



Visual assessment of weed abundance using a GPS device

Method/protocol submitted by:

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Objectives of the method/protocol:

Providing a data set of geo-referenced notes of weed abundance at the field scale, in order to build field maps of weed density. Maps built in the same field every year can be used for demonstrating trends in the evolution of weed infestation on the long term, hence providing indicators of the efficiency of long term weed management over the whole cropping sequence.

Possible uses of this method/protocol:

The method can be used for characterising the evolution of weed flora in a given field, for example for verifying that Integrated Weed Management does not induce any increase in weed density on the long term.

Method/protocol:

In a given field, weed infestation is assessed approximately 3-4 times a year: before post-emergence weed control, after weed control, before harvesting, and before soil cultivation.

A precise global positioning system (GPS) device is used to mark and geo-reference the spatial weed abundance of each species at many locations all over the field. Measurements are done in a zig-zag manner at short intervals (typically every 4-10 m) all over the field area. At each location along the travel path, a qualitative abundance note for a 16 m² area (4 m x 4 m) is given for every weed species that is present. Very low local densities are estimated by the number of individuals observed on the area (typically less than 6 plants over the 16 m² area). For higher local densities, a scale is used based on 5 density thresholds which are used to delimitate qualitative classes:

- 1: <1 pl.m⁻²
- 2: 1 < D < 3 pl.m⁻²
- 3: 3 < D < 20 pl.m⁻²
- 4: 20 < D < 50 pl.m⁻²
- 5: 50 < D < 500 pl.m⁻²
- 6: 500 pl.m⁻² < D

Note 0 indicate that the given weed species is not present at the 16 m² location.

In large fields, the sampling intensity is a compromise to capture weed spatial variability as well as to enable field measurements to be practically feasible, considering labour constraints and costs. For a given species, the number of locations ranges from 30 to 200 (mean number approximately 90), varying as a function of the abundance and homogeneity of the species distribution. To improve the precision of the estimation of the limits of the weed patches, the intensity of location observed is increased around the limits of marked patches.



The GPS-based estimation method improves the ease of scouting, because the scouting staff has to note down at each location the abundance only in the close surrounding, without having to remember the plant density observed in previous locations for mentally estimating the average abundance.

Notes are translated to weed density.m⁻² prior to kriging (ordinary kriging) using a geostatistical software.

References or examples of studies carried out by using this method/protocol:

Chikowo R, Faloya V, Petit S, Munier-Jolain NM (2009) Integrated Weed Management systems allow reduced reliance on herbicides and long-term weed control. *Agriculture, Ecosystems and Environment* 132 (2009) 237–242

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