**0030** - **Possibilities for sustainable agrarian feedstock production and utilisation**

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To meet the future demands of a sustainable biogas production from agrarian feedstock, concepts need to be developed, where high yielding energy crops are integrated into sustainable and site-adapted crop rotation systems, and where the production of food, feed and materials can occur without mutual competition. So far as technologies for the use of catch crops or agrarian by-products like straw are developed the energy output can be additionally increased.
In several field experiments of the Institute of Agricultural Engineering across Austria a number of varieties and types of maize, sorghum, wheat, rye, barley, sunflower and sugar beet were grown and examined with regard to biomass and methane yields. Results from site experiments show that the variety or variety-type of an energy crop and the climatic condition of a certain location had a great effect on biomass as well as on methane yields. Significant differences in the methane yield have been observed when 16 maize varieties of different maturity behaviour were tested. Polynomial trend lines gave a 5 t DM ha-1 higher biomass yield for very-late maturing varieties (FAO number > 350) in contrast to early maturing varieties (FAO number < 250) at a dry matter content between 28 to 35 %. According to the differences in the nutrient composition of the investigated varieties also significant differences in the specific methane yields were shown. The theoretical and practical investigation of the methane potential of site-adapted and ecological balanced crop rotation systems have been compiled for selected Austrian regions. Yearly methane yields of 1,300 to 2,000 in organic and 1,680 to 3,870 m3N CH4 ha-1 per hectare in conventional agricultural systems could be achieved. Laboratory results of the anaerobic digestion of energy based feedstock mixtures have shown their potential for a positive co-fermentation effect. The high potential of ligno-cellulosic material from side-products or residues was also demonstrated when straw was pre-treated with steam-explosion technology and fermented in the lab. Besides the improvement of fermentation properties the specific methane yield of straw was increased by 30 percent.
The development of pre-treatment and harvesting technologies has to be forced when ligno-cellulosic biomass or catch crops are used. In the context of anaerobic digestion of straw steam-explosion pretreatment is likely the method of choice. In view of soil humus content the effects of straw removal and recycling of low C containing digestates has to be investigated.