



Simulation of two Cropping Systems with EPIC and CropSyst Models

L. GIARDINI, A. BERTI, and F. MORARI

Dipartimento di Agronomia Ambientale e Produzioni Vegetali, Università di Padova, Legnaro (PD), Italy

Corresponding author: A. Berti, Dipartimento di Agronomia Ambientale e Produzioni Vegetali, Università di Padova, Agripolis, 35020 Legnaro (PD), Italy. Tel.: +39 049 8272828, Fax: +39 049 8272839, E-mail: aberti@agripolis.unipd.it

BACKGROUND. Mathematical models can be valuable tools for representing the long-term productive and environmental effects of different cropping systems, extrapolating the experimental results in time and space.

METHODS. The mathematical models EPIC and CropSyst were applied to an experiment comparing two cropping systems with different input level, with the aim of testing the potential to represent the complex relationships characterising the plant-soil-climate system. The experiment was conducted in a typical environment of the coastal part of Veneto Region, characterised by the presence of a shallow watertable. Estimates provided by the models were thus compared to the values of state variables measured during the experiment (above ground biomass, total production, soil water content, soil nitrates in root profiles).

RESULTS. In this experiment, EPIC and CropSyst generally gave reasonable estimates of crop growth and yields. In some cases, however, the variation between measured and simulated data was evident, due to the effects of pests and weeds on crop development.

The models showed no important differences simulating soil water content. CropSyst generally simulated the dynamics of soil nitrates better than EPIC, although both models could describe the mean trend of the nitrates, but not their fluctuations over time.

CONCLUSIONS. Both models were sensitive to weather trends, while the simulation response to varying successive crops and agronomic techniques was poorer than that observed in situ. Moreover, the main drawback of both models is that they do not consider the effect of diseases and weeds on crop productivity. Under certain conditions, this aspect can be a severe limitation, as we found in maize following set-aside.

Key-words: models, EPIC, CropSyst, cropping systems, nitrates.