ASA-CSSA-SSSA – 2007 International annual meetings

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Water limitation of energy crop rotations – A simulation study for German conditions

Since the European and German energy policy has focused on the support of renewable energy production (Renewable Energy Sources Act; amendment 2004) an increased trend in cultivation of biomass for using in biogas plants can be observed.

Crop rotations in some farms are tending to maize monocultures or rotations with very high percentage of maize. Also further intensification of energy crop rotations by double cropping of winter cereals used as silage followed by maize or sorghum are currently discussed. These rotations have a higher potential biomass production under non water restricted conditions like maritime regions with annual rainfalls of 700-850 mm/a (e.g. Schleswig-Holstein) but may fail in many regions in Germany because of too low water supply.

Within a cooperative project (BIOGAS-EXPERT) a multi-factorial (location, crop rotation, nitrogen-amount, nitrogen-form) field experiment was established. Nitrogen and carbon flows as well as possible looses in the system of "soil-plant-fermenter" will experimentally be quantified and modelled.

A first calculative approximation of the impact of location (maritime *vs.* continental) on the potential dry matter production and the water use efficiency of three different energy crop rotations (maize monoculture, grassland and a rotation of maize, wheat silage and a grass intercrop) will be presented. The simulations are based on a combination of model modules for dry matter production and water balance based on an object-orientated modelling environment HUME and a model called FOPROQ.