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Microplastic in Agricultural Soils

Agriculture uses several plastic sources on a regular basis. They are used to manage climate, pests and diseases or to control weeds. Residues of those plastics are sometimes consciously or unconsciously incorporated in the soil and remain there as micro or nano-plastics.

Micro and nano-plastics have known negative side effects on microorganisms and plants, and should therefore be prevented from entering the soil system. The EU Horizon 2020 project MINAGRIS (micro- and nano-plastics in agricultural soils) tackles the topic on several levels.

Methods

A two level survey to establish the state of the art of plastic use was performed in Slovenia, the Netherlands, United Kingdom, Estonia, Switzerland, Austria, Italy, Greece, Spain and France with more than 100 farmers (figure 1). A semi-anonymous survey was conducted orally and filled in online by project members on LimeSurvey.

Results

A detailed list of agricultural products containing plastics, their used quantities, frequencies, crops, the region and farm where they were used, as well as the components they are made of, were described. Suspected indirect sources of plastic, such as polluted compost, littering, or tire abrasion, were also surveyed.

A clear tendency could be observed in the crops where plastic is used intensively (e.g. polytunnel-based crops, tomatoes, peppers, cucumbers and lettuce) (Figure 2).

Most materials were made of polyethylene (PE), followed by polypropylene (PP). However, half of the interviewees did not know the exact components of the materials they use (Table 1).

Outlook

Through a parallel developed method to identify plastic in soil samples, it will be possible to link the use of plastic to the effective residues and additional factors like environment or crops.

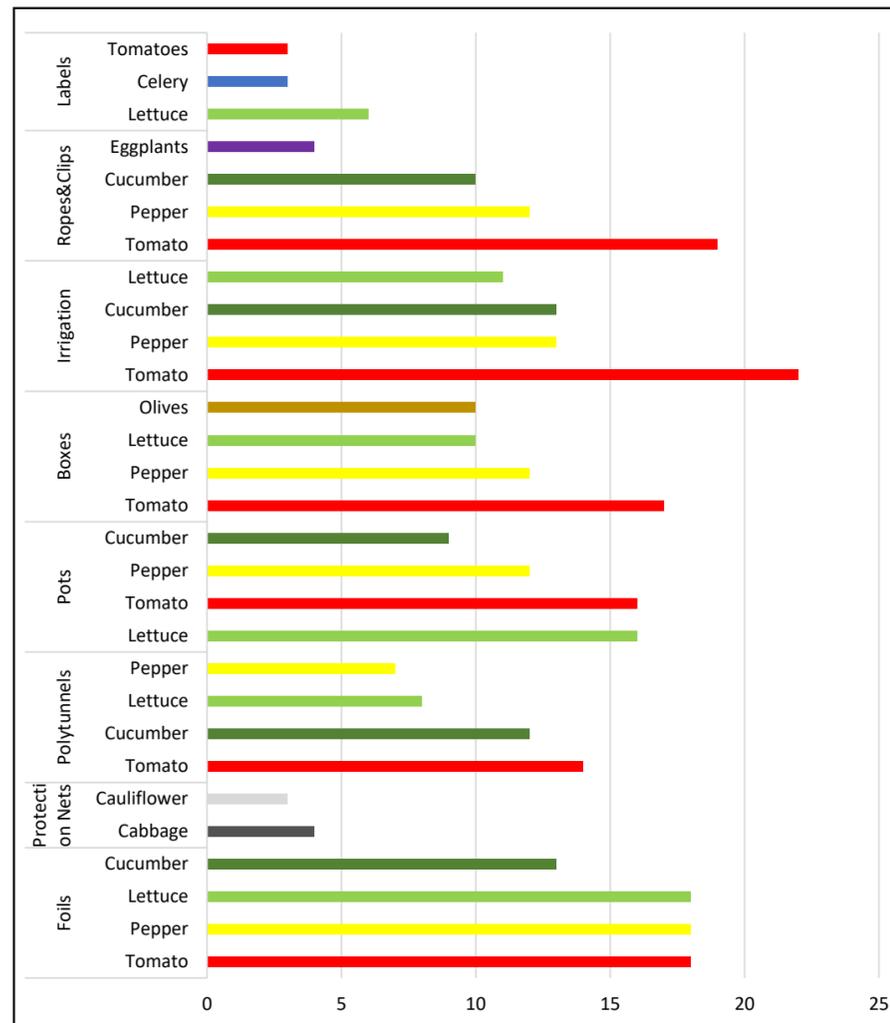


Figure 2: Most frequently mentioned crops in relation to the use of plastic material

Table 1: Evaluation of the farming-material-composition, according to the interviewees.

Material	Mulch/other foils	Crop protection nets	Polytunnel covers	Transplant trays & pots	Harvest / transport boxes	Irrigation equipment	Ropes/ clips	Labels	Plant protection equipment	Insect traps	Other
Unknown to farmer	21	13	12	13	20	25	16	12	12	21	19
PE	29	6	3	5	26	26	9	9	9	2	17
PP	2	1	1	3	5	5	6	4			9
PVC	1			1	3	16	1	1		2	
Biodegradable	10			1		1	1		1	1	1
HDPE	1	2			7	4					
PS				14							
LDPE	2					8					
Styrofoam				8							
Oxo-biodegradable	4										
Teflon						4					
Microfiber	2										
Nylon		1									1
PC						1				1	
POM						2					
LLDPE	1										
Pharmacol	1										
AHGS		1									
PET				1							
MDPE (alkathene)						1					
PD						1					
HPPE											1
Silicone											1
N=	74	24	16	46	61	94	33	17	22	27	49

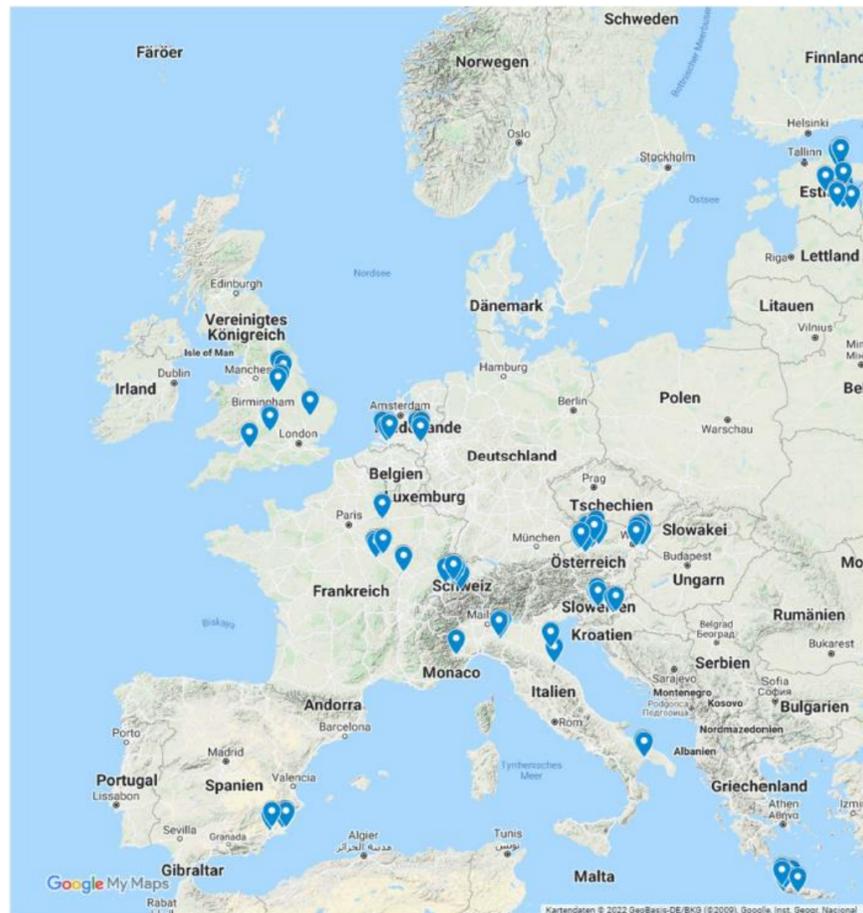


Figure 1: Interviewed locations



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