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CO2MPOSITIV- OPTIMIZATION OF ORGANIC MATERIALS CYCLES OF VITICULTURE IN LUXEMBOURG

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Abstract: The residue grape marc is transformed into a regional, high-quality fertiliser by optimizing the composting process. Ways are shown that improve the organic materials cycles in Luxembourg's viticulture in order to minimize the need for mineral nitrogen and phosphate fertilizers and pesticides. The use of the composting process in agriculture and the use of compost products are one possibility to increase sustainability and counteract climate change.

Locally produced compost products help to promote humus formation and thus help to protect the climate. The aim of the project is to promote wide support for organic fertilisation and composting. Thus, first windrow composting, where grape marc, green waste and other biodegradable material are mixed, has started in 2019. The compost as well as compost tea are applied on trial plots in an organic vineyard to investigate the effects on soil fertility.

Introduction: Organic fertilizers are a simple and resource-efficient tool for more sustainable land management by closing materials cycles. Compost is an organic material that is aerobically degraded by soil organisms, whereby water-soluble nutrients are made available to the plants and act as fertilizer. Compost does not only improve nutrient availability, but it also maintains soil organic matter content, stimulates microbial activity and, hence, promotes soil resilience (Bustamante et al. 2010, Ferrer et al. 2001).

Currently, grape marc and other agricultural residues are rarely used as farmers are not well-informed about the composting process, the benefits of compost usage and thus do not take up this additional work. The CO_2MPOSiTiv project carries out windrow composting on a stockyard in the vineyards of the Luxembourgish River Moselle. The produced compost, compost tea and a mixture of both are applied on organic vineyards in order to study the effects on soil fertility and plant health.

Material and methods: The first compost windrows were built in May and October 2019 in long rows in triangular form with dimensions of 50m x 1.5m x 1.5m on a tarred stockyard within the vineyards of River Moselle. A paved area is used for composting to optimize the accessibility under all weather conditions. The material mixture consists of 50% vol. grape marc, 30% vol. green waste, 10% vol. straw, 5% vol. soil (rich in clay) and 5% vol. biochar in order to optimize the composting process. The windrows are frequently turned and irrigated, depending on temperature and CO_2-content to

improve the quality of the compost. The composting time is about eight weeks. The windrow is covered by a compost fleece to keep it dry, control the moisture of the material and prevents surface run-off in heavy rainfall.

The trial plots are located in the south-west of Luxemburg, in the Moselle valley, at 260 m a.s.l. (mean temperature: 10.8°C, mean precipitation 685.3 mm). Vine cultivation at River Moselle is on steep slopes of shell limestone and keuper, on heavy brown earth. Soil analyses of the trial plots showed a Corg of 1.3 %, C/N-ratio of 7.6 and a pH of 8. 5-year old pinot gris is cultivated under organic farming (since 2009) on these trial plots.

A randomized block design with 3 repetitions is used to study the effects of the application of CO_2MPOSiTiv compost, of compost tea as well as a mixture of CO_2MPOSiTiv compost and compost tea on soil fertility and plant health in comparison to the control plots in the vineyard. Soil parameters (N, P, K, Corg) as well as plant growth and health, yield and nutrition are observed.

Results: The first composting windrows that started in May 2019 have proven that the material mixture and the management of the composting process resulted in a respectable final product. During the composting process, sensory evaluations and measurements of temperature and CO_2 content have been done in order to determine the necessary turns and the watering of the windrow (fig. 1). Turns have been done very frequently at the beginning to ensure aerobic degradation and more often at the end of the composting process as the CO_2-content increased. According to the sensory testing of the compost moisture, the windrow has been watered twice.

The material-mix seems to be appropriate as it led to a good composting result. The C/N ratio decreases during the composting process and the resulting C/N was 22.4. Finished aerobic composted material should have a ratio close to 10, which was not achieved for this windrow. Ferrer et al. (2001) described a C/N ratio of 17.62 for aerobic compost. The higher C/N ratio could be due to the age of the grape marc as for this first setup, old grape marc from 2018 was used. Other indicators for aerobic compost described by Ferrer et al. (2001) are the contents of N (literature 2.14 %, CO_2MPOSiTiv 0.67), C (literature 37.72 %, CO_2MPOSiTiv 15 %), P (literature 0.28 %, CO_2MPOSiTiv 0.25 %) and K (literature 1.89 %, CO_2MPOSiTiv 0.83). The windrow in October 2019 contains fresh grape marc from the current grape harvest and is expected to increase compost quality.

The CO_2MPOSiTiv compost and compost tea will be applied on trial plots after grape harvest in October 2019. First results are expected in spring 2020.

Besides the windrow composting and the application of compost on vineyards, dissemination of knowledge on composting is one of the main objectives of the CO_2MPOSiTiv project. Thus, several seminars for wine growers and farmers as well as press communiqués and radio and TV contributions have been organised with great success as the project is well-known by interested groups.

Discussion: The first windrow composting has shown that a well-functioning cooperation of all actors is needed to carry out this project. Windrow turner, machines, staff and composting material have to be available at the perfect points in time to guarantee the success of the composting process. As the windrow turner will be owned by the winegrowers after the project and the wine growers work in close cooperation with the local communities and the extension service, it is ensured that the composting will be continued after the project end.

The start of the project has also shown that there are often administrative barriers that prevent farmers to adapt the composting. The dismantling of these barriers is one main aim of the project and a close coordination process with the authorities is indispensable.

Wine growers and farmers need substantial interest for this issue and the awareness of the need of closed materials cycles. Advice to farmers by the organic extension service regarding to material mixtures, sensory evaluation and

knowledge on the composting process plays a key role for the success of the CO_2MPOSiTiv-project, as a failure of the composting process by procedural errorsand additional administrative efforts on the farms can quickly lead to disinterest.

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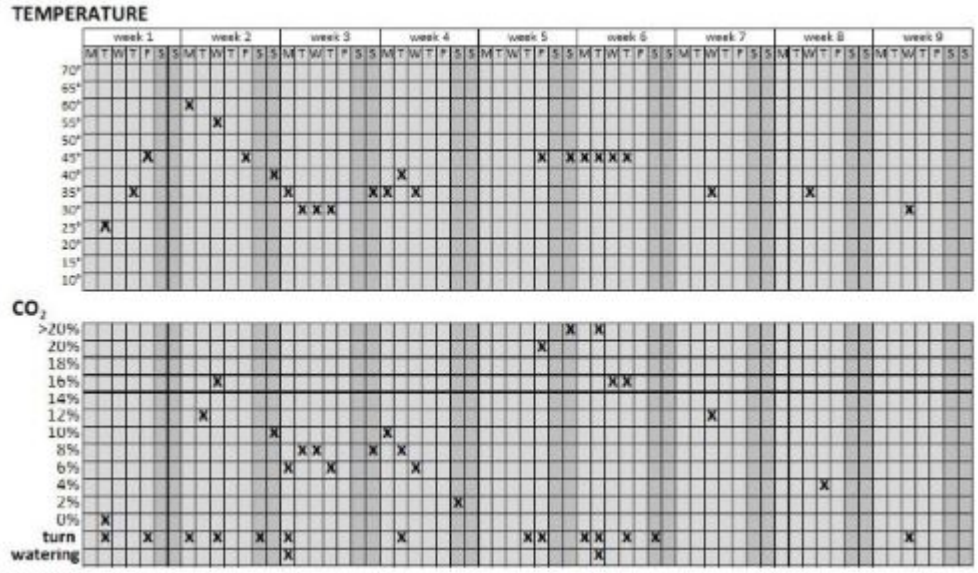
References

Bustamante, M.A., Said-Pullicino, D., Paredes, C., Cecilia, J.A., Moral, R. (2010): Influences of winery-distillery waste compost stability and soil type on soil carbon dynamics in amended soils. Waste Management, 30, 1966-1975.

Ferrer, J., Páez, G., Mármol, Z., Ramones, E., Chandler, C., Marín, Ferrer, A. (2001): Agronomic use of biotechnologically processed grape wastes. Bioresource Technol. 76, 39-44.

Image:



Disclosure of Interest: None Declared

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