



## Energy balance in olive oil farms: comparison of organic and conventional farming systems.

Marta M. Moreno (1), Ramón Meco (2), and Carmen Moreno (3)

(1) University of Castilla-La Mancha, School of Agricultural Engineering, Dep. of Vegetal Production and Agriculture Technology, Ciudad Real, Spain (martamaria.moreno@uclm.es), (2) Agrarian Research Service, Castilla-La Mancha, Toledo, Spain (ramonmeco@jccm.es), (3) School of Agricultural Engineering, Dep. of Applied Mathematics and Statistics, University of Castilla-La Mancha, Ciudad Real, Spain (carmen.moreno@uclm.es)

The viability of an agricultural production system not only depends on the crop yields, but especially on the efficient use of available resources. However, the current agricultural systems depend heavily on non-renewable energy consumption in the form of fertilizers, fossil fuels, pesticides and machinery.

In developed countries, the economic profitability of different productive systems is dependent on the granting of subsidies of diverse origin that affect both production factors (or inputs) and the final product (or output). Leaving such external aids, energy balance analysis reveals the real and most efficient form of management for each agroclimatic region, and is also directly related to the economic activity and the environmental state.

In this work we compare the energy balance resulting from organic and conventional olive oil farms under the semi-arid conditions of Central Spain. The results indicate that the mean energy supplied to the organic farms was sensitively lower (about 30%) in comparison with the conventional management, and these differences were more pronounced for the biggest farms ( $> 15$  ha). Mean energy outputs were about 20% lower in the organic system, although organic small farms ( $< 15$  ha) resulted more productive than the conventional small ones. However, these lower outputs were compensated by the major market value obtained from the organic products. Chemical fertilizers and pesticides reached about 60% of the total energy inputs in conventional farming; in the organic farms, however, this ratio scarcely reached 25%. Human labor item only represented a very small amount of the total energy input in both cases (less than 1%).

As conclusions, both management systems were efficient from an energy point of view. The value of the organic production should be focused on the environmental benefits it provides, which are not usually considered in the conventional management or not valuing the damage it produces to the environment. Organic farming would improve the energy efficiency in these environmental conditions, offering a sustainable production with minimal inputs.