OPTIMIZING JAPANESE KNOTWEED CONTROL AND ESTIMATING COSTS TO ERADICATE POPULATIONS

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Knotweed species in Wisconsin

1. **Bohemian knotweed**
   (*Polygonum x bohemica*)
2. **Japanese knotweed**
   (*Polygonum cuspidatum*)
3. Giant knotweed
   (*Polygonum sachalinensis*)

Invade a wide range of areas

Only anecdotal information on management available when initiated research

- Few herbicides tried
  - glyphosate, imazapyr, triclopyr
- Unsure of proper timing
  - spring vs summer vs fall
- Recommendations often involved
  - Mowing prior to treatment
  - Use of high volume applications
- Unknown the cost to control populations and timeframe needed to eradicate

Developed experiments to answer these questions 2012-2017

- Herbicides that are effective (2012-2015)
- Timing of application
  - Summer vs fall after mowing (2012-13)
  - Spring vs fall (2015-2017)
- Use of mowing (2012-2015)
- Does herbicide volume affect Milestone control? (2014-2015)
- Cost to control populations and time to eradicate (2014-18)

Methods

- Trials were RCB designs with 4 replicates
- Herbicides were applied to plots 10 x 25 ft wide
- A range of measurements were taken, results will focus on cover 12-18 months after treatment
- SAS Proc Mixed, if different mean separation with Fisher's protected LSD at $P<0.05$

Herbicides Evaluated

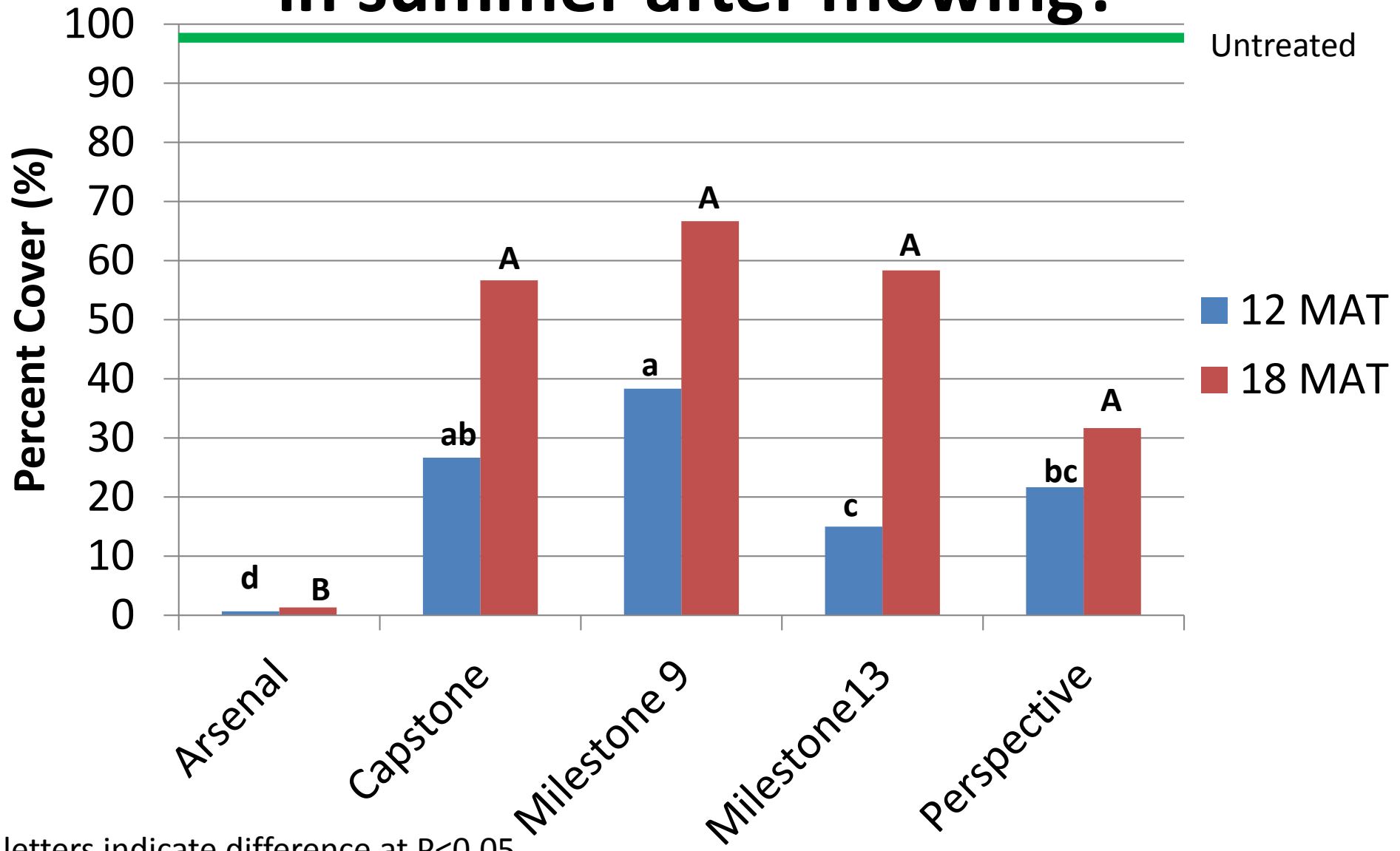
Herb	Rate	Active Ingred.	Selectivity	Residual
Arsenal (Habitat)	4-5.25 pt/A	Imazapyr	Not selective	YES
Capstone	1.3 gal/A	Triclopyr + aminopyralid	Safe to established grasses	YES
Perspective*	6 oz/A	Aminocyclopyrachlor + chlorsulfuron	Safe to established grasses	YES
Milestone	7 - 14 fl oz/A	Aminopyralid	Safe to established grasses	YES
Rodeo*	8 lbs ae/A (9%)	Glyphosate	Not selective	NO
Crossbow*	1 gallon/A	2,4-D + triclopyr	Safe to established grasses	Limited

*Only in 1 study

Plots had > 85% knotweed cover prior to treatments

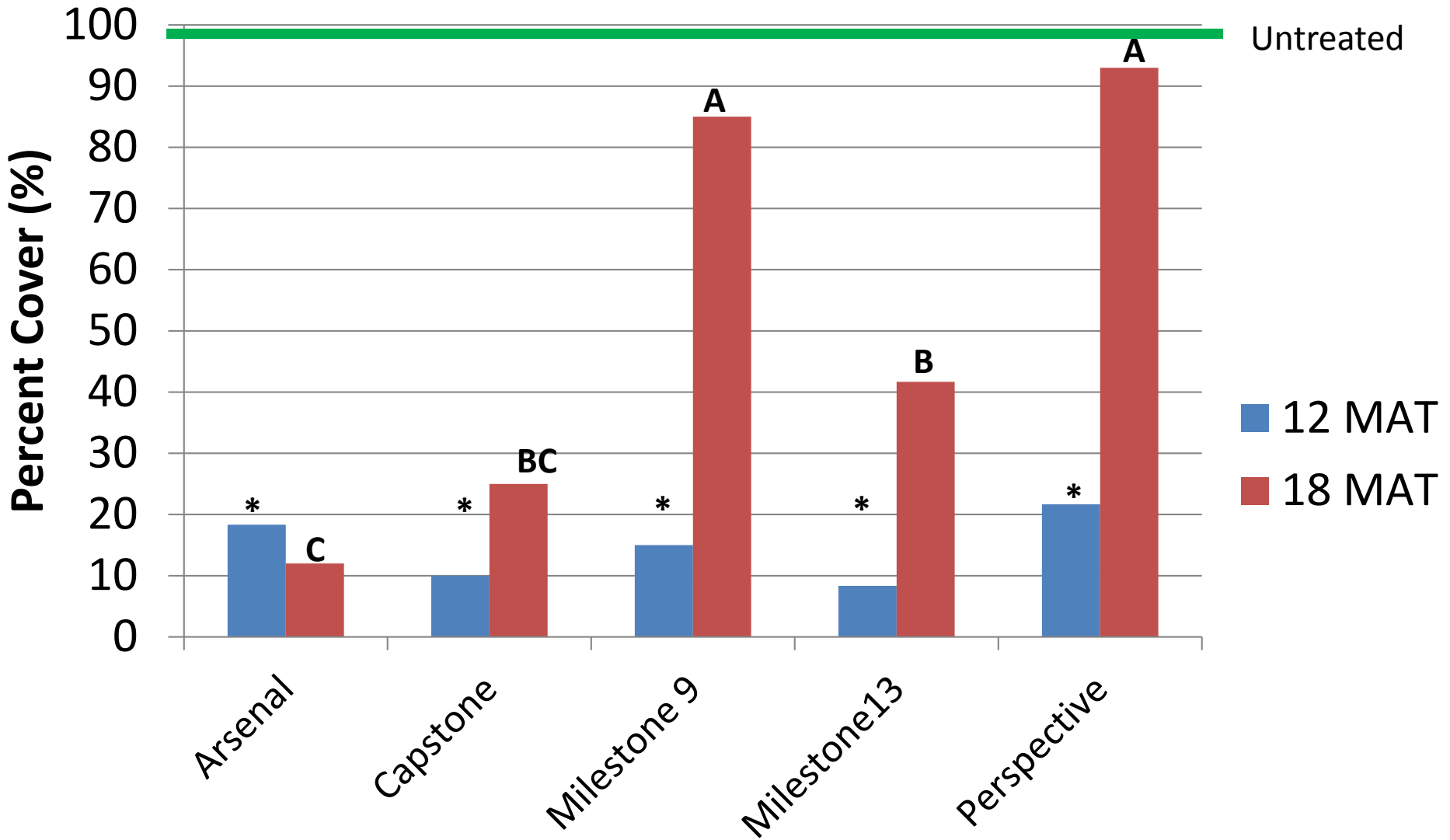
Initially we mowed plants and let resprout for 1 month prior to treatmen

Which herbicide works best when sprayed in summer after mowing?

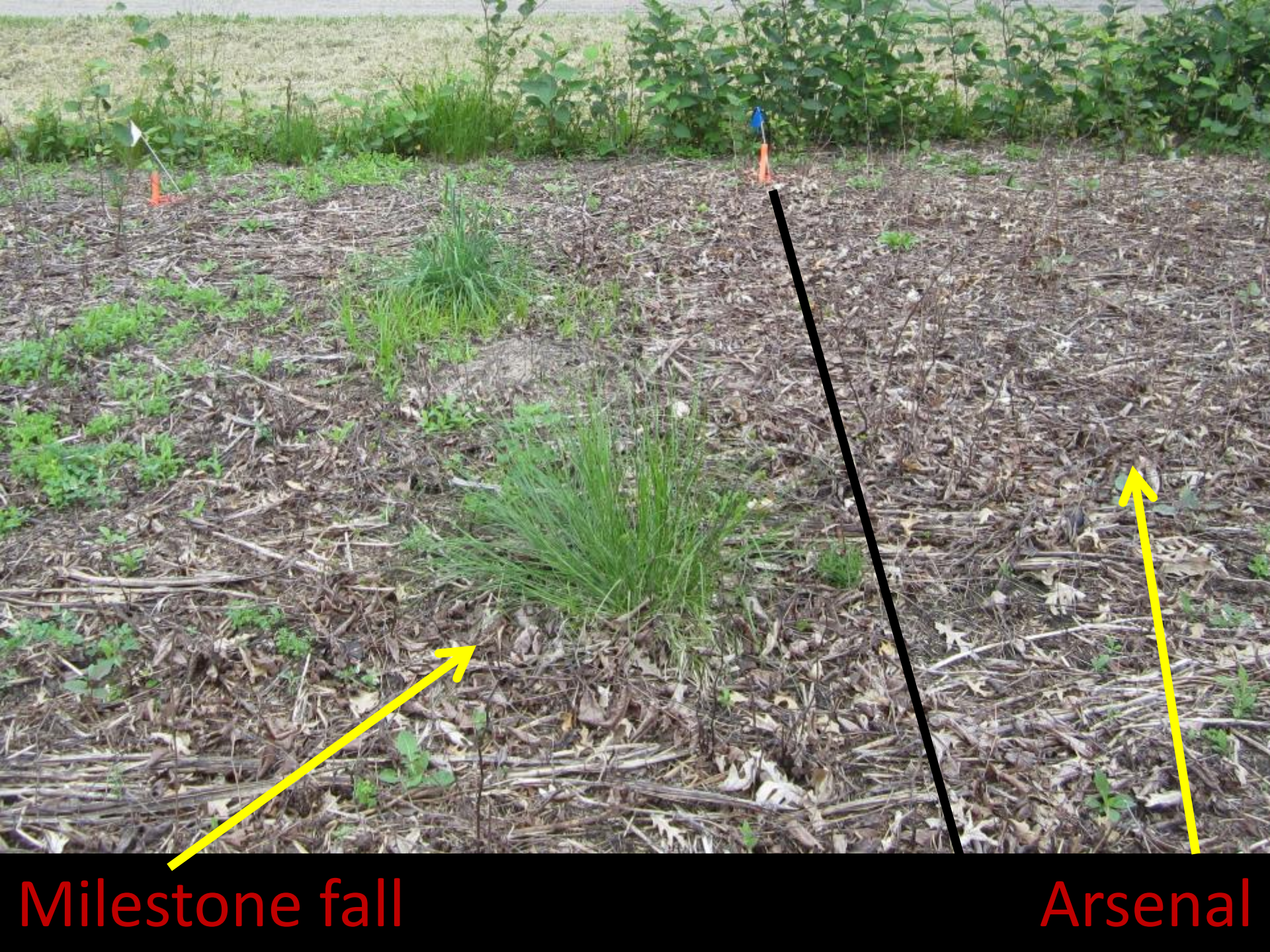


letters indicate difference at P<0.05

Which herbicide works best in fall after mowing?

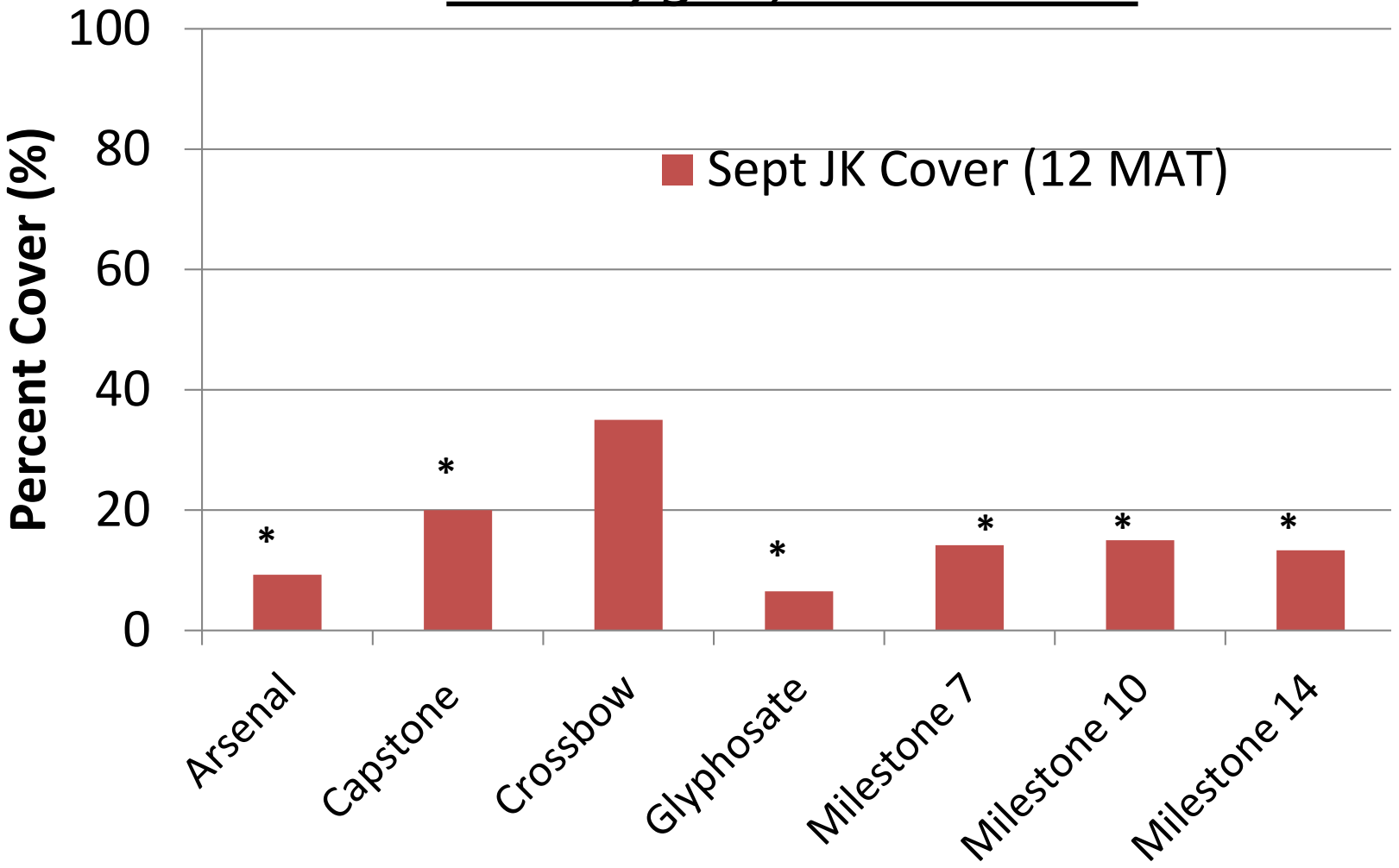


* Indicates significantly different than UTC at P<0.05


Milestone fall
Arsenal

Can we get glyphosate to work as well as other herbicides?

Sheboygan, WI 12 MAT



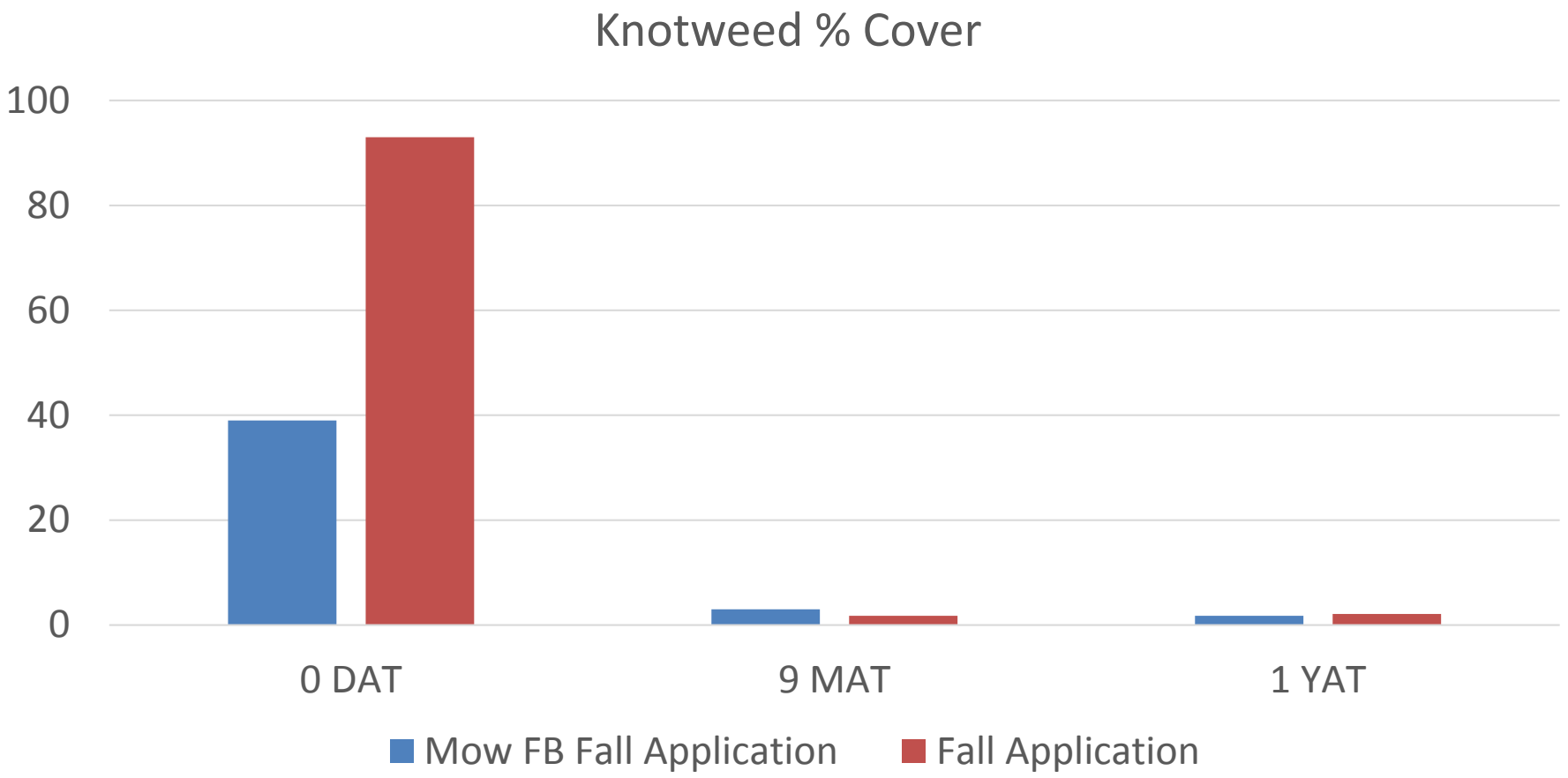
* Indicates significantly different from UTC at P<0.05

Summary of herbicide studies

- Arsenal/Habitat is most effective
  - Effective in summer or fall, get bareground residual may prevent revegetation following year
- Milestone
  - Best results in fall at spot trt rate (14 fl oz/A)
  - Established grasses won't be harmed
- Roundup/glyphosate
  - Can be effective, but need HIGH RATE (9% Rodeo)

Do we need to mow?

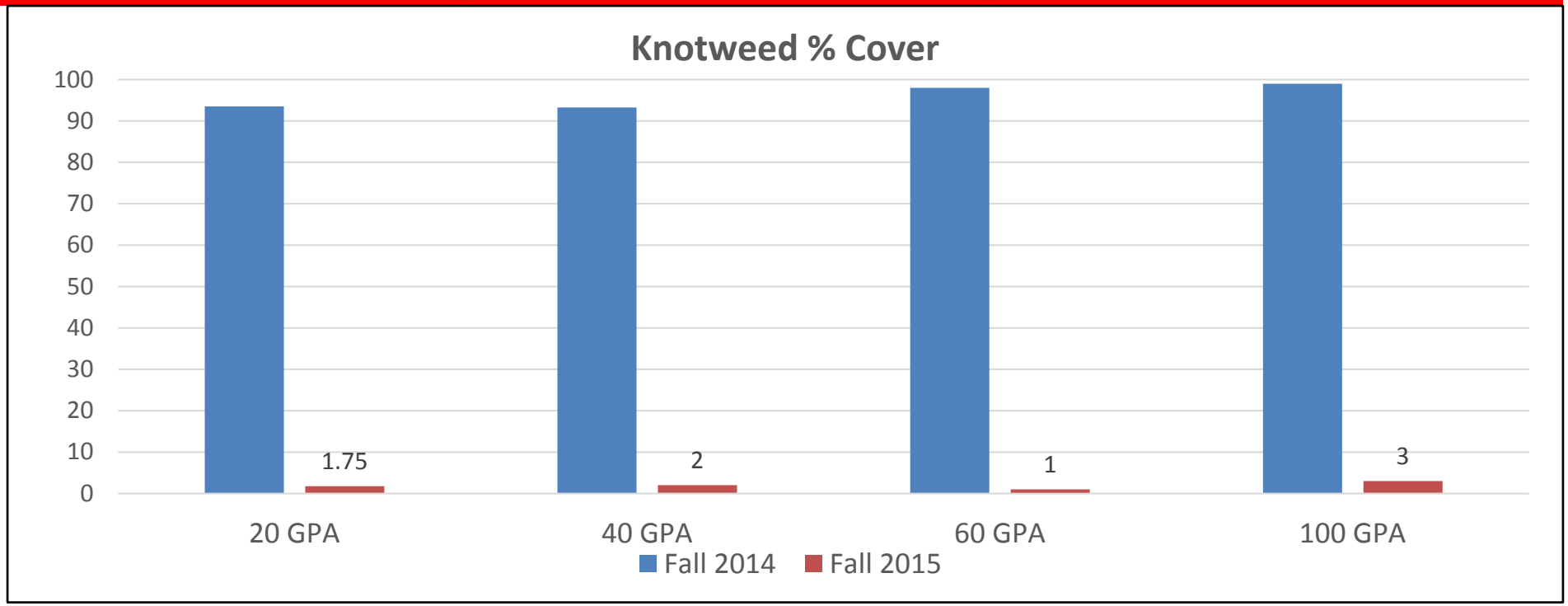
- Compared effectiveness of fall milestone (14 fl oz/A) to plants mowed in July vs not mowed



Does application volume affect control?

- Milestone applied at 14 fl oz/ac at 4 GPA:
  - 20, 40, 60, and 100 GPA

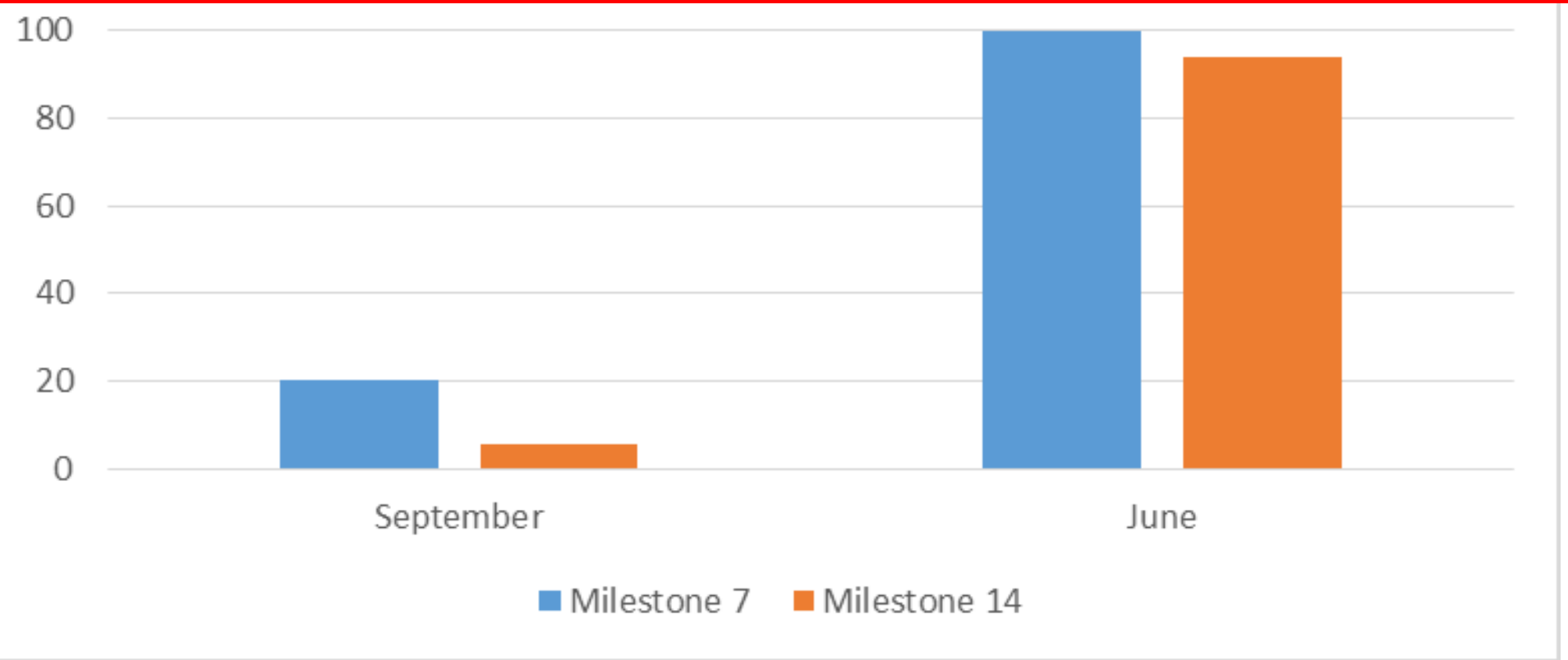
Results (Milestone 14 fl oz/A) 0 and 1 YAT



Is Fall better than Spring for applying a herbicide?

- Milestone applied at 7 or 14 fl oz/ac in fall vs spring

% cover Knotweed 12 months after application



Can we make it work on WI roads and what does it cost?

Can we make it work on WI roads and what does it cost?

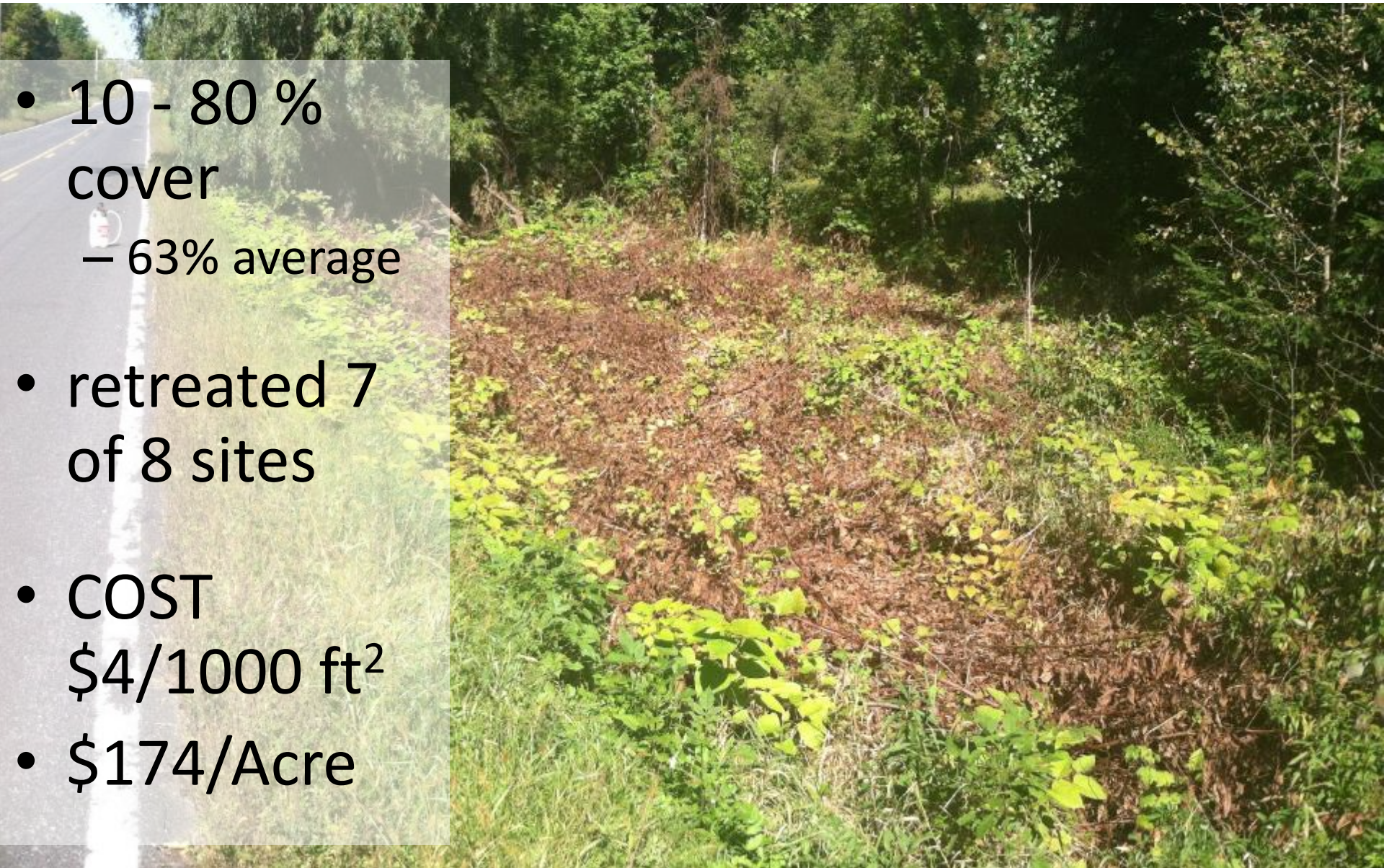
- Evaluated effectiveness and cost of milestone 14 fl oz/A on roadsides
  - 8 location in SE Wisconsin with dense small patches of knotweed
  - 2014 mowed in July then applied herbicide to resprouting tissues in September
  - Retreated following year if knotweed cover > 20%
  - Estimated cost EACH YEAR
    - Herbicide
    - Time for staff to mow/treatment

Initial Year (2014)

Treatment year

- cover 80-99%
  - 95% avg.
- treated all sites (8)
- COST $19/1000 ft^2
- $827/acre

Second Year (2015) 1 YAT



- 10 - 80 % cover
  - 63% average
- retreated 7 of 8 sites
- COST $4/1000 ft^2
- $174/Acre

Third year (2016) 2 YAT

- 75- 98 % cover
  - 22% average
- retreated 2 of 7 sites
- COST:
  - $1/1000 ft^2
  - $44/Acre

Fourth year (2017) 3 YAT

- 1- 35 % cover
  - 13% average
- Would have to retreat 2 of 7 sites

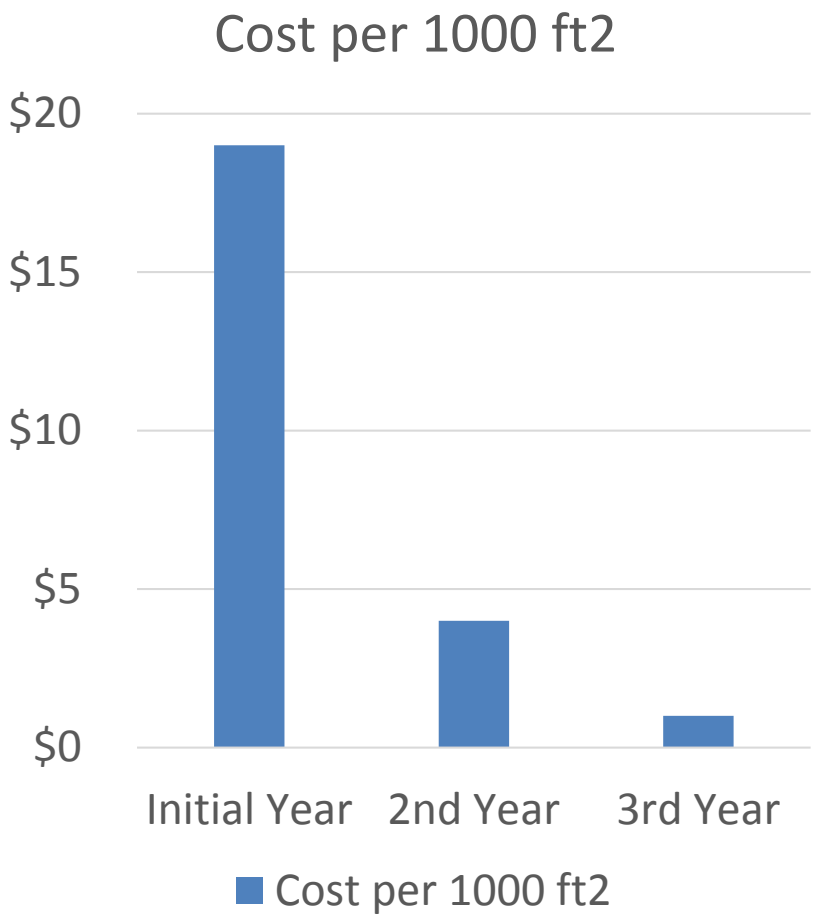
Summary of Control and Cost

Knotweed control

- Knotweed cover
  - After 1 yr trt: 63% cover
  - After 2 yrs trt: 22% cover
  - After 3 yrs trt: 13% cover

- No Populations **<u>ERADICATED</u>**

COST OF TREATMENT



Conclusions

- Knotweed can be suppressed, but need to follow-up control for **at least** 2 consecutive yrs
  - Range of herbicides that are effective
    - Roundup, Milestone, Arsenal/Habitat
- Control costs are initially high, but are reduced >3 fold in subsequent years

What about restoration?

Questions?

- Thanks to the following for involvement in this research
  - Dow Agrosciences
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  - Tony Summers
  - Chris Bloomingdale
  - Students