

Valorization of digestate in greenhouse tomato crops.

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Introduction

The digestate is a byproduct rejected during the transformation of waste into biogas. In Switzerland, biogas industries pay farmers to spread it on their fields. In vegetable organic crops, the cost of digestate and its fertilizer value make it interesting. An experiment was carried out by Agroscope in 2016 to compare the effect on a tomato crop fertilized with digestate or with organic reference.

Material and methods

- Venlo greenhouse compartment of 360 m².
- Crop information: organically grown, Kanavaro grafted on Maxifort, density of 2.5 stems m⁻², culture between 21.04.2016 and 5.10.2016, first harvest on 24.06.2016.
- Digestate came from a methanization factory using green waste, catering leftovers and agricultural excrement.
- Organic reference fertilizer was provided by Hauert as Biorga.
- Fertilizer was distributed via drip irrigation system every beginning of week. The nutrient standard for an expected yield of 11 kg m⁻² and the calculated amount supplied are described in table 1.

Table 1. Nutrient standard and calculated amount supplied.

	N [kg ha ⁻¹]	P ₂ O ₅ [kg ha ⁻¹]	K ₂ O [kg ha ⁻¹]
Standard	155	110	235
Reference	152	96	315
Digestate	156	151	280

Results



Figure 1. Tomato plants in greenhouse (10th June 2016). Digestate modality in the right row.

The measures made on plants and fruits did not show difference due to the mode of fertilization on the plant phenology (table 2), the yield (table 3) or quality of fruits (table 4).

Table 2. Phenology (means of 8 repetitions). At the end of the culture for growth and flowering stage. Mean during the culture for leaf length and stem diameter.

	Growth [cm]	Flowering stage [cluster]	Leaf length [cm]	Stem diameter [mm]
Reference	390	13.8	37.0	8.3
Digestate	378	13.4	35.6	8.1

Table 3. Yield (means of 8 repetitions).

	Yield [kg m ⁻²]	Fruits [nb m ⁻²]	Average fruits weight [g]
Reference	12.5	106	118
Digestate	12.4	104	119

Table 4. Analyses of quality (means of 8 repetitions of analyses made the 13.7, 19.08 and 26.08).

	Firmness [Durofel Indice]	°Brix	Acidity [g l ⁻¹ citric acid]
Reference	82.6	4.6	5.3
Digestate	83.6	4.5	5.1

Conclusions

- The vigor of plants is as good with digestate as with the reference fertilizer.
- The yield is similar for both modalities.
- The quality of fruits is not affected by the fertilizer.