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Energy Balance of Wheat Production in Morocco

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Abstract

Energy use in agriculture has recovered an increasing interest since the first energy crisis in the early seventies. The ration of energy that goes in agricultural production is less than 5 % for the industrial countries. In developing countries this percentage is probably higher due to a lower level of industrial activities. Therefore, energy saving possibilities are of high interest.

In Morocco, the most planted crop is soft wheat with 1.75 million ha (2.3 million tonnes produced, about 38 % of the annual consumption) in 2001/02. The major part of this production is mechanised using small and medium size tractors and machines.

The objective of this paper is to assess the energy balance of winter wheat production under Moroccan conditions and to investigate energy saving possibilities.

An average field operation itinerary was considered and characterised using results of own research and values from specialised literature world wide. Energy coefficient values are estimated and assumptions are admitted to ensure objective comparison with similar wheat balances under other latitudes.

The energy balance is established considering several forms of energy such as muscle energy, energy content of inputs (fertilisers, seeds, ...), fuels, and machines. In addition the balance gives the needed energy for each field operation and each input, so that comparisons could be made from several points of view.

The analysis of the energy balance shows that the largest energy consumer is fertilisation. It contributes to the total energy use at more than 20 %. The N-fertiliser alone enters for more than 50 % of the fertiliser energy expenditure. Direct energy in the form of fuel and lubricants contributes to less than 10 % of the total energy needed for wheat production.

The basic technical itinerary can be improved by introducing practices such as manure spreading to reduce chemical N-fertiliser application and combination of operations to decrease fuel consumption and to avoid soil densification.

Compared to other countries, wheat production in Morocco needs a minimum energy expenditure due to the fact that farmers do not use fertilisers correctly. Some basic operations are not executed at all, such as pest control.

Keywords: Energy balance, Morocco, wheat production

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