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humification processes of olive pomace in soil

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Recycle in agriculture of waste materials deriving from agro-industrial production is matter of great interest at present day for public opinion, agricultural factories and for the lawmakers, whose task of making rules in a matter of absolute importance for environmental safeguard is particularly delicate, taking into consideration that also efficiency of productive systems and quality of products has to be secured.

A new organic matrix among the waste materials from olive oil mills has appeared from not many years (not more than 20), and they are olive mill pomace. They originate from a new olive oil extraction procedure, where solid and liquid wastes are mixed together. It is quite a new material and would need an adequate amount of studies before being allowed to be spread in the environment. Italian law very rapidly seems to have resolved the problem of their recycle on 1996, using a law which had been written for the olive mill waste water: it permits waste water spreading on agricultural soils, for an amount up to 80 m^3 per hectare. This measure has been decided after very large researches had been carried out throughout the world, with results encouraging such a decision. But the same amount has been settled for olive pomace spreading. Actually olive mill waste water has very a different composition, being the pomace much richer of organic matter, prevalently composed of materials which not easily or rapidly may be changed to humic substances, like lipids or lignin of olive stones.

With this study we want to follow the changes in the organic matter of soil after pomace spreading and without spreading, using three techniques: determination of humification parameters, Isoelectric focusing and ^{13}C NMR. The first two techniques give a measure of the trend of humification processes. The third provides information on

the chemical composition, related to the functional groups of organic matter. Pomace has been added to two soils in amounts corresponding to 80 m^3 per hectare, samples were incubated at 30˚C and at 60% of field capacity. Sub-samples were taken out at begin of the trial, after 1, 3, 6 and 12 months.

The pomace addition to the soils produced a decrease of the IEF peaks closer to the cathode but within an year they were increased more than those of the soil untreated. The same happened with the humification parameters: after a decrease due to the pomace addition they started to increase in an year.

In the NMR spectra in an year an increase of the peak around 135 ppm has been found in the soil treated, correspondent to aromatic or alkenes compounds, very low in the pomace, demonstrating that the humification processes include the synthesis of aromatic (or alkenes) compounds. The same increase has not been found in the soils not treated. Furthermore the pomace displays a sharp peak at nearly 35 ppm, corresponding to aliphatic compounds, probably mostly fatty acids. This was found in the soils treated at start experiment, but it was lowered after 1 year incubation.