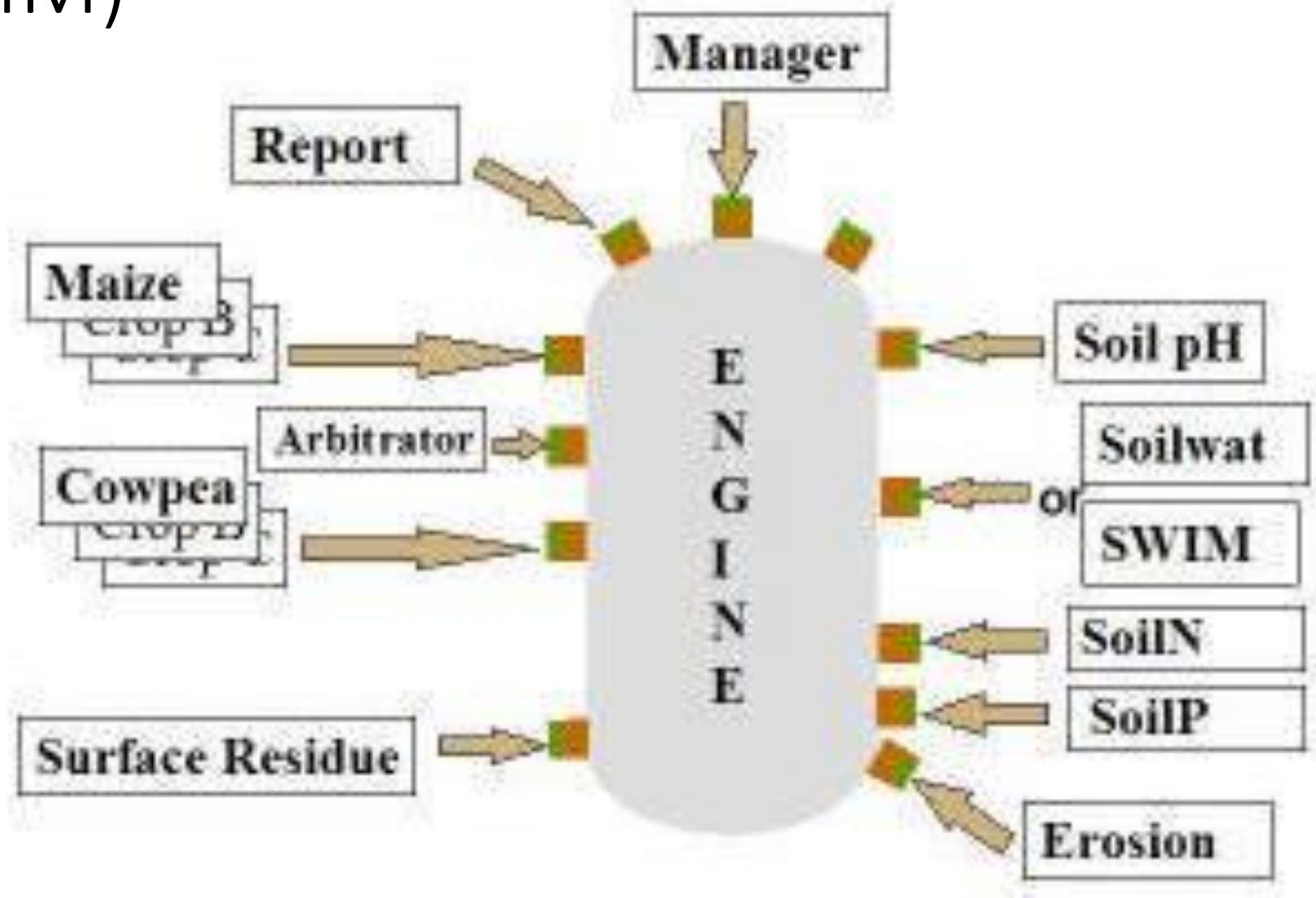
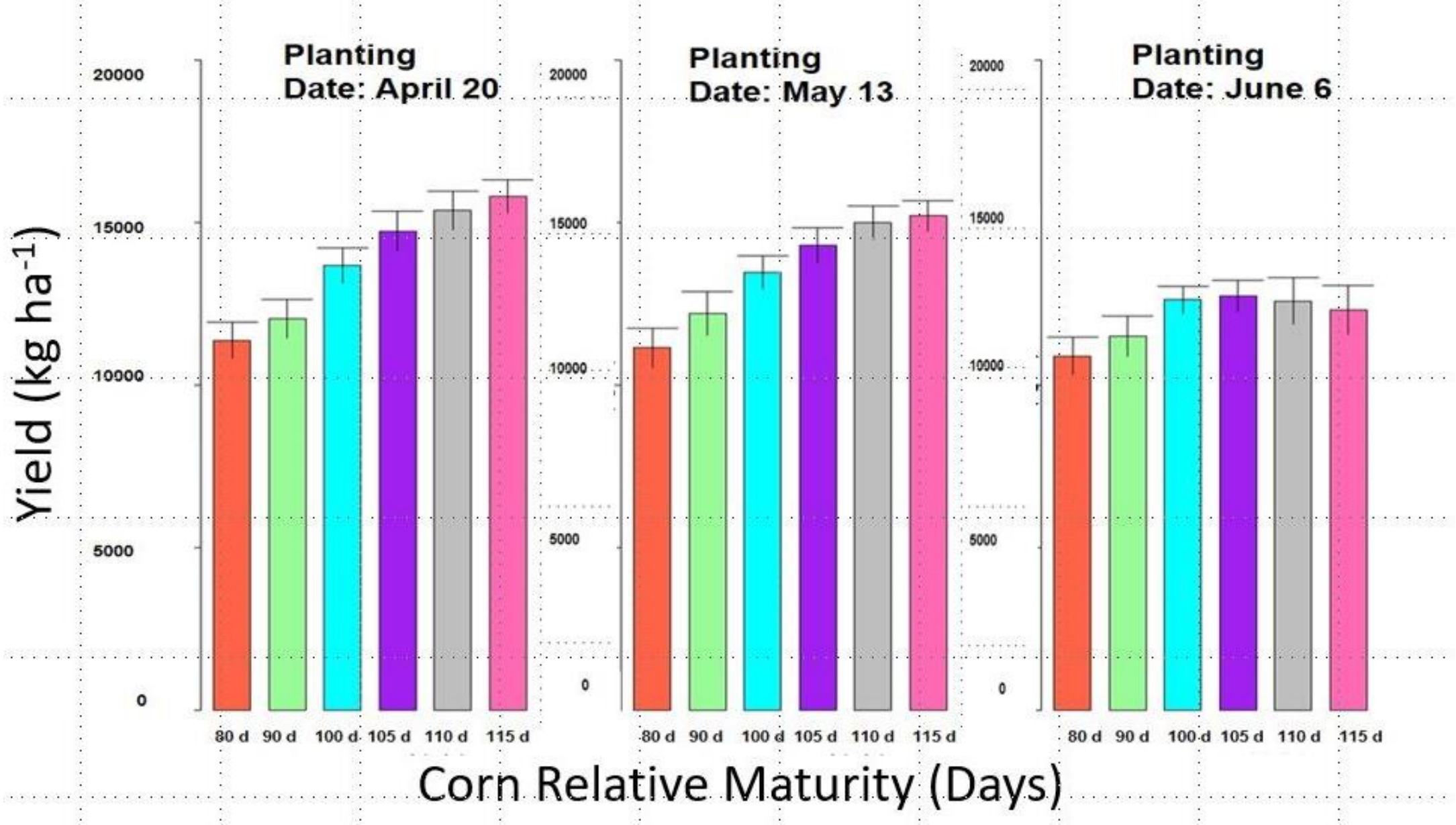


Early season varieties
80-90 day

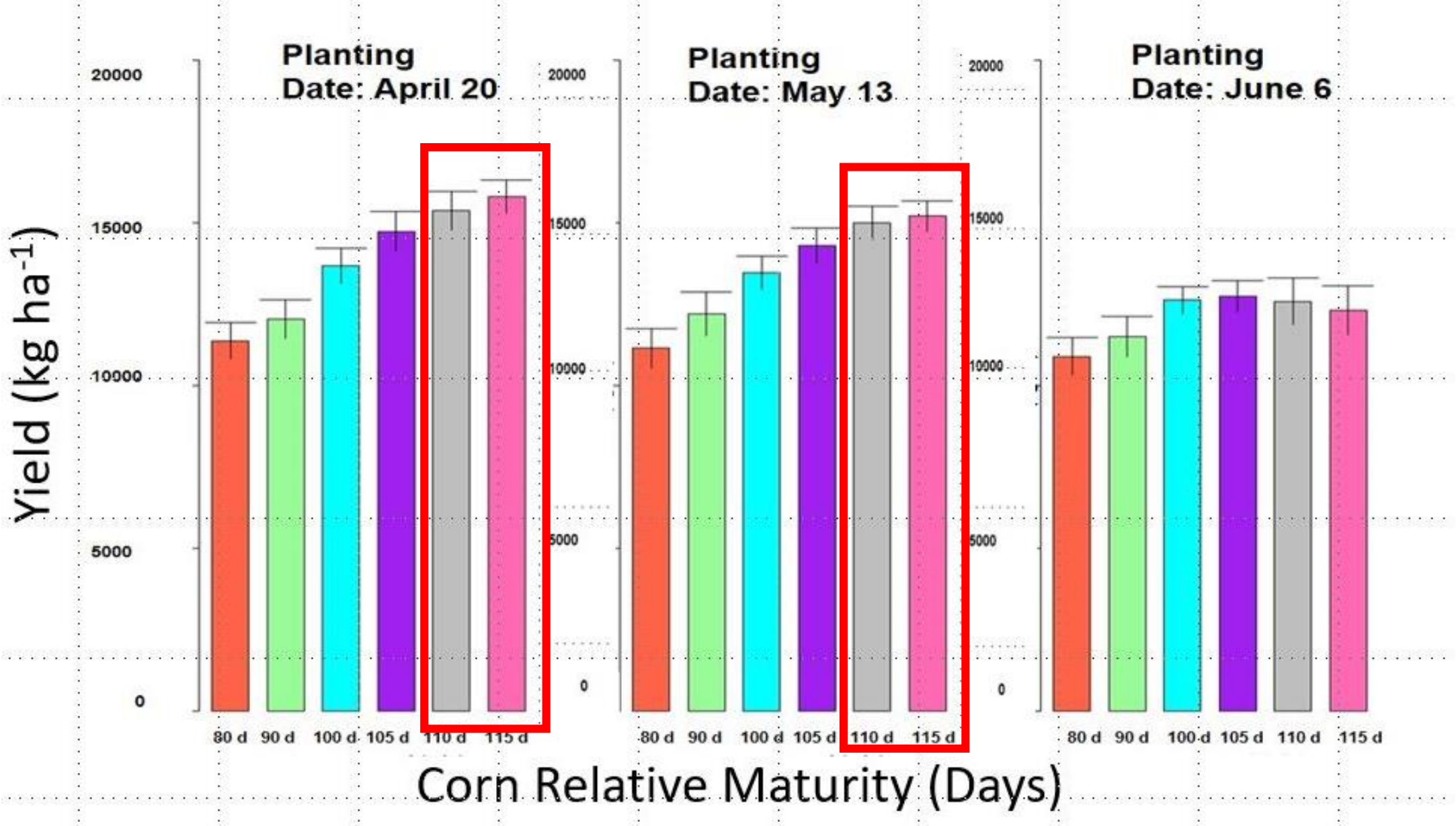
Agricultural **P**roduction **S**ystems s**IM**ulator (APSIM)



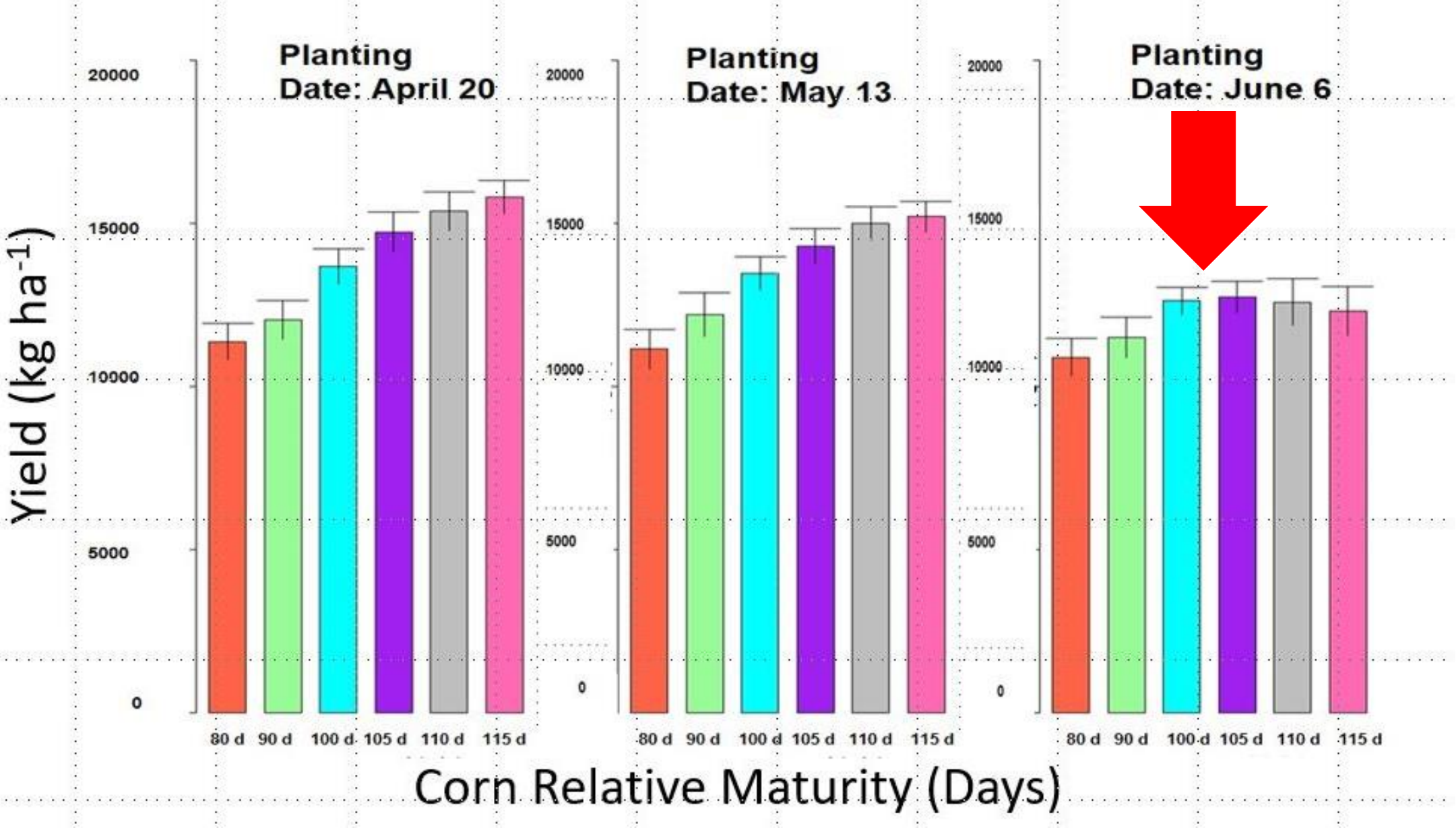
Corn yield results based on different varieties and planting dates



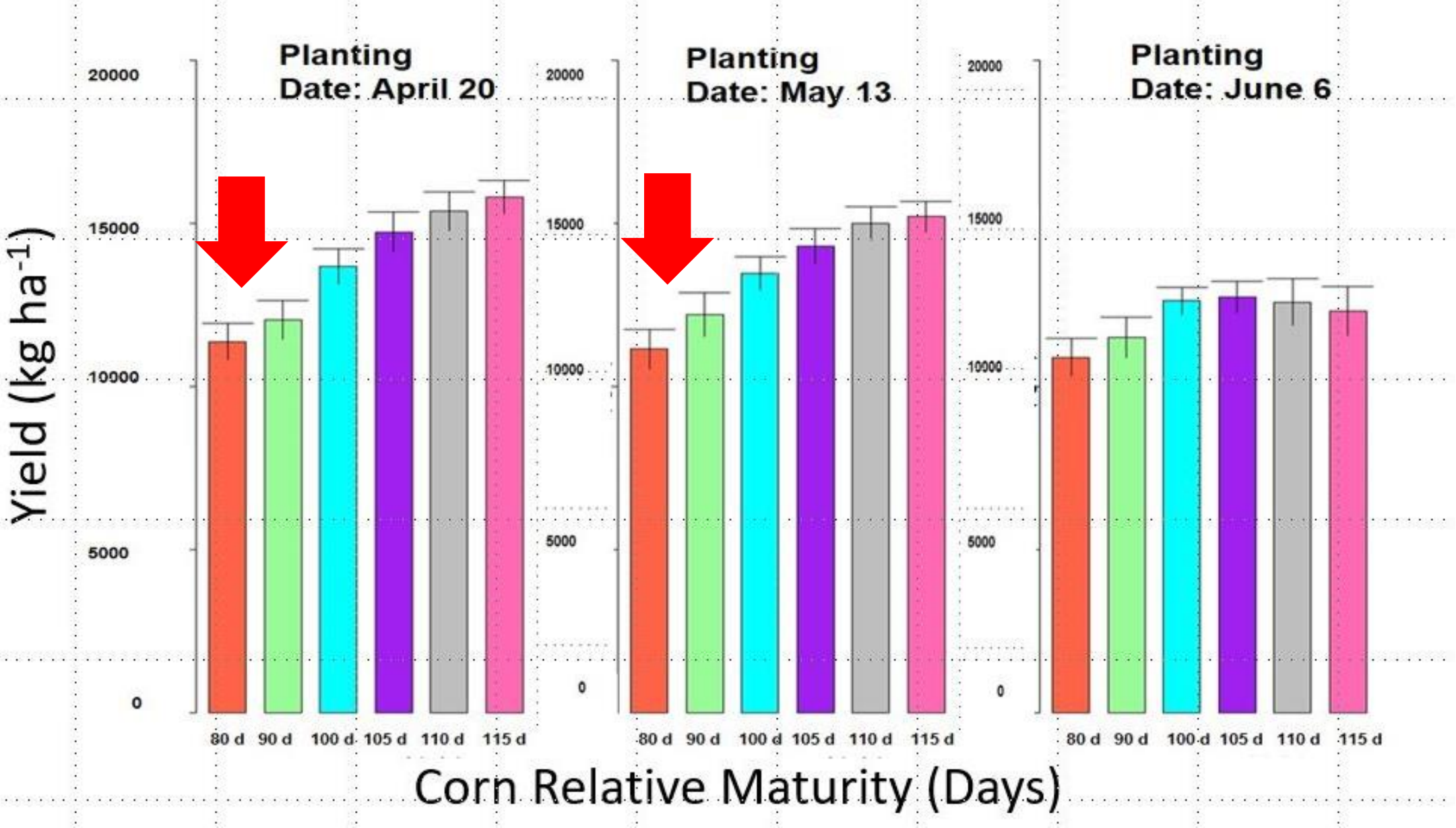
No differences in late season varieties when planted in April or May



Yield declines when planted in June



Yield differences between early, medium and late season varieties



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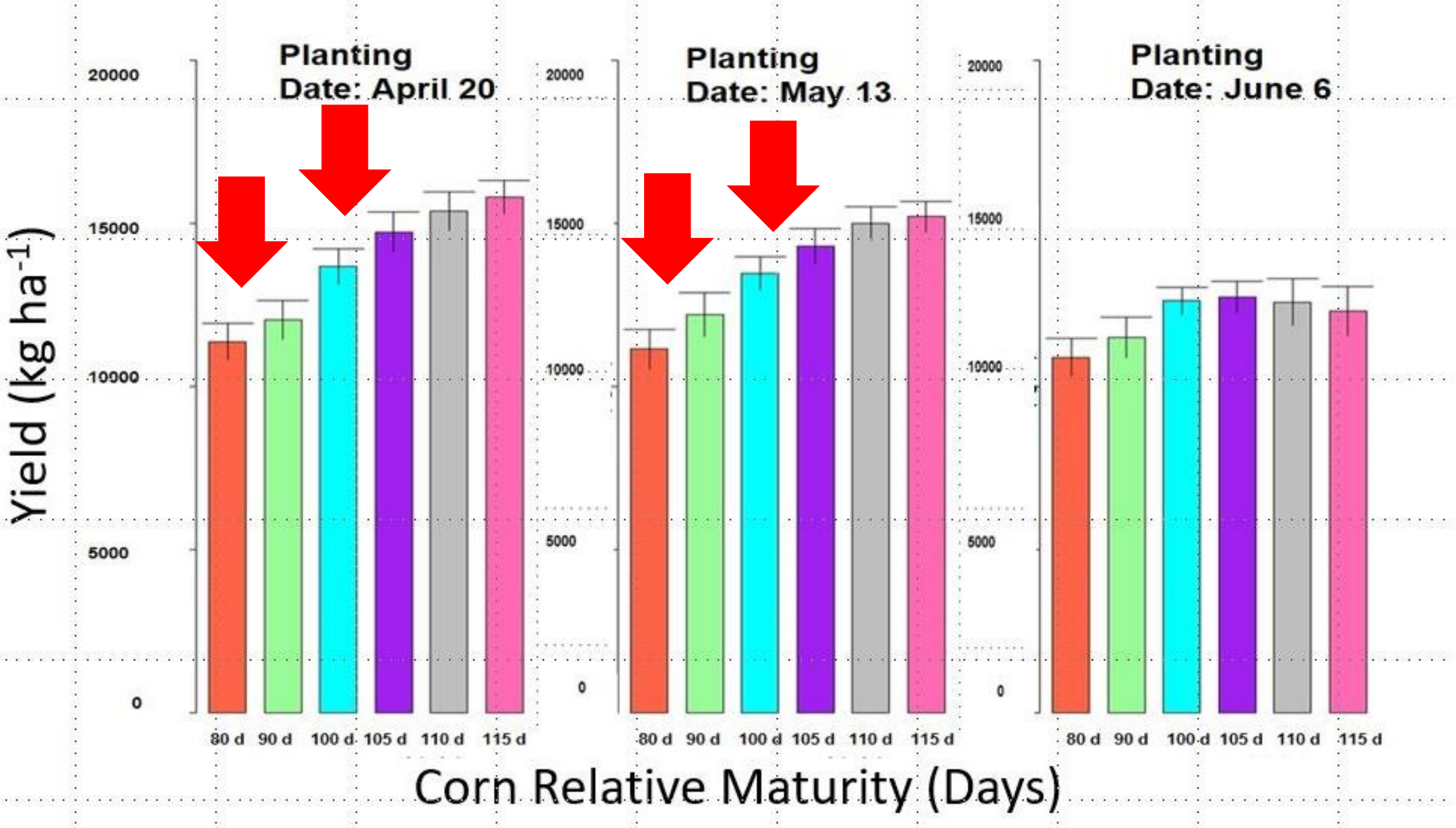

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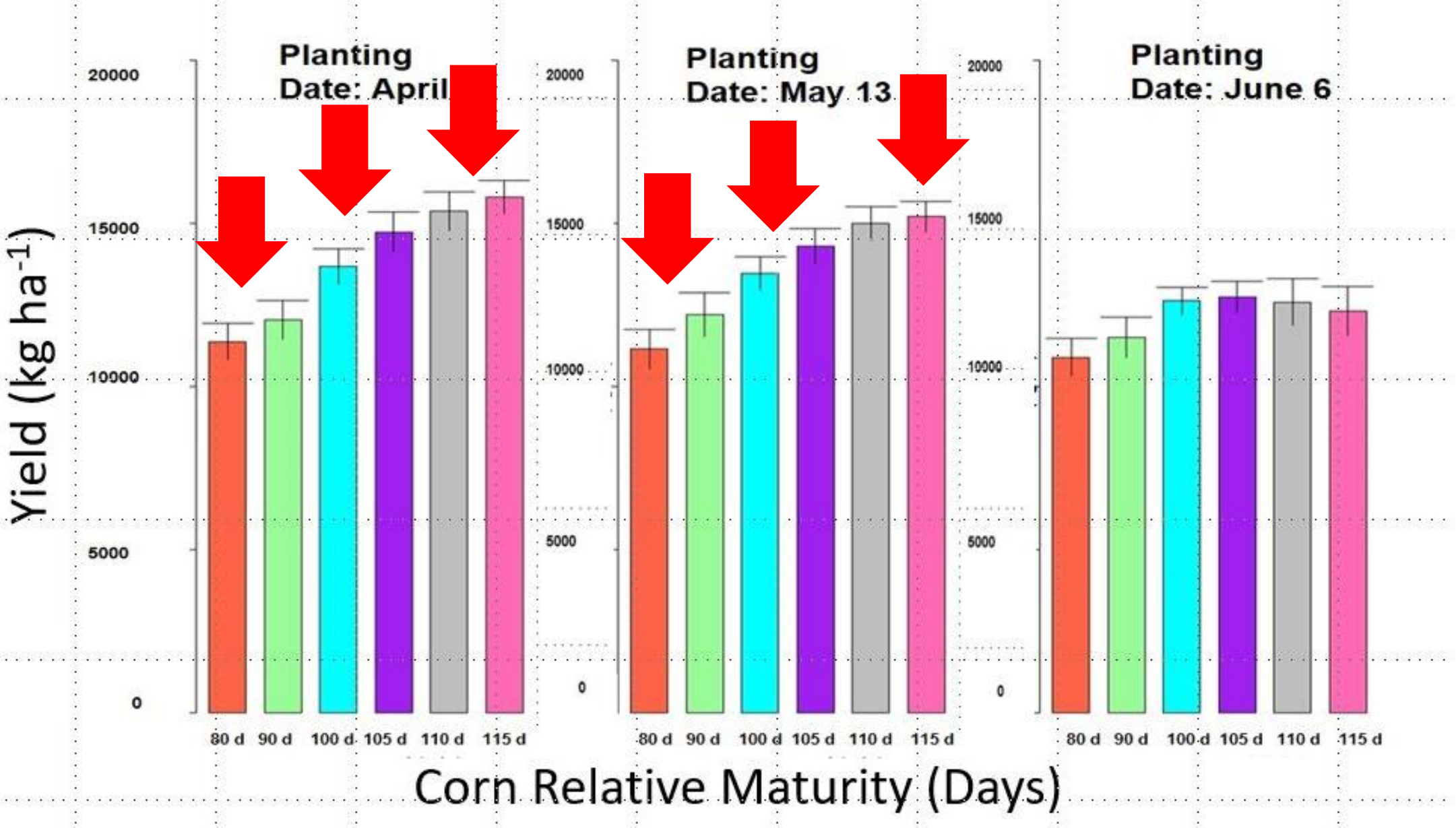
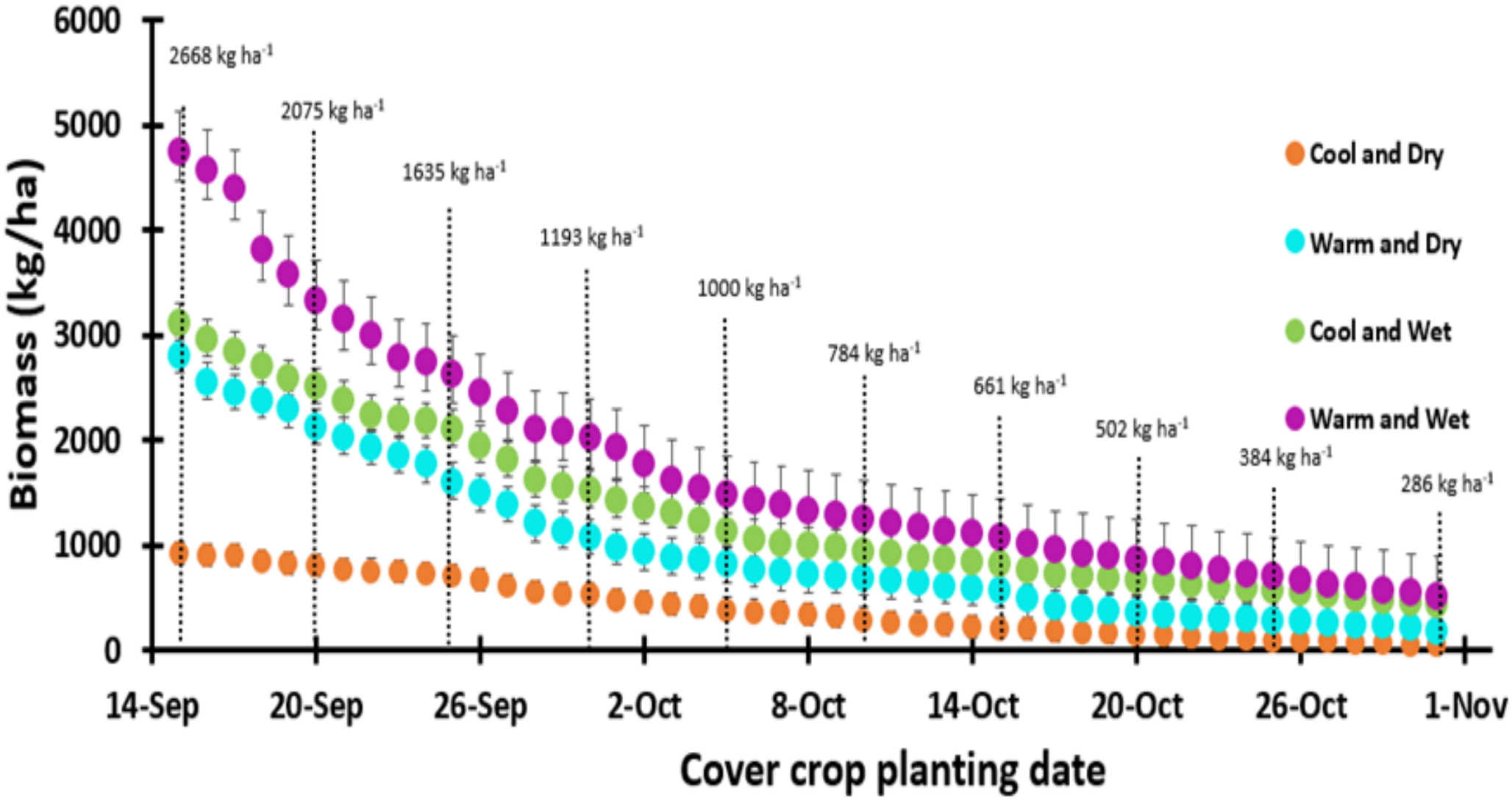


Corn planting date	Comparative relative maturity hybrid	Model predicted harvest date
April 20	80 day	August 28
	90 day	Sept 7
	100 day	Sept 15
	105 day	Sept 21
	110 day	Sept 25
	115 day	Sept 29
May 13	80 day	Sept 7
	90 day	Sep 16
	100 day	Sept 25
	105 day	Oct 1
	110 day	Oct 4
	115 day	Oct 9

Simulated different planting dates in fall with mid-April termination



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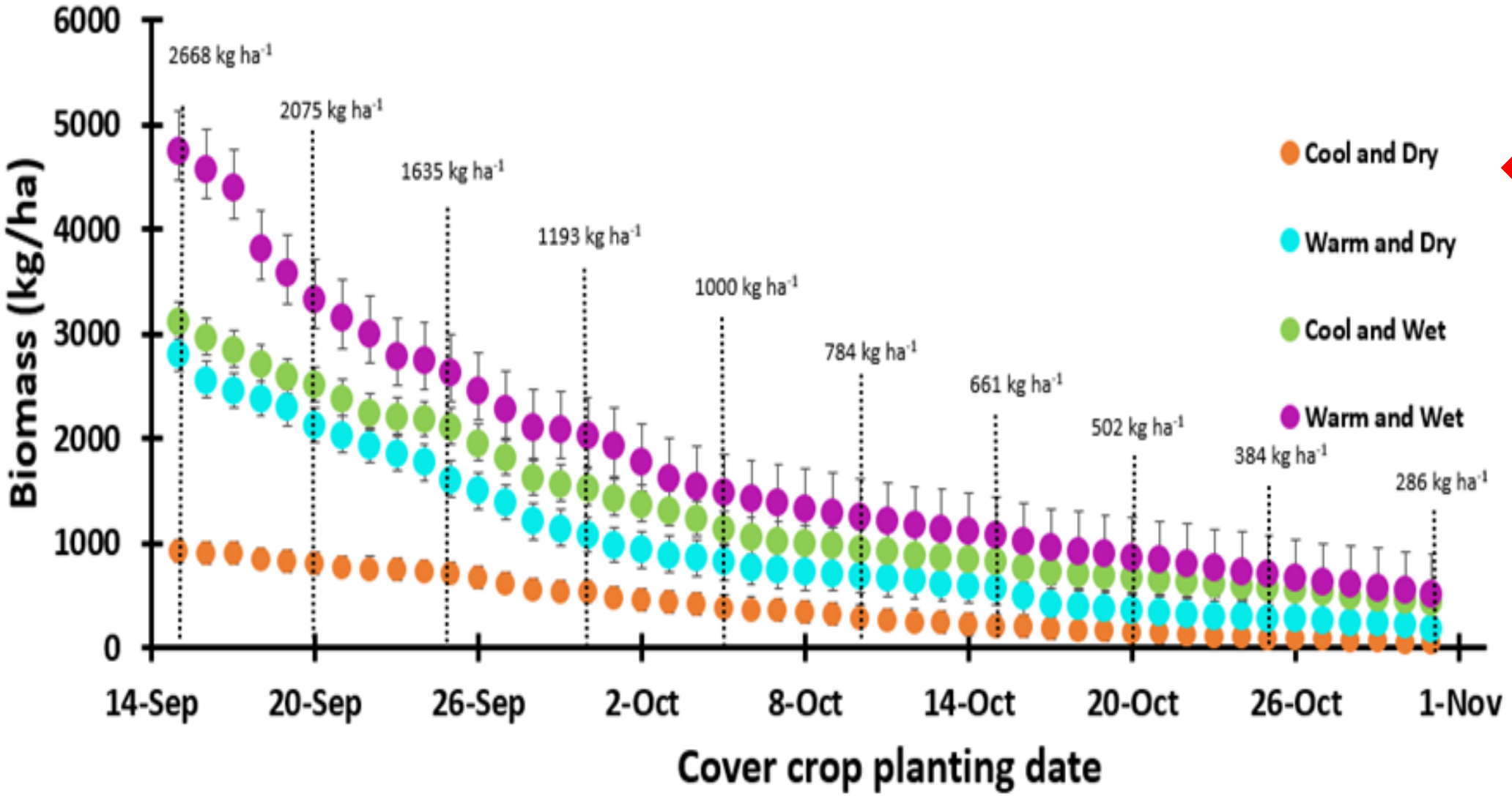

Seasons based on above or below average moisture and temperature

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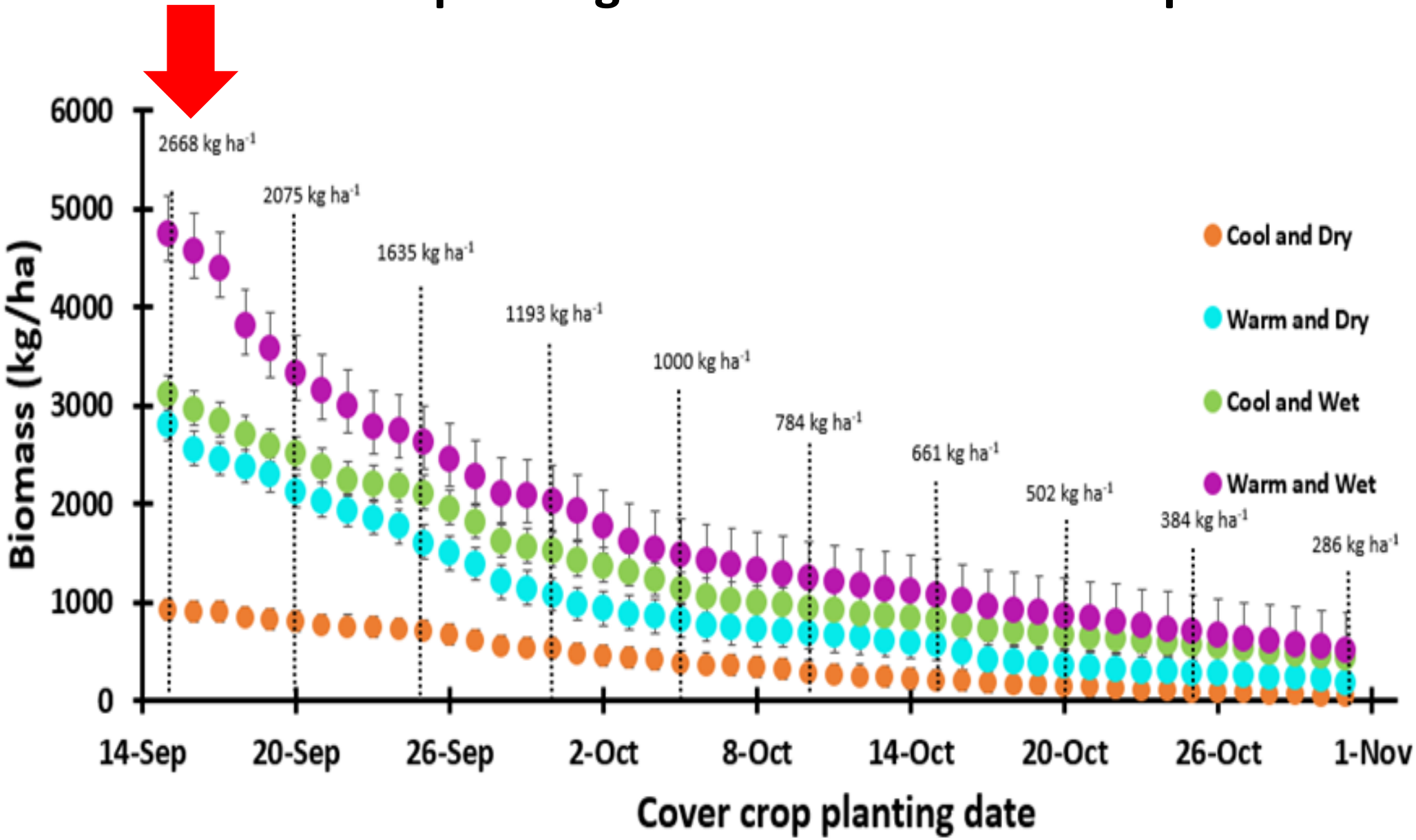

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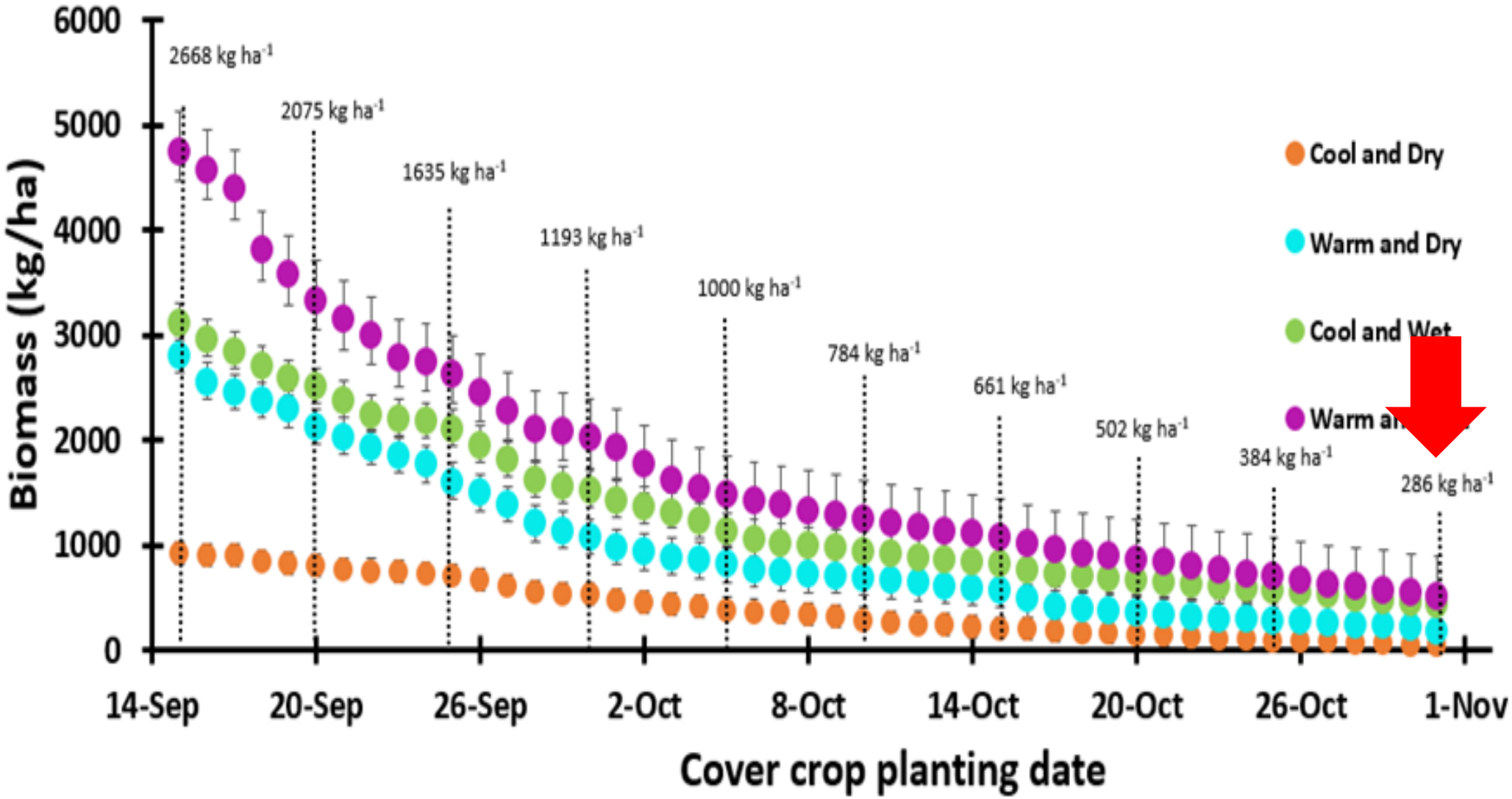
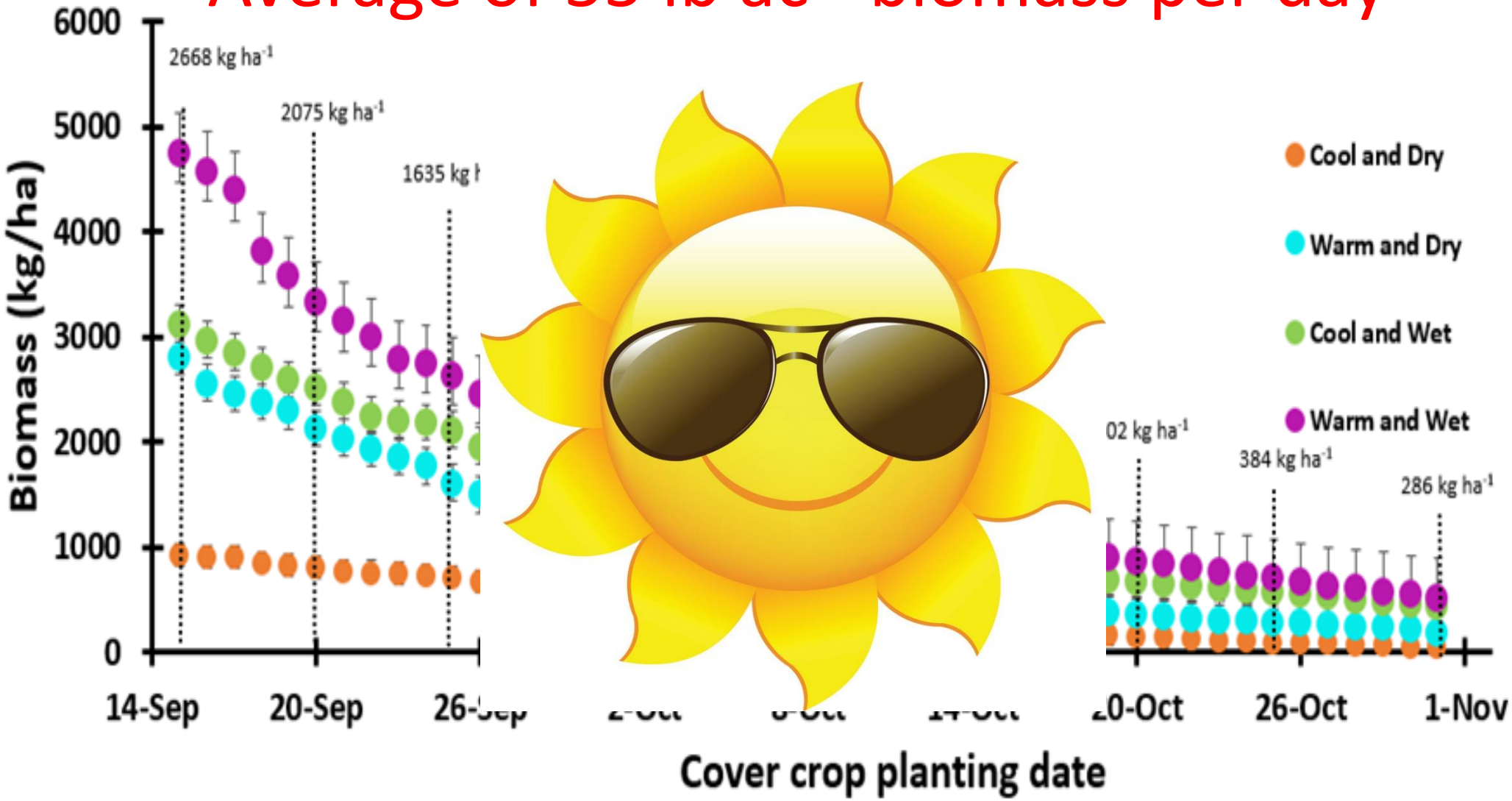
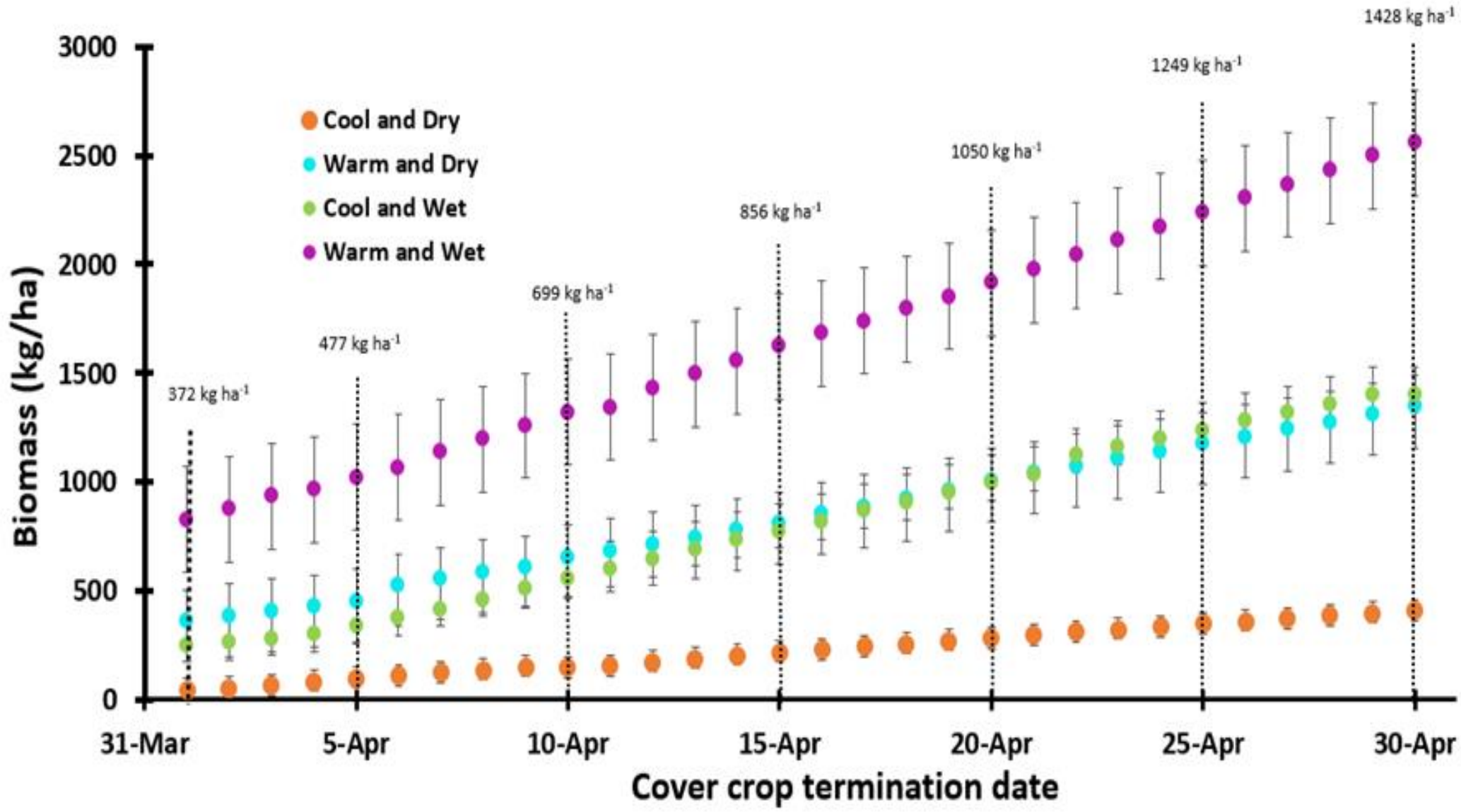


Simulated different planting dates in fall with mid-April termination

Average of 55 lb ac^{-1} biomass per day



Simulated different termination dates in spring with mid-Oct planting



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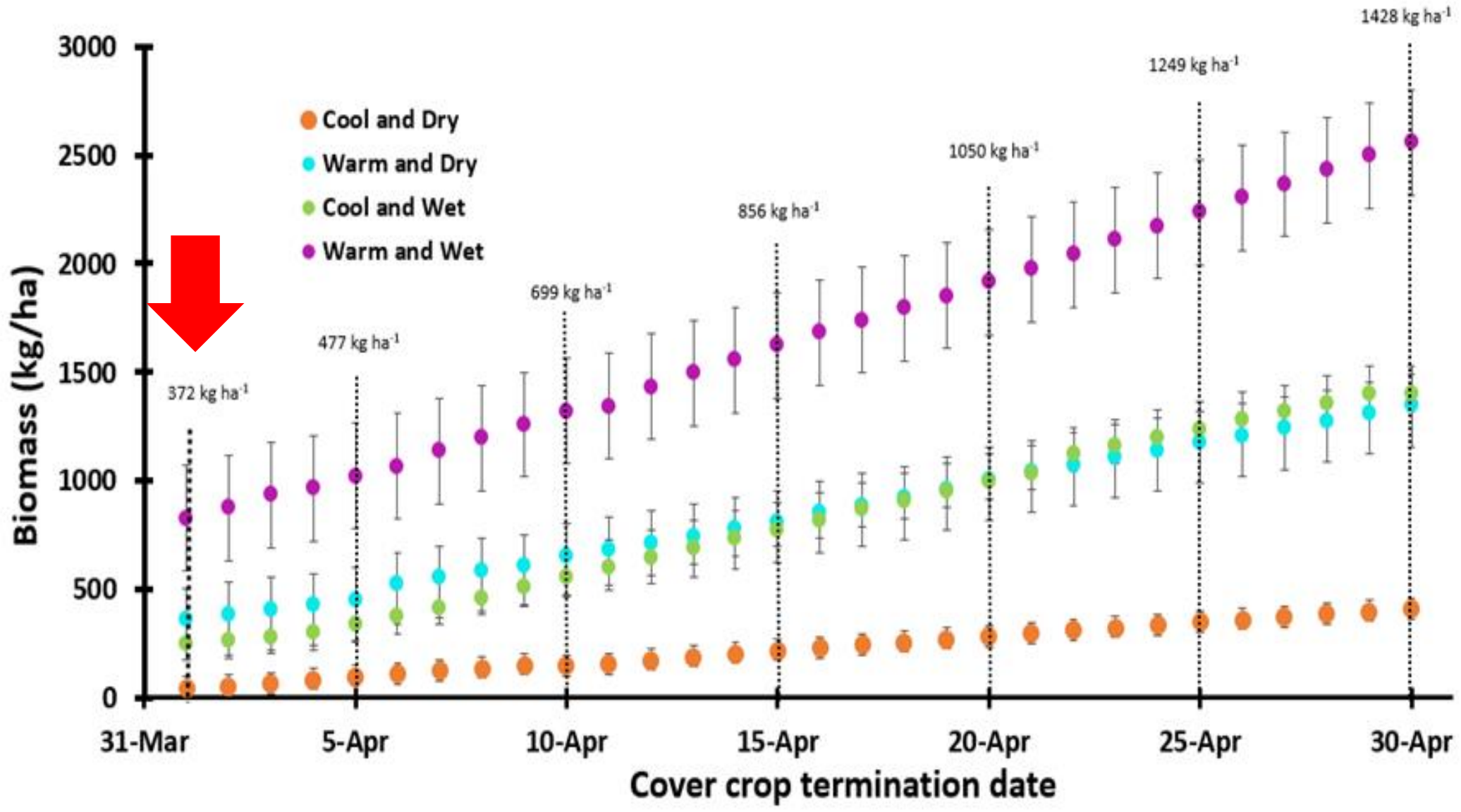

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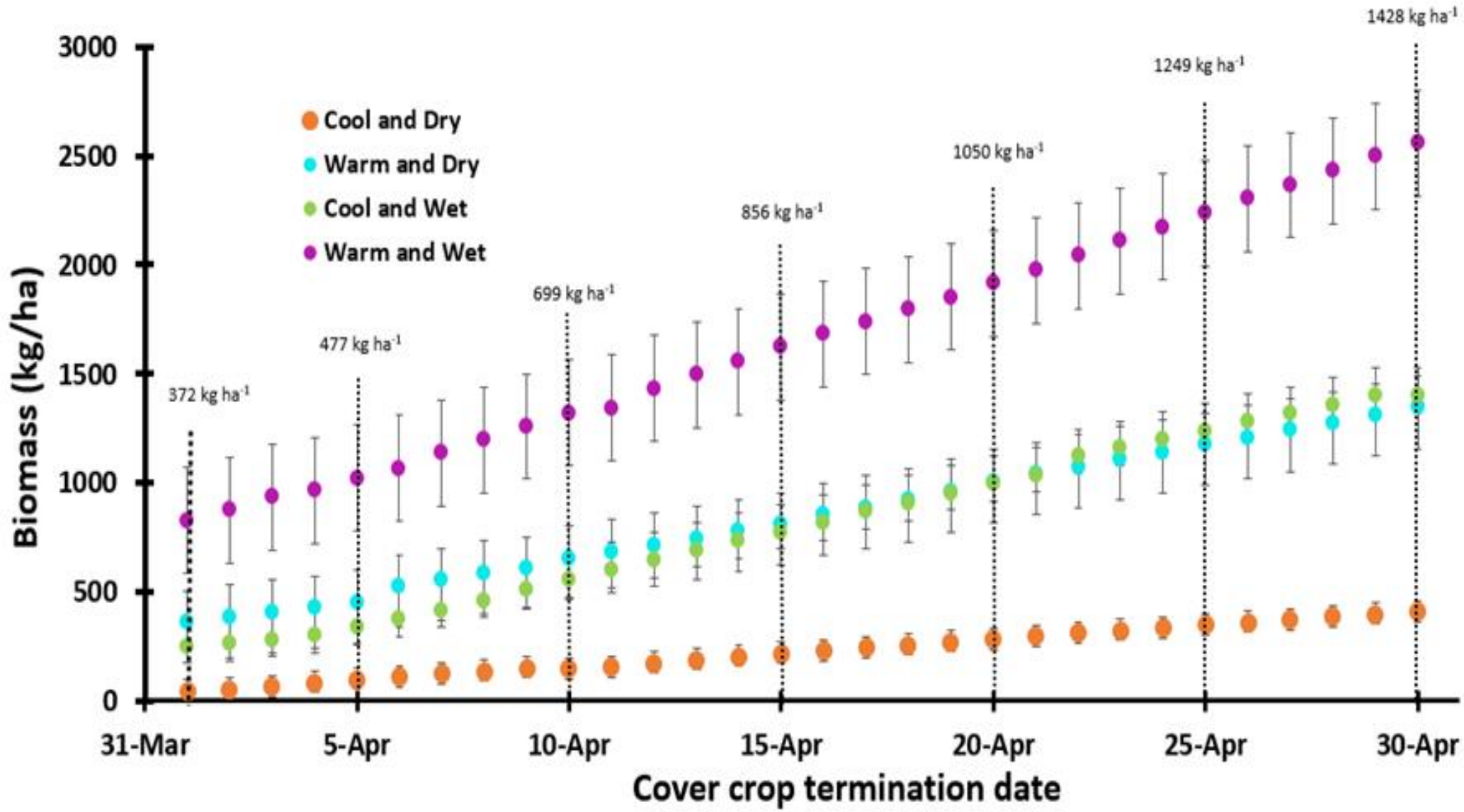

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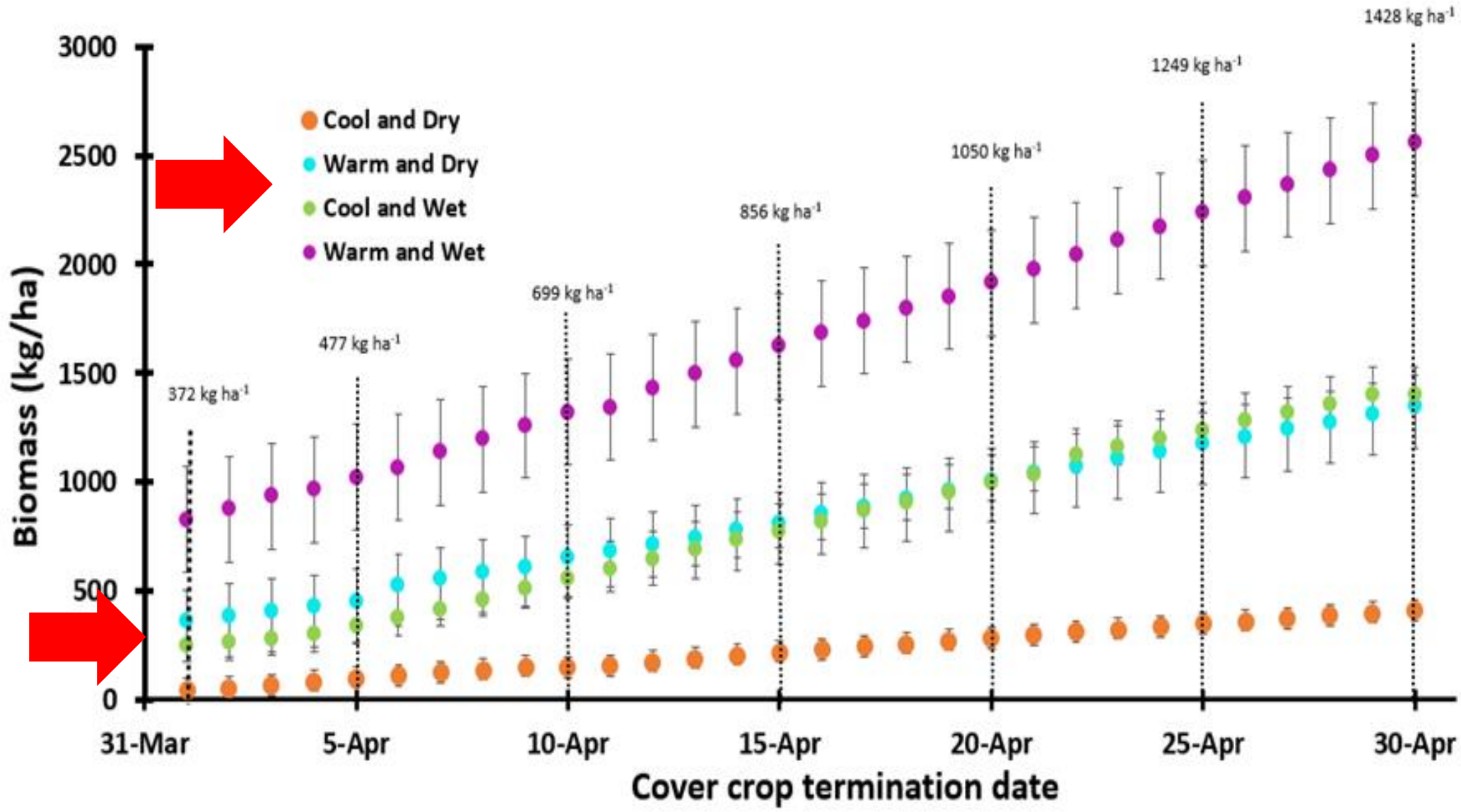
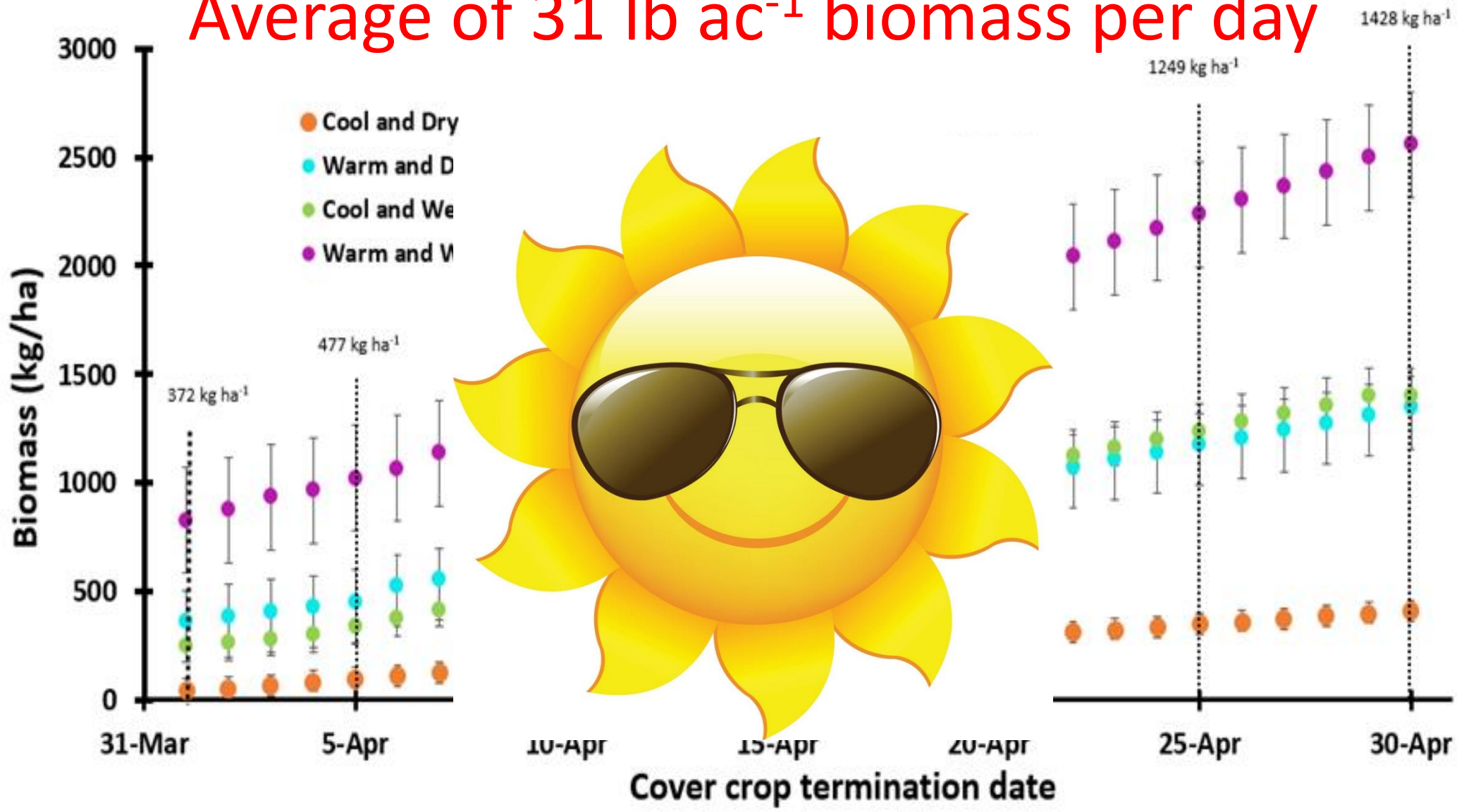


Simulated different termination dates in spring with mid-Oct planting

Average of 31 lb ac^{-1} biomass per day



Corn planting date	Comparative relative maturity hybrid	Model predicted harvest date	Predicted corn yield (bu ac^{-1})	Rye planting date	Average biomass (lb ac^{-1})
April 20	80 day	August 28	169	Sept 3	3123
	90 day	Sept 7	179	Sept 8	2712
	100 day	Sept 15	203	Sept 16	2446
	105 day	Sept 21	219	Sept 22	1761
	110 day	Sept 25	229	Sept 26	1458
	115 day	Sept 29	235	Sept 30	1142
May 13	80 day	Sept 7	165	Sept 8	2712
	90 day	Sep 16	182	Sept 17	2380
	100 day	Sept 25	200	Sept 26	1458
	105 day	Oct 1	212	Oct 2	1064
	110 day	Oct 4	223	Oct 5	892
	115 day	Oct 9	226	Oct 10	727

Summary of cover crop simulations

- Our experiments demonstrate that the difference between cover crop planting in mid-September and late October is **ten times more biomass**….
- …. And **four times greater biomass** when terminating at the end of April versus the beginning
- Above average moisture and temperature can result in **four times greater** rye biomass than below average moisture and temperature
- No yield penalty associated with planting corn in mid-May
- Small yield penalty associated with medium versus late season varieties but this allows for earlier cover crop planting (particularly if corn is planted in April)

Chatterjee et al. In Revision. Simulating winter rye cover crop production under alternative management in a corn-soybean rotation. Agronomy Journal.

Treating cover crops like cash crops

- Treating winter cover crops more like cash crops requires greater growing season utilization, particularly in cropping systems dominated by summer annual crops and/or colder climates
- While a number of approaches exist to do this, farmers tend to report greatest planting success with drilling post harvest
  - There are opportunities to carefully manage variety selection, planting date to greatly increase cover crop biomass with limited yield impacts
- #1 is determining YOUR goals for the cover crop – giving it more of the growing season might be worth a few bushels for weed control, forage, etc.

How farmers express this idea

- *You got to do everything right. It's not just all that simple … that we'll just plant rye and we'll do things that way we already did, always did. I think you need to do things right to make it work well, but I think you can get just as good of yields and you can get all the advantage of soil savings and we think we're improving the soil's tilth and the organic matter level. So there's a lot of advantages, but probably have to make some [management] changes.*

Basche and Roesch-McNally. 2017. Research topics to scale up cover crop use: Reflections from innovative Iowa farmers. Journal of Soil and Water Conservation. 72(3): 59A-63A.

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- *It's a system. You've got to get everything right and, you know, some of the researchers at some of the universities, they don't change anything when they do a cover crop study. Everything's the same and the cover crop's going to lose every time.*

Basche and Roesch-McNally. 2017. Research topics to scale up cover crop use: Reflections from innovative Iowa farmers. Journal of Soil and Water Conservation. 72(3): 59A-63A.

The Strength and Quietness of Grass
Henry A. Wallace, June 21, 1940

Everything we have been learning about grass tends to bear out that grass is a source of strength to agriculture; and therefore to the Nation.

The more we fail to realize this, the more difficult it will be to maintain and build up our great agricultural resources and our soil resources – yes, and our human resources too.

The more we think in terms of the world situation and the future of our country the more important grass will become in our agricultural system.

Thank you!

abasche2@unl.edu

Q&A

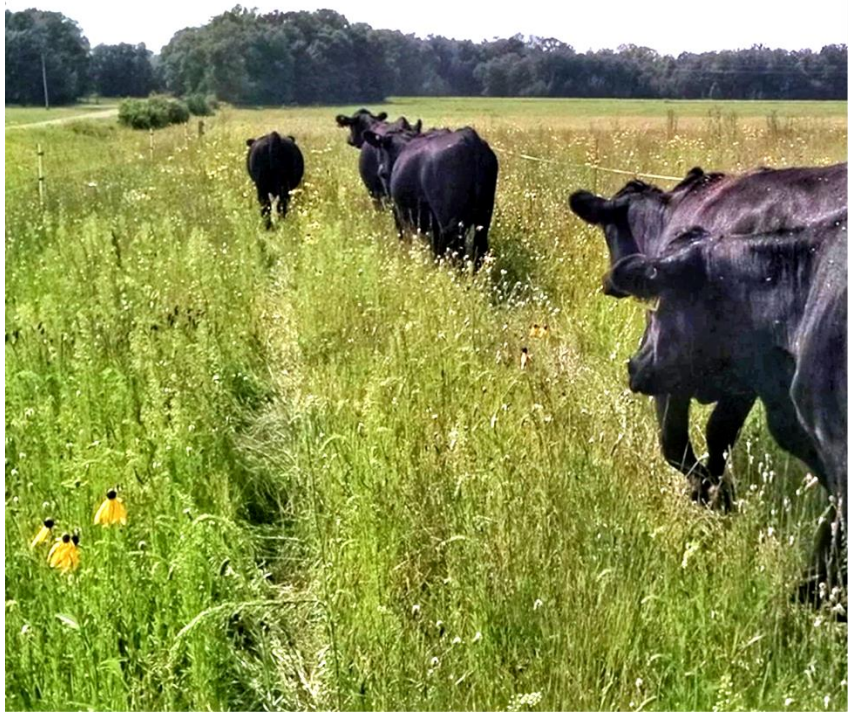
Please submit your question by using the “Questions” box in the Control Panel on your screen. You may need to expand the “Questions” box by clicking the small arrow.

Questions will be combined to help us get through as many as we can in the time we have remaining.

REMINDERS!

- Register for upcoming webinars: www.pastureproject.org/events
- Complete the post-webinar survey – it's quick, confidential, and helps us offer more free webinars

CONTACT US!



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