Jointed Goatgrass Research from Wyoming and Nebraska

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INTRODUCTION:

- More than ten years of research on the biology, ecology, and management of jointed goatgrass has been conducted at the University of Wyoming and University of Nebraska thanks to financial support from the National Jointed Goatgrass Research Program.

PROJECTS:

- Effect of site and year variation on economic thresholds.
- Influence of fertilizer placement on jointed goatgrass competitiveness.
- Influence of wheat seeding rate on jointed goatgrass competitiveness.
- Technologies for studying jointed goatgrass seed movement and survival across a range of environments.
- Predation of jointed goatgrass seeds.
- Effect of imidazolinone-resistant winter wheat technology in a winter wheat-fallow rotation.

OUTPUTS:

- Four peer-reviewed research articles published in Weed Science, Weed Technology, and Crop Science
- One M.S. Thesis (Kappler) and two PhD Dissertations (Wilson and Sbatella) were completed.

SUMMARY of RESULTS:

- Site- and year-effects can have a dramatic effect on wheat yield losses due to jointed goatgrass.
- Microchip technology can aid in determining jointed goatgrass movement and viability.
- Deep banding of fertilizer near the wheat seed increases wheat competitiveness with jointed goatgrass.
- Increased wheat seeding rates can reduce jointed goatgrass biomass and reproductive tillers.
- Mice and rabbits are the predominant predators of jointed goatgrass seed.
- Use of imazamox in imidazolinone-resistant winter wheat can reduce jointed goatgrass densities in the current year as well as subsequent crop years.

REFERENCES:

Jasieniuk, M., B.D. Maxwell, R.L. Anderson, J.O. Evans, D.J. Lyon, S.D. Miller, D.W. Morishita, A.G. Ogg Jr., S. Seefeldt, P.W. Stahlman, F.E. Northam, P. Westra, Z. Kebede, and G.A. Wicks. 1999. Site-to-site and year-to-year variation in *Triticum aestivum-Aegilops cylindrica* interference relationships. Weed Science, 47:529-537.

Kappler, B.F., D.J. Lyon, P.W. Stahlman, S.D. Miller, and K.M. Eskridge. 2002. Wheat plant density influences jointed goatgrass (*Aegilops cylindrica*) competitiveness. Weed Technology, 16:102-108.

Kniss, A.R., D.J. Lyon, and S.D. Miller. 2008. Jointed goatgrass management with imazamox-resistant cultivars in a winter wheat-fallow rotation. Crop Science, 48:2414-2420.

Mesbah, A.O., and S.D. Miller. 1999. Fertilizer placement affects jointed goatgrass (*Aegilops cylindrica*) competition in winter wheat (*Triticum aestivum*). Weed Technology, 13:374-377.

Sbatella, G.M. 2006. Jointed goatgrass viability losses under different environments. PhD Dissertation, University of Wyoming.

Wilson, D.W. 2000. Viability of buried weed seed and computerized seed detection techniques. PhD Dissertation, University of Wyoming.

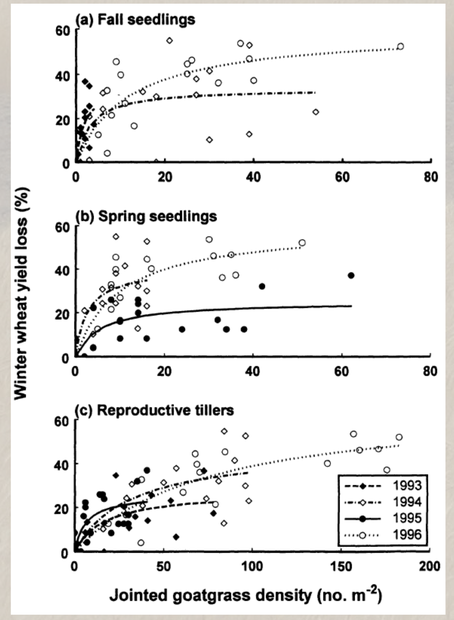
From Wilson (2000) and Sbatella (2006). Using microchip technology to determine viability losses and seed movement under different environments.

From Mesbah & Miller (1999): Influence of fertilizer placement on winter wheat (top) and jointed goatgrass (bottom) growth and development.

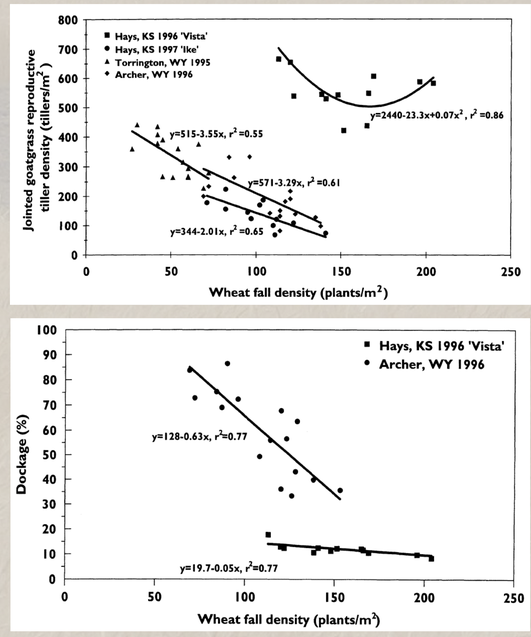
		Winter wheat			
Fertilizer	AEGCY	Spikes/ plant	Seeds/spike	200-seed wt	Height
		no.	no.	g	cm
Check (no N)	no	3.8	26.3	6.7	94.2
Deep band	no	4.2	27.3	6.8	96.3
Broadcast	no	4.1	27.2	6.8	95.3
Spoke wheel	no	4.2	27.2	6.8	95.4
Check (no N)	yes	3.0	23.2	6.3	90.6
Deep band	yes	3.5	24.0	6.3	91.3
Broadcast	yes	3.1	22.4	6.2	90.7
Spoke wheel	yes	3.6	24.1	6.4	92.5
LSD (5%)		0.7	1.7	0.3	2.1

	Jointed goatgrass				
Fertilizer	Fall density	Spikes/ plant	Joints/ spike	Height	Biomass
	plants/m²	no.	no.	cm	tons/ha
Check (no N)	48.8	5.0	7.4	64.8	3.4
Deep band	45.3	4.5	7.2	65.1	2.9
Broadcast	47.5	5.8	7.6	67.2	3.6
Spoke wheel	44.8	4.6	7.2	66.0	2.7
LSD (5%)	NS	0.4	0.2	1.1	0.5

From Jasieniuk et al (1999): Relationship between winter wheat yield loss and jointed goatgrass density at Archer, Wyoming.



From Kappler et al. (2002): Relationship of winter wheat fall density to percent dockage of wheat grain (top) and jointed goatgrass reproductive tiller density (bottom).



From Kniss et al. (2008): Effect of imazamox-resistant wheat rotation on jointed goatgrass density.

Crop year	Treatment	Jointed goatgrass density	
		West location	East location
		tillers m⁻²	
1	IR	0.03a†	3a
	STD	22b	34b
2	IR in Year 2	NS‡	1a
	STD in Year 2	NS	18b
	IR-IR	0.3a	0.5§
	IR-STD	1ab	18
	STD-IR	2b	2
	STD-STD	6c	17
3	IR in Year 2	NS	14a
	STD in Year 2	NS	27b
	IR in Year 3	0a	NS
	STD in Year 3	0.5b	NS
	IR-IR-IR	0§	17§
	IR-IR-STD	0.3	9
	IR-STD-IR	0	28
	IR-STD-STD	0.9	28
	STD-IR-IR	0	6
	STD-IR-STD	0.1	22
	STD-STD-IR	0	13
	STD-STD-STD	0.6	36

†Means within a crop year followed by the same letter are not significantly different at the 0.05 probability level.

‡NS, not significant (0.05).

§Two-year interaction effects at the East location and 3-yr interaction effects at both locations are not statistically significant, but simple effects means are provided for the reader's information.