



## Influence of crop residues on weed emergence

Nebojša Nikolić<sup>1</sup>, Donato Loddo<sup>2</sup>, and Roberta Masin<sup>1</sup>

<sup>1</sup>Department of Agronomy, Food, Natural resources, Animals and Environment - DAFNAE, University of Padova, Legnaro (PD), Italy

<sup>2</sup>Institute for Sustainable Plant Protection - IPSP, National Research Council of Italy - CNR, Legnaro (PD), Italy

Weeds are one of the major problems in agriculture, they can reduce yield, interfere with harvest and serve as hosts to possibly harmful organisms. For a successful agricultural production, weed issue must be tackled in the beginning, during the germination-emergence phase. With different management systems weed seed bank is exposed to different field conditions which may favour or obstruct the germination. One of these conditions is the presence or the absence of crop residues on the soil surface, very common in the newer agricultural practices, such as Conservation Agriculture. In this work the germination of eight weed species: *Abutilon theophrasti*, *Setaria glauca*, *Digitaria sanguinalis*, *Sorghum halepense*, *Amaranthus retroflexus*, *Sonchus oleraceus*, *Chenopodium album* and *Echinochloa crus-galli*, was examined under the residues of two crop species maize (*Zea mays*) and wheat (*Triticum sp.*). For each weed species 200 seeds were used, while three different quantities of residues were used for the two crops, the quantity measured in one square meter of the field (1), half of that quantity (0,5) and a half more than the one measured in the field (1,5), plus control, without residues. The experiment was conducted at the experimental farm of the University of Padova in Legnaro (PD) in a 8x2x3 factorial design with three blocks, plus three control repetitions. Seeds of each weed species were sown in an area of 20 cm<sup>2</sup>. Before the beginning of the experiment, the soil from the designated areas was removed and sterilized at 105°C in order to prevent contamination by the seeds already present in the soil. Once the soil was sterilized and restored to the field, the seeds were sown on the surface of the soil and covered with the respective quantity of the respective crop residue or left uncovered in the case of control. The experiment started on December 2018, and the seeds were left undisturbed during the winter, imitating natural conditions. Seeds started germinating on March 2019 and were controlled twice a week until the end of germination process, all germinated plants were removed and counted. ANOVA and LSD analysis were performed on cumulated germination data. Only quantity of residues and weed species resulted significant as factors (p-value < 0,000). The results showed that the quantity 1 and 1,5 can reduce the germination from 10 to 30% respectively, while quantity 0,5 can in fact increase germination by 15%. As for the weed species, they were all more inhibited by the higher concentrations of residues, but in respect to control it was observed that some of them seemed to be favoured by the low presence of residues *S. halepense* and *A. theophrasti*, not particularly influenced were *A. retroflexus*, *E. crus-galli* and *S. oleraceus*, while *C. album*, *D. sanguinalis* and *S. glauca* showed major germination rate reduction. In conclusion, to obtain the weed inhibitory effect, it seems very

important to pay particular attention to the homogeneity of the distribution of the crop residues on the soil surface, low residue density areas could favour weeds.