

## Maize quality for silage and cost of production

T. B. A. Oliveira<sup>1</sup>; M.W. Oliveira<sup>1</sup>; C. Nascif<sup>2</sup>; T. C. Rodrigues<sup>2</sup>; D. M. Lima Júnior<sup>3</sup>; F. S. Brito<sup>1</sup> and C. L. Franco Júnior<sup>1</sup>

<sup>1</sup>*Universidade Federal de Alagoas, Maceió, Alagoas, 57100-000, Brasil, Email: maurowoliveira@gmail.com.* <sup>2</sup>*Programa de Desenvolvimento da Pecuária Leiteira (PDPL/Viçosa), Viçosa, Minas Gerais, 36570-000, Brasil.* <sup>3</sup>*Universidade Federal de Alagoas, Campus Arapiraca, Arapiraca, Alagoas, 57309-005, Brasil,*

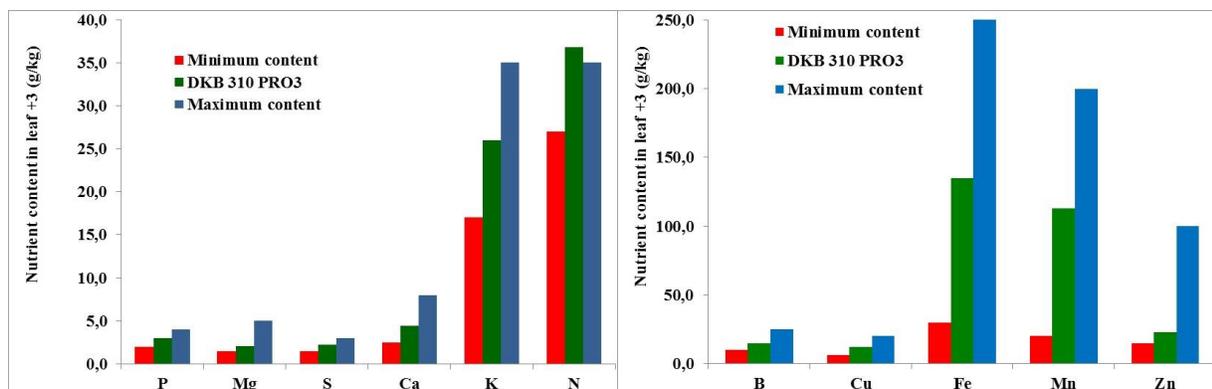
**Keywords:** forage quality, dairy farming, production system, agricultural management.

**Introduction:** Maize silage is one of the best forages for feeding dairy cows. Maize hybrids, soil fertility and cropping practices have great influence on productivity and nutritional quality of the forage and, consequently good silage. Due to the high removal nutrients by harvesting of the whole corn plant for silage, the balance of nutrients in the soil-plant system to avoid decreases in productivity in future maize crops should be cared. This study aimed to evaluate the nutritional status of maize plants, nutrient balance in the soil-plant system, forage quality for silage and cost of production in the first harvest under high-technology production system.

**Materials and Methods:** The study was conducted at a dairy farm located in the county of Mercês, Zona da Mata Mineira, from October 2016 to March 2017, medium texture soil. Base saturation in the layer of zero to 20 cm was 70%, with 37% in the layer of 20 to 40 cm. Soil phosphorus and potassium contents in the 0 to 20 cm layer were respectively 12 and 42 mg dm<sup>-3</sup>, considered as average. No exchangeable aluminum was detected in the 0-40 cm depth profile. In the first week of October, glyphosate was applied to the area at a dose of 3.0 liters per hectare. The hybrid DKB310 PRO3 were sowed one week after herbicide application. Were used 450 kg per hectare of formulated fertilizer 10-30-10 (N-P-K) for planting. Weed control was made after corn emergence. Were used glyphosate and atrazine at a dose of 3.0 liters per hectare of commercial product of each herbicide. In phenological stage of 3 pairs of leaves, cover fertilization was performed using 1.000 kg of fertilizer 20-00-20 per hectare. Fertilizer was applied in the corn interrow to avoid possible losses by volatilization. In the phase of female inflorescence, plant nutritional status was evaluated, following methods described by Raij (2011). Crop forage production was evaluated when whole corn plant presented on average 33% of dry matter. Six systematic samples per hectare were carried out. Maize was cutted about 20 cm height above the ground and plant material was weighed and chopped in a forage machine. Subsamples of the chopped material were oven dried and analyzed for mineral nutrient and structural carbohydrate contents. In the calculations of crop production costs, the land rent value adopted in the region was considered, which was R\$ 720.00 per hectare for first-crop maize. Costs related to lime and gypsum application for the first harvest were based on soil acidification rates due to the use of nitrogenous fertilizers and the amount of dolomitic limestone required to neutralize this acidification, associated to removal of calcium, magnesium and sulfur from maize harvest.

**Results and Discussion:** Figure 1 show foliar mean values of macro and micronutrient content of the hybrid DKB310 PRO3 compared to the minimum and maximum levels Raij (2011). Foliar

concentrations were in proper ranges. Coefficients of variation were less than 10% for all nutrients, indicating crop uniformity.



**Figure 1** Mean values of macro and micronutrient foliar contents compared to the minimum and maximum levels reported in the national literature.

Average yield of total biomass produced by DKB310 PRO3 was 61.5 ton of natural matter per hectare, with 32.8% mean dry matter content. Crop was very uniform and the coefficient of variation for total biomass yield was 5.27%. Mean values of N, P, K, Ca, Mg and S contents in g per kg of dry matter in the biomass were respectively 13.5; 1.6; 10.6; 1.7; 1.1 and 1.2. Thus, mean nutrient removal by corn harvest was 273; 32; 214; 35; 23 and 24 kg ha<sup>-1</sup> of N, P, K, Ca, Mg and S. Balancing NPK nutrients in the soil-plant system, considering chemical fertilizations such as nutrient inputs and output as removal of these nutrients by harvesting maize biomass, was verified that the balance was negative for nitrogen (28.0 kg ha<sup>-1</sup>), positive for phosphorus (27.0 kg ha<sup>-1</sup>) and negative for potassium (10.0 kg ha<sup>-1</sup>). Crop chemical fertilization was most charged item in production, corresponding to 47.04% of production costs. The other two items that impact in production costs were purchase of corn seeds and land rent, with percentage values of 18.01 and 15.26%, respectively. Chemical fertilization, land rent and purchase of seeds totalized 80.31% of total costs, which was R\$ 4,719.50 per hectare. The price per ton of dry matter was R\$ 232.54. Concerning forage quality, 8.45% crude protein content, 13.5% acid detergent fiber and 50.14% neutral detergent fiber were measured.

**Conclusions:** Production system used allowed maize plants to be well fertilized and crop productive with good quality forage, without compromising soil fertility. Cost of producing a ton of forage dry matter was R\$ 232.54.

## References

Raij, B. 2011. Fertilidade do solo e manejo de nutrientes. Piracicaba: International Plant Nutrition Institute. 420p.