The Effect of Organic Fertilizers and Amendments on Photosynthesis and N Metabolism in Strawberry.

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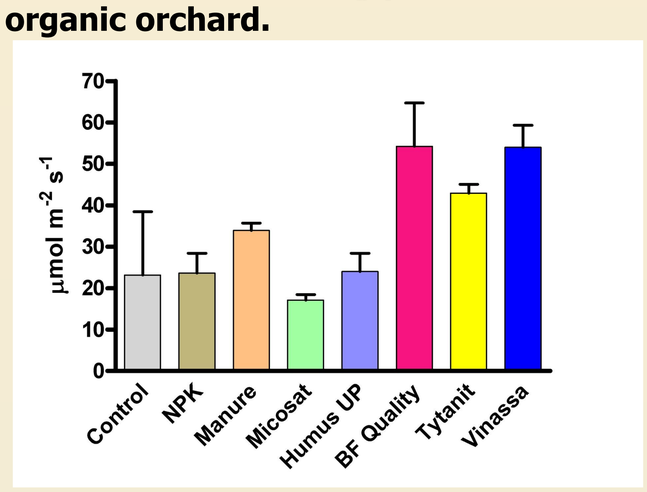
BACKGROUND

The increasing interest in organic strawberry production is driving the offer of new inputs as fertilizers and/or amendments based on a new concept of plant nutrition. Their activity is not only based on macro and microelements, but also on organic compounds or microorganisms present in their formulation.

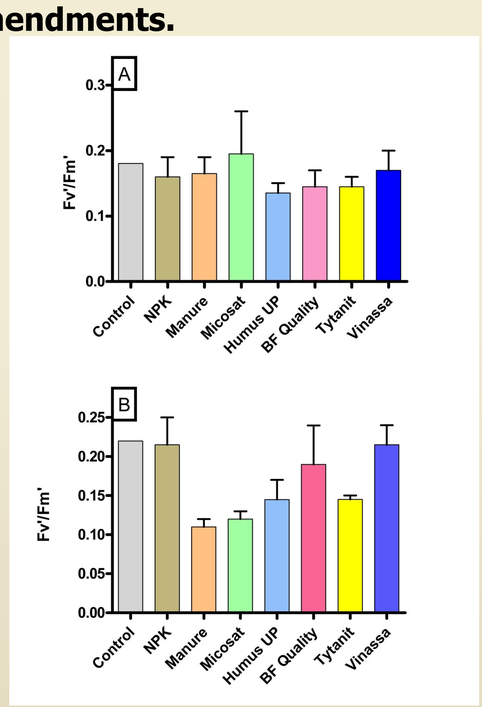
The efficacy of these products is frequently shown through increased yield or plant growth, but the physiological mechanism of action is frequently not known.

PLANT SYSTEM

Strawberry cv. Elsanta grown for 12 weeks in rhizoboxes with 1.8 kg podsolic soil from organic orchard.



Photosynthesis rate was increased by treatments with foliar fertilizers and amendments.



Photosynthetic efficiency, assessed with the Fv/Fm ratio of chlorophyll-*a* fluorescence, was not affected by the treatments in young leaves (A), while in old leaves (B) some products induced a slight reduction in efficiency.

FERTILIZERS AND AMENDMENTS USED

DRY MANURE

SEAWEEDS EXTRACT

VERMICOMPOST EXTRACT

YEAST STILLAGE

TITANIUM SOLUTION

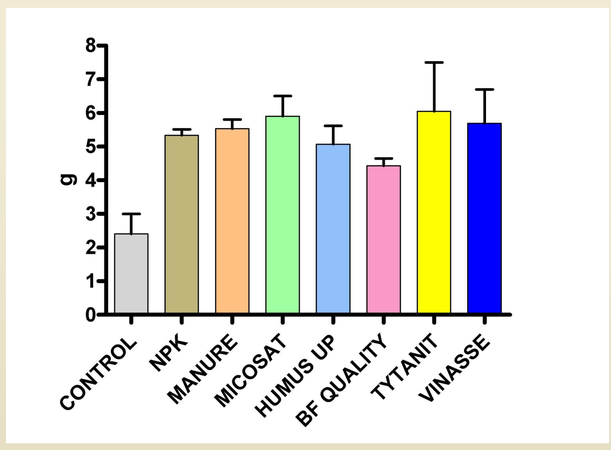
MICROBIAL CONSORTIUM

Plants were treated with dry manure alone or in association (half a dose) with a seaweed extract (BF Quality), a vermicompost extract (Humus UP), stillage from yeast production (Vinasse), a product containing titanium (Tytanit), and a microbial consortium composed of mycorrhizal fungi, PGPR and *Thricoderma harzianum* (Micosat).

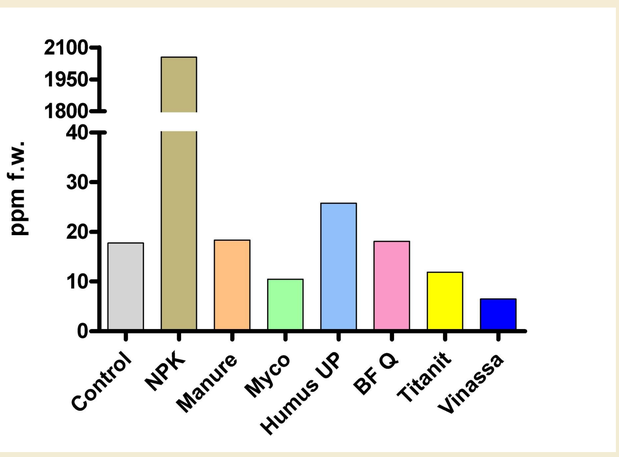
Standard chemical NPK fertilizer (NPK) or no treatment (Control) were used as control.

The amount of macroelements applied with the different treatments on a kg•ha^{-1} basis.
The first four products were applied to the soil, while the other three were sprayed on the leaves.

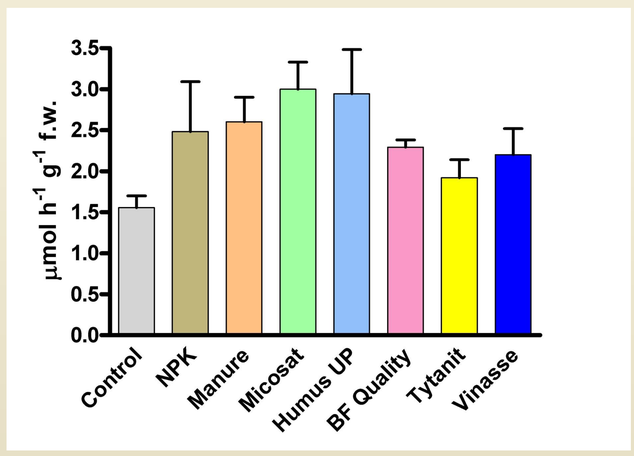
TREATMENTS	N	P	K
0. CONTROL	0	0	0
1. NPK	70	26	100
2. MANURE	45	13	17
3. MICROBIAL CONSORTIUM	23	6.5	12
4. VERMICOMPOST EXT.	1	0.1	0.2
5. SEAWEED EXT.	23	6.5	8.5
6. TITANIUM SOLUTION	23	6.5	8.5
7. YEAST STILLAGE	23	6.5	8.8



Total plant dry weight was higher in all the fertilized plants in comparison with control. However, no differences were shown among the chemical and organic fertilizers.



Nitrate content in leaves of NPK-fertilized plants was fifty-fold higher than in plants treated with any organic fertilizer or amendment, and in untreated plants.



Nitrate reductase (NR) activity in leaves was higher in all the treatments in comparison with untreated (Control) plants. However, no differences were shown among the chemical and organic fertilizers and amendments.

CONCLUSIONS

- **Organic compounds present in Vinasse and BF Quality (mainly aminoacids) induced higher photosynthetic activity matched by high photosynthetic efficiency. Also Titanium increased photosynthetic activity, but photosynthetic efficiency was lower than with the organic fertilizers.**
- **A similar level of NR activity in the leaves of fertilized plants, irrespective of the kind of product, is matched by a fifty-fold higher amount of nitrates in the leaves of NPK-fertilized plants in comparison with the organically fertilized plants. This indicates an inefficient use of nitrate in chemically fertilized plants.**
- **Plant growth was similar for the differently fertilized plants even though the total amount of nutrient elements provided with the organic fertilizers was much lower than in the standard chemical fertilization.**
- **Increased soil biological fertility and higher efficiency in the use of nutrients in organic form are considered the major factors explaining such results.**

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