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(BIO)SOLARISATION: ADVANTAGES AND DISADVANTAGES

This factsheet contains complementary information to the Best4Soil video on (Bio)Solarisation: Advantages and disadvantages.
https://best4soil.eu/videos/15/en

Biosolarisation has been evaluated in the last years, showing great results in several crops to manage soil borne diseases.

For **strawberry** crops, several materials have been tested in different countries, showing promising results when applying biosolarisation with available fresh poultry manure (FPM) to control fungi and nematodes (López-Aranda et al., 2012; Zavata et al.,2014) (fig.1).

Fig. 1: Strawberry field trial during biosolarisation and subsequent (healthy) crop.

For more than ten years, biosolarisation has been tested and improved, to a stage where it is now implemented by greenhouse **flower** growers in the province of Cádiz (South of Spain). Initial trials showed a complete control of *Fusarium oxysporum* f. sp. *dianthi* when a mix of FPM and fresh flower plant residues were incorporated into the soil, deep irrigated and solarised with polyethylene film (García-Ruíz et al., 2012). Follow on trials repeated the successful control Fusarium wilt of carnation and *Meloidogyne incognita*, using only 5 kg/m2 of FPM (Melero-Vara et al., 2012).

For more than 20 years, bell **pepper** has been subject of investigation to identify alternatives to methyl bromide, with many different methods and products being tested. Results of this long period of trials show that biosolarisation is the best alternative to control *Phytophthora capsici* and P. *parasitica* as well as *Meloidogyne incognita* (Martínez et al., 2006; Ros et al., 2008). Also soil fatigue was reduced when biosolarisation was conducted. The biosolarisation was performed in these trials using the following approach. Easily available fresh sheep manure (FSM) was mixed with fresh pepper residues and/or FPM. The dosage of organic matter was reduced as the treatment is repeated year after year: FSM+FPM: 5+2.5 kg/m2 (1st year), 4+2 (2nd year), 3+1.5 (3rd year), 2+0.5 (4th and later years) (Martínez et al., 2011). In these studies, the biosolarisation is highly effective when applied in Summer (fig.2).

Fig. 3: Healthy pepper crop after biosolarisation of soil with Meloidogyne spp.

Recent trials in greenhouses cultivated with **tomatoes** or **cucumbers**, have shown comparable results to those exposed above. Soil fatigue, knot-root nematodes, *Phytophthora parasitica, Fusarium solani* f. sp. *cucurbitae* and *Fusarium oxysporum* f. sp. *radicis-cucumerinum* are

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some diseases that have been controlled by means of incorporating fresh organic matter (mostly a mix of plant-crop residues and fresh manure) followed by a deep irrigation and tarping with transparent polyethylene or Virtually impermeable film (VIF). Some growers sow mustard and other Brassicas on their own farms to mix with fresh manure and/or crop residues, and in many cases the biosolarisation is performed only on the plantation rows (cropping areas), which reduces the consumption of plastic and organic matter (https://best4soil.eu/videos/11/en) (Martín-Expósito et al., 2013; García-Raya et al., 2019; Gómez-Tenorio et al., 2018) (fig. 3).

Fig. 3: Tomato field trial during biosolarisation and subsequent (healthy) crop.

LIMITATION TO SOUTH EUROPE?

Solarisation is traditionally used in Southern Europe, where long periods of sunshine are sufficiently present. At the beginning of the solarisation process, it is especially important that several days continuous sunshine occurs. It is at this point that the temperature in the first soil layer has to be raised as fast as possible to kill weed seeds. Otherwise, weeds will grow and push the plastic film upwards, thereby strongly reducing the warming effect of solar radiation on the soil. Therefore, solarisation is a technique not fully suited to northern countries of Europe. However, with the increasing temperatures during the last years (fig. 4), and especially very warm and sunny summers, the solarisation method might become achievable for certain regions in the central part of Europe. The efficacy of the process can furthermore be increased by applying the biosolarisation method i.e., adding easily degradable organic matter to the soil before covering with the plastic film. In regions where solarisation is not used, the potential of this best practice could be a topic for a community of practice i.e., a group of persons who share knowledge on a specific topic. The creation of such a community of practice is supported by the Best4Soil network by organizing a workshop dealing with the concerned topic. If you are interested, then contact Best4Soil (contact form is on www.best4soil.eu).

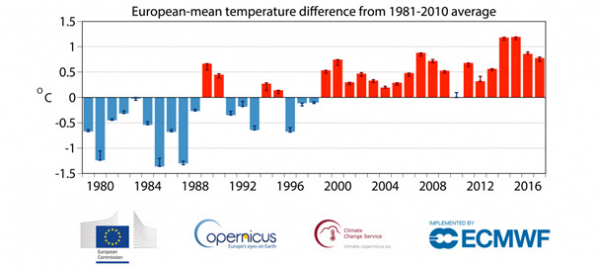

Fig. 4: Evolution of the mean air temperature in Europe (Source: https://climate.copernicus.eu/climate-2017-european-temperature).

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