INTRODUCTION

Analyzing agricultural machinery operations under the environmental point of view has become an achievable objective. Soil texture, field shape, field-farm distance, mass, lifespan and annual working time are the variables that affect inputs and outputs of operations and that must be quantified in local contexts. The aim of this study is to use a model for inventories for local contexts to reduce the unreliability linked to average data used for environmental assessments.

METHODS

A tool (ENVIAM; ENVIronmental Inventory of Agricultural Machinery operations) for reliable inventory of operations in different pedo-climatic contexts has been built to reduce the inaccuracies related to the uncritical use of database processes:

- **Tractors and implements**: gathered in two databases.
- **Working time**: split in effective work, turns at headlands, refilling, emptying, transfers.
- **Engine load**: values attributed to each working time component.
- **Fuel consumption**: f(working time, engine load, specific fuel consumption).
- **Exhaust gases emissions**: f(working time, engine load, European Stage of belonging).
- **Lubricant consumption**: f(maintenance schedule, duration of the operation, life span).
- **Materials consumption**: f(working time, life span, materials in which machinery is split - e.g., iron, copper, aluminum, plastic, glass, rubber).

THE COMPLETE OPERATION

PHASE 1A Farm/field transfer

PHASE 2 Loading

PHASE 3 Accessory timings

PHASE 4 Spreading

PHASE 5 Turns at headlands

PHASE 1B Field/farm transfer

RESULTS

ENVIAM helps realize a complete and trustworthy inventory of agricultural machinery operations. The quantification of inventory data as a sum of data per each phase that composes the operation is much effective for the inventory reliability.

Direct use (fuel, lubricant and inputs such as fertilizers, seed), indirect use (materials) and emissions of exhaust gases are quantified per each operation. Comparing operations in different contexts brings out that local pedo-climatic variables determine considerable variability in the results.

Choosing the optimal coupling between tractors and implements alternatives brings great contributions to the reduction of direct and indirect inputs and, consequently, of emissions released to the atmosphere.