Crops rotation: two crops per year

Due to the global challenges of climate change, it is unthinkable to increase agricultural land by cutting down forests. Thus, it is important to employ the environmental tools such as circular agriculture to improve crop production while decreasing inputs and environmental impact.

GOAL

The aim of this study was to demonstrate THAT IT IS POSSIBLE to increase the efficiency of an agricultural production system through use of the practices of Circular Agronomy.

MATERIAL AND METHODS

This study include two farms located in the State of Minas Gerais, Brazil:

- 3W Agronegócios farm (Farm 1): coordinates 21° 23’ 3” S and 44° 39’ 35” W, in the municipality of Itutinga, and
- Santa Helena farm (Farm 2): coordinates 21° 15’ 39” S and 44° 31’ 04” W, in the municipality of Nazaré.

Soil: the main soils of the farms are classified as “Latossolo Vermelho-Amarelo” or Oxisol (Typic Hapludox);

Livestock: 3,704 and 1,237 beef cattle animals were bought and confined during the two years (January to December 2020 and 2021) at Farm 1 and Farm 2, respectively.

RESULTS AND DISCUSSION

In spring/summer crops, the Farm 1 occupied around 35% of its fields with soybean, 25% with beans, and 30% with maize and around 13% with sweet potatoes. The Farm 2 also maintained a proportion close to 70% or above of legumes and about 30% with maize.

The average yields of soybeans, maize, common beans, and in spring/summer crops were 5.0, 12.4, and 2.5 tons ha⁻¹, respectively, that is, about 1.5, 2.0, 2.3, and times higher than the average Brazilian yields. In the second harvest they also showed yields equal to or above the national averages. In 2021, the average Brazilian yields of first crop beans, maize and soybeans were 1.17, 6.4 and 3.5 tons ha⁻¹, respectively. In the second crop, the average Brazilian yields of beans, maize and wheat were 0.9, 2.9, and 5.4 tons ha⁻¹, respectively.

During three harvests, Farm 2 exported 1,298 tons of N in the grain, forage, and sweet potato and added 1,037 tons of total N. That is, they exported 235 kg/ha/year in grains and tubers and added 197 kg/ha/year of N as fertilizer (Fig. 1 a and b).

In the same period, Farm 2 applied in the three years 639.4 tons of total N and they exported 694.8 tons of N in the grain crops. They exported 225 kg/ha/year of grain and applied 210 kg/ha/year of N as fertilizer;

During the two years of confinement, it was estimated that about 85% of the N consumed by the animals was excreted in feces and urine.

FINANCIAL SUPPORT

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Figure 1. a) Diagram showing N Input and N Output at Farm 2. and b) Average inputs and outputs of nitrogen (kg/ha/year) in the production system of Farm 2, based on the 2018/19, 2019/20 and 2020/21 harvests and beef cattle production from 2020 to 2021.

CONCLUSION

- Using circular agronomy practices, the two farms applied 19 and 7% less chemical fertilizers than they exported of the crops, within a scenario of high crop yields;
- It was estimated that about 85% of the N consumed by the animals was excreted in feces and urine.