Influence of Spring Tillage on Common Ragweed Emergence in Nebraska

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Introduction

Common ragweed is a native species found throughout the United States and it is a competitive weed in several crops, including soybean. In Nebraska, common ragweed has been observed to emerge early in the season, from April until June. Glyphosate-resistant common ragweed has been confirmed in Nebraska and many other states. Tillage before planting is being considered as an additional tool to control glyphosate-resistant common ragweed; however, the effect of tillage on the emergence of common ragweed seedlings is unknown.

Figure 1: Glyphosate-resistant common ragweed in soybean field in Adams, NE

Objectives

To evaluate the influence of spring tillage on the emergence pattern of a glyphosate-resistant common ragweed population in Nebraska.

Materials and Methods

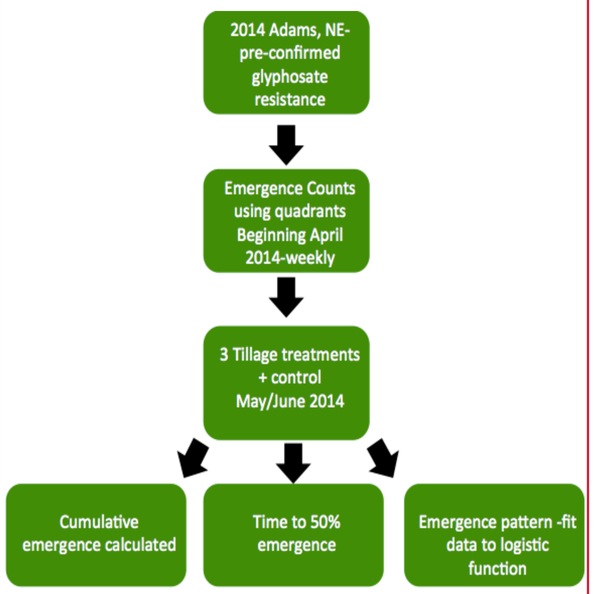


Figure 2: Materials and Methods Process

Logistic Function Used to Fit Data:

$Y = a / [1 + \exp(b\text{-}c \times DOY)]$

- Y is the cumulative seedling emergence at specific time (response variable)
- DOY is day of year (explanatory variable)
- *a* is the asymptote or maximum cumulative emergence within a year (theoretical maximum for Y normalized to 100%)
- *b* and *c* are shape parameters. The logistic function was fit to the data of each counting quadrant using PROC NLIN in SAS.

Time to 50% Emergence:

The shape parameters *b* and *c* were then used to estimate the number of days to 50% giant ragweed seedling emergence (T_{50}): $T_{50} = b/c$

Figure 3: Common ragweed seedling

Conclusion

Spring tillage timings had no effect on total common ragweed emergence and time to 50% emergence. On average, 3,196 seedlings m^{-2} emerged and May 4 was the time when 50% emerge was observed. Most of the common ragweed seedlings emerged before soybeans planting time, making spring tillage an alternative management option to control glyphosate-resistant common ragweed in this region. This study will be repeated in 2015.

Results

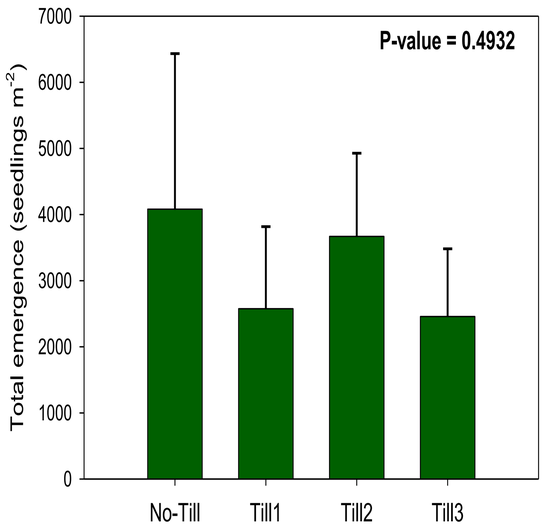


Figure 4: (Left) Influence of spring-tillage on common ragweed total seedling emergence (plants m^{-2}).

Figure 5: (Below) Average emergence and standard error of treatments.

Treatment	Average	SE
No Till	4081	2351.378
Till 1	2574	1243.5
Till 2	3669	1259.02
Till 3	2458	1022.71

- Spring tillage had no effect on total common ragweed seedling emergence (P >0.05) (Figure 4). The data was log transformed to meet the assumptions of normality. Back transformed data are presented to make it easy to understand. (Figure 4 and 5)

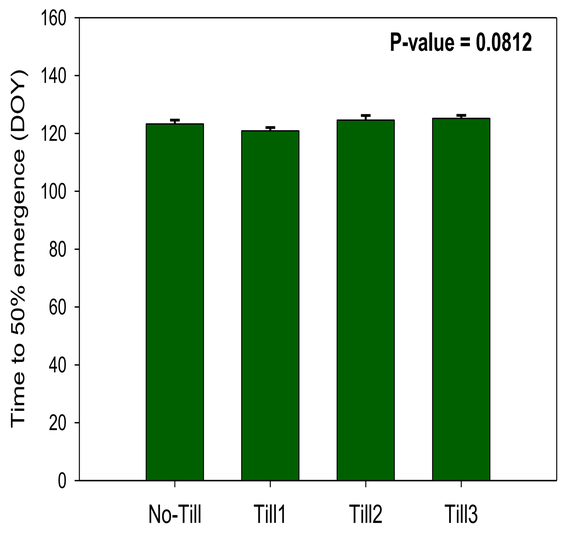


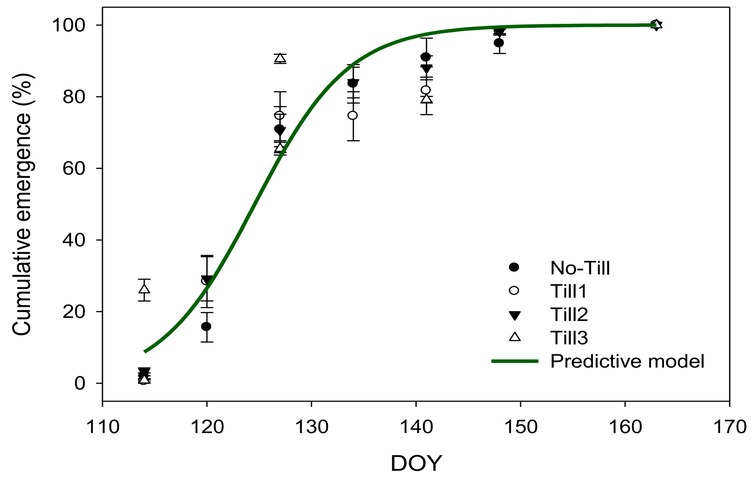
Figure 6: (Left) Influence of spring-tillage on time to 50% common ragweed emergence.

Figure 7: (Below) Average time to 50% emergence and standard error of treatments.

Treatment	t50	SE
No Till	123	1.3
Till 1	121	1.1
Till 2	125	1.6
Till 3	125	1.0

- Tillage had no effect on time to 50% common ragweed seedling emergence (P>0.05). No data transformation was necessary for time to 50% cumulative emergence. (Figure 6 and 7)

Figure 8: (Right) Cumulative emergence ploted with predictive model.



- After fitting data to predictive curve it can be seen that tillage treatments had no effect on time to 50% cumulative emergence. (Figure 8)