

## **The Use of Synthetic Soil for The Vegetables Cultivation in Conditions of Limited Water Consumption**

**Dr. Ing. Italo Luigi de Paoli Ph.D**

D&D Srl

Keywords: Compost, water consumption, vegetables foods

Presenting author email: [depaoli@ddgroup.it](mailto:depaoli@ddgroup.it)

The separate collection of urban organic waste and green waste for the countries of the European Union averages 100 kg / inhabitant x year with an annual growth of about 10%. The production of quality compost averages 38% - 40% of the production of organic waste material. every year in Italy about 500,000 tons are produced under the "quality compost" brand, equal to 35% of national production.

This quantity of compost is only partially used by the market, the remainder is disposed of on the land as agricultural soil improver without adequate economic enhancement of the product

In particular the composting of vegetable waste, such as the mowing of grasses, twigs, leaves and horticultural residues, provide an excellent substrate for the formation of compost, without the presence of pollutants (heavy metals), plastics or other objects that may in some way compromise the characteristics of the final product.

The advantages of using compost in natural soils can be summarized in the following:

Slow release according to the needs of the plant;

Synergy with mineral fertilizers;

Positive action on the water balance;

Reduction of plant diseases;

Improvement of the structure (porosity for water and air, root penetration and workability);

Reduction of soil erosion;

Reduction of pollution of the aquifer;

Stimulation of microbial and enzymatic activity;

Stimulation of radical activity. (\*)

The excellent ratio between the C / N content, which for waste of fruit and vegetable origin is generally equal to 30 (C = 58; N = 2.5) (\*\*) gives the final product characteristics such that it can be used as as a substrate for floral crops, as a soil improver for horticultural productions and other cultivation practice.

This study seeks to enhance the production of quality compost by creating a synthetic soil, where the percentages of compost on average oscillate between 50% and 60% in which, with appropriate precautions, different species of horticultural can be grown in conditions of high environmental safety without the use of pesticides and with a consumption of water used for irrigation limited to the actual evaporation of the plants.

Furthermore, the use of synthetic soil useful for crop growth is very limited (thickness of about 15 cm 20 cm), and is an excellent support for the transmission of nutrients that are administered to the plant by irrigation.

The project started in 2018 and currently underway aimed to test the use of synthetic soils (compost + peat) as a crop substrate for the production of horticultural products, on an industrial scale and in particular its applicability in conditions of lack of land. useful for the development of agricultural practices and in conditions of limited availability of water resources.

The first data obtained confirms the validity of the project through a series of different horticultural productions, especially if this technology is applied where the availability of land suitable for the cultivation of vegetables is limited and where the use of water for irrigation represents a cultural criticality.

The consumption of land is very low and is generally variable with the type of vegetables grown, similarly the consumption of water is very low, with an average request slightly higher than the actual evapotranspiration, useful for maintaining the optimal humidity for the growth of the plant.

The use of synthetic soils for the cultivation of vegetables lends itself well to the construction of vertical farms, (today generally used for the production of salads and lettuces), where the presence of these substrates guarantees a high industrial production, with a high degree of automation.

Furthermore, the construction of vertical farms through the use of synthetic soils represents a further possibility in the concrete development of these technologies, giving the final product organoleptic characteristics equal to, if not superior to, what the market offers today, with agricultural practice in greenhouse or "open field", where the final products are used for human nutrition.

#### Reference

(\*) Werner Zanardi. CIC Compost e agricoltura – olmedo 4.11.2016

(\*\*) <https://www.isprambiente.gov.it/contentfiles/00003500/3526-manuali-2002-07.pdf>