ABSTRACT:
Sustainability in Agriculture Waste for new organic-mineral fertilizers
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Improper waste disposal in agriculture represents - together with the misuse of chemical fertilizers - the major threat for the environment and a high risk for human health.

This paper aims to demonstrate how to recycle different types of agriculture wastes for producing soil fertilizer with a balanced level of nutrients. The novelty of the paper is:

1) Innovation strategy in agricultural waste management, reducing different types of waste with a patented process;
2) Producing new-patented organic-mineral fertilizers effective on soil and plants;
3) Producing fertilizers able to improve food quality, connecting food and wastes to economy and environment.

Università Mediterranea of Reggio Calabria (Italy) with its full-professor Adele Muscolo and SBS Steel Belt Systems SRL from Milan (Italy) have developed a new process to produce new fertilizers using sulfur recovered from refineries and agricultural waste.

Over the next years, agricultural production will face major challenges: increasing population, climate changes, land degradation. Climate change is expected to cause substantial reductions in crop production, particularly in Africa, South Asia and Mediterranean Countries: estimates from FAO indicate that 38% of the land cultivated in the world has been already damaged by conventional agricultural practices.

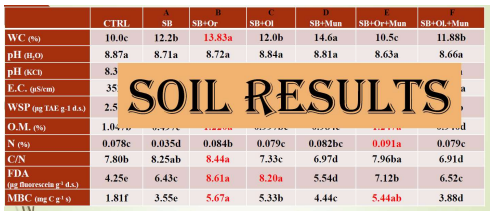
Consequently, our research concentrated on the recovery of degraded areas, especially in arid and semi-arid areas where soil desertification, soil salinisation and alkalisation are the major constraints. The Università Mediterranea and the Company SBS Steel Belt Systems (with its know-how in sulphur processing & solidification & pastilliation) shared the research project and the joint-research brought to the discovery of a new class of fertilizers: organic-mineral fertilizers composed by sulphur + bentonite + organic waste from agriculture (e.g.: waste from oranges).

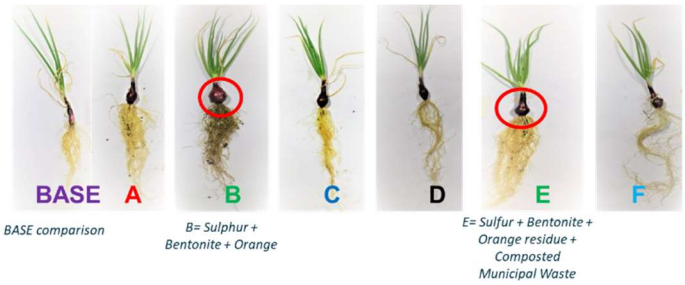
Picture 1: Composition of organic-mineral fertilizers

This new type of fertilizer has been patented as well as the continuous production process implemented with steel-belt machineries running without stopping (24/7).

This new patented type of organic-mineral fertilizer has been tested in greenhouses by the Mediterranea University and the results were very positive: it is possible – with the right dose – to revert the desertification.

Sulphur is lowering the pH, while at the same time the organic agriculture waste can reinsert the organic matter into the soil, because the production process of the fertilizer is mechanical (mixing) and not chemical, hence preserving the organic part which is present in the final fertilizer-product. This reverting of desertification & organic matter re-allocation is stable and sustainable in time.





Picture 2: data from University + photos of tested onions

Because elemental sulphur is not soluble in water, it is mixed with bentonite clay in the production machinery and slowly released into soil, where the soil bacteria will transform it in sulfate-sulfur, which is soluble in soil and easily taken up by plants.

Instead, the agriculture organic waste (from oranges) could be found and sourced locally in the South of Italy as well as in many other Mediterranean Countries. For example, it is possible to source oranges and citrus which - after being squeezed - are ready for a drying process and a subsequent grinding in order to have a dry orange powder to be mixed with sulphur & bentonite.

Italy, after Spain, is the major citrus producing Country of the Mediterranean Basin, with an area of more than 170 000 ha. and an average production of 3 million tons over the last 5 years.

Therefore, SBS Company and Università Mediterranea developed this new org-min fertilizer in South Italy, which could reduce the disposal of organic agriculture waste in open fields recycling the "left-over"/squeezed oranges and eventually olives (tests are in progress). This fertilizer is produced with process-machinery consisting of a continuous, fine-tuned blending system, complete with a pastillation unit, which is able to produce small pellets to be packed in big bags.

Presently, SBS Company together with Università Mediterranea are working on a joint LIFE Project financially sponsored by the European Union from Brussels in order to:

a) develop and install a pilot industrial production line to fine-tune the continuous patented production process (it will be implemented in the 2nd SBS plant in Sicily-Italy);
b) test in open fields the new patented organic-mineral fertilizers: 27 ha. of land are ready for testing the new org-min fertilizers on vegetables and on durum wheat.

The LIFE Project has just started last September 2021 and it will last for 42 months.

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