ASPECTS ABOUT APPLY FERTILISERS IN ECOLOGICAL VINE GROWING

ASPECTE PRIVIND ADMINISTRAREA ÎNGRĂŞĂMINTELOR ÎN PLANTAŢIILE VITICOLE ECOLOGICE

COTIANU R., ATUDOSIEI NICOLE, CORFU GABRIELA
Bioterra Unversity Bucharest

Abstract. *Ecological viticulture is mainly a system that corresponds to the healthy and high quality foods request. Also, ecological wine crop provides the breeding and protection of natural resources on long term for the benefit of future generation. In order to practice the system of ecological viticulture is important to reduce the environment pollution and to promote cautiously the intensive systems of viticulture productions taking into according the use of industrial inputs do not produce pollution over the limits, issued by the food safety standards.*

Rezumat. *Viticultura ecologica este, in primul rand, un sistem care raspunde exigentelor cererii de produse sanatoase si de calitate superioara; ea constituie o viticultura care garanteaza protectia si ameliorarea resurselor naturale pe termen lung si le transmite nealterate generatiilor viitoare. Pentru a practica o viticultura ecologica este necesar sa se tina seama de faptul ca pe langa orientarea spre protectia resurselor naturale trebuie limitata si poluarea mediului inconjurator si sa fie promovate sistemele intensive de productie viticola, dar cu circumspectie incat utilizarea cantitatilor de imputuri de natura industriala sa nu produca efecte poluante, peste limitele admisibile, stabilite prin normele de securitate alimentara.*

The Romanian Department for the Agriculture is funding nation-wide compost application trials covering all major grape-growing regions. These trials are not primarily targeted at promoting organic viticulture but rather to support the development of markets for recycled organics. Nevertheless, the use of compost as a management tool with a wide range of beneficial effects is very relevant for the organic grape growing industry. The use of compost in viticulture can, as in other agricultural/horticultural applications result in a wide range of positive effects. However, there is also scope for potentially detrimental effects.

MATERIAL AND METHODS

We used statistical date and the results of the analysis methods. This research was compiled which presents an international overview of the current level of knowledge and the state of play of compost use in viticulture.

RESULTS AND DISCUSSIONS

Supply of plant nutrients

Compost contains all macro- and micronutrients essential for plant growth. However, not all nutrients are readily available in mineral forms for plant uptake. Considerable amounts of nitrogen and phosphorus are organically bound in the compost and are released only once the organic matter is mineralised through microbial

activity. The level of readily available mineral nitrogen contained in compost and the degree of nitrogen release due to the mineralisation process following compost application are of particular interest.

The nutrient budget in Table 1 shows that a compost application of approximately 10 t dm/ha (20 m^3/ha) should be sufficient to meet the demand of grapevines, except for nitrogen. However, the apparent lack of nitrogen in the budget is alleviated through airborne nitrogen deposits (30 - 50 kg/ha per year in Germany), through mineralisation of soil humus reserves or through leguminous cover crops. Most, or a high proportion of phosphorus, potassium, magnesium and calcium found in recycled organics compost is available to plants immediately or becomes plant-available over time. Approximately 20 % of phosphorus in compost react like P in mineral fertilisers and are immediately available for plant uptake while the remainder is more strongly bound and will become available later. Virtually all potassium supplied with compost can be used immediately by plants.

Table 1

Availability and supply of nutrients contained in 20 m^3/ha of an average bio-waste compost in comparison to the nutrient demand of grape vines

Nutrient	Nutrient level (% dm)	Nutrients available to plants in kg/ha and as percentage of total (in brackets)		Nutrient demand of vines (kg/ha per year)
		In first year	Within four years	
N	**1.2**	10-20 (10-15%)	approx. 50 (approx. 40 %)	45-80
P_2O_5	**0.7**	20 - 30 (30 - 40 %)	70(100%)	16-23
K_2O	**1.2**	70- 100(65-85%)	120(100%)	83-100
MgO	**1.8**	10-30(5-15%)	7	10-151
CaO	**6.0**	sufficient	sufficient	15-40

The situation is more complex with nitrogen of which only a small proportion is directly available to plants initially and the remainder being mineralised and released only over time (3-4 years). As a rule of thumb it is generally assumed that approximately 5 % of the total amount of nitrogen found in recycled organics compost is present in a mineral form and hence directly plant available and that annually approximately 10 % of the total nitrogen is mineralised over the next few years. It is estimated that in total approximately 40 % of all nitrogen contained in compost at the time of application will become available to plants.

In order to reconcile conflicting research results and to solve many open questions related to nitrogen availability and the mineralisation of organic matter, which is important both from a plant nutritional and environmental point of view, a 10 year long-term, cooperative research project was established. It aims to provide a better understanding of the long-term dynamics of mineralisation and nitrogen supply potential of compost.

However, most available data relate to temperate climatic conditions in Europe and it has to be expected that nitrogen dynamics associated with compost use are quite

different in climatically different wine growing regions. An assessment of nitrogen availability from composted chicken manure and slaughterhouse waste in conditions showed that compost is not necessarily a slow release fertiliser. Surprisingly, according to plant growth results, composted chicken manure provided more nitrogen than urea during the first seven weeks of the trial and generated a flush of growth which peaked after nine weeks simultaneously with that of urea fertilised plants and at almost the same level (fig. 1). Considerably more research is warranted to examine the effects of using compost in various climatic conditions.

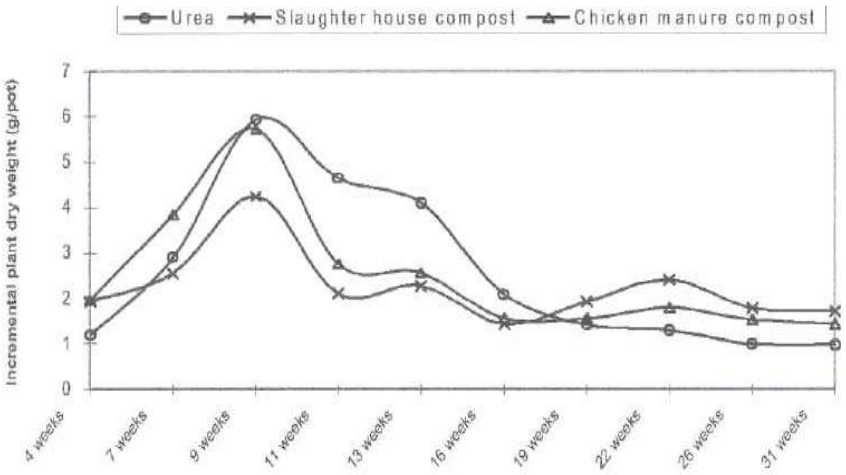

Fig 1 - Effect of inorganic and organic nutrient sources (2 g N/12 lt. pot from each source) on plant growth (grass)

Improvement of soil physical, chemical and biological properties

In many experiments it was shown that compost use could substantially improve soil physical, chemical and biological properties, which are often important factors in determining its fertility status. The improvement of these soil properties results often in indirect benefits such as reduced erosion, ease of cultivation or a reduced disease incidence.

Crop yield and quality effects

Compost use showed inconsistent effects on grape yields, depending on the type of compost used, the vineyard soil and the control it was compared against. A 3-year trial in an organic production system started to show beneficial long-term effects of compost use in the last year of the experiment.

The use of compost as mulch resulted in substantial yield increases in some Australian trials. An observed three-fold yield increase was primarily due to increased survival of bunch numbers in very dry growing conditions (fig. 2). Additional nutrient supply through the use of mulch was not looked at.

According to the available literature, compost use on grapevine makes relatively little difference to the quality of the must or wine generated from these grapes.

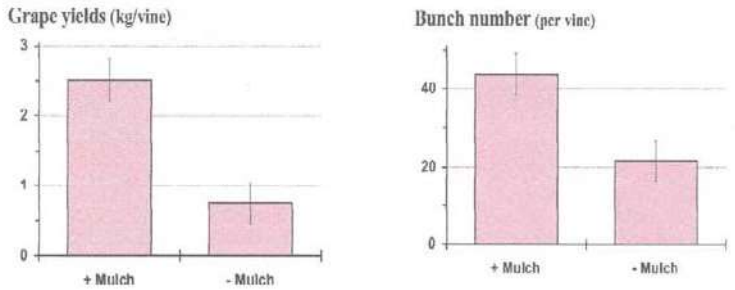

Fig 3 - Effect of 7.5 cm mulch layer (50 cm wide) on grape yield and bunch survival in 18 month-old vines (conventional production)

CONCLUSIONS

Most of the obtained research data and information on the use of compost in viticulture originates from Europe. A wide range of positive effects can be attributed to the use of compost, some of which were also shown in vineyard trials. Compost provides essential plant nutrients but their release over time seems unpredictable. This is why research efforts in Europe now focus on this aspect which is important both from a plant nutritional as well as environmental point of view. Research in other regions has focused on the use of compost to redress the most pressing local problems, for example water shortage. However, future research into the use of compost should also investigate aspects such as nitrogen mineralisation from compost in warmer. climatic conditions and the release of nitrogen and phosphorus from compost to assess its nutritional value over time and its potential detrimental effects if used inappropriately.

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