

**MODERN SOIL MANAGEMENT TECHNIQUES**  
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*Abstract*

In viticulture the permanent single crop cultivation and the rigid trellis systems require different soil cultivation techniques for the row between the vine-plants and for the line of vine-plants. Weed control is mainly performed by ploughing or herbicide application. The use of herbicides in vineyards is widely reduced to post-emergence application two times a year in the line of vine-plants because of difficulties for a proper mechanical weed control under the vine-plants. Further, permanent green cover in the rows with several cuttings per year is an appropriate system in viticulture. The combination of green cover in the rows and post-emergence herbicide treatment in the line is widely used in regions with sufficient rainfall and only moderate slopes like in the Palatinate (Germany). In contrast, green cover is avoided in dry areas (like in the Mediterranean) and at steep slopes with shallow and skeletal soils (like at the Mosel) because of water concurrence between vine- and cover-plants. Weed control systems had been regarded mainly from the point of view of their efficacy to protect the vine-plant from negative impacts of weeds on vigour and health. With the discussion about sustainable land use, also in viticulture the impact on soil ecological parameters has to be taken into consideration. In the context of a life-cycle assessment about weed control in vineyards it became obvious, that the data available concerning the potential impact on soil biology differ in a wide range between mechanical and chemical weed control. In this life-cycle assessment also the fate of the herbicides in vineyards and the influence of mechanical soil management on vineyard soils were investigated. Because of the data requirements for registration of herbicides, profound information is available and in general, the environmental impact of registered plant protection products can be regarded as harmless if used in the recommended manner. Therefore,

for chemical weed control data on soil and water organisms were available and evaluated. For the mechanical variant mainly data about flora and fauna and about the effect on soil compaction, erosion, and emission of dust were available. The study of these data from literature revealed a lack of superior criteria for an ecological evaluation of different side effects on the environment by different weed control systems. Therefore, it was difficult to estimate the influence of two different weed control systems on soil micro-organisms on a comparable basis. Another difficulty was, that data obtained in agriculture are often not transferable to the situation in viticulture because of different management and natural conditions.

The aim of this work was to compare the influence of different weed control systems on microbial biomass in vineyard soil. Therefore, at different vineyard sites with different soil characteristics, mechanical and chemical weed control were compared for their influence on soil microbial biomass. Each site had a plot cultivated according to ecological and integrated viticulture, respectively. Soil samples were taken shortly before and after weed control as well as during the whole year. The samples were analysed for physical and chemical soil characteristics and soil microbial biomass. During two years of investigation the results did not indicate a clear differentiation of soil microbial biomass due to neither cultivation system nor management of weed control.