

## **Influence of field margin strip and no-till management on weed seed decay in soil**

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Conservation Agriculture is becoming a prominent method of soil management in crop production. Thanks to its basic principles, which are minimum soil disturbance, permanent residue cover and crop rotation, it is able to tackle the problems of soil erosion, desertification and soil infertility. Due to the lack of tillage operations, seeds present in these soils experience different microclimatic and microbial conditions to those in disturbed soils. In this work the decay process of five weed species, *Abutilon theophrasti*, *Alopecurus myosuroides*, *Amaranthus retroflexus*, *Digitaria sanguinalis* and *Portulaca oleracea*, was compared between a soil managed under no-till and the adjacent buffer zone. Twelve small steel mesh bags for each species filled with 50 seeds were buried in both sites on July 2017 at 12 cm depth. Starting from October 2017, after 3, 9, and 15 months four bags per species were exhumed. After exhumation, the seeds were tested, firstly using the 'unimbibed crush test'. Those that failed the test were marked as degraded, those that passed were subjected to a germination test, placed in Petri dishes with 2 ml of distilled water and put in an incubator at 25/15 °C and at 12/12h dark/light photoperiod. Germination process was monitored every 2-3 days. After a few weeks the non-germinated seeds were stored at 4 °C for four weeks and then again placed in an incubator with optimal temperature for germination. After twice in the incubator the tetrazolium test was performed on the non-germinated seeds to control their vitality. Ultimately the seeds were classified as degraded, germinated, dormant (vital under tetrazolium test) and non-viable.

Microbial activity of the soil was tested in both sites using fertimeters made out of cotton and silk threads, to examine the cellulolytic and protolithic microbial activity respectively. Three treatments were used: nitrogen, phosphorus and control (not treated), in order to examine the nutrient content. Analysis consisted of burying fertimeters in the soil in both sites before every exhumation of the seeds, and later measuring their degradation using a dynamometer. After 7 days the fertimeters were exhumed, dried and their degradation level tested. Factorial analysis of variance (ANOVA) was performed to analyse the effect of site and species and their interaction on seed degradation. ANOVA was also performed to analyse fertimeters degradation. Homogeneity of variance was tested using Levene's test. Significant differences among means were identified using the Newman-Keuls test.

*A. theophrasti* and *A. myosuroides* were the two most degraded species while *P. oleracea* was the least degraded. Fertimeters from the field were more degraded than those from the buffer strip. Degradation of cotton threads was higher in the field, indicating greater activity of cellulolytic microorganisms. Degradation of the control was also higher than that of treated fertimeters, meaning that there were no deficiencies in nutrients. Seed degradation level was higher in the field than in the buffer strip, which is in accordance with the data obtained from fertimeters, showing higher microbial activity in the no-till field.