

## **Dandelion Germination Trial**

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### **Summary**

This trial was performed in order to determine the best method for counting dandelions and also to observe and record the timing of dandelion (*Taraxacum officinale*) germination in a creeping red fescue (*Festuca rubra*) / Kentucky bluegrass (*Poa pretensis*) turf. This study was conducted in Olds, AB within the black soil zone. Two treatments were evaluated to determine the best method for counting dandelions. In order to facilitate the weekly counting process, four 0.25m<sup>2</sup> plots were sprayed with Roundup® (Glyphosphate). This was compared with unsprayed plots that had existing dandelions completely removed. Initial counts of mature dandelion were taken prior to the Roundup application. Following spraying, weekly dandelions counts were taken between June and October 2005. Moisture and temperature data was taken from the Olds College weather station reports. Significantly more dandelions germinated in the untreated plots than the Roundup treated plots and the spraying did not assist in the counting process. Total dandelion emergence for the whole year was 415 dandelions per m<sup>2</sup> for the untreated plots and 158 dandelions per m<sup>2</sup> for the Roundup treated plots. Trial results indicate that 65% of dandelion emergence occurred between July 7 and August 3 in the non-herbicide plots and 81% in the Roundup applied plots. Moisture was not limiting during the trial.

### **Introduction**

Dandelions are a common, widespread problem in turfgrass throughout Alberta. This non-native, perennial weed will propagate through air borne seed dispersal, dormant seed germination from the seed bank, and regeneration from root stock if cropped above the crown region. Dandelions can compete with turfgrass, perennial forages, and other plant species for vital nutrients and space. The objective of this study was to determine timing of dandelion germination with respect to their temperature and moisture requirements and to establish a methodology for effective enumeration of dandelions. Understanding dandelion biology with respect to germination will aid in the effective use of pre-emergent herbicide applications.

### **Materials and Methods**

This study was conducted at the Prairie Turfgrass Research Centre research plots located at the N.W. corner of Olds College campus in a black Chernozemic soil. An initial plant survey identified four main species within the trial site. These were Kentucky bluegrass, creeping red fescue, red/white Clover (*Trifolium pretense/repens*) and dandelion. Dandelions were allowed to go to seed prior to the initiation of the study to ensure high amounts of viable seed in the plots. Enumeration of existing dandelions and their growth stage were recorded prior to the herbicide application (Table 1.0).

Plots that measured 0.5 by 0.5m were established in a random sub plot design and were replicated four times. Two treatment methods were conducted in order to establish the most appropriate methodology for effective enumeration of dandelions. To ensure over wintering dandelions had been eradicated prior to trial evaluation and to facilitate the weekly counting process plots were sprayed with a 6% solution of Roundup®

(Glyphosphate) until foliage was wet. The second method was to manually remove mature dandelions and clover from the remaining four plots with a pen knife in order to increase visibility of newly germinated plants.

Each plot was observed for dandelion emergence on a weekly basis beginning June 22, 2005. Prior to each weekly evaluation, offset pruning shears were used to trim the grass to a height of 4.5cm to facilitate the counting process. A 0.25m<sup>2</sup> quadrant with 25 individual grids was constructed and was used to facilitate the counting process. Visible dandelion seedlings were enumerated at the first leaf stage and were then extracted by cutting into the root zone below the crown region with a pen knife at a 45° angle. This was done to avoid regenerative growth by the dandelion seedlings and to facilitate future counts.

Precipitation and temperature data were obtained from the weather station located on the Olds College campus.

### Results and Discussion

Dandelion counts, which were conducted prior to the treatment phase, averaged 80 dandelions per m<sup>2</sup> (Table 1). This was considered to be very high and would ensure sufficient seed in the soil for this trial. Growth stages of the dandelions showed that 85% of the dandelions were between the 2 and 10 leaf stage. Dandelions with few leaves may indicate an early stage of development and that germination may have recently occurred.

Table 1 – Initial dandelion count and stage of development per 0.25m<sup>2</sup> plot.

Leaf Stage	Initial Dandelion Count per 0.25m <sup>2</sup>																				Total		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20-30		30+	
Plot #																							
101		2	2	9	6	2	3	6	1	2		2									4*	4*	44
<b>*102</b>		<b>2</b>	<b>1</b>	<b>3</b>		<b>3</b>		<b>2</b>															<b>11</b>
201		6	2	3	1	3		7	1	1	1	3	2	1				1			1*		33
<b>*202</b>		<b>3</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>3</b>		<b>2</b>	<b>1</b>														<b>12</b>
<b>*301</b>	<b>1</b>	<b>2</b>		<b>1</b>		<b>2</b>		<b>2</b>		<b>1</b>													<b>9</b>
302		1	4	3		4		7		2		1		1									23
<b>*401</b>	<b>1</b>					<b>2</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>1</b>		<b>1</b>											<b>12</b>
402			1		1	2	1	6	2	3				1									17

\*Single dandelions appeared to have multiple crowns

\*\*Bold text indicates Roundup applied plots

Analysis of the data showed that there was a significant difference for germination counts between the Roundup treated and the untreated plots (Figure 1). Total germination over the entire rating period was 415 dandelions per m<sup>2</sup> for the untreated area while 158 dandelions per m<sup>2</sup> germinated in the Roundup treated area. This difference may have been due to moisture retention within the untreated plots due to the vegetative cover which provided better conditions for germination or recalcitrant compounds left from the Roundup may have been toxic to the seedlings.

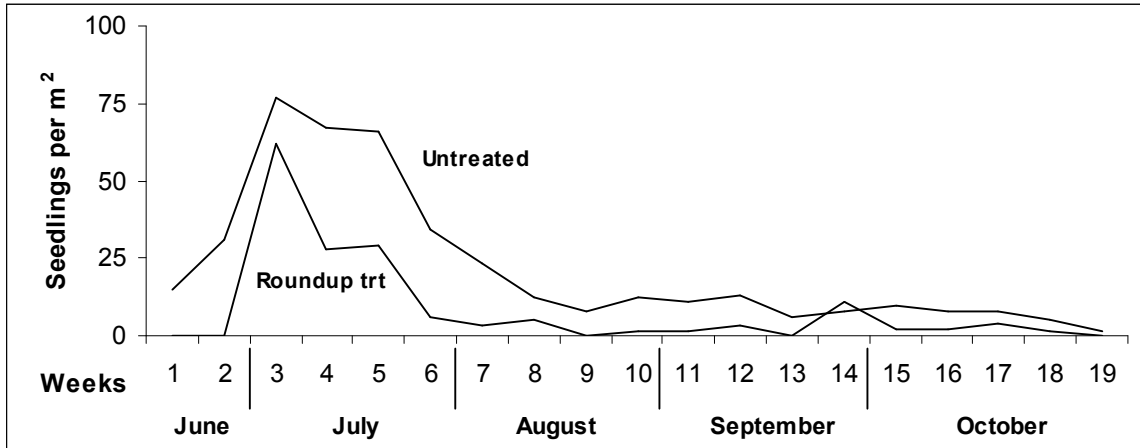


Figure 1.0 – Dandelion germination counts June – Oct 2005

Results indicated that a large percentage of germination occurred over a five week period between July 7 and August 3. In the Roundup treated area 81% of dandelion emerged in this period while 65% emergence occurred within untreated plots (Figure 1.0).

Moisture and temperature data showed a significant impact on initial germination. A direct correlation between germination and rainfall occurred as germination increased after each rainfall (Figure 1.0 & 2.0). Heavy rainfall events on June 7 and on June 18 increased soil moisture levels allowing for a greater seedling moisture absorption rate. Through the peak germination period, increased temperatures proved to be a factor as well (Figure 2.0). At the end of the growing season germination dramatically declined as temperatures dropped.

It should be noted that dandelion counts were not made until the first true leaf began to emerge because clover cotyledons had similar physical characteristics as dandelion cotyledons making positive identification difficult.

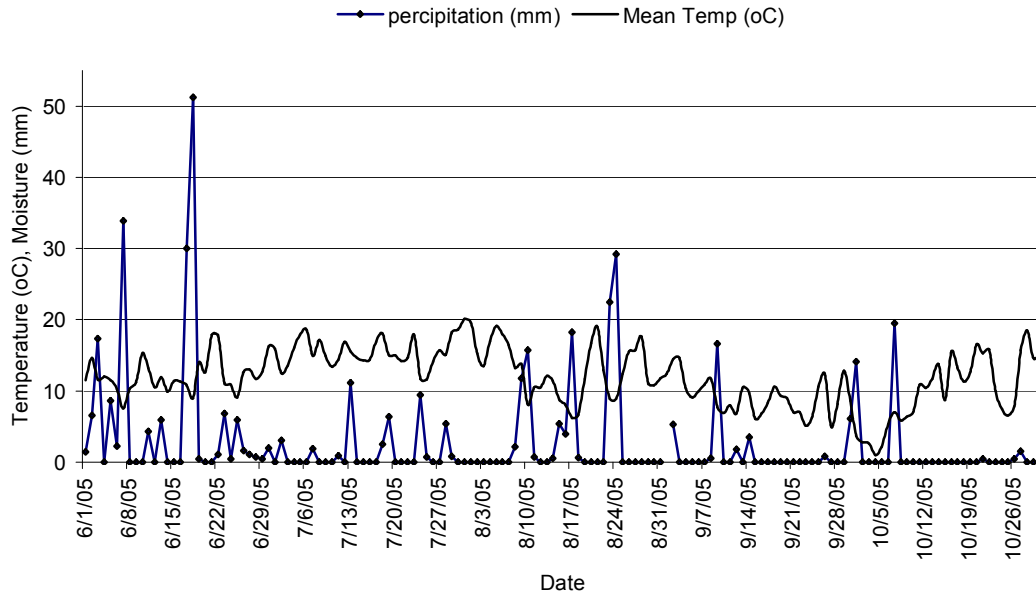


Figure 2.0 – Moisture and temperature data Olds, AB June – October, 2005

Findings show a decline in germination after the initial surge. This could be the result of seed bank depletion after spring seed dispersal.

Clover and dandelion removal may have influenced the germination process. By reducing competition through the extraction of seedlings this may have made resources more available for growth (sunlight, nutrients, moisture).

Recommendations for future emergence trials are that initial counts should start earlier, possibly as early as mid May. In addition, dates of dandelion seed dispersal should be noted. It does not appear necessary to make an initial application of Roundup to facilitate the counting process. Close clipping of the turf is all that is necessary.