# Fire Ecology in the Northern Great Plains

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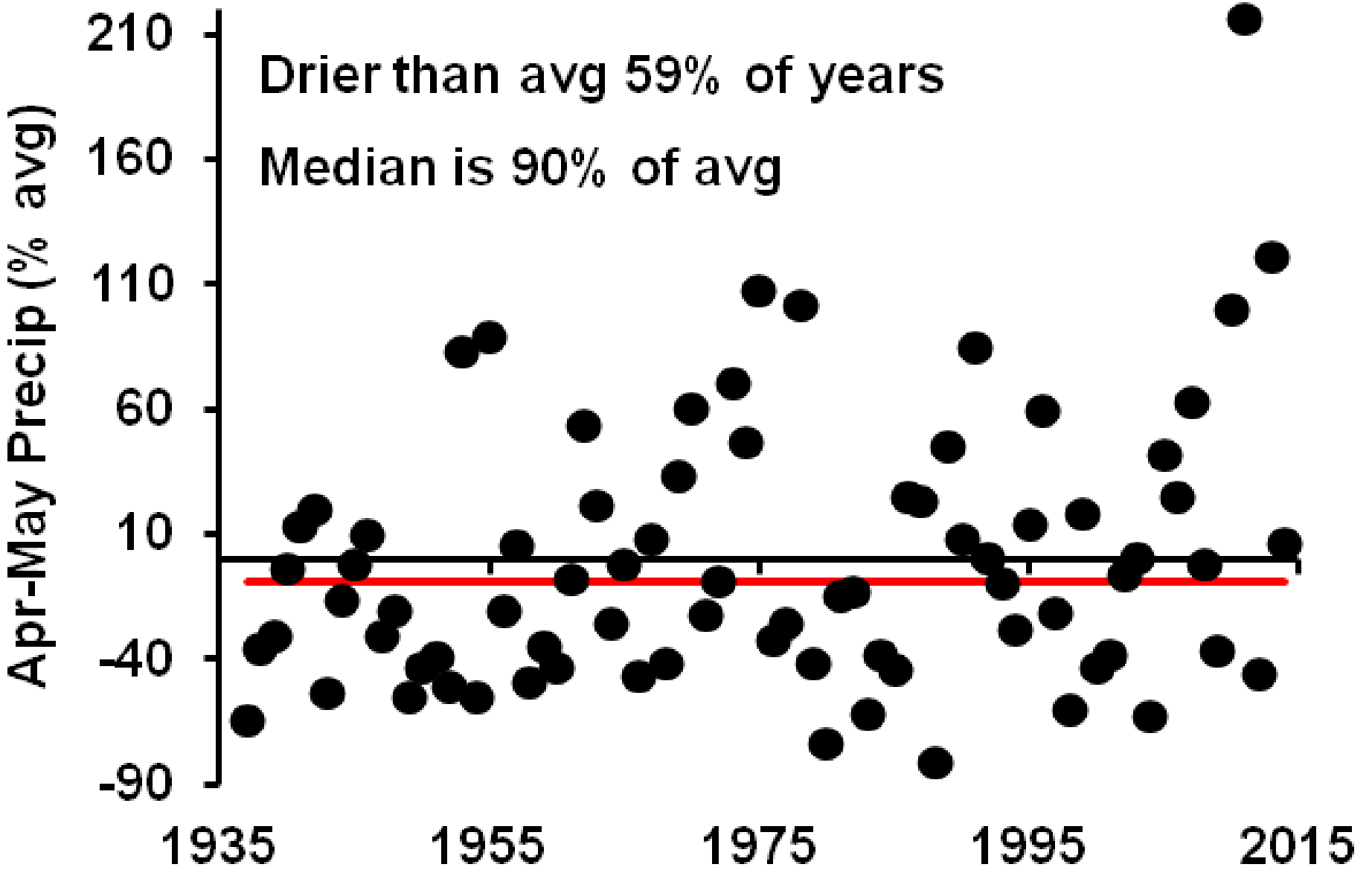
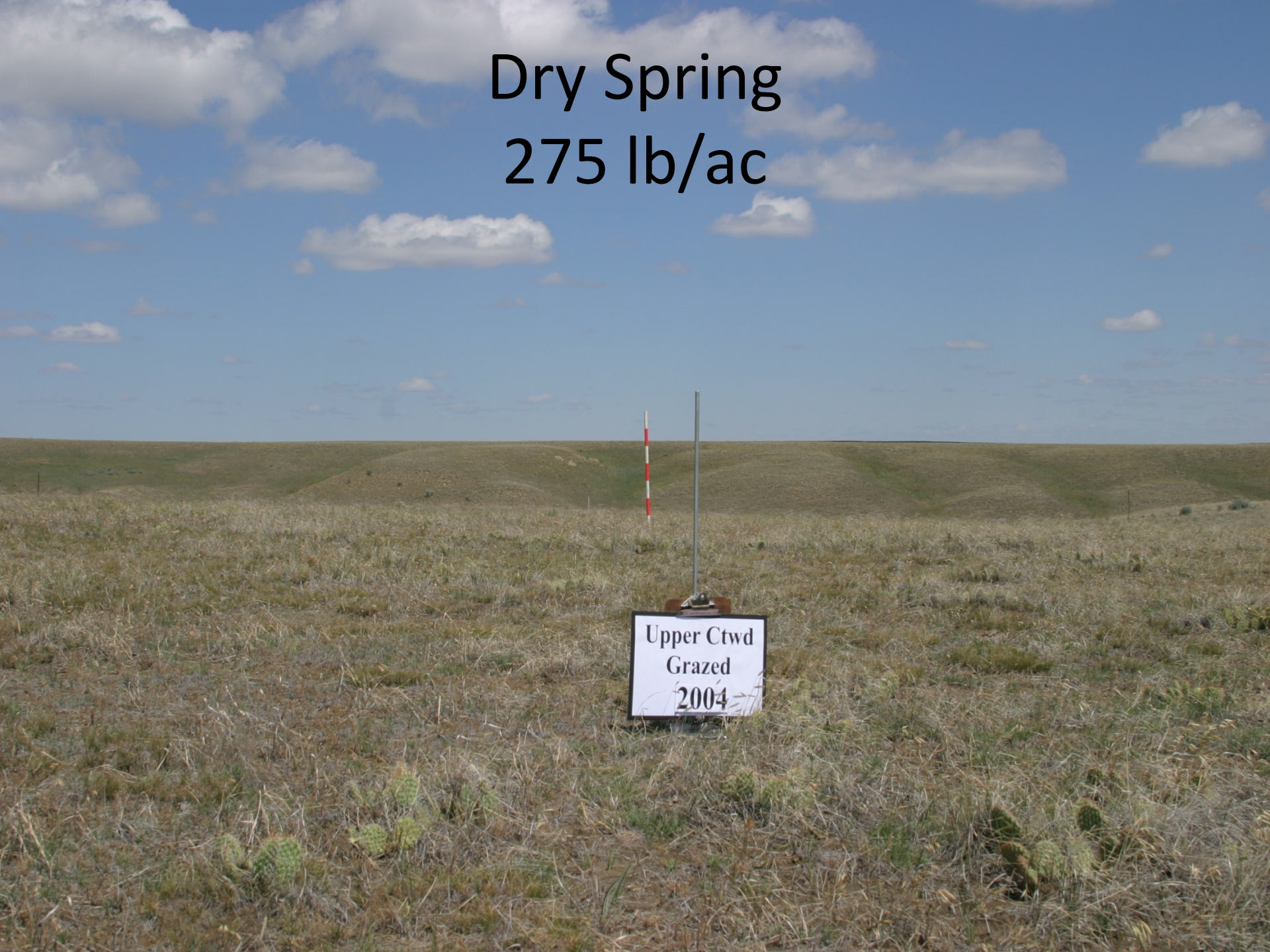
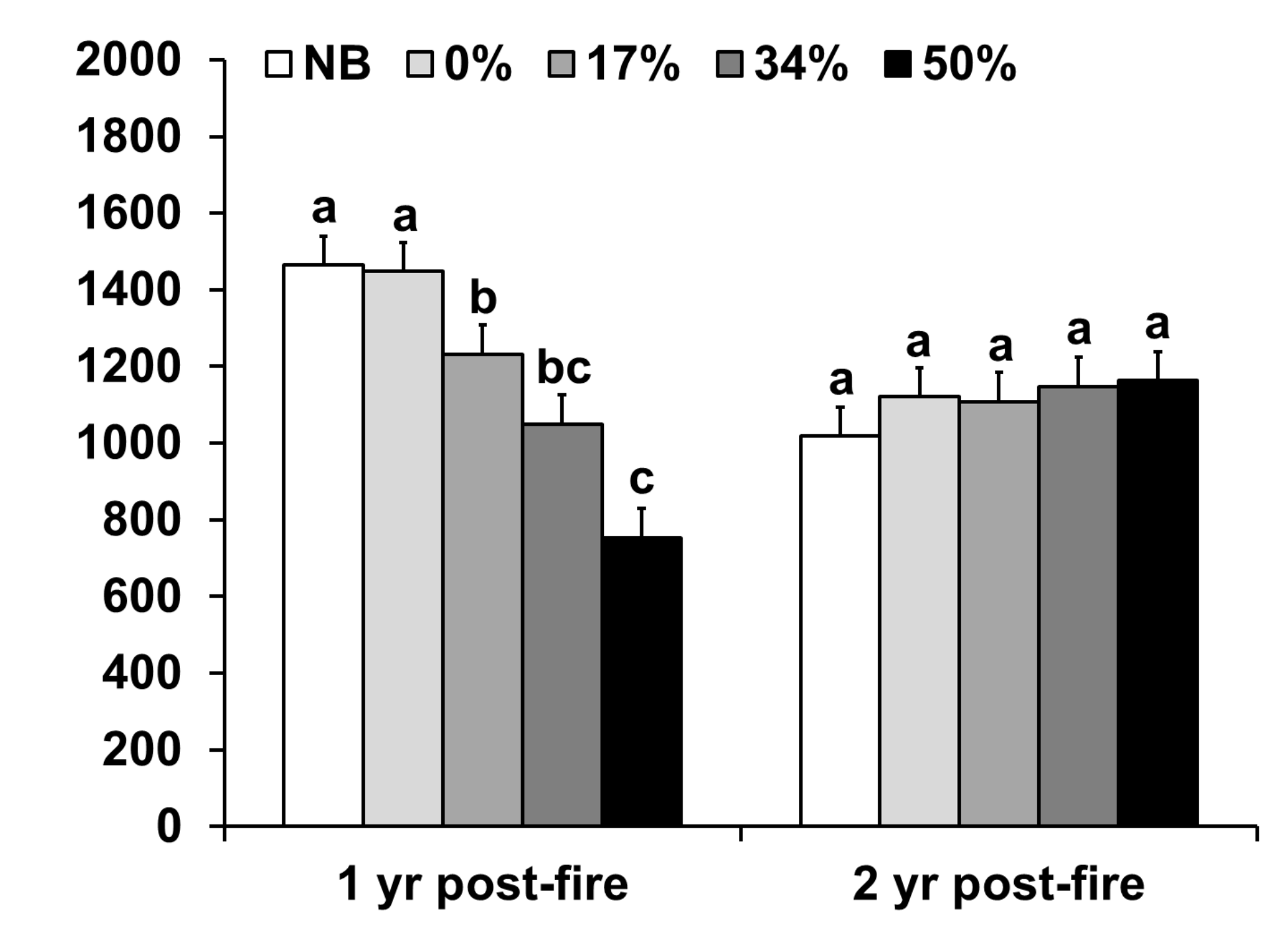
• Summer fire & Post-fire grazing
• Fire season and return interval
• Weedy species management
• Lethal heat dosage
• Bud response
• Fire effects on forage quality

# Spring Precipitation in Miles City




Dry Spring
275 lb/ac
Upper Ctwd
Grazed
2004

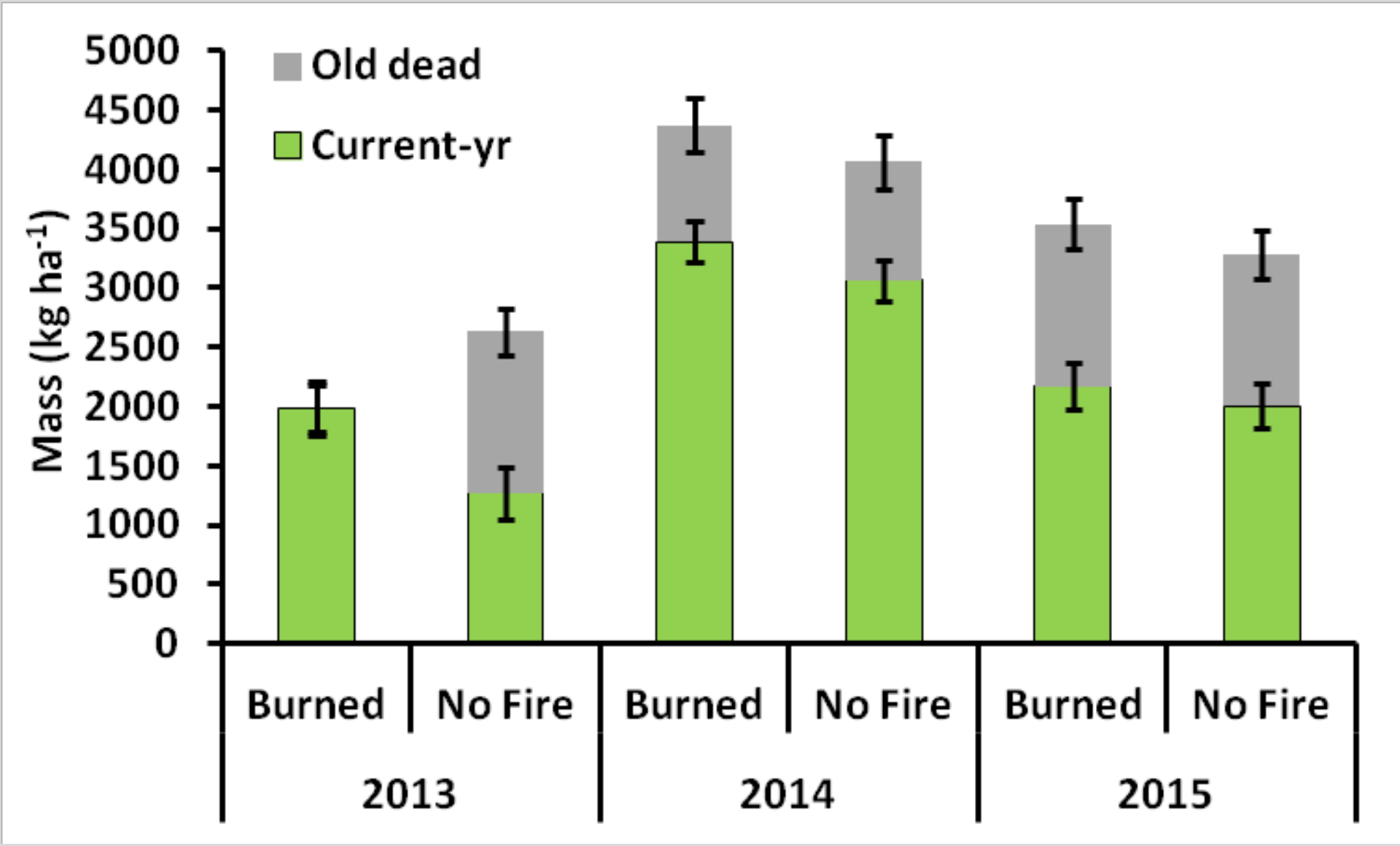
# Wet Spring
# 1312 lb/ac


NB
0%
17%
34%
50%
2000
1800
1600
1400
1200
1000
800
600
400
200
0
a
a
b
bc
c
a
a
a
a
a
1 yr post-fire
2 yr post-fire

# Post-fire Utilization

- Fire shifted composition toward described historic community
- Grass productivity was never reduced
- Up to 50% use in June and July appears safe

# Fire Effects



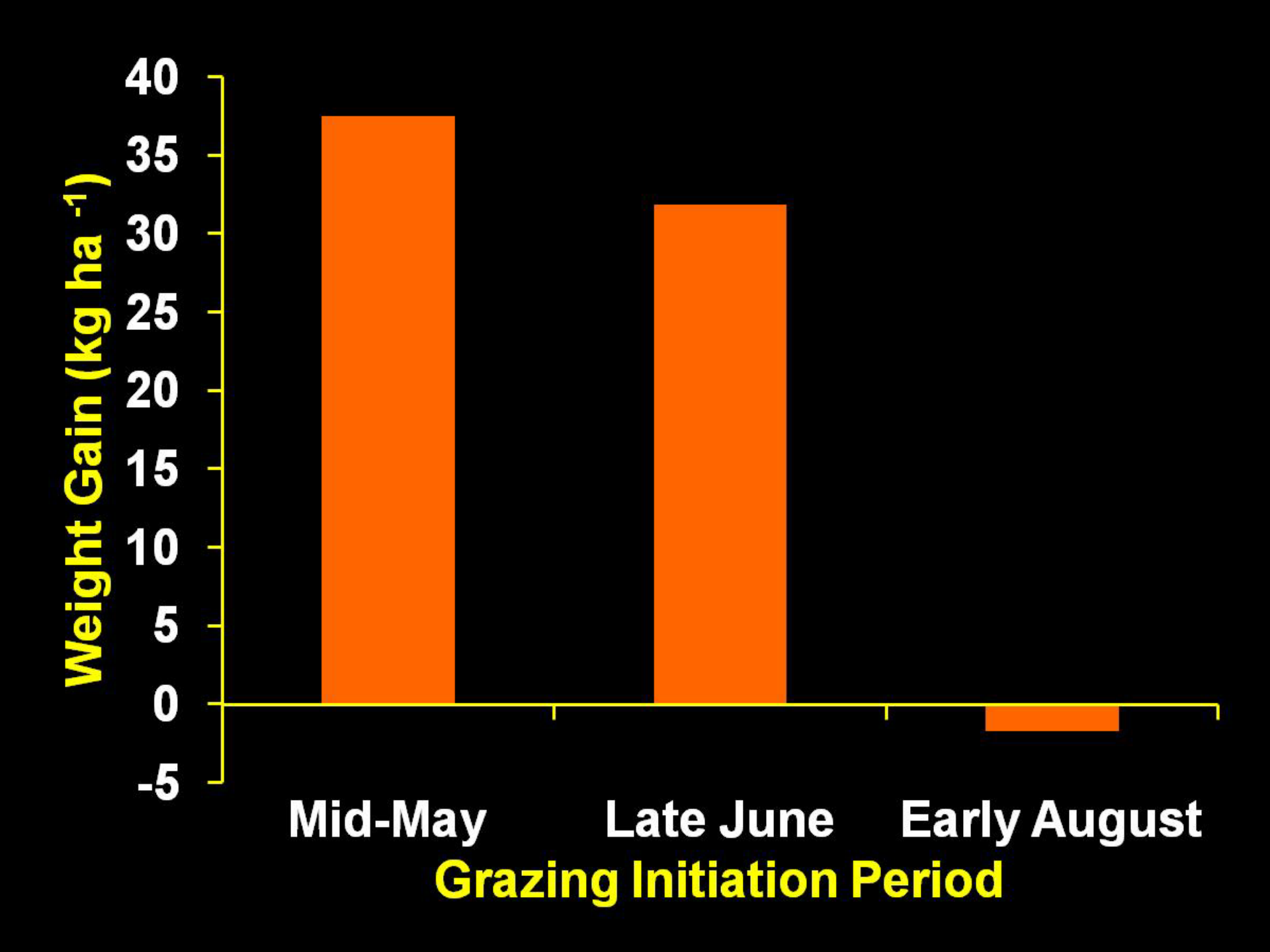
# Post-fire Deferment

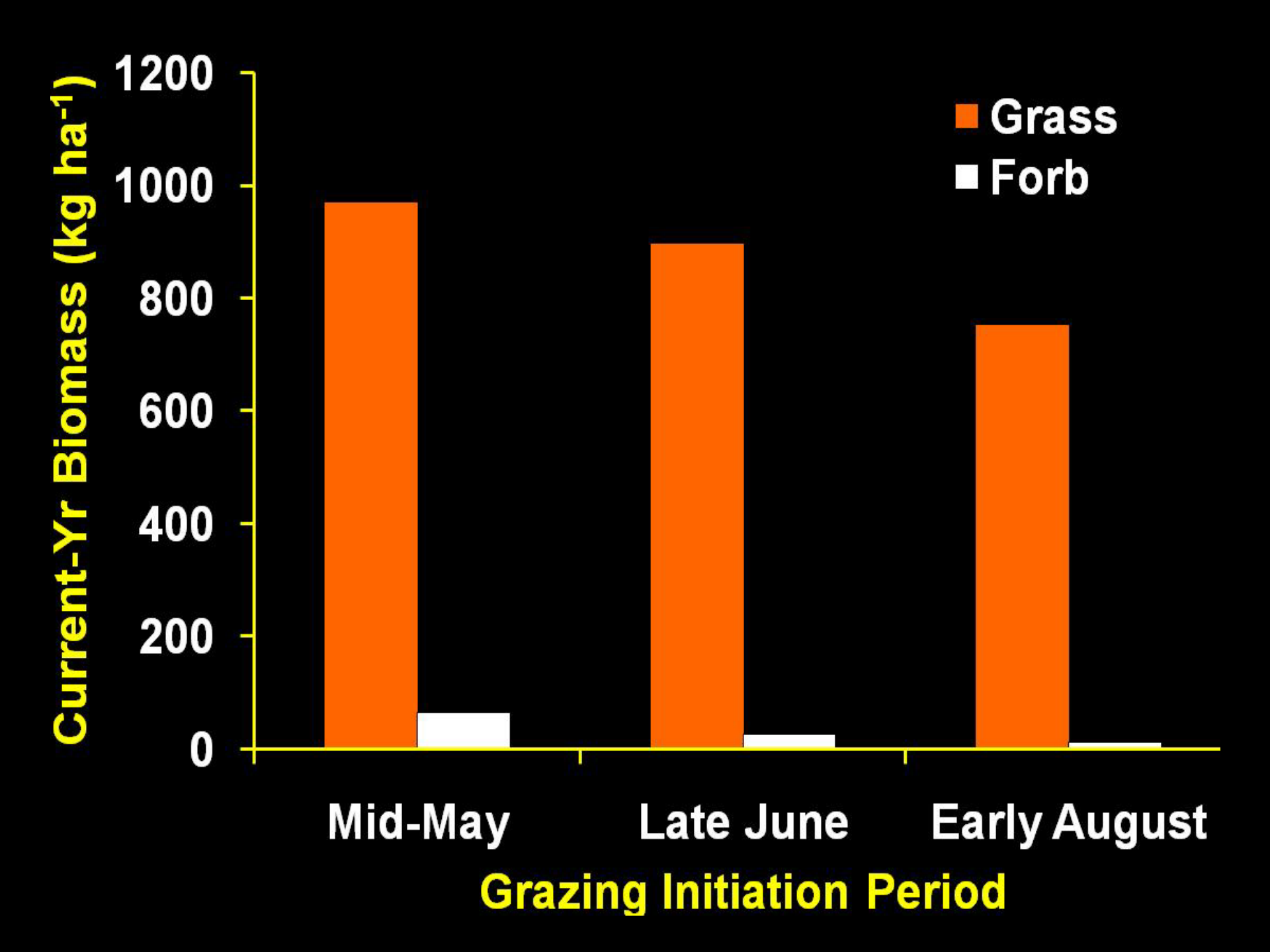
Summer Fire

Grazed following growing season:

Mid-May, Late June, Early August

Experiment repeated

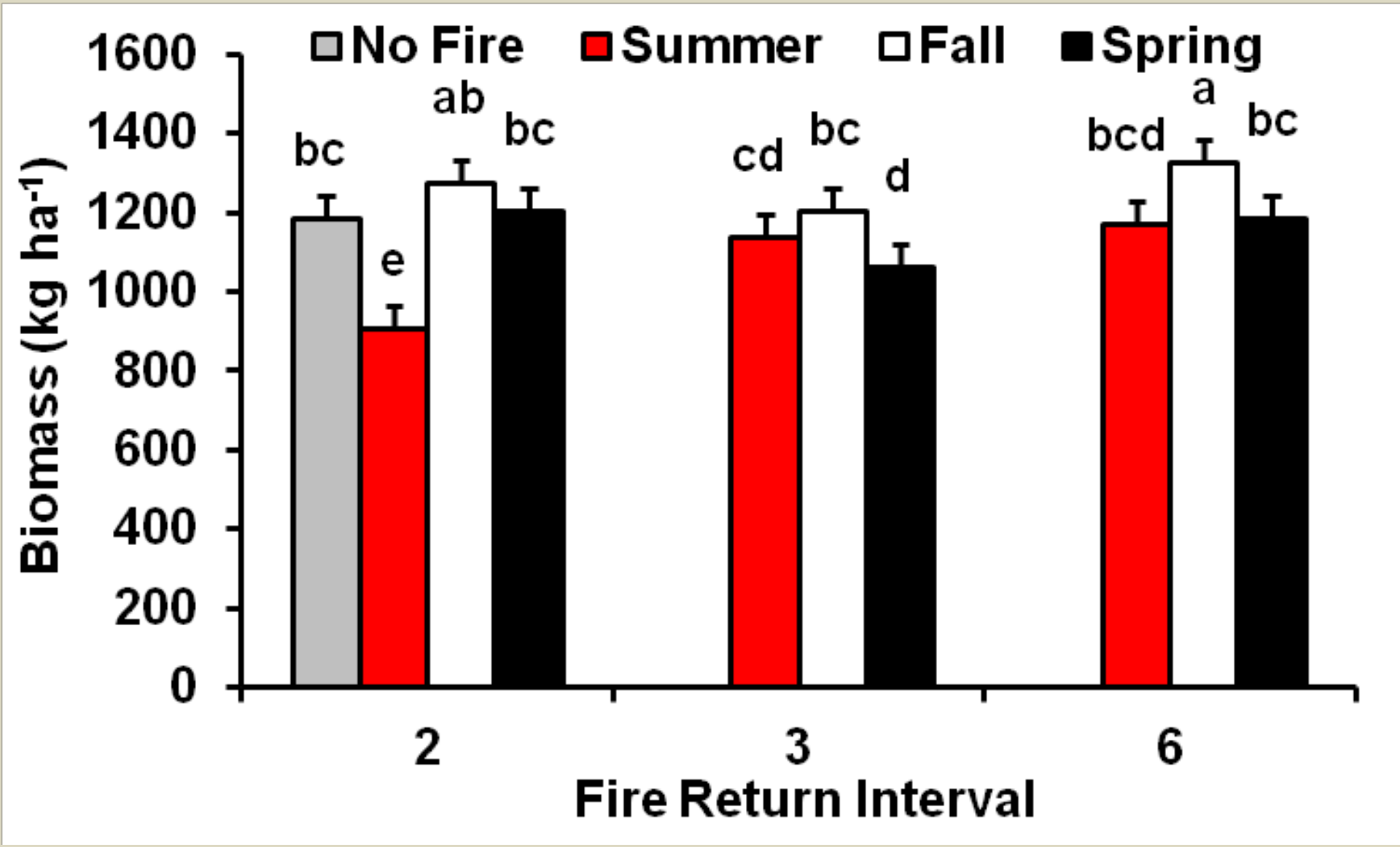

40
35
30
25
20
15
10
5
0
-5
Weight Gain (kg ha -1)
Mid-May
Late June
Early August
Grazing Initiation Period


Current-Yr Biomass (kg ha-1)
1200
1000
800
600
400
200
0
Grass
Forb
Mid-May
Late June
Early August
Grazing Initiation Period

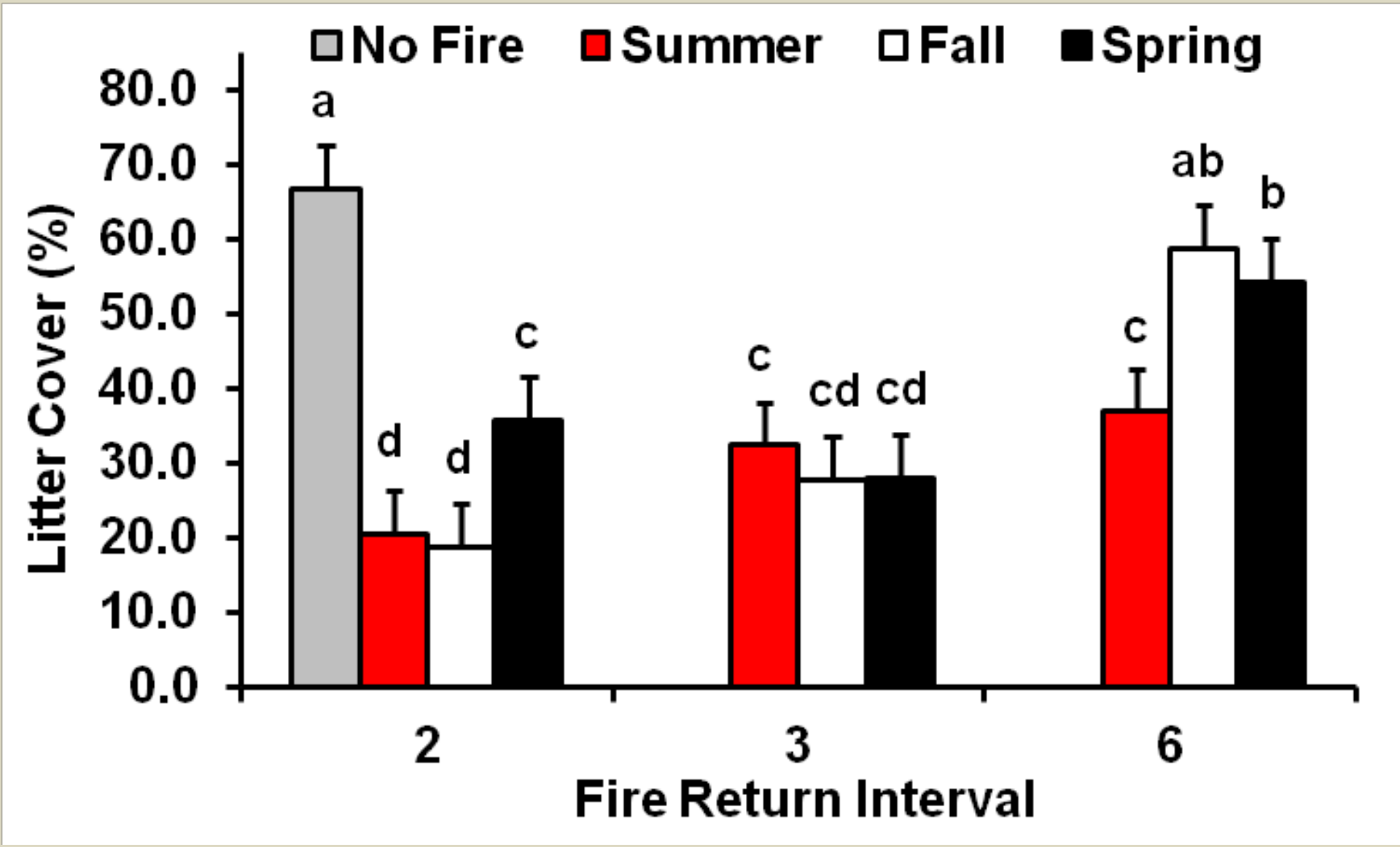
# Average Burn Dates (2006-2013)

| Fire Season | Return Interval | | |
|---|---|---|---|
| | 2-yr | 3-yr | 6-yr |
| Summer | Aug 27 | Aug 21 | Sep 2 |
| Fall | Oct 31 | Oct 23 | Oct 21 |
| Spring | Apr 19 | Apr 18 | Apr 30 |

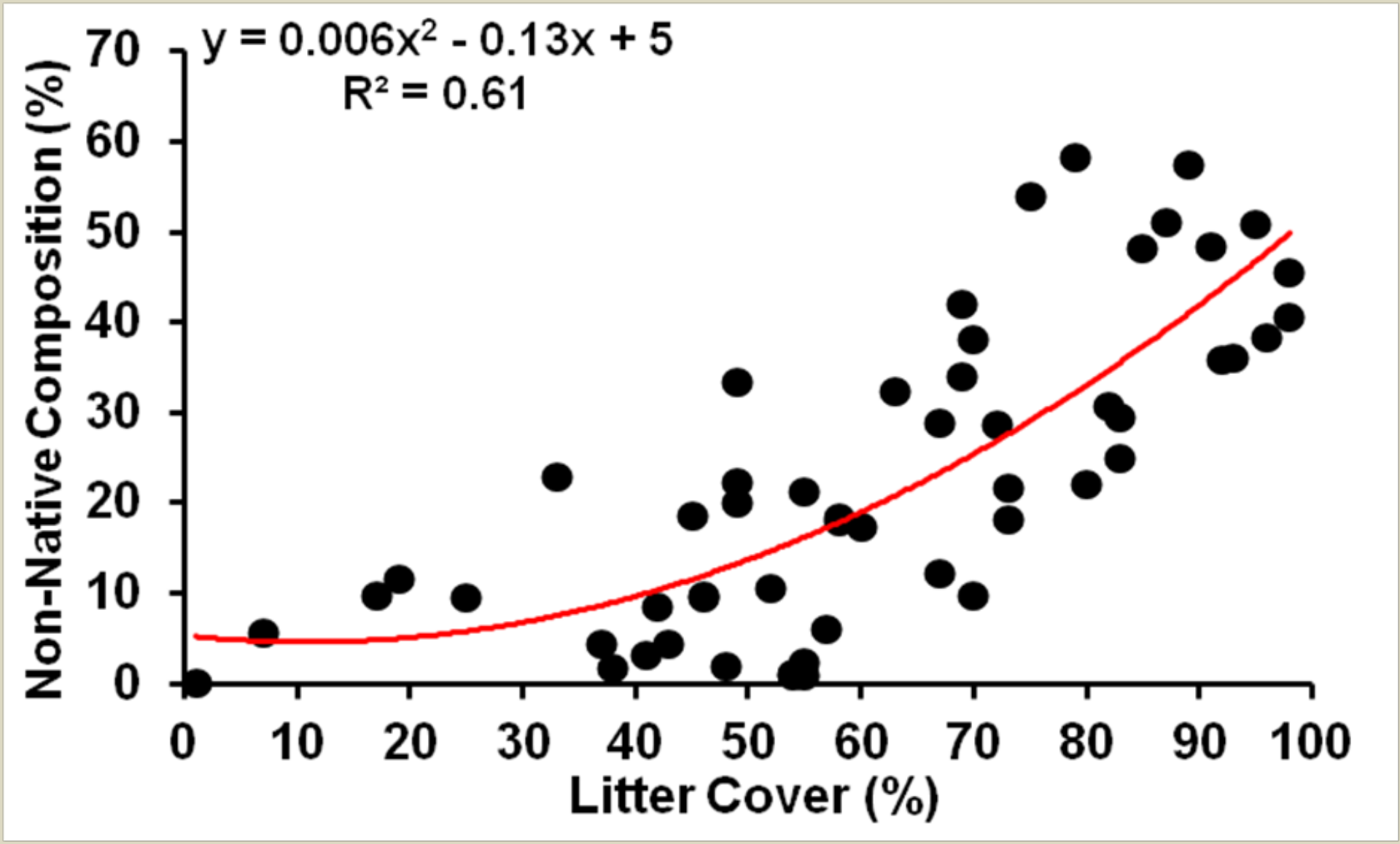
# Total Current-Year Biomass



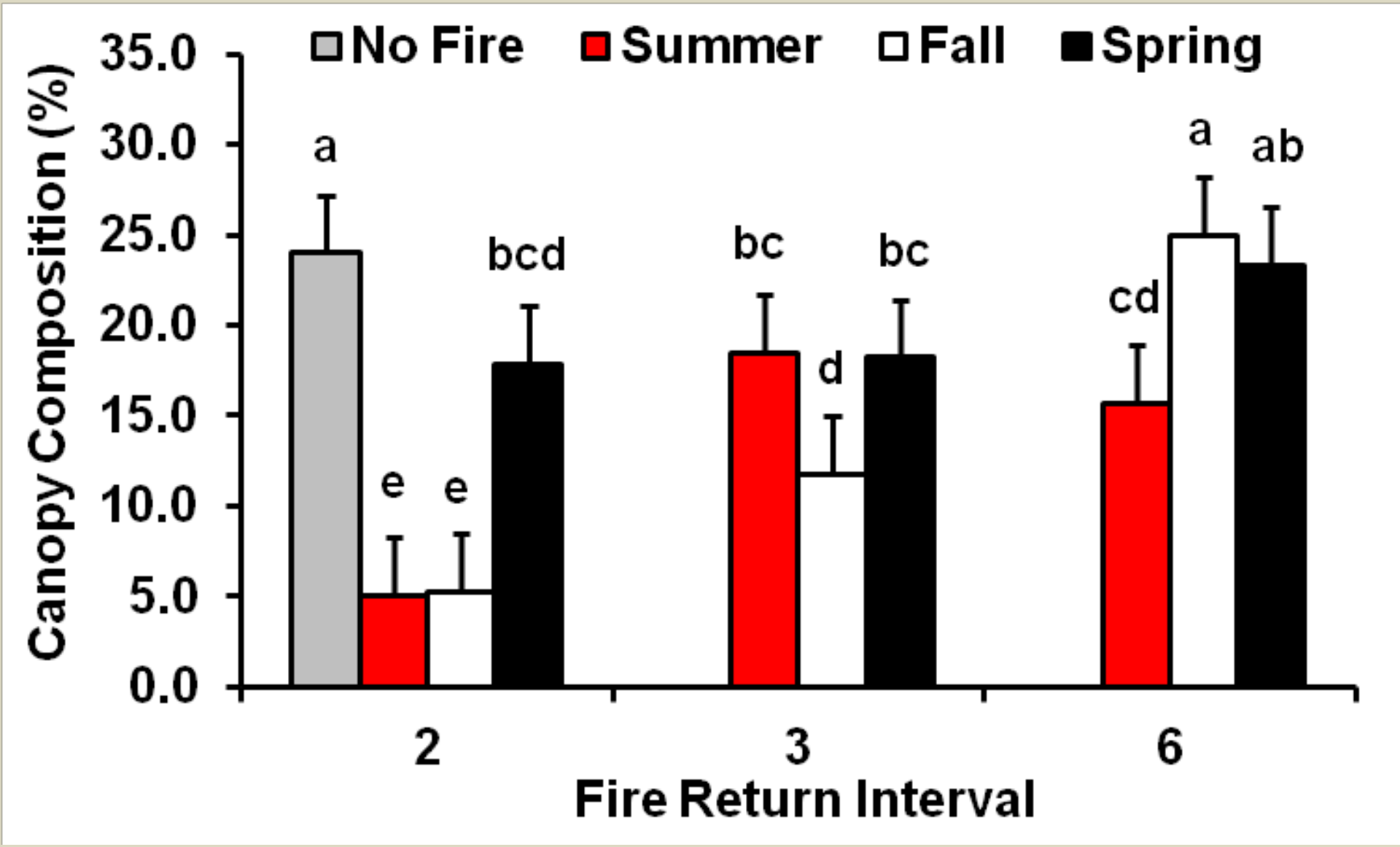
# Litter Cover



# Litter & Non-Native Species



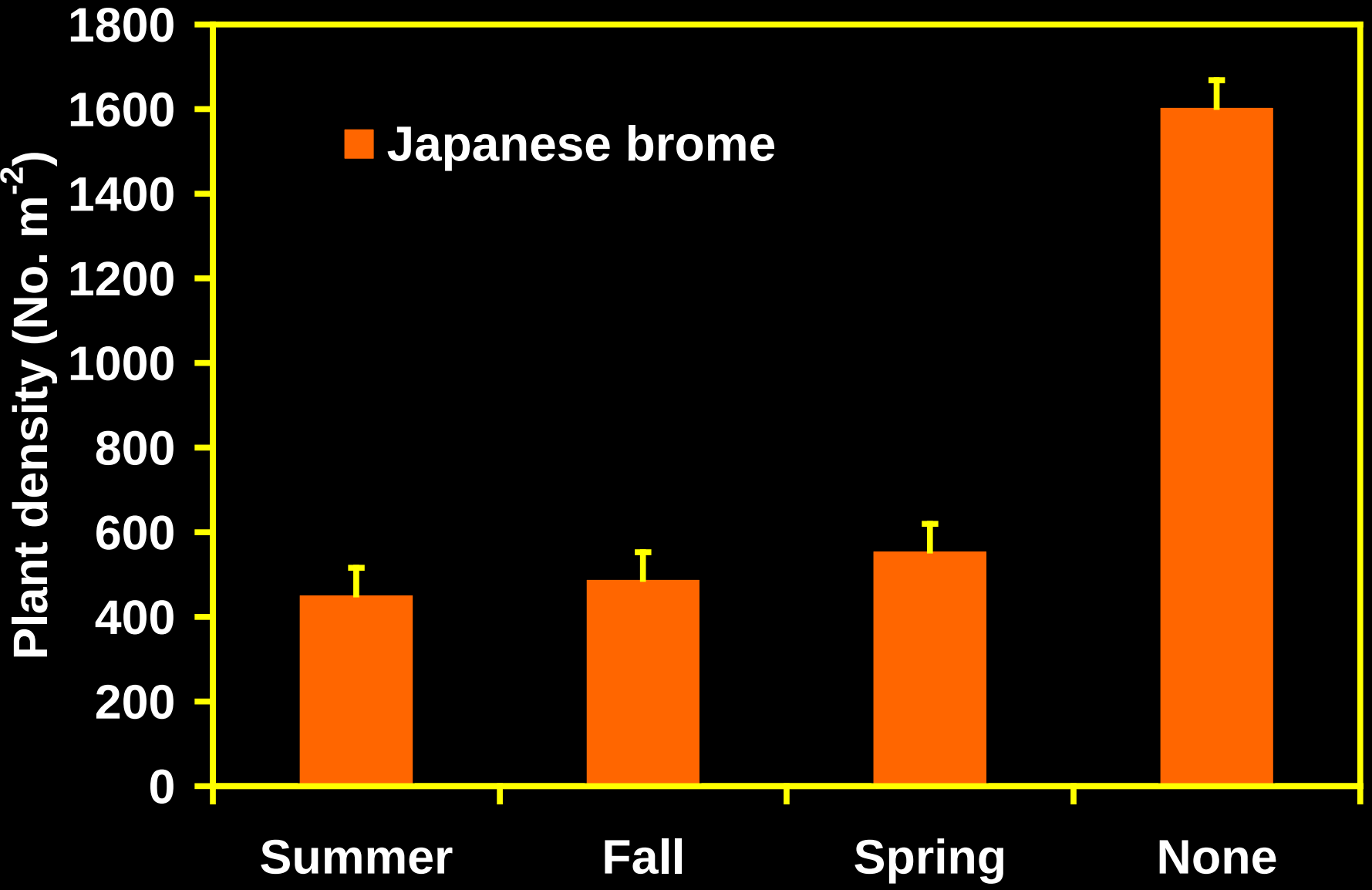
# Non-Native Species



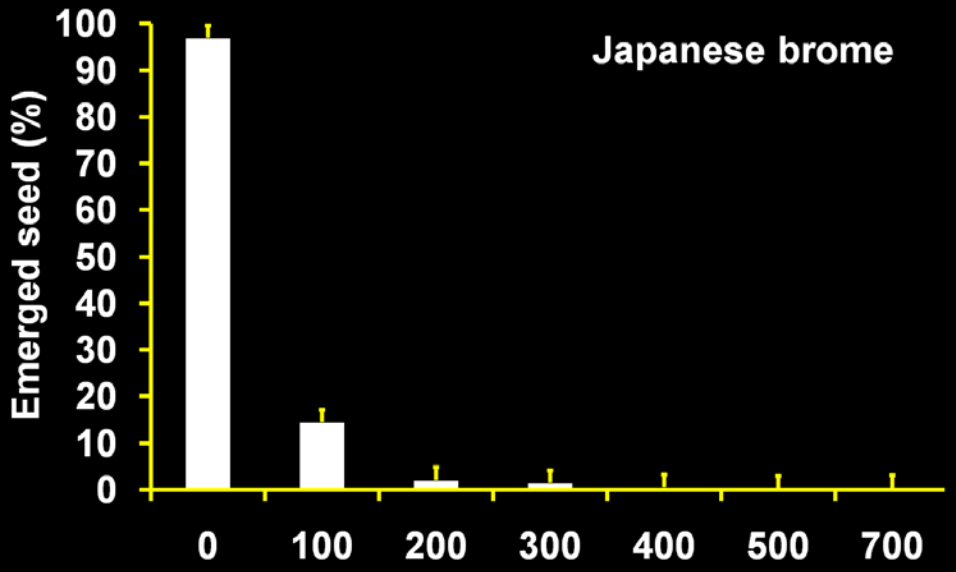
# Summary

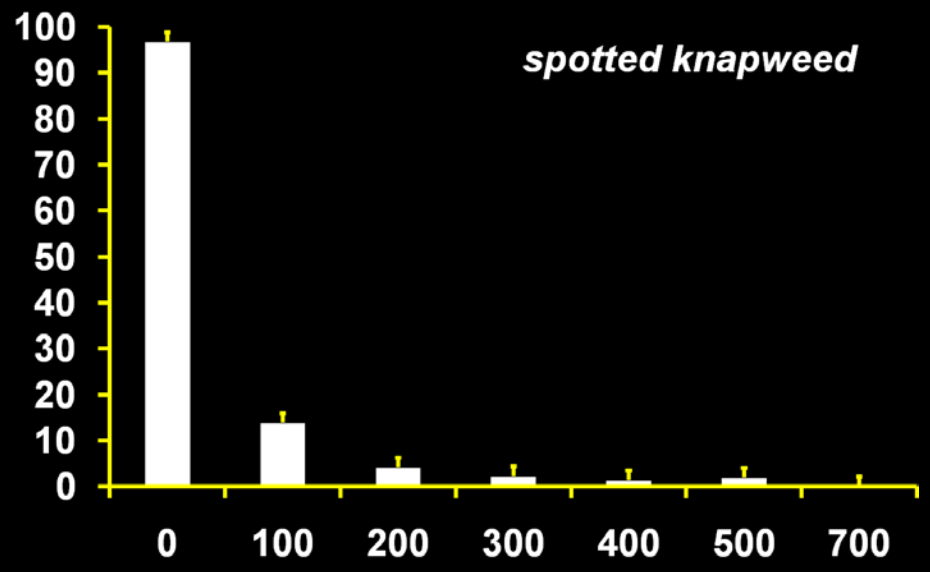
- 2-yr interval is fastest on average
- Fire effects are complex & species-specific
- Total biomass is resistant
- Composition is sensitive
- Fall and summer fire at short intervals favor rangeland integrity

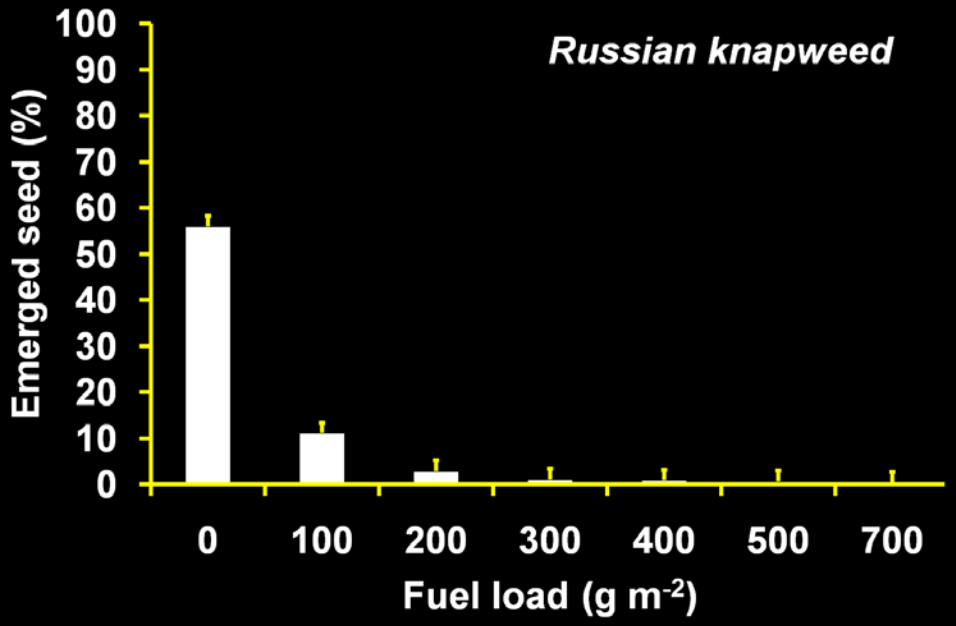
# Fire Season Effect on Brome Density

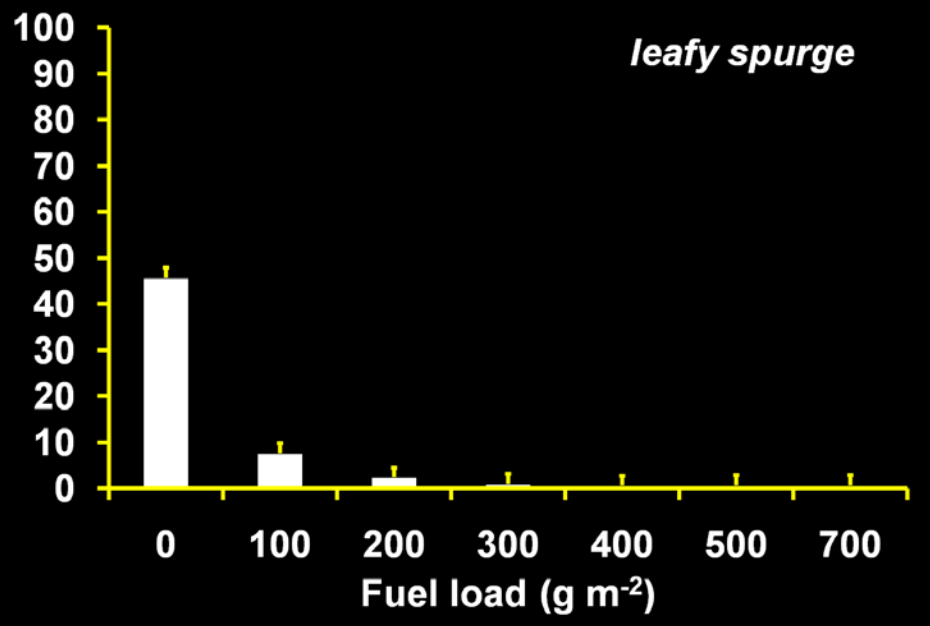


# Fire Effects on Weed Seed Emergence

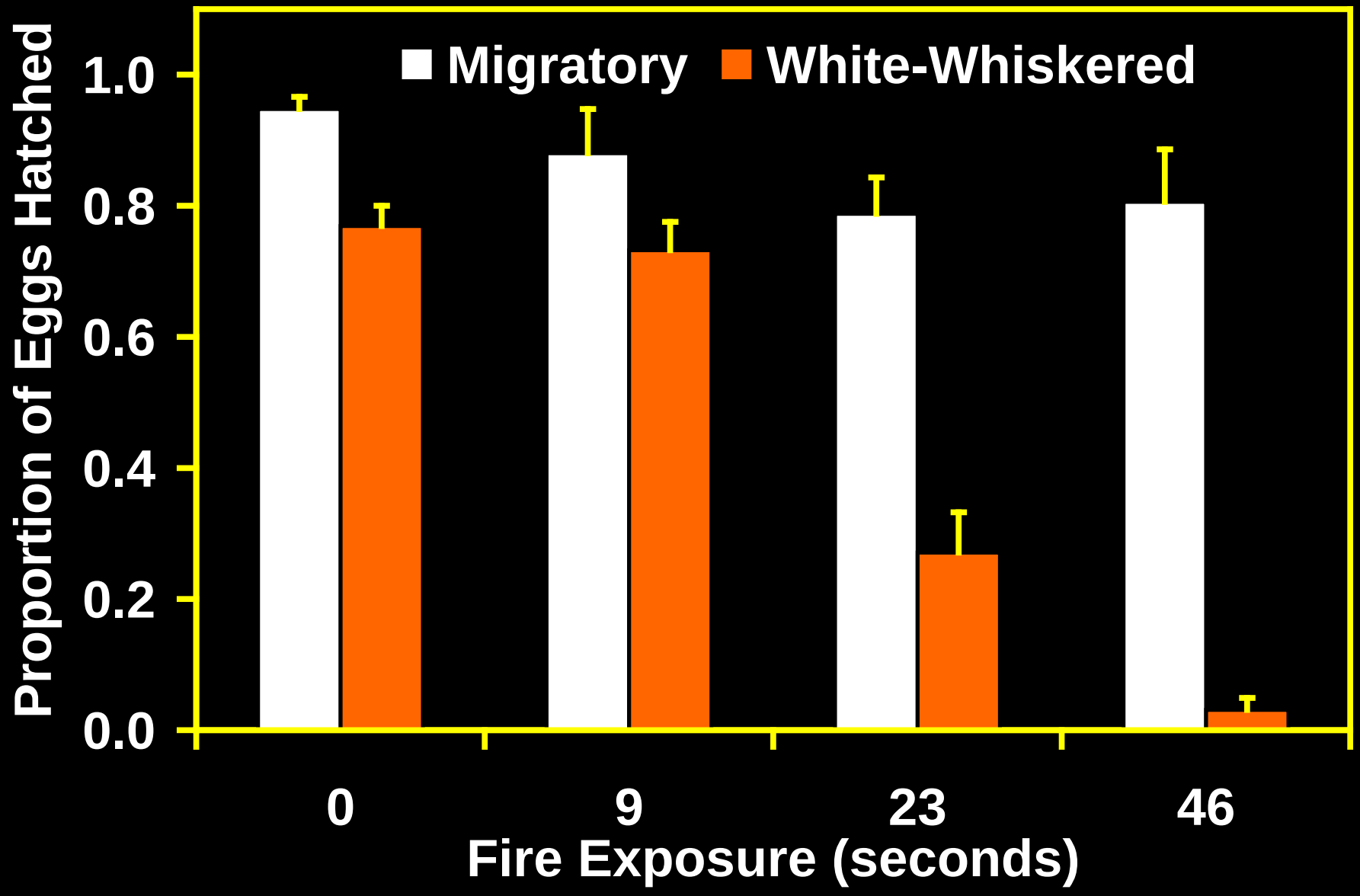


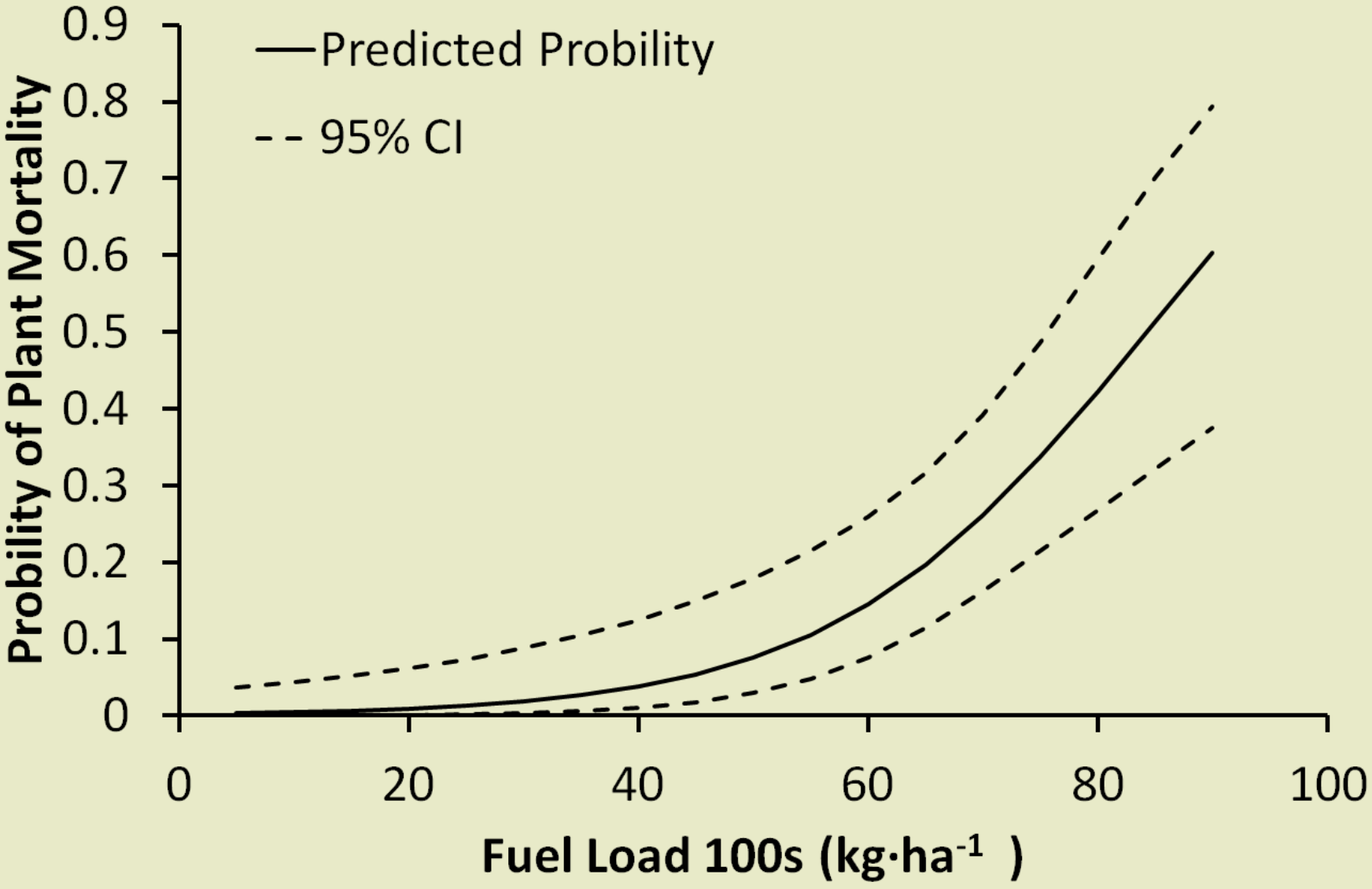



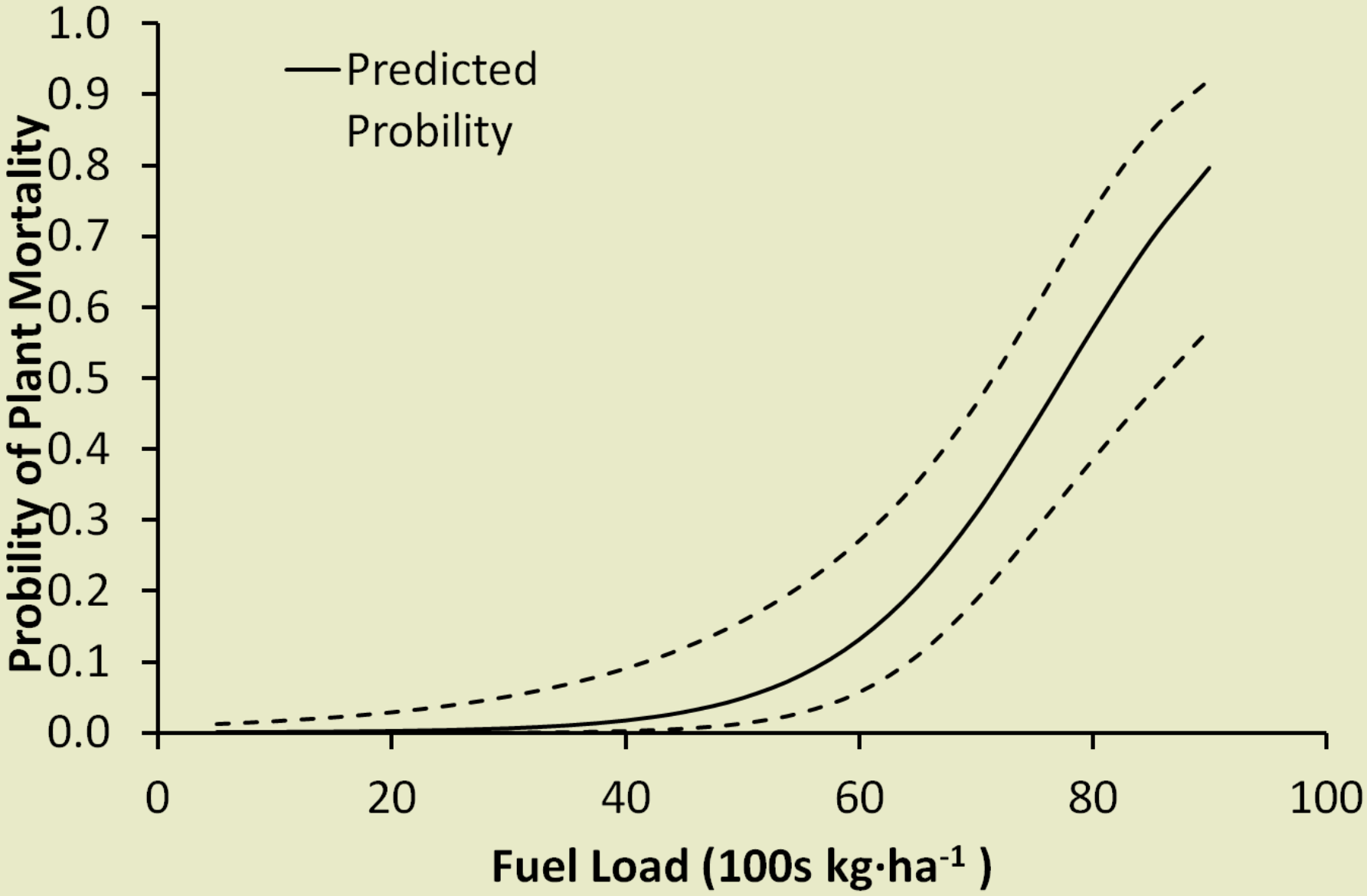
# Heat Effects on Eggs



# Needle-and-thread



# Blue grama

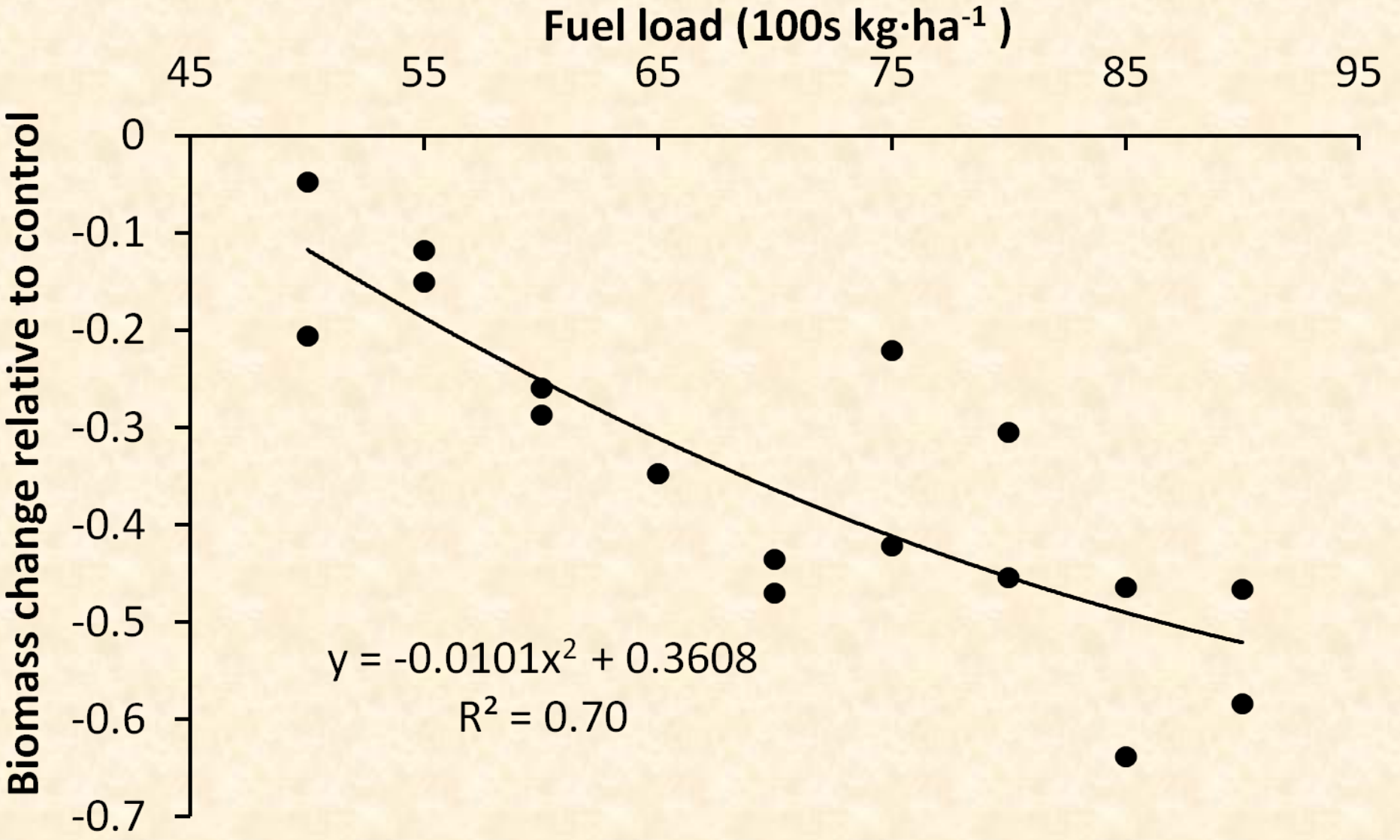

Predicted Probility
Probility of Plant Mortality
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
0
20
40
60
80
100
Fuel Load (100s kg·ha-1 )

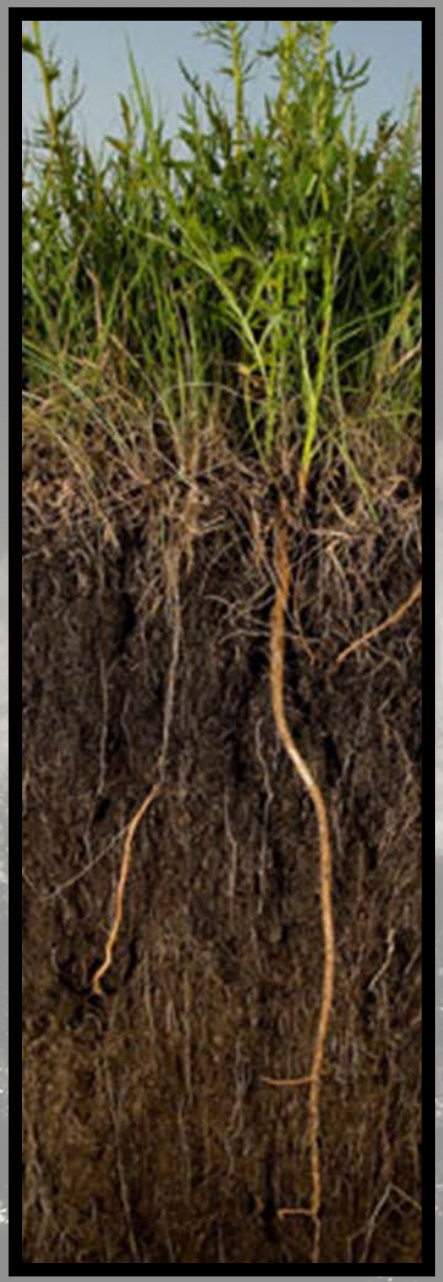
**Western wheatgrass & threadleaf sedge mort. < 1%**

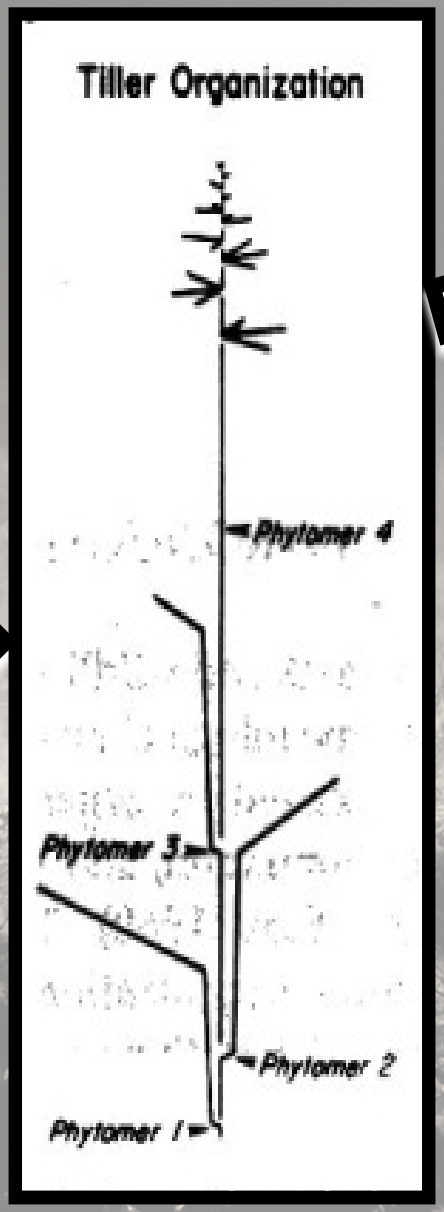
**For 50% probability of mortality:**

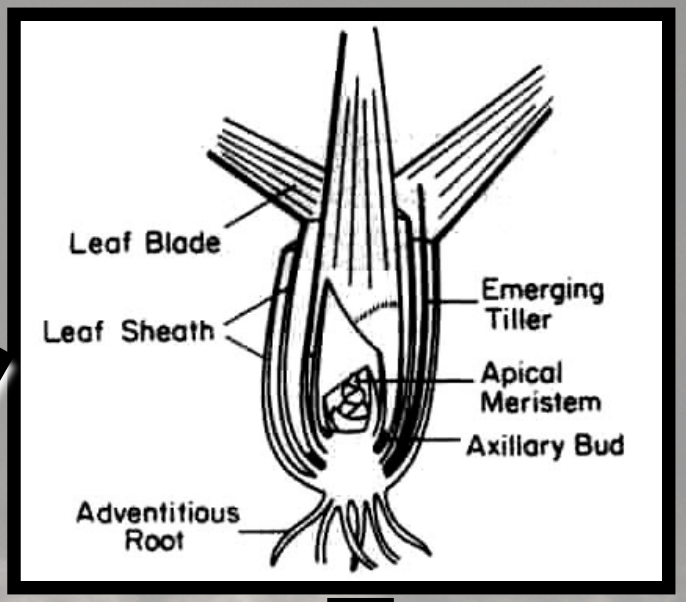
| | |
|---|---|
| **Blue grama** | **7.5 min, 1134 °F, 7130 lb/ac** |
| **Needleandthread** | **10.4 min, 1162 °F, 7575 lb/ac** |

# Western wheatgrass

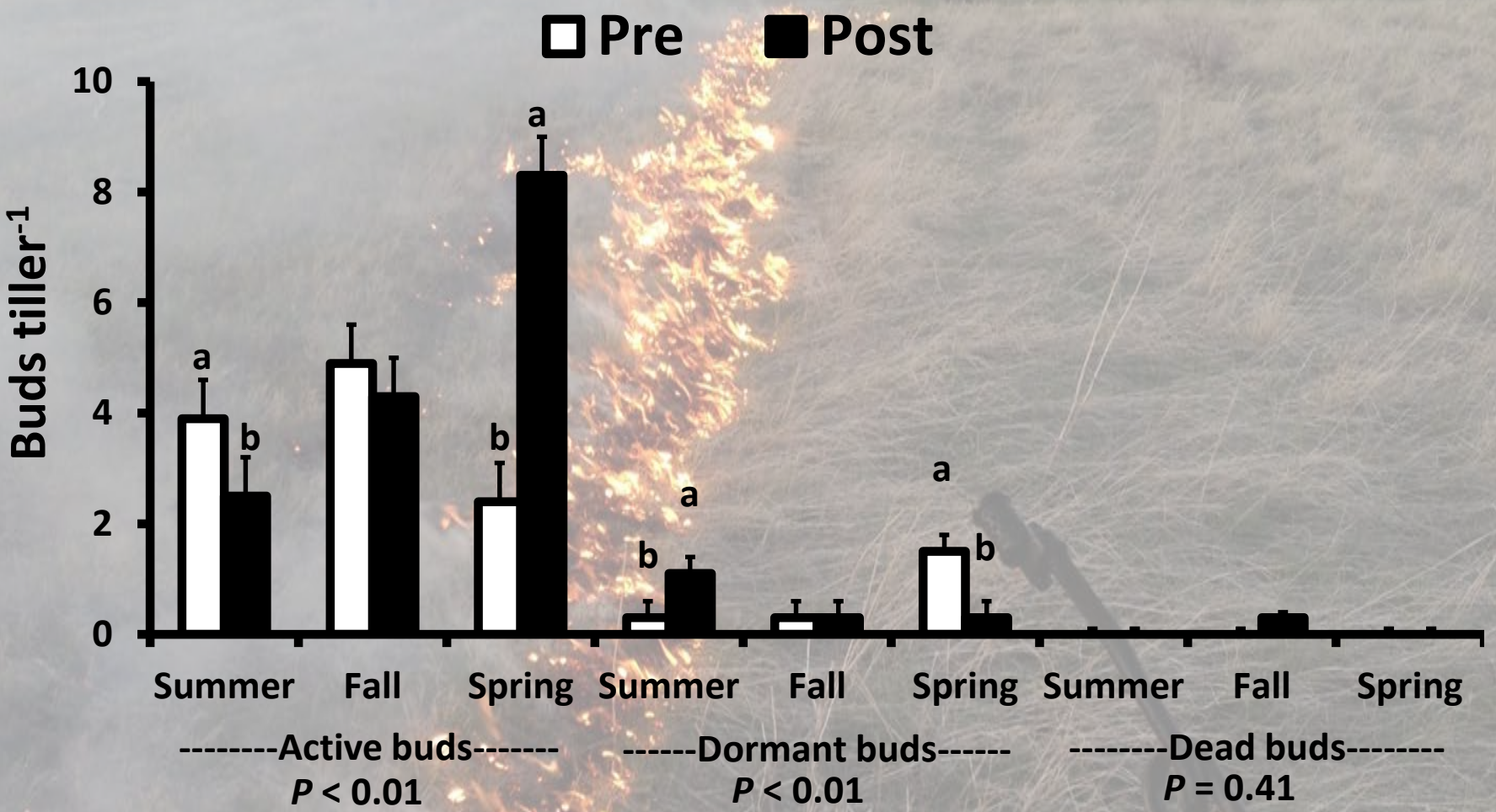




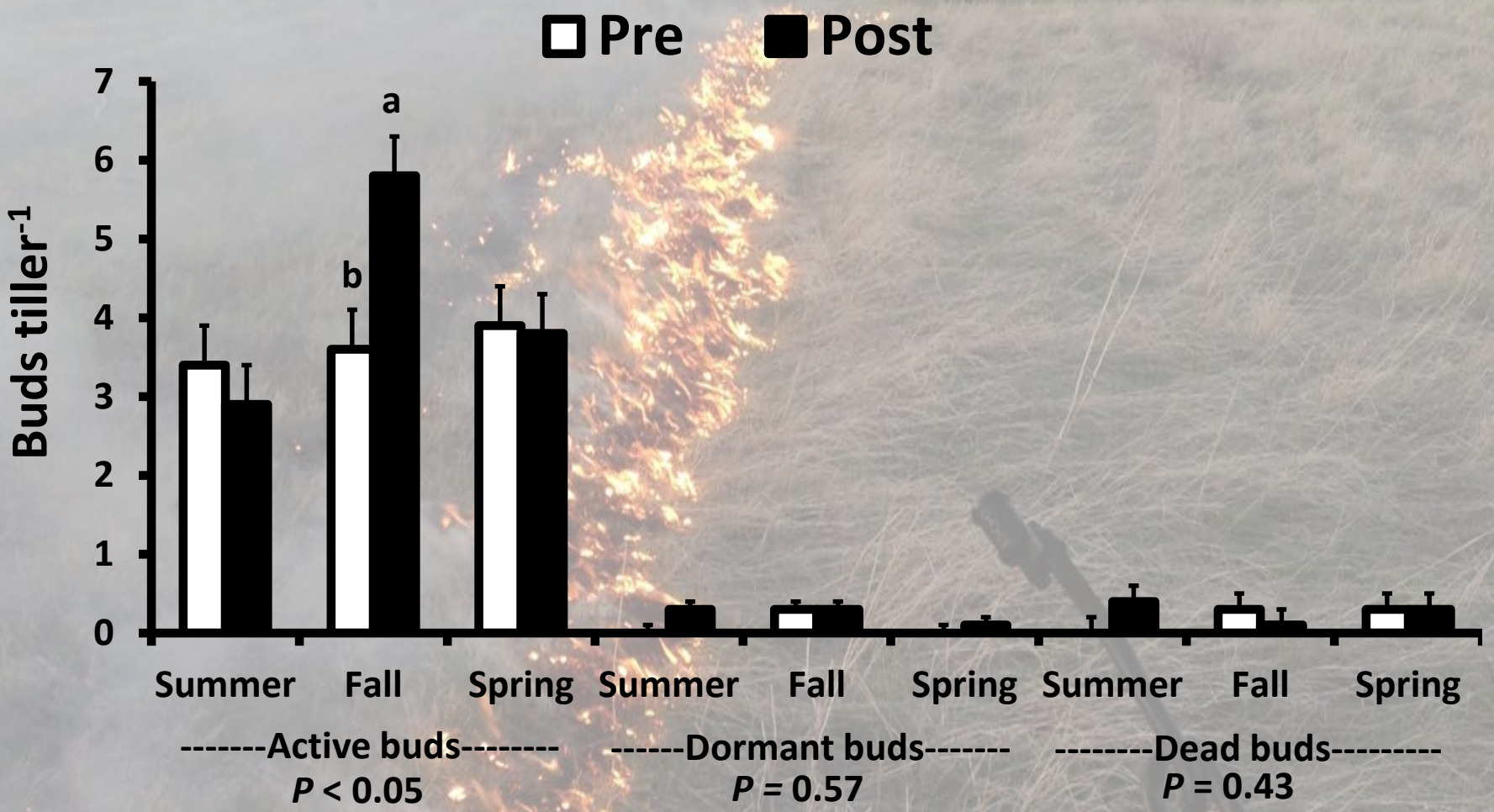

Tiller Organization
Phytomer 4
Phytomer 3
Phytomer 2
Phytomer 1


Leaf Blade
Leaf Sheath
Emerging Tiller
Apical Meristem
Axillary Bud
Adventitious Root

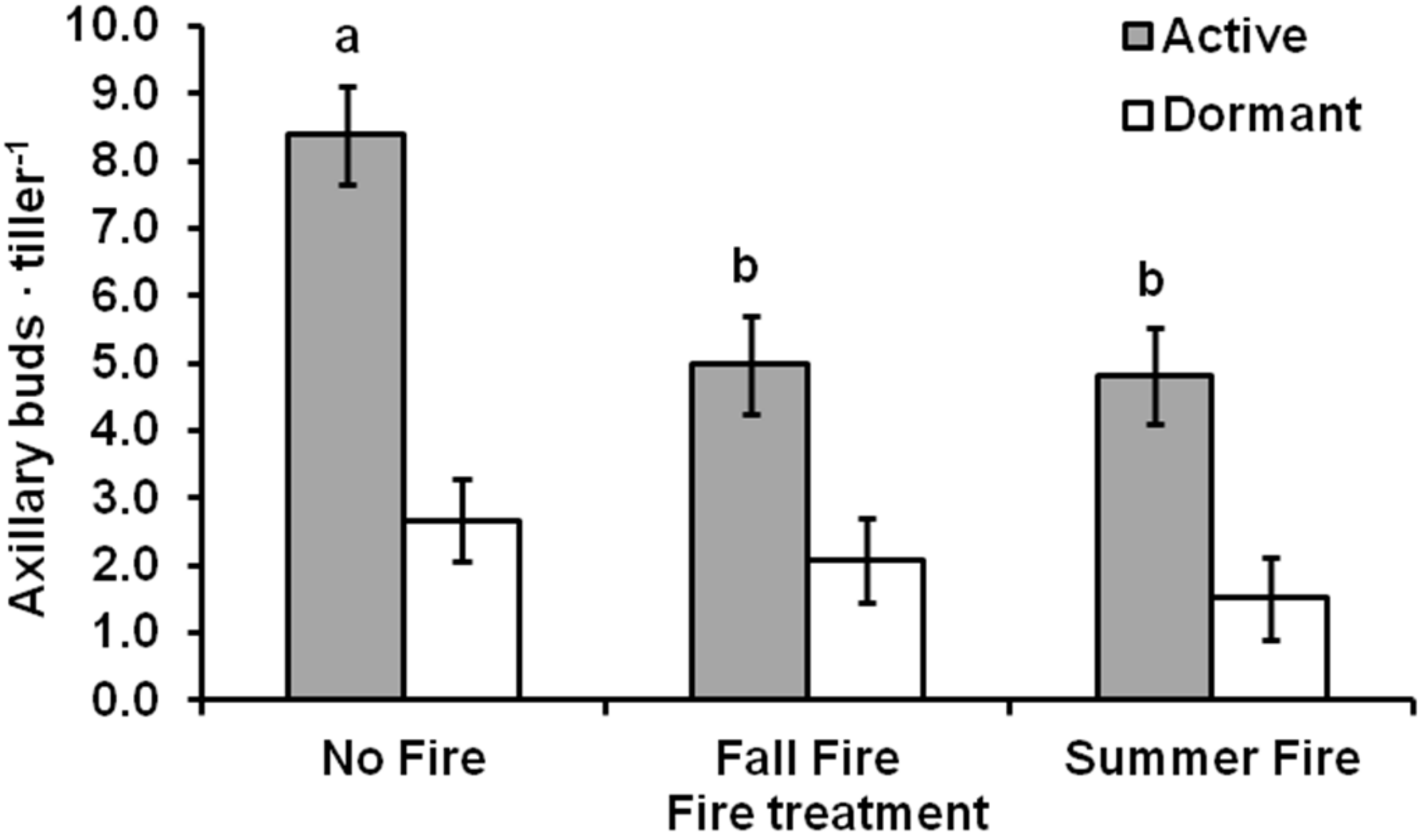
# Immediate Fire Effects
# Blue Grama



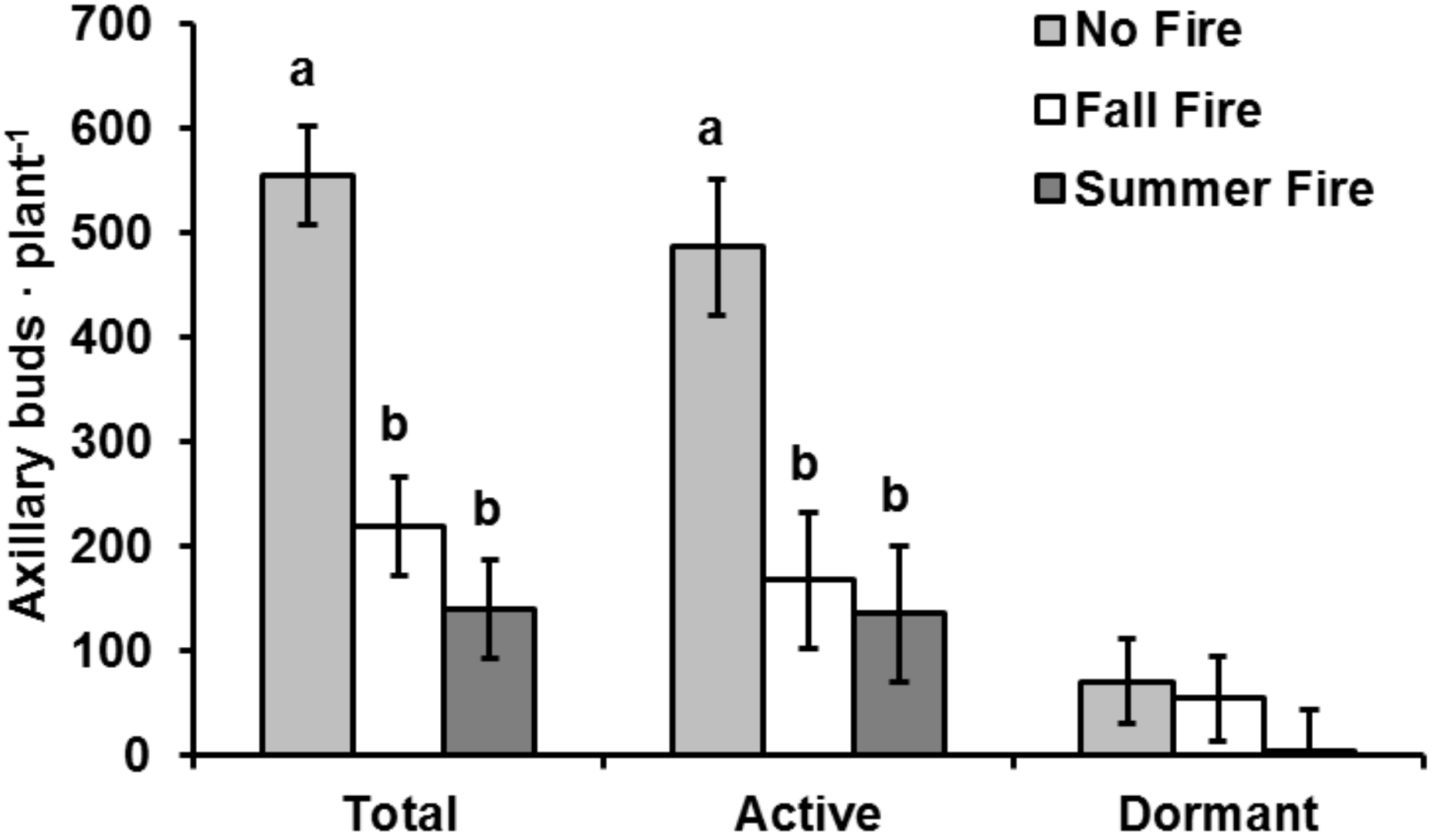
# Immediate Fire Effects Western Wheatgrass



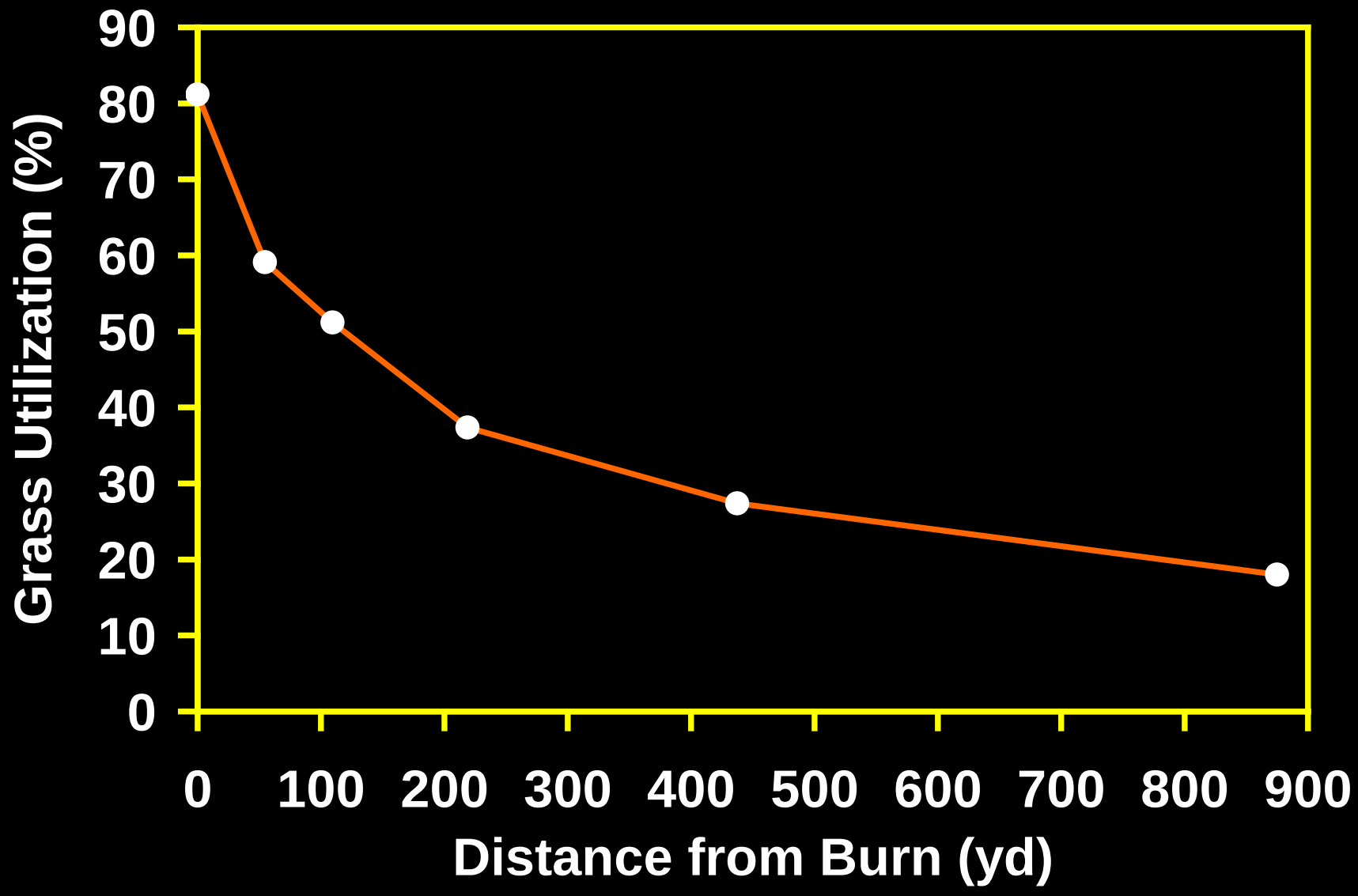
# Purple threeawn



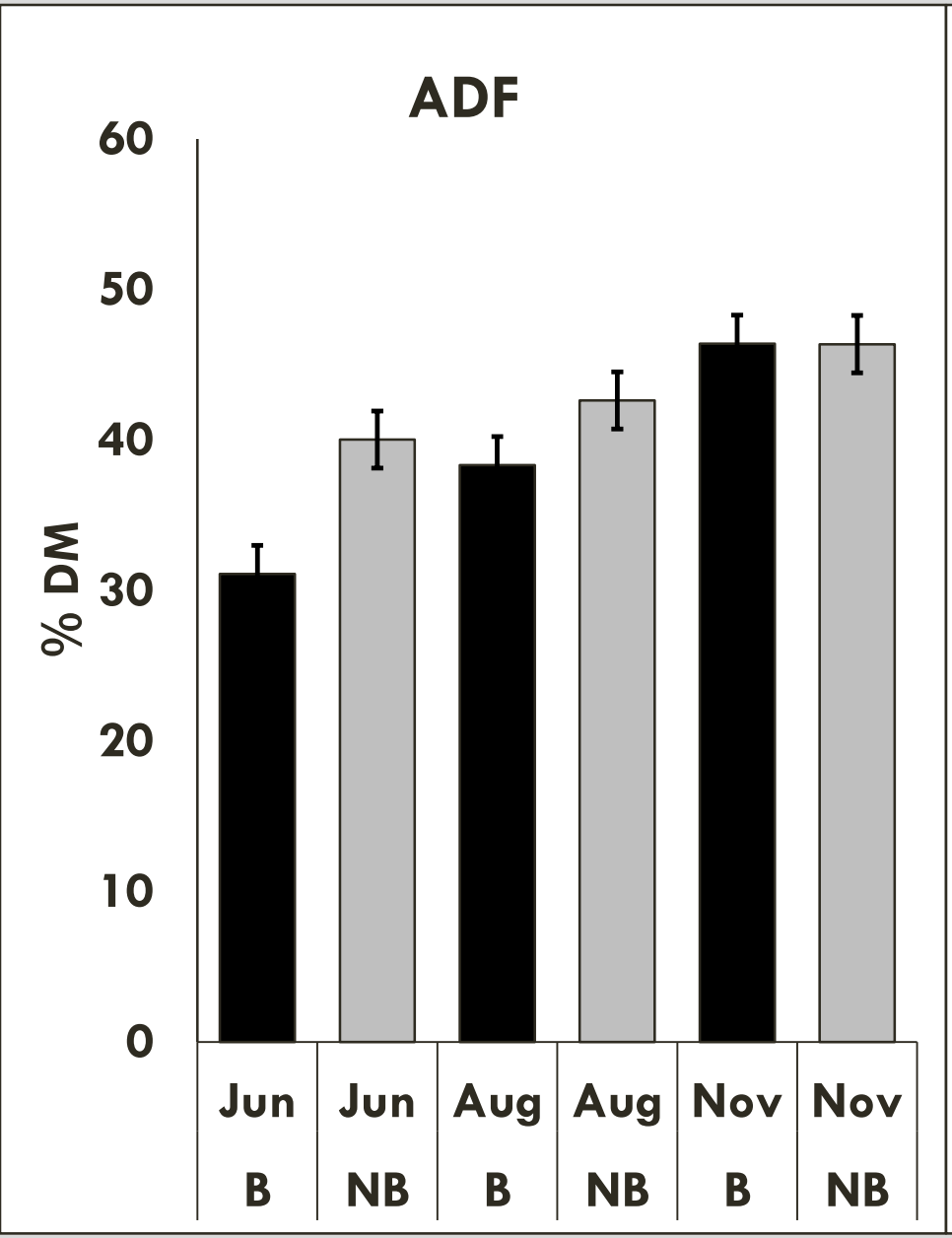
# Purple threeawn

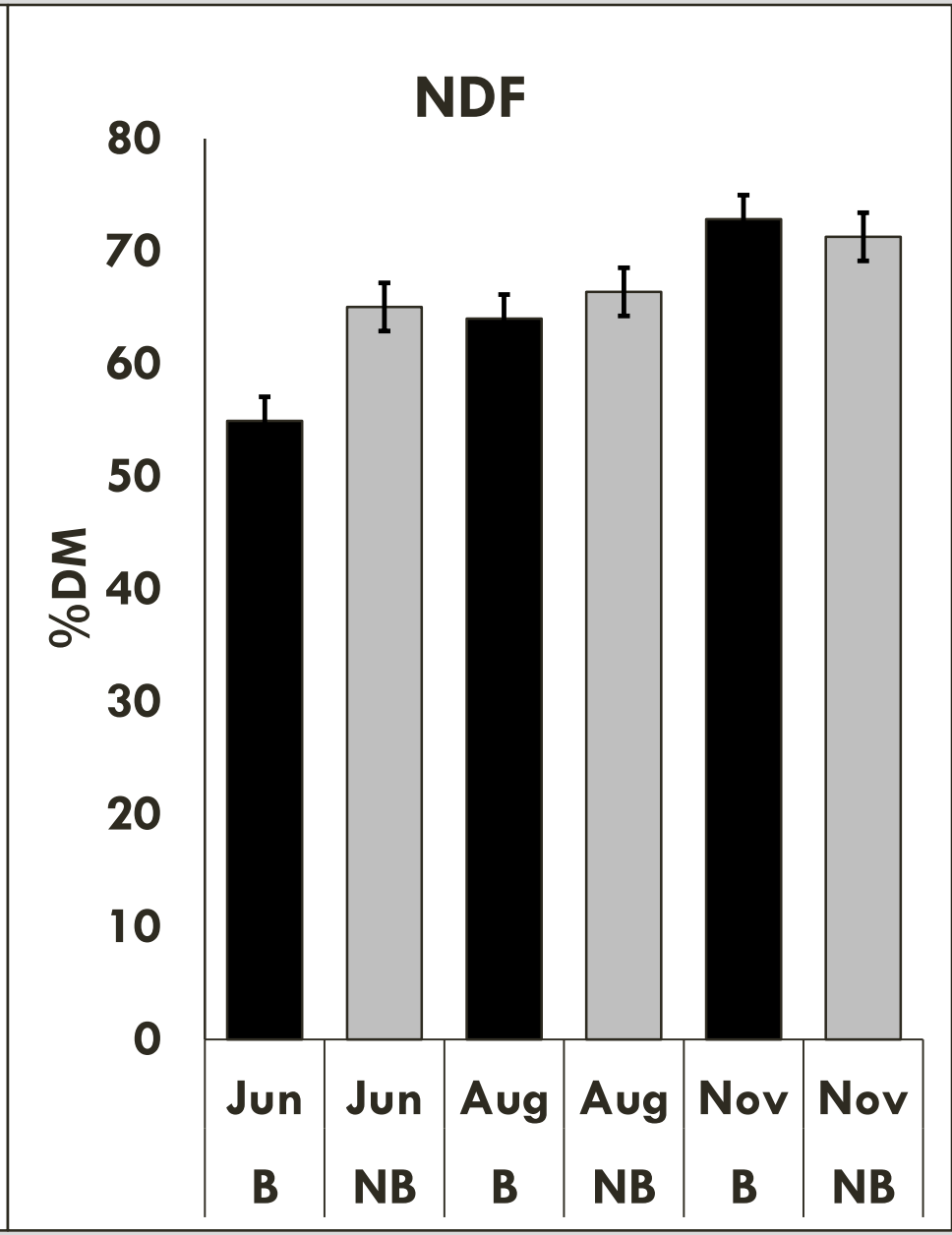


# Fire Effects on Grazing Distribution

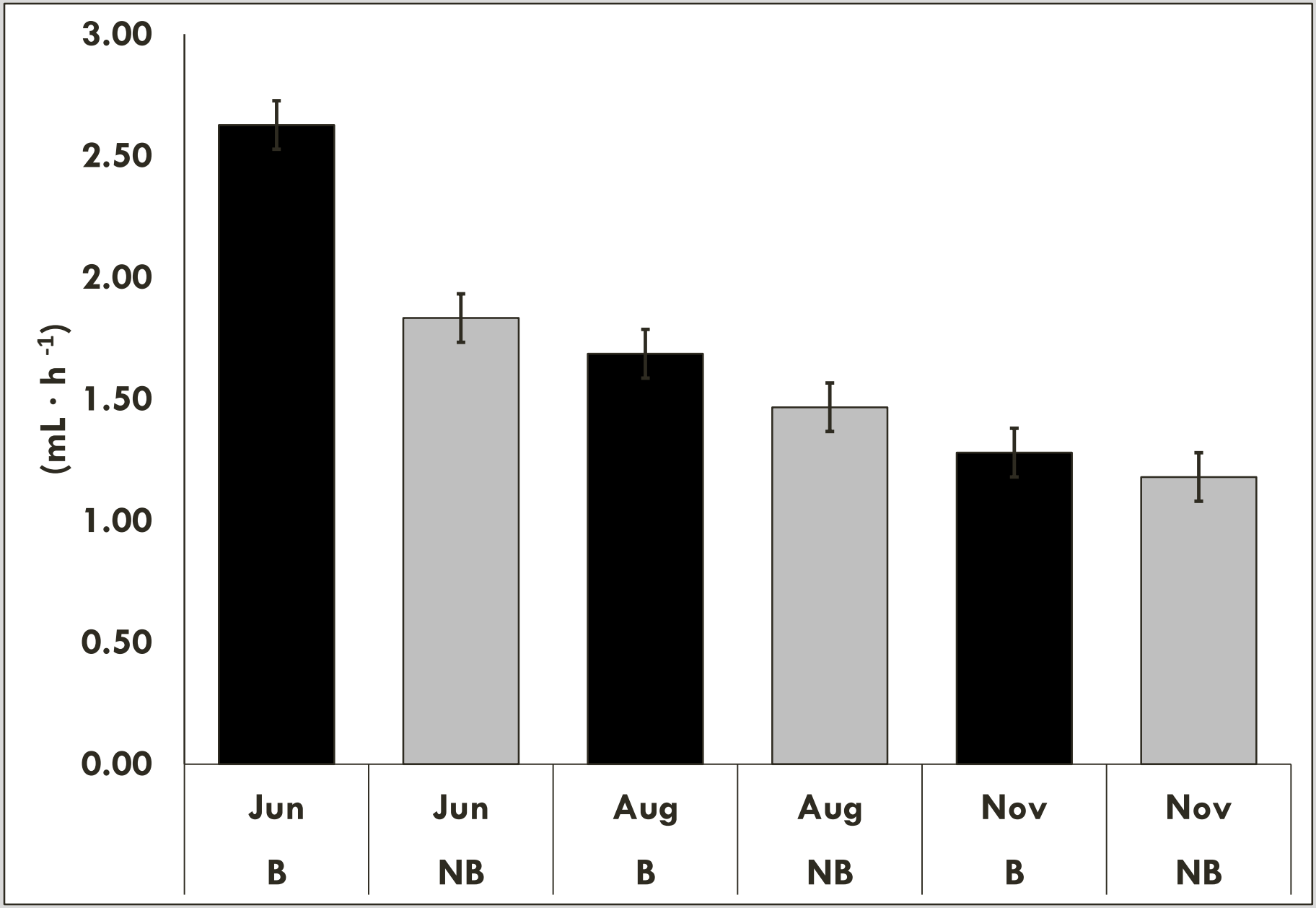


# Fiber Fractions



# Average Fermentation Rate



# Take-home message

- Productivity is resistant
- Preferred natives are favored
- Fire effects are species-specific
- Moderate grazing after fire is safe

- Fuel load and heat dosage are good predictors
- Bud bank may be the key
- Increased forage quality is short-lived

# Questions or comments?