GROWING DEGREE DAYS AND DANDELION CONTROL

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INTRODUCTION

For some time professional lawn care operators have recognized the inconsistent control provided by spring applications of broadleaf weed herbicides. It is accepted that fall applications of such herbicides are much more effective than those in spring. Intensive cultural practices typical of fall are often more pressing than broadleaf weed herbicide applications. This makes spring applications neccessary. Spring breakthroughs in the control of fall applied herbicides can also neccesitate spring applications. Ester and amine formulations of 2,4-Dichlorophenoxyacetic acids (2,4-D) and mixtures containing 2,4-D are commonly utilized for such applications. Esters formulations are more effective in spring, however amine formulations are less expensive.

PLANT GROWTH AND TEMPERATURE

In spring the primary factor which influences plant growth is temperature. Growth and development in spring proceed only when warmer temperatures are detected by the plant. In the case of perennial broadleaf weed species carbohydrates are mobilized within the taproot and used to provide energy for foliar growth. At some point in the growth and development of the plant succeptibility to herbicide damage is conferred. This may be due to increased translocation of herbicides throughout the plant. The objective of this research was to utilize a measure of accumulated heat, the growing degree day (GDD) to predict the onset of broadleaf weed succeptability to a spring applied herbicide.

GROWING DEGREE DAYS

Growing degree days are a measure of acculated heat. Growing degree days are additive and are generally computed on an annual basis, and are simple to use. Farenheight and Celsius scales are both compatable with the calculation of GDD. Growing degree days also have application to the timing of many other biological events.

RESEARCH

Dandelion (*Taraxacum officinale* Weber) was chosen as the model species to test the use of GDD to time applications of a herbicide. The herbicide 2,4-Dichlorophenoxyacetic acid + 2,4-Propionic acid (2,4-D +2,4-DP) was chosen as the model herbicide. Ester and amine formulations of the herbicide were tested. Research was conducted at the Purdue Agronomy Research Farm in West Lafayette, IN. GDD were calculated using the averaging method.

Minimum daily temp + Maximum daily temp

$$GDD = \frac{\qquad\qquad}{2} - \text{base temp}$$

Base temperature was 50° F. Temperature thresholds were set at 86° F for a maximum and 50° F as a minimum. In spring 1993 applications were made over a wide range of GDD, while that range was reduced slightly in 1994-95 in order to pinpoint the suspected point of change. Carbohydrate and protein levels within dandelion plants were observed at the same time.

RESULTS

Applications of the ester formulation of 2,4-D +2,4-DP made from 1993 to 1995 were found to be acceptable if made after 130 to 150 GDD. Applications made on the same calendar date in all three years provided inconsistent control over that period. Applications of the amine formulation provided variable control in 1994 but consistent control if applied after 150 to 185 GDD in 1992 and 1993. Carbohydrate and protein levels appeared to have little relation to plant succeptability.

SUMMARY

Growing degree days are more effective at the timing of herbicide application than calendar days. The use of growing degree days to predict suitable periods of plant succeptability in the spring is recommended. The use of GDD to time a transition from ester formulations of 2,4-D and 2,4-D containing herbicides to amine formulations of same is problematic. GDD intervals which provide good control in one location may be unacceptable in other locations. Daily calculation of GDD and subsequent observation of treated areas may provide the GDD interval which is most appropriate for your geographic location.