

**A Decision Tool –
Sequencing Crops
to Help
Manage Weeds**

Crop-Weed Research in Colorado - Semiarid Climate

Long-Term Rotation Study (+10
Years)

Ancillary Studies

Trends in Weed Dynamics

Guidelines for Rotation Design

Vary Life Cycle
(Winter vs. Summer)

Vary Planting Dates Among Crops
(Early vs. Late Season)

Vary Row Spacing
(Wide Row vs. Narrow Rows)

Vary Cultivars within Crops
(Differing Plant Heights)

Vary Planting Dates within Crops
(Outside Peak Weed Emergence)

Impact

Weeds – Crop Life Cycles

Rotate Winter & Summer

Annual Crops to Reduce Weeds

**Example - Field Sandbur & Green
Foxtail**

Biomass in Proso Millet

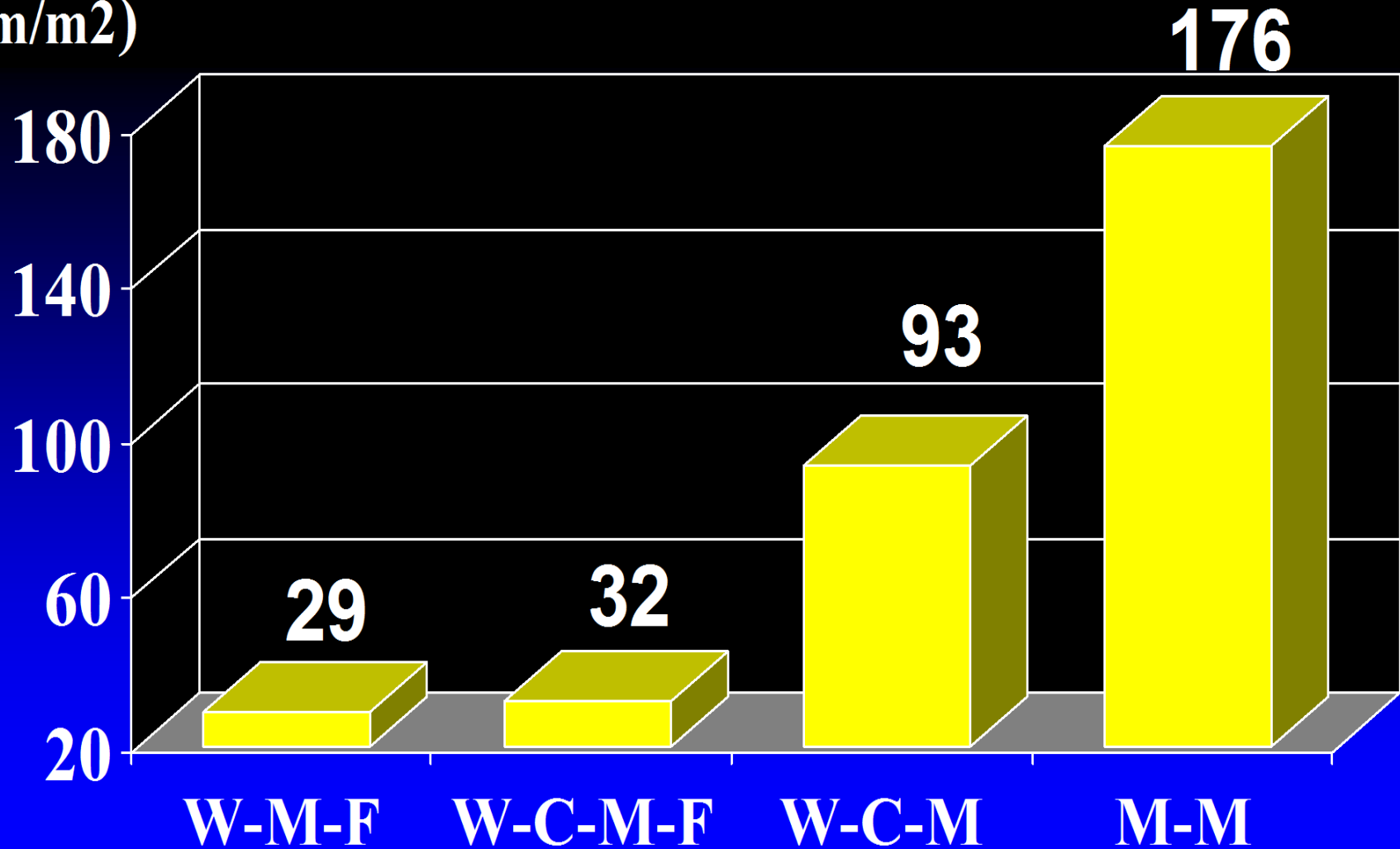
after 8 Years

Weeds in Proso Millet

2 Year Average

Biomass

(gm/m²)



Weeds – Crop Life Cycles

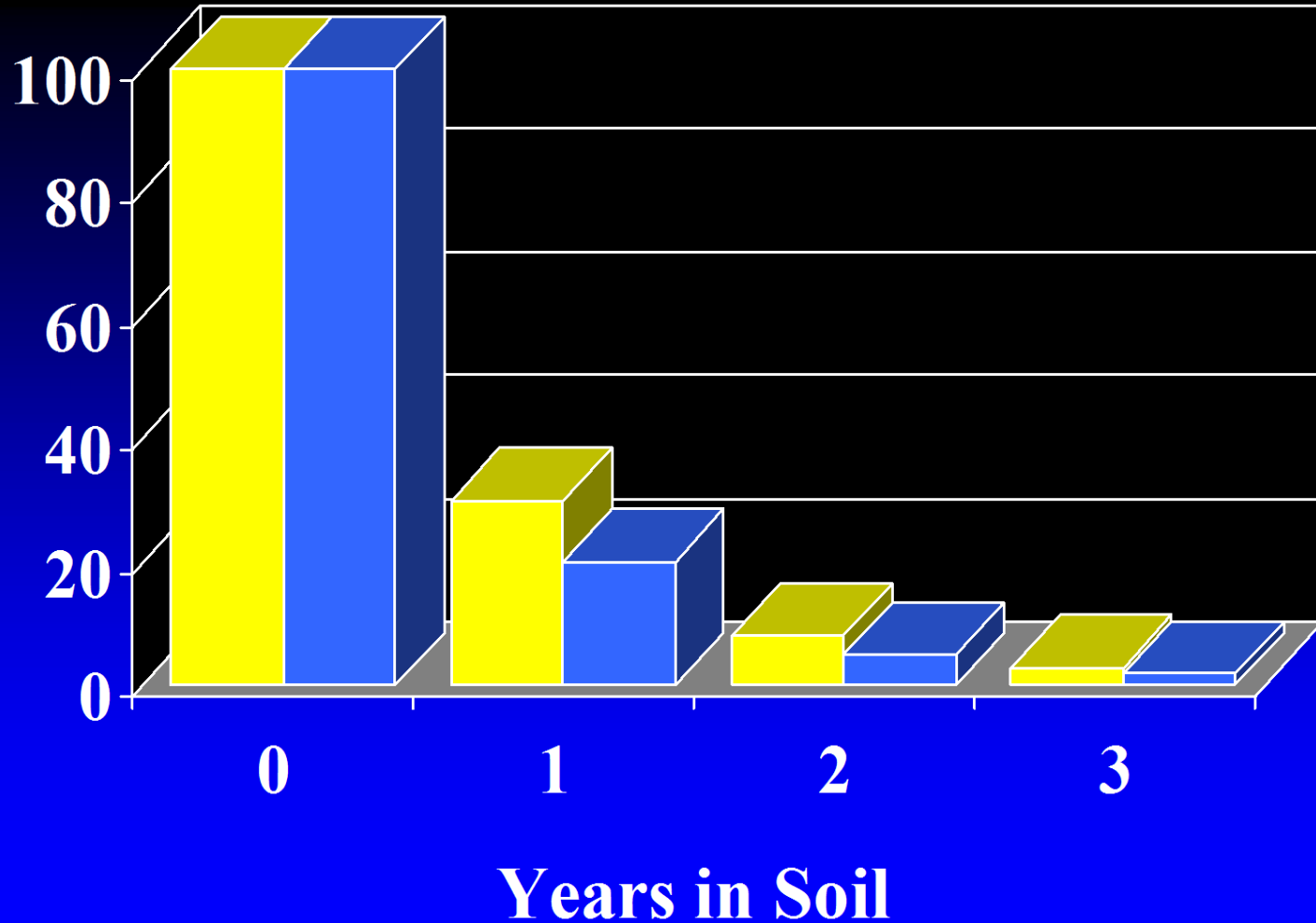
**Response is Based on Decline of Live
Weeds in Soil**

**Seed Numbers Decline Rapidly in Soil if
seed is not Added to Soil**

Weed Seed Survival in Soil

Live Seed (%)

■ Sandbur ■ Foxtail



Weed Density

Balance of

Winter and Summer Crops

Minimizes Weed

Density

2 Years in - - - 2 Years out

Population Growth of Weeds (*2-Year Interval*)

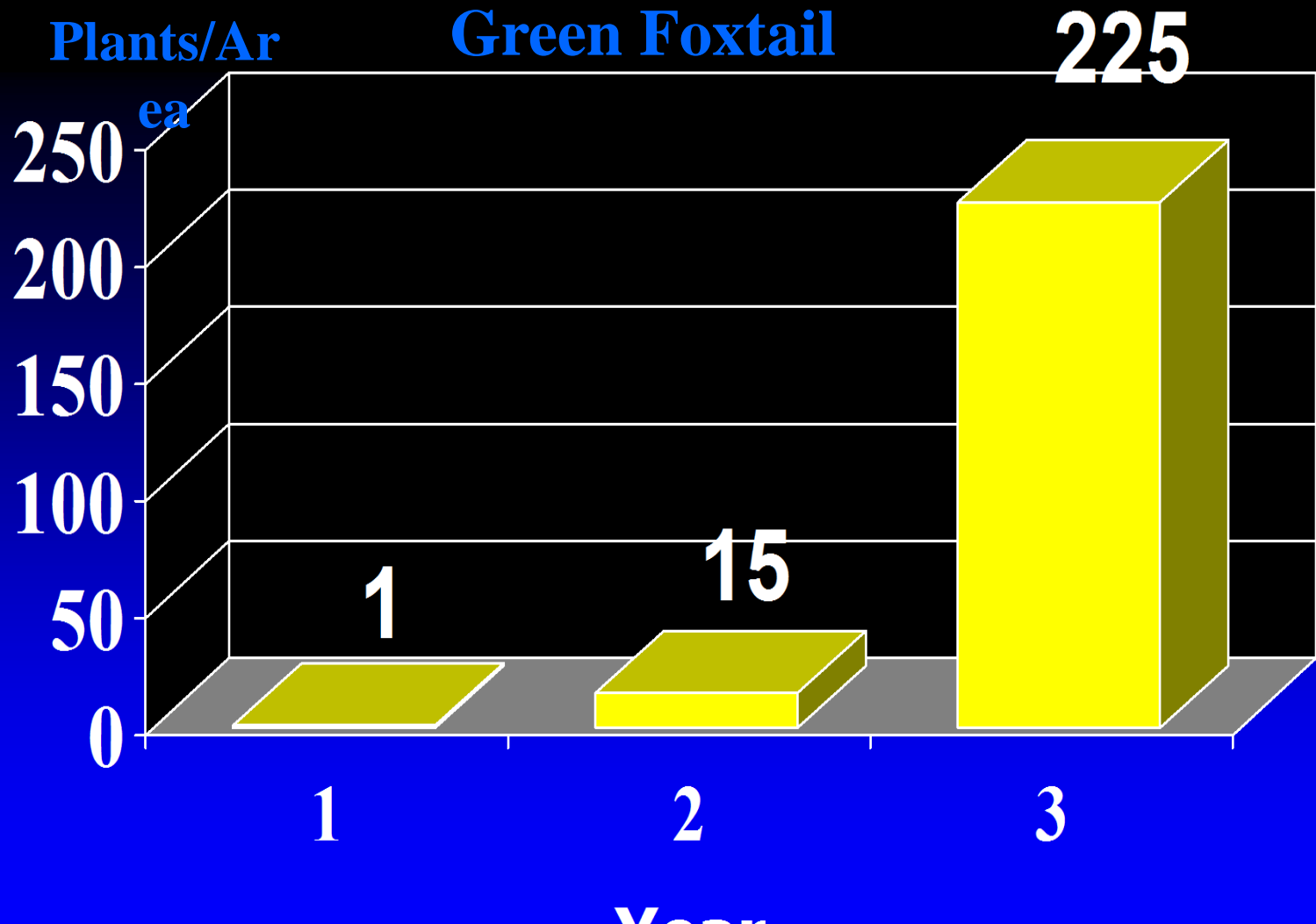
Green Foxtail (Corn Canopy)

Plant – 2500 Seeds

**Seed Bank Emergence -
6%**

Control Level – 90%

Rate of Increase - Density



Weed Density

Population Explodes

In 3rd Year of Similar Crop

Natural Rate of Increase

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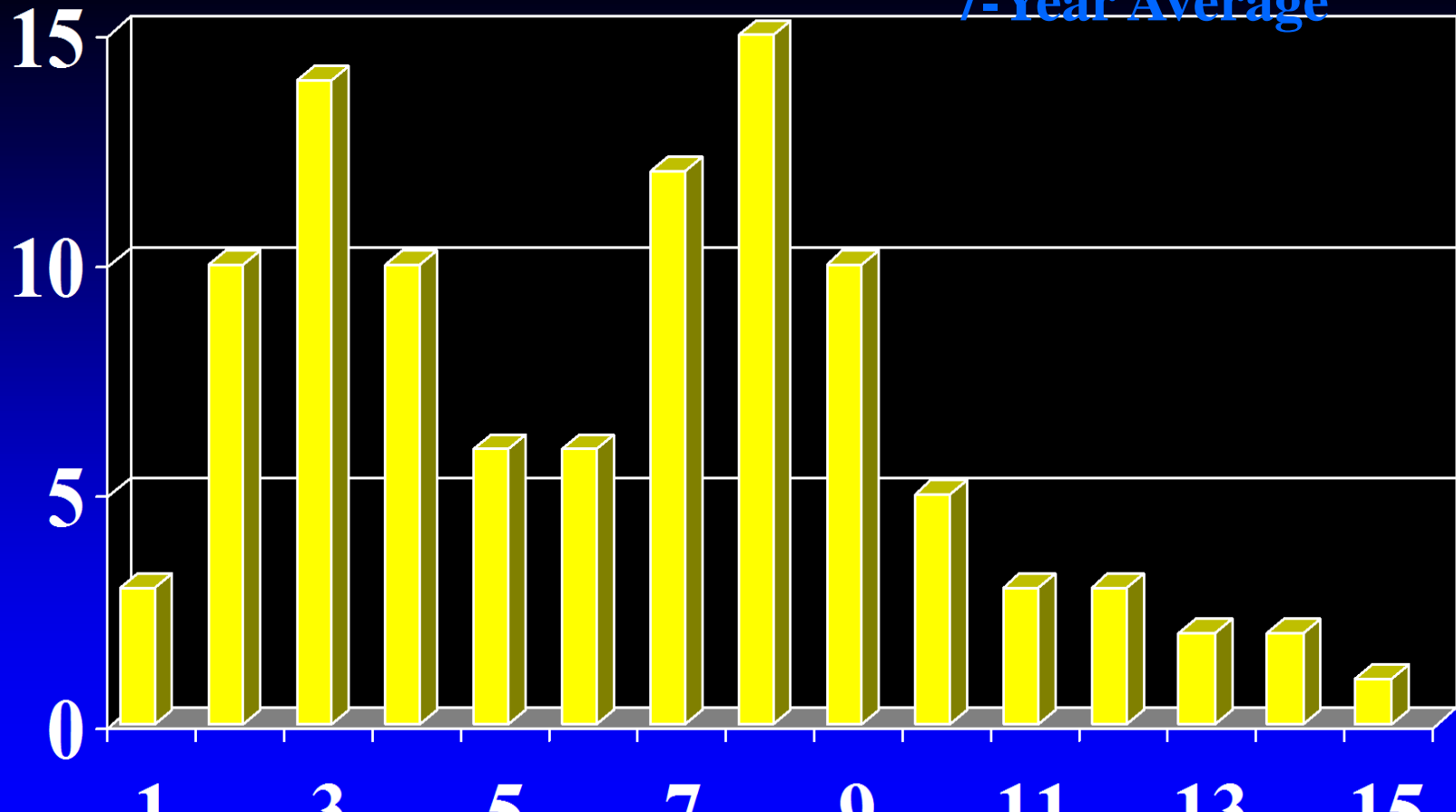
Vary Planting Dates within Crops
(Outside Peak Weed Emergence)

Weed Community Emergence

Weeks after April 1

(% of Seasonal)

7-Year Average



Crops with Different Planting Dates

Safflower – April 1

Sunflower – June 1

**80% Less Weeds in
Sunflower**

Crops with Different Planting Dates

Corn – May 1-7

Proso Millet – June 1-10

35% Less Weeds in Proso

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Crop Competitiveness and Row Spacing

Corn, Sunflower, Proso Millet

**No Control Tactics after
Planting**

Harvest after 7 weeks

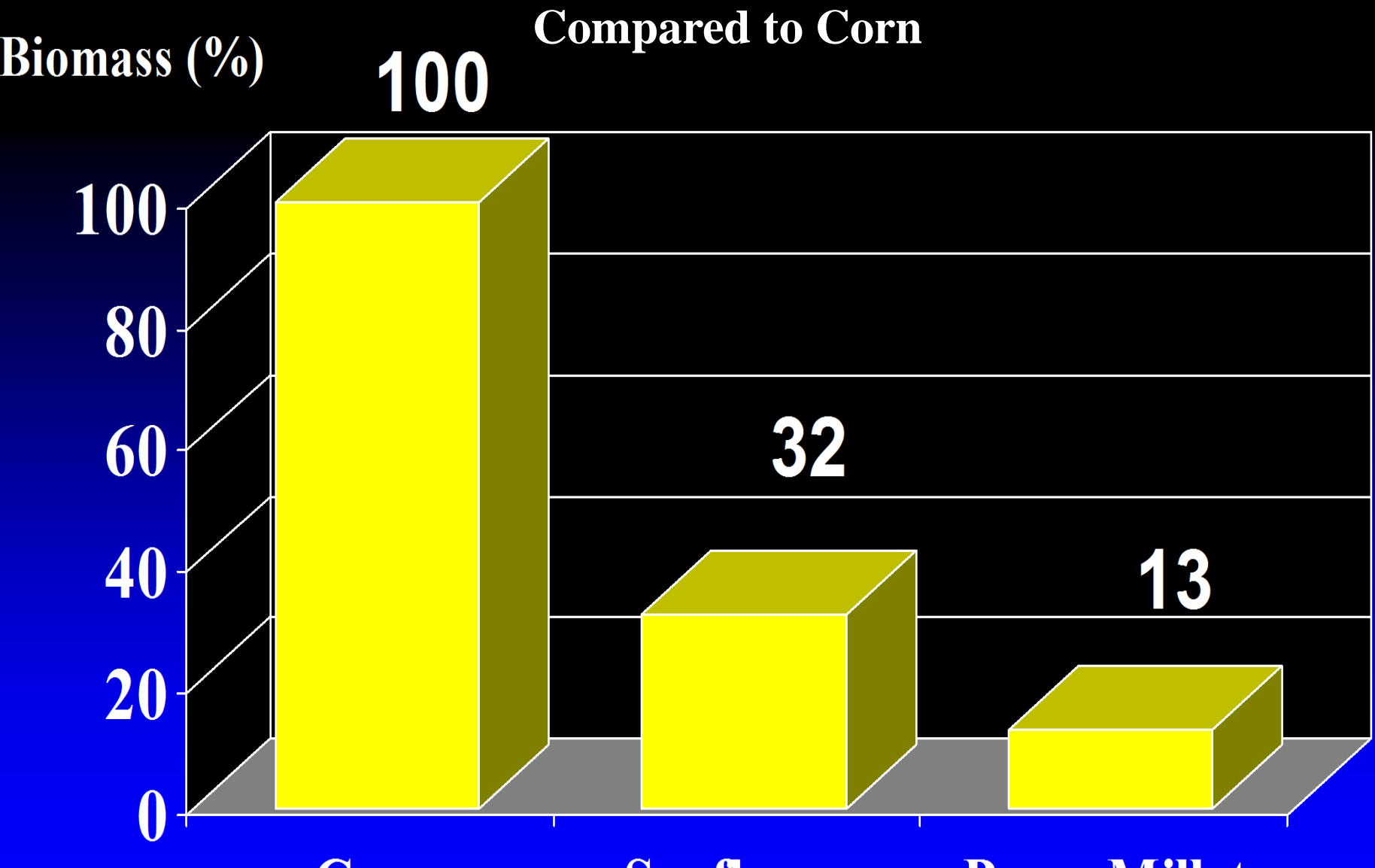
Winter Wheat – Previous Crop

Crop Competitiveness

3-Year Average – Akron CO

	Planting Date	Row Spacing
Corn	May 1-7	30-inch
Sunflower	June 1-10	30-inch
Proso Millet	June 1-10	8-inch

Weed Biomass in 3 Crops



Crop Competitiveness and Row Spacing

Later Planting (Corn → Sunflower)

**Reduced Weed Biomass in
Sunflower 3-fold**

Narrow Rows (Sunflower → Proso)

**Reduced Weed Biomass
Almost 3-Fold**

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Downy Brome - Winter Wheat

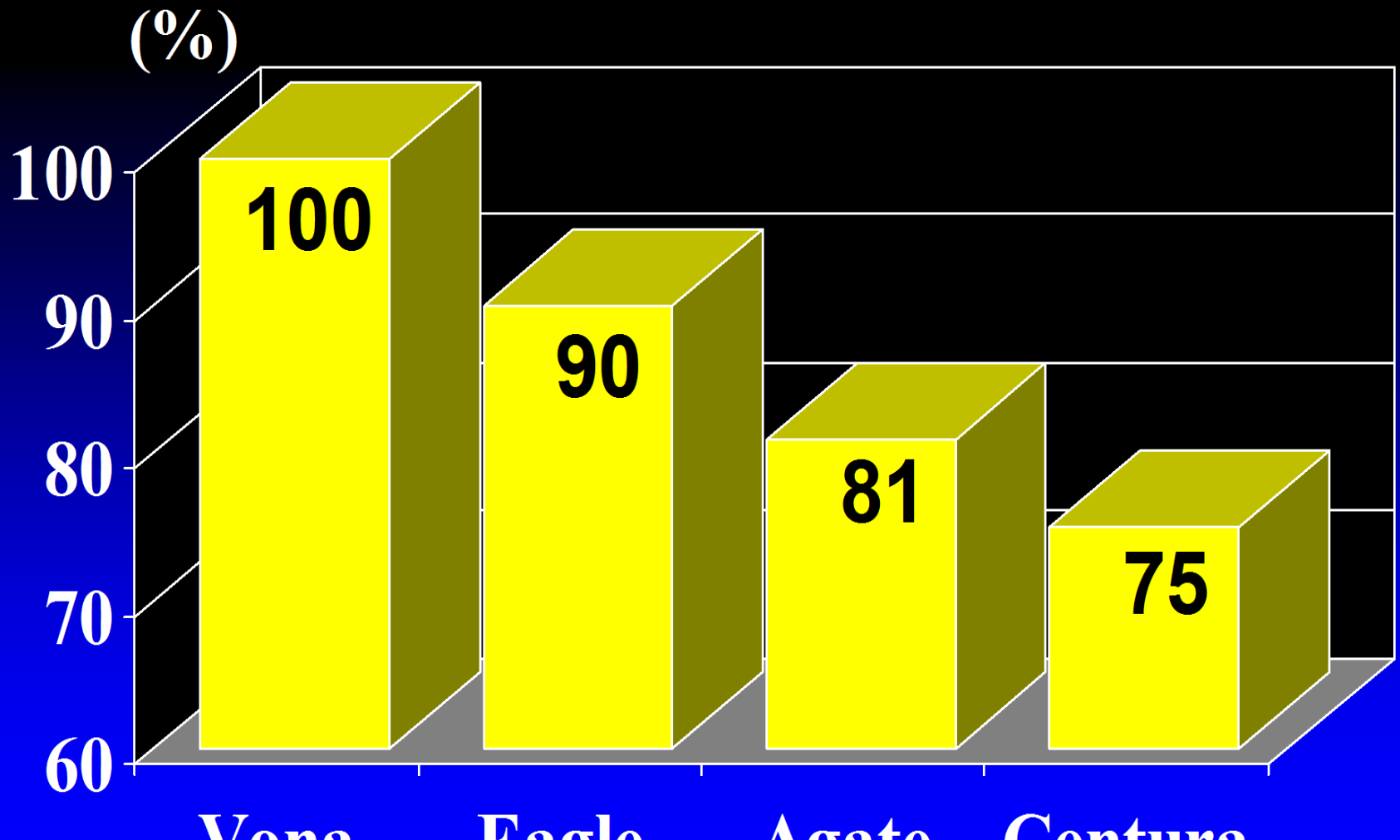
Cultivars Differ in Competing
With

Downy Brome

Related to Plant Height

Downy Brome Growth in Wheat

Cultivars in Nebraska



Downy Brome - Winter Wheat

**Tolerant Cultivars Yield More if
Downy Brome is Present**

However, Yield Less

if No Downy Brome

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Downy Brome - Winter Wheat

6-Year Study

**Delayed Planting Helped Only 1
Year**

Yield Loss

Timing of Rain – Weed Emergence

Natural Weed Control with Crop Sequence

Arranging Crops Can Help

Reduce Weed Impact

and

Improve Management

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