Izquierdo J. F. (ES): New model approach for forecasting timing of weed control measures (618)

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Weed emergence models based on hydrothermal degree are used to predict the ideal timing of weed control measures. These models rely on equations such as Gompertz, Weibull or logistic, in which daily soil temperature and moisture are required inputs. These models are good predictors of weed emergence patterns at local and regional scales where fields have similar climatic and soil conditions, but lose accuracy when extrapolated to different scenarios. Another weakness is the subjectivity of the starting point for assessing the accumulation of hydrothermal degrees. Usually the starting date is set to the day of tilling or seeding, however, this assumption has no biological or ecological basis. The sigmoid equations used in these models are good descriptors of weed emergence patterns, therefore, we suggest the use of the differential form of the equation rather than the integrated form for timing purposes. When using the differential form of the equation, validation at local scale and starting date are not required because calculations are based on sigmoid relationships between data recordings. Hydrothermal time accumulation starts when the first weed emergence is recorded in the field. Cumulative emergence and hydrothermal time are added weekly. When the rate of emergence starts to decrease (the data slope begins to flatten), the plateau of the sigmoid curve is approached and, therefore, the maximum percentage of emergence. The best time to spray is when weed emergence reaches 95%, thus, it can be recommended that herbicide be applied when this percentage is reached according to the model. In order to check the accuracy of this approach, a Gompertz equation in its differential form was applied to 35 data sets from different weeds, crops and years in Spain. Results showed that the date predicted by the differential model for 95% weed emergence matched what was observed in the field.

Keywords: Weed control, Gompertz, Model, Timing, Weed emergence pattern

Weed community evolution in conservative and conventional agricultural systems (624)

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The potential shift in weed communities is a common concern in conservation tillage systems. The aim of this study was to determine, in a field study, the weed community evolution over time in conventional and conservative cultural systems. The study was carried out in northern Italy over the period 1997-2012. Two cultural systems were compared: conventional (CONV), based on ploughing, and conservative (CONS), based on minimum tillage. A four-year crop rotation, including wheat, maize, pea, sunflower, rape and soybean was adopted. In both systems weeds were controlled with herbicides. Weed density was assessed for each crop at least twice during the growing season in non treated areas, while weed seed bank (at 0-15 cm depth) was monitored at the end of each crop rotation cycle. For the majority of the crops grown in CONS total weed density was significantly higher than in CONV. In summer crops the most abundant weeds were *Echinochloa crus-galli*, *Chenopodium album* and *Galinsoga quadriradiata,* with the highest density in system CONS. In wheat, weed infestation was mostly represented by *Stellaria media*, *Veronica persica* and *Lamium purpureum*. At the beginning of the study weed seed bank varied from 11838 seed/m^2 in CONV, to 13616 seed/m^2 in CONS. In the following assessments, weed seed bank decreased remarkably in both systems, particularly in CONV. Over the period weed species richness was influenced by the rotation cycle and by the changes in agronomic practices occurred. The highest number of weed species was generally observed in summer crops and in the system CONV. The CONS system was characterized by a higher Simpson index and a lower Shannon value, compared to CONV system. Weed management resulted more simplified in CONV system, due to a more diversified and generally less abundant infestation.

Keywords: Conservation tillage, weed population dynamics, minimum tillage