

BIOMASS PRODUCTION OF ANNUAL FORAGE CROPS FOR BIOGAS.

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In Merelbeke (Flanders) a monoculture of maize (+ rye as a catch crop) and a 3 year crop rotation of maize, Italian ryegrass (IR, *Lolium multiflorum*), 1 cut IR + sorghum (+ rye as a catch crop) were compared in terms of biomass production (organic matter yield) (OM) for methane production. The experiment started in 2008 on a parcel where maize was growing since 2003. Two N- fertilizer regimes were conducted for the annual crops: a high-moderate and extensive N-regime (i.e. moderate x 0.6). OM yield significantly decreased by the reduction of N: -17% for Italian ryegrass, -13% and -10% for maize in monoculture or in rotation respectively and - 4% for sorghum. During a period of 3 years there was no significant difference in OM yield between maize in rotation, maize in monoculture and the combination of 1 cut IR + sorghum at the two N-fertilisation levels. Maize in rotation produced in 2009 and 2010 significantly more OM per ha than maize in monoculture (since 2003). The average yield of 3 years of a monoculture maize (16.6 t OM per ha) was considerably higher than the average yield of a 3 year rotation maize - Italian ryegrass-sorghum (15.2 t OM per ha). The ranking of the individual energy crops in terms of OM production per ha was the same for the moderate and the extensive N fertilization level: maize in rotation > 1 cut IR + sorghum > maize in monoculture >> Italian ryegrass. The substrate specific methane yield of the crops, involved in this experiment, are comparable and have less influence on the methane yield per ha than the area-specific methane yield. The costs for growing these crops, in terms of euro per 1000m³ methane were considerably lower for maize monoculture (332 euro) in comparison with the rotation in this experiment (515 euro). Growing Italian ryegrass is the highest N demanding and the most expensive crop in this rotation and a replacement by e.g. energy beet is worthwhile to consider. Rye was only used as a catch crop after maize monoculture because it was not fertilized. When fertilized, rye can improve the biomass production in both systems.