

Determination of Growing Degree Days to Manage a Warm-Season Annual Weed in a Cool Season Pasture

USDA Northeast Climate Hub Partners Meeting:
Building Resiliency Through Adaptation

March 14 & 15, 2018 | Rutgers University, New Brunswick, NJ

Rakesh S. Chandran, Ph.D.

Professor and Extension Specialist – Weed Science

West Virginia University

USA

rschandran@mail.wvu.edu

Introduction

- Jointhead Arthraxon (*Arthraxon hispidus* (Thunb.) Makino)
- Synonyms: Small carpetgrass, jointhead grass
- Non-native annual grass
 - Introduced to USA from far east in late 1800s
 - Present in most mid-Atlantic and Southeastern states
- Considered unpalatable to livestock
- Displaces native forages in pasture
- Increasingly prevalent in the Appalachian region



Photo – C. Talbott







Jointhead arthraxon



Deer-tongue grass
(*Dichanthelium clandestinum*)

Objective

- Determine Growing Degree Days (GDD₅₀) requirement of Jointhead Arthraxon germination to time the application of pre-emergence herbicide or other management efforts.

Experimental Details

- Two field experiments at a producer's farm near Lost Creek, West Virginia (2016, 2017)
- Permanent cool-season pasture with history of problem weed during past 3-5 years
- Native forages – Tall fescue, KY bluegrass, orchardgrass, and mixture of clovers

Growing Degree Days

$$\text{GDD}_{(50)} = (\text{Mean temperature}) - 50$$

E.g. Max temp = 70F
Min temp = 60F

$$\begin{aligned}\text{GDD}_{(50)} &= ((70+60)/2) - 50 \\ &= 65 - 50 \\ &= 15\end{aligned}$$

Determine the cumulative $\text{GDD}_{(50)}$ for the Julian Calendar (January 1st)

Growing Degree Days (Buckhannon, WV)

Month	GDD ₍₅₀₎		
	2016	2017	Avg. *
January	0	13.5	0
February	2.1	48	0
March	87.2	62.5	0
Till April 25 th (Cumulative)	207.3	217 (April 18 th)	8**

* Historic averages: <http://www.weather.intellicast.com/Local/History.aspx?month=1>

**Note: Based on historic average, 207 GDD₍₅₀₎ was reached on May 22nd



April 25, 2016 (207 GDD)



April 12th, 2017 (157 GDD)



April 18th, 2017 (217 GDD)

Treatments 2016

- Pendimethalin - 4.484 kg ai ha⁻¹ (4 lb ai A⁻¹)
- Pendimethalin + glyphosate - 1.12 kg ae ha⁻¹ (1.0 lb ae A⁻¹)
- Glyphosate (Treated Control) - 1.12 kg ae ha⁻¹ (1.0 lb ae A⁻¹)
- Untreated Control
 - Four replications arranged as RCB



Pendimethalin +
Glyphosate

Pendimethalin

Photo taken
June 29, 2016; 2 MAT

Jointhead grass Control

Visual Control

Treatment	Appl. Rate	May 23 (1 MAT)	June 29 (2 MAT)	Oct. 26 (6 MAT)
	- kg ai/ha -	----- % -----		
Pendimethalin	4.48	95	95	96
Pendimethalin + Glyphosate	4.48+ 1.12	98	98	99
Glyphosate	1.12	0	0	0
Control		0	0	0
LSD*		12	21	0.3

* LSD – Least Significant Difference at $P=0.05$

Jointhead grass Dry Matter Weight

Treatment	Dry Matter	
	Appl. Rate	Oct. 26 (6 MAT)
	- kg ai/ha -	--T/ha --
Pendimethalin	4.48	0.6
Pendimethalin + Glyphosate	4.48+ 1.12	0.0
Glyphosate	1.12	23.71
Control		19.1
LSD*		0.2

* LSD – Least Significant Difference at $P=0.05$





Photo taken 6 MAT

Concluding Remarks

- Growing Degree Days (GDD₅₀) requirement of Jointhead Arthraxon germination determined to be approximately 200
- Pendimethalin at 4.24 kg ai/ha applied PRE provided acceptable season-long control of jointhead Arthraxon in a cool-season pasture

Acknowledgments

W. Suan, Suan Farm, Lost Creek, WV

J. Griffith, NRCS, Tygart Valley District, WV

L. Campbell, Retired County Agent, WV Extension Service

BASF (for addressing a request from mid-Atlantic Agronomy Weed Scientists to secure a label for Prowl H₂O in forages)

Thank You!

Questions ?