

Life Cycle of Fall- and Spring-planted Biotypes of *Conyza* spp. Described in Growing Degree Days.

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Horseweed (*Conyza canadensis*) and hairy fleabane (*C. bonariensis*) are two common weeds in perennial cropping systems and non-crop areas of California. Glyphosate-resistant (GR) populations of these species were documented in 2005 and 2007, respectively. In the Central Valley, these species generally have two major times of emergence, in late fall and late winter. The fall-emerging plants overwinter as a rosette and start rapid growth in late winter. The spring-emerging plants start rapid growth soon after emergence but both the fall- and the spring-emerging plants flower and set seed in late summer. However, the difference in growth and phenological development of the plants emerging at these two times of the year has not been studied. Also, it is not known if emergence characteristics or phenological differences are different between the GR and glyphosate-susceptible (GS) biotypes of these two species. The use of growing degree days (GDDs) is common in describing phenological development of crops and insect pests. In the case of weeds, the development of some species have also been described in GDDs. Control measures with herbicides may be better if application timings were based on GDD rather than on growth stage. Therefore, a two-year study was conducted at Fresno, CA to compare the growth and development of fall- and spring-planted GR and GS horseweed and hairy fleabane. The time taken to reach various phenological stages (rosette, bolting, initial appearance of flower bud, initial flowering, and initial seeding) was recorded days after transplanting and converted to GDDs using a base temperature of 13° C and 4.2° C, for horseweed and hairy fleabane growth, respectively. Dry mass of the plants at initial seed set was also recorded. Results showed that, the GDDs required to reach various phenological stages was different between the fall- and spring-planted hairy fleabane. The fall-planted hairy fleabane plants required more GDDs to set seed than the spring-planted ones. However, there was no difference between the GR and the GS hairy fleabane for the number of GDDs required to reach the various phenological stages. In contrast, both the fall- and spring-planted horseweed required similar GDDs to reach the various phenological stages. Furthermore, the GR horseweed plants required fewer GDDs to reach the various phenological stages than the GS plants. Planting date had no effect on final aboveground hairy fleabane biomass but fall-planted horseweed amassed more dry matter than the spring-planted individuals. Studies have reported that postemergence herbicides control these species better when applied at or before the rosette stage. Once the plants bolt, they become somewhat tolerant to herbicides, in general. Biological information generated from this study could help in the management of horseweed and hairy fleabane, especially with postemergence herbicides under various winter and spring temperature conditions.