

Using free range pigs to reduce *Cyperus esculentus* infestation in fields in Switzerland: Encountered difficulties and findings from 3 field trials

M. Keller*, R. Total

Agroscope, Wädenswil, Switzerland * martina.keller@agroscope.admin.ch

Cyperus esculentus is a difficult to control weed. Introduced about 40 years ago, *C. esculentus* is present now in the main vegetable producing and arable farming areas in Switzerland. This weed reproduces mainly vegetatively via tubers in the soil. Dormant tubers in the soil are not controlled with herbicides and thus *C. esculentus* eradication is difficult to achieve in heavily infested fields. Free range pigs (*Sus domesticus*) are well known for their grubbing and digging activity. About 8% of their daily dry matter intake can consist of soil (Fries et al., 1982). For example Wunsch et al. could show that *Helianthus tuberosus* tuber number in the soil could be effectively reduced by grazing pigs (2011). *Cyperus esculentus* tubers are tasty and nutrient rich. Thus, it is likely that free range pigs will actively search for *C. esculentus* tubers in the soil. Various authors reported that different animals such as pigs can reduce infestation levels of *C. esculentus*. (e.g. Schonbeck, 2013 or MacDonald, 2015). The aim of this study was to investigate whether *C. esculentus* infestation can be reduced by keeping free range pigs for several months in Swiss fields.

3 on-farm field trials were carried out at 2 sites. One trial was carried out on soil with high organic matter content in 2013 to 2014. After grazing started, soil samples (10 l) were taken every month (3 times) at the same spots in the treated field area (with pigs) and in the untreated control area (no pigs). 2 trials were carried out on sandy soil in 2013 to 2014 and 2015 to 2016 at the second site. Soil samples were taken before and after the grazing period in the treated and untreated area. To determine the number of viable i.e. ready to germinate tubers, the soil samples from each trial were put in the greenhouse in the spring or summer following the trial and *C. esculentus* plants were counted after 2 to 4 weeks.

In the first trial a significant reduction of about 70 % of viable tubers was found compared to the untreated control one month after grazing. The determined reduction remained almost the same in the samples taken thereafter. The trial was initiated in autumn and it is likely that the pigs were active in the first month and then grubbing activity declined due to the onset of winter. In the second trial, 16 *C. esculentus* plants germinated in the soil samples taken prior to grazing (average over 'no pigs' and 'with pigs'). No treatment effect was found in the soil samples taken after the grazing period. However, only 4 *C. esculentus* plants germinated on average. Possibly due to the high variability no significant time effect (before and after trial) could be determined. In the third trial, the infestation level was high in the soil samples (on average 130) prior to the trial. No treatment effect was found after the trial. However, a significant time effect occurred: Only 71 *C. esculents* plants germinated per soil sample taken at the end of the trial.

The different findings might be due to the different soil types and different weather conditions during the trials. Possibly the approach works better on soils with high organic matter content than on sandy soils. The grazing and grubbing of the pigs could be further enhanced by loosening compacted soil first or scattering other sources of fodder in the field. During the trials difficulties such as high variability in infestation levels, high variation in general and adverse weather conditions were encountered. Further trials should be carried out under well controlled conditions, in addition a potential decrease in the number of viable tubers due to trial duration should be accounted for.

References

The detailed reference list can be obtained from the authors.