Yield and nitrogen use efficiency of fodder and sugar beet (*Beta vulgaris* L.) in contrasting environments of northwestern Europe

Yield and nitrogen (N) use efficiency (NUE) are important traits for the evaluation of crops used for renewable energy production. Contrary to other bio-energy crops, data on NUE are not available for beet crops from the Beta genus for high yielding conditions of northwestern Europe. Thus, our study aimed to provide such information for one current representative of the cultivar groups sugar and fodder beet. Field experiments were conducted with six mineral fertilizer N doses (0-200 kg N ha\(^{-1}\), 40 kg steps) at one site in Germany (DE), The Netherlands (NL) and Denmark (DK) in 2010 and 2011; each combination of site and year (DE10, DE11, NL10, NL11, DK10, DK11) was evaluated as distinct environment.

The environments strongly differed in yield (dry matter, sugar), N uptake, harvest indices and N utilization efficiency (NUT\(_{E}\)) parameters. Increasing the fertilizer N dose increased dry matter yield and sugar yield in the environments NL10, NL11, DK10 and DK11, but not at DEW and DE11. Harvest indices decreased with increasing fertilizer N dose in the environments NL10, NL11, DK10 and DK11 only, which were characterized by a 70-110 kg N ha\(^{-1}\) lower N uptake at zero fertilizer N than DE10 and DE11. The N uptake continuously increased while NUT\(_{E}\) decreased with increasing fertilizer N dose at all environments. When regarding environmental and fertilizer N effects, yield was neither related to harvest indices nor NUT\(_{E}\).

Despite several significant interactions between environment and cultivar, the data clearly reveal that yield, sucrose concentration in taproot dry matter, total plant N uptake, NUT\(_{E}\) and apparent fertilizer N recovery were considerably higher for sugar beet (SB) than for fodder beet (FB). Contrastingly, harvest index on taproot dry matter basis and N harvest index were higher in FB than in SB, while harvest index for sugar was similar. An improved harvest index was obviously not the cause for the higher sugar yield of SB compared to FB, while sucrose concentration in taproot dry matter was clearly favourable for SB. Although SB crops incorporated more N into the leaves than FB, NUT\(_{E}\) was considerably higher in SB, especially when focusing on sugar instead of dry matter production. In conclusion, SB offers a higher potential for producing bio-energy per unit of arable land with less N use related greenhouse gas emissions per unit of energy gain than FB [D. Laufer, O. Nielsen, P. Wilting, H. J. Koch*, B. Maerlaender (Inst Sugar Beet Res, Holtenser Landstr 77, D-37079 Gottingen, Germany), *European Journal of Agronomy*, 2016, **73**, 124-132].

Influence of flaxseed combined with thyme, rosemary, and sage leaves as fodder additives on antioxidant status in the liver of Japanese quail

The aim of this study was to investigate the influence of a combination of plant supplements with antioxidant properties on the total antioxidant status measured by FRAP and the activity of selected antioxidant enzymes in the livers of Japanese quails. The birds were given feed with the 4% addition of flaxseed combined with a 1% admixture of dried thyme, rosemary, or sage leaves, respectively. The results showed an increased value of the antioxidant potential in the livers of quails fed with a diet that contained the combination of flaxseed and thyme, compared to the control diet and the diet that included flaxseed and rosemary. In all groups given dietary herbal supplements, males and females did not differ in liver antioxidant capacity, whereas in the control group decreased values of these indices for males were found. In the groups fed with the addition of
flaxseed and herbs, the activity of glutathione peroxidase and superoxide dismutase was significantly lower than in the control group. There were no differences in the activity of catalase and glutathione S-transferase between the analyzed groups. The use of flaxseed with the addition of thyme, rosemary, and sage leaves had a significant effect on liver antioxidant status in the studied quails [R. Drozd*, A. Rybarczyk, A. Wasak, M. Skolmowska, M. Jakubowska, K. Rybak (West Pomeranian Univ Technol Szczecin, Dept Immunol Microbiol & Physiol Chem, Szczecin, Poland), Turkish Journal Of Veterinary & Animal Sciences, 2016, 40(3), 359-364].

NPARR, 7(2), 2016-146 Reuse of fish pond sediments as fertilizer for fodder grass production in Bangladesh: Potential for sustainable intensification and improved nutrition

Intensive aquaculture systems (e.g. pangasius farming) make important contributions to food security in developing countries, including Bangladesh, but are associated with a variety of negative environmental impacts, including the discharge of nutrient rich sediments into local ecosystems. The present study consists of laboratory based analysis of the nutrient content of pangasius pond sediments (PPS), a trial of the efficacy of reuse of PPS as fertilizer to produce para grass as a green fodder for dairy cattle, and a comparative assessment of the economic viability of para grass production in rice fields using PPS to support small-scale dairy farming operations, thereby removing a major constraint to the growth of commercial dairy production in Bangladesh. PPS had significantly higher levels of organic carbon, nitrogen, phosphorous, potassium and sulfur than rice plot soil, and was a highly effective fertilizer for para grass cultivation. Production of green fodder for dairy cows using PPS yielded a higher rate of return than rice production. The indirect integration of aquaculture with agriculture through the reuse of PPS as fertilizer for green fodder production has significant potential to contribute to sustainable intensification and nutrition security goals, by improving the efficiency of nutrient use in aquaculture, reducing local environmental impacts associated with sediment disposal, and increasing the production of micronutrient rich milk [M. M. Hague*, B. Belton, M. M. Alam, A. G. Ahmed M. R. Alam (Bangladesh Agr Univ, Dept Aquaculture, Mymensingh, Bangladesh), Agriculture Ecosystems & Environment, 2016, 216, 226-236.