

Emergence timing and morphological characteristics of *Galium* populations in western Canada

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Introduction

- Cleavers are two different problematic species collectively called *Galium aparine* (A) and *Galium spurium* (B) (Malik and Vanden Born 1988)



(<http://www.luontoportti.com/Suomi/en/>)

- Significantly reduce crop yields, increased harvesting difficulty and difficult to separate from canola during crushing (Malik and Vanden Born 1988)
- 6th in relative abundance in Saskatchewan canola fields up from 31th in 1970's which correlates with increased canola acres (Leeson 2012)
- Group 2 and 4 resistance (Hall et al. 1998)
- Are we missing control due to timing of implementing strategies?

Objectives

- 1) To determine the emergence timing of cleavers populations obtained from various locations in western Canada
- 2) To measure morphological characteristics of cleavers populations that influence competitive ability

Materials and Methods

- Randomized complete block design with 4 replications over 2 years (2013 and 2014)
- Treatments: Seeding Date (Spring vs. Fall) and Populations (SPG, Trawin, Heavin, Clancy, Vegreville, and Lacombe)
- 400 seeds per 1 X 2m micro plot
- Emergence monitored daily in three 15m² quadrats
- Morphological characteristics measured throughout growing season
- Emergence curves fitted using DRC package in R studio
- Morphological traits analyzed in SAS using Proc Mixed

Results

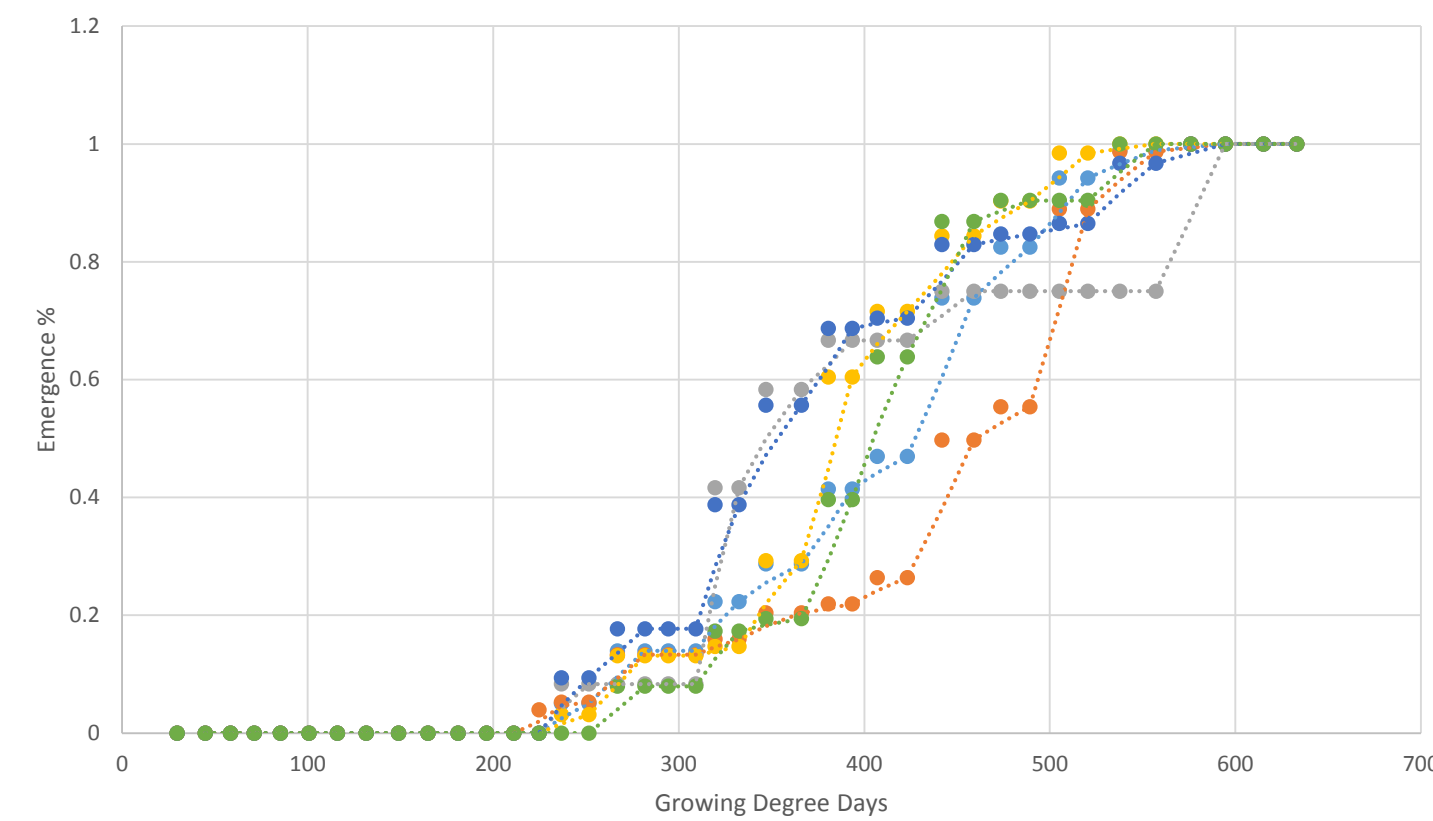


Figure 1: Spring 2013 emergence timing of cleavers.

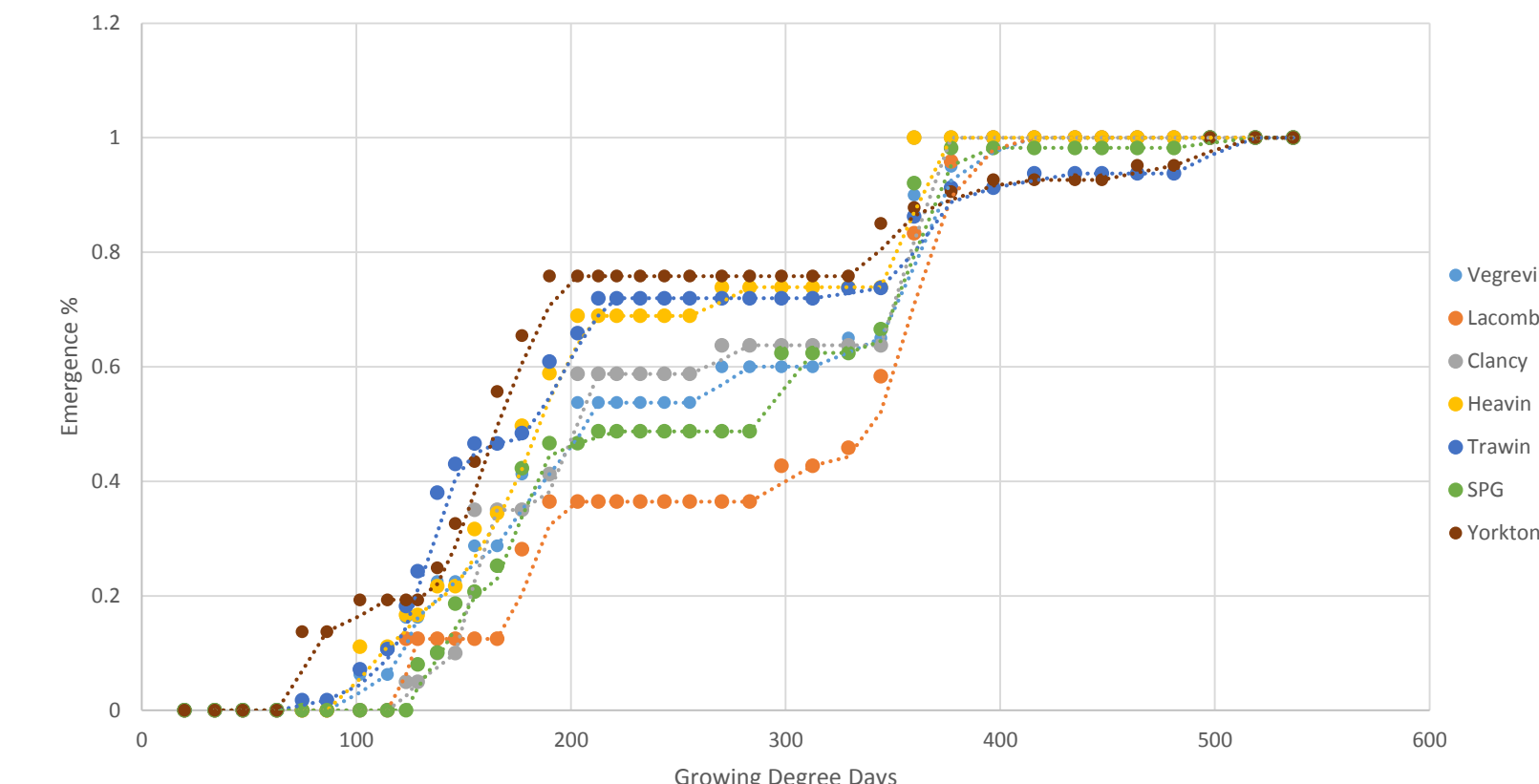


Figure 2: Spring 2014 emergence timing of cleavers.

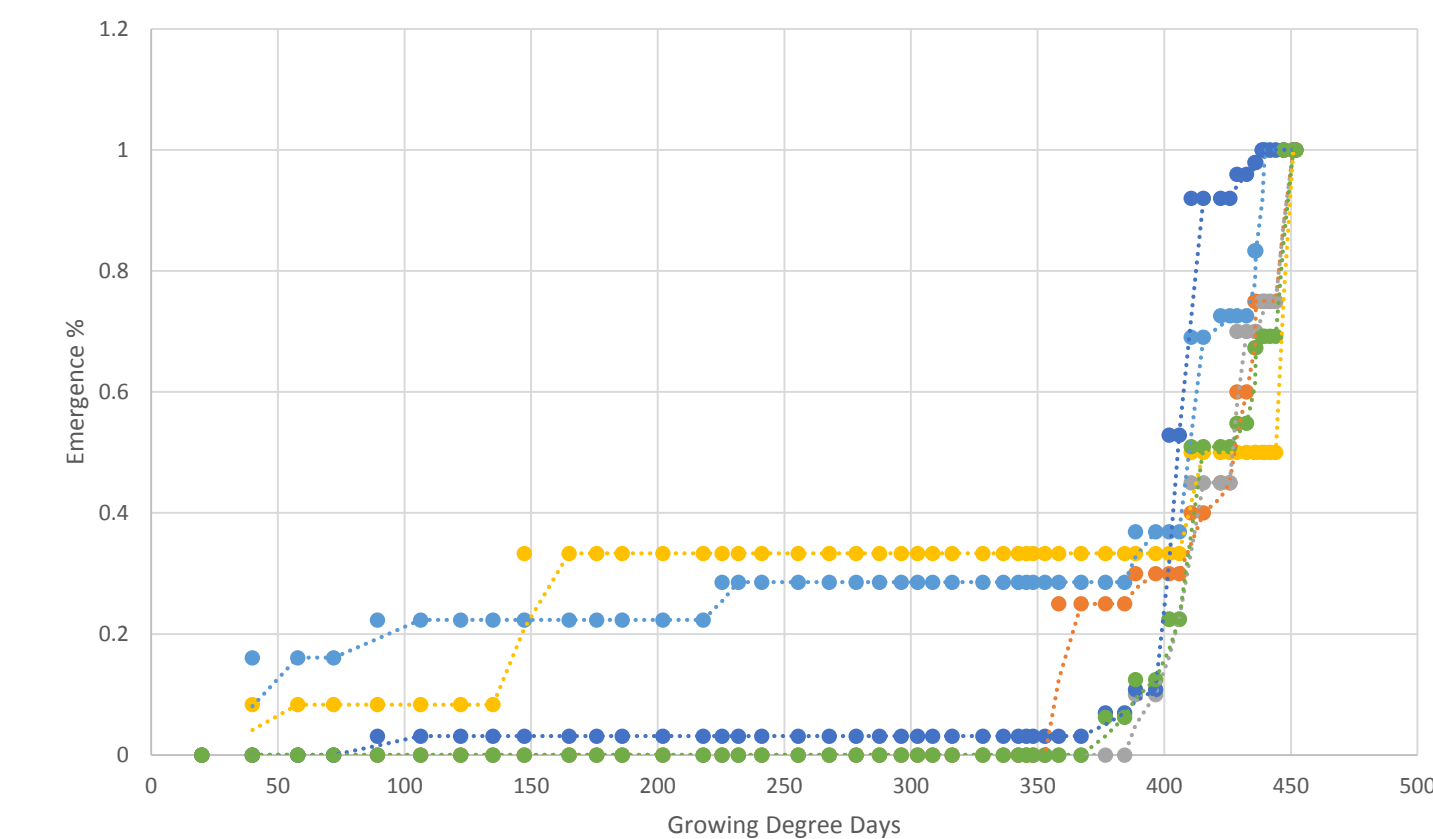


Figure 3: Fall 2013 emergence timing of cleavers.

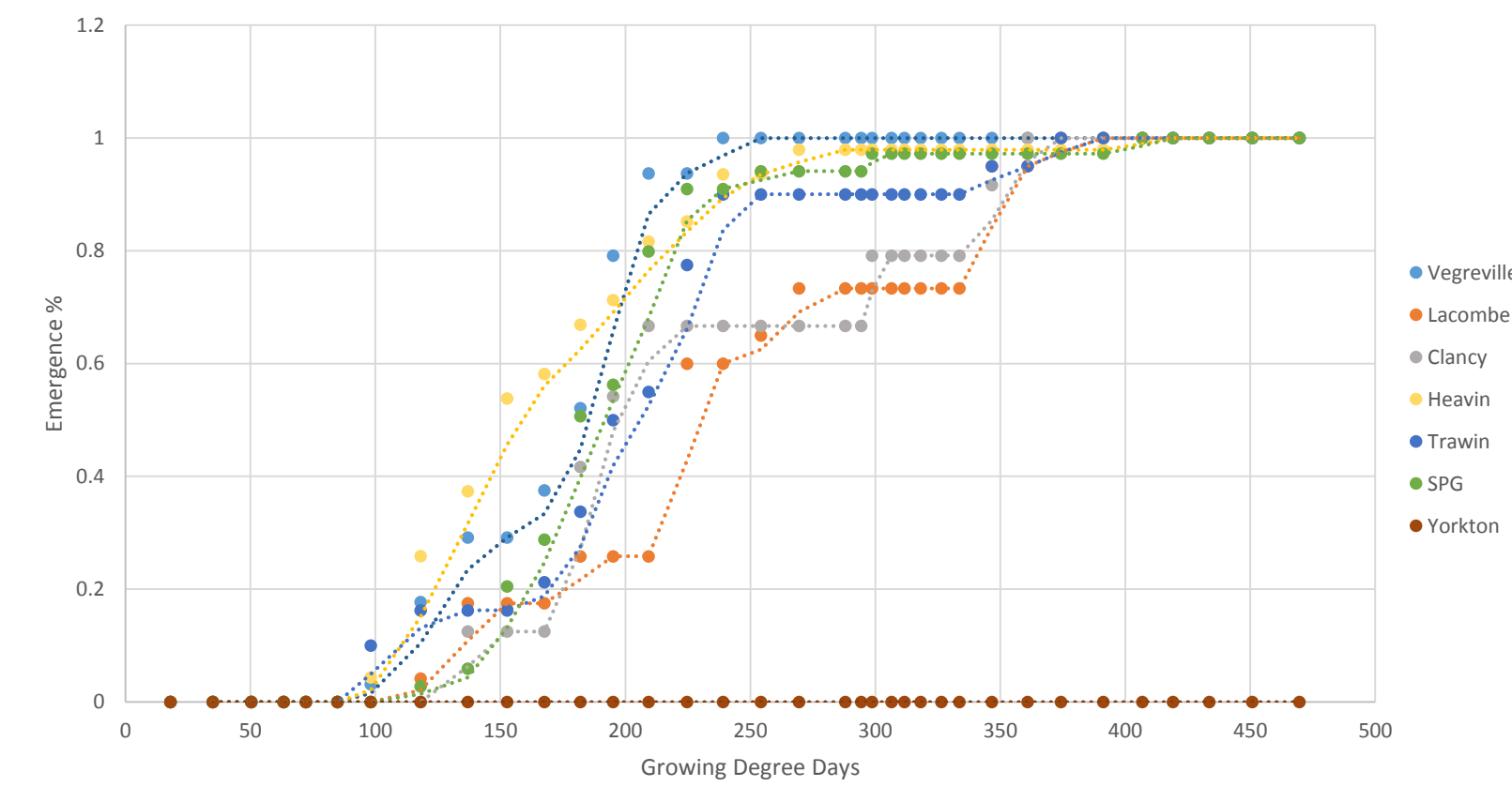


Figure 4: Fall 2014 emergence timing of cleavers.

- Populations and year are significantly different from each other and could not be combined
- Cleavers are both spring and fall germinating with the exception of the Yorkton population in fall of 2014

Table 1: Yield and thousand seed weight response of populations to year

Populations	Yield		Thousand Seed Weight	
	2013	2014*	2013	2014*
Clancy	12.51 A	18.57	1.93 B	2.32
Heavin	7.92 B	18.55	2.44 A	2.40
SPG	7.37 B	12.47	2.43 A	2.41
Trawin	8.75 AB	19.33	2.14 AB	2.53
Lacombe	7.64 B	12.01	2.35 AB	2.55
Vegreville	6.97 B	14.36	2.31 AB	2.57
SEM	1.141	2.591	0.109	0.106
p-value	0.0135	0.2034	0.0306	0.4937

Letters indicate a significant difference among populations means (P<0.05); Multi-treatment comparison method using Tukey method; SEM= Standard Error of Mean

* - No significance difference between populations in that year

- Yield and thousand seed weight were the only morphological traits to show significance. There was a significant interaction between populations and year for yield and thousand seed weight, all other morphological characteristics measured were combined between years and no significant differences were detected between the various populations
- The ideal growing conditions for cleavers in 2014 (cool and wet) appears to suggest all cleavers populations can be a great threat to crop production

Conclusions

- Time to 50% and 100% emergence varies among cleavers populations on the prairies meaning optimum control timing will also vary
- Long periods of emergence timing has contributed to poor management
- Cleavers emerge in both spring and fall and can overwinter
- Scouting and weed staging is imperative to increasing efficacy of herbicides on cleavers
- Control is important to ensure high yielding populations do not contribute more seed to the seedbank
- Environment can influence competitive ability of cleavers

References

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Acknowledgements

Gerry Stuber, Aaron Gerein, and U of S Weeds Crew for their technical assistance and the following funders:

