Spatial dynamics of a *Sorghum halepense* population in a maize monoculture

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*Sorghum halepense* is a perennial plant very common in most Spanish maize fields. The typical aggregated distribution of this weed and the high cost of the post emergence herbicides required for its control makes it an ideal target for site-specific weed management. The objective of this study was to determine the heterogeneity of sizes and shapes of *S. halepense* patches and the time evolution of these patches under standard agronomic practices.

The study was conducted in Arganda del Rey (Madrid, Spain), in a 2.4 ha maize field that had been cropped annually with the same crop for the last 10 years. The spatial distribution of a *S. halepense* population was monitored during two consecutive years. In 2005, patches of *S. halepense* were located visually at the four leaf stage of maize by walking along parallel transects every 12 m. Geo referencing of patch location was conducted using a backpack DGPS equipment and a pen computer with an appropriate data acquisition program. Patch shape and size were recorded by walking around the perimeter of each patch. In addition, average weed density in each patch was determined by counting *S. halepense* tillers emerging in a series of quadrats spaced 1-m throughout one or two transects of the patch. A few days after sampling, nicosulfuron was sprayed using a coarse site-specific approach: the operator opened or closed the control valve of the 10-m boom sprayer when the tractor entered or left dense patches of *S. halepense*. At harvest time, the location of residual patches was determined by visual scoring from the cabin of a combine with the aid of the same DGPS equipment. The same operations were repeated in 2006. Total weed infested area, patch size and frequency distribution of patch sizes were estimated using ArcView.

In 2005, 12% of the field area was covered by *S. halepense*. Large patches (> 200 m²) represented 83% of this infested area, whereas medium (30-80 m²) and small (< 25 m²) patches represented only 11% and 6%, respectively. Although the positions of the patches generally remained unchanged from one year to the next, the percentage of land covered by *S. halepense* in 2006 increased up to 25%. In general, patch expansion followed the direction of tillage and crop planting. The rate of patch expansion varied for patches of different sizes. Large, medium and small patches increased their area by 56, 185% and 206% respectively. These results point out the importance of spraying small patches before they expand and invade the whole field. Although the number and the location of most patches detected from the combine did not change compared with those detected before herbicide application, the total area infested was higher at harvest time. This indicates that the coarse site-specific spraying approach used was not satisfactory in eliminating *S. halepense* patches. Furthermore, some areas with low weed density that were not detected in the early stages were detected at the end of the life cycle of the crop. At this time, the green leaves of the weed and its tall panicles contrast clearly with the dry senescent crop.