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[C3.3-4] Soil Management Strategy for Enhancing Crop Yields

# Previous Intercropping Corn with Palisadegrass in a Tropical Region as Affecting Soil Fertility and Annual Crops Nutrition and Grain Yields

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The use of cover crops and crop rotation are important practices aiming a sustainable agriculture production. The temporary introduction of perennial forages such as palisadegrass [Brachiaria brizantha (Hochst. ex A. Rich) Stapf] in traditional grain production areas could increase soil quality (physical, biological, and fertility) and breaks the cycle of pests, diseases, and weeds of the following crops with positive effect on the grain yield. The objective of this study was to evaluate the effect of the introduction of perennial forage as a previous cultivation in the soil fertility and on the five followed cash crop nutrition and grain yield in a tropical region.

The experiment was conducted in Botucatu, State of Sao Paulo, Brazil (48° 26 - W; 22° 51 - S; 740 m above sea level). A dry winter and hot and rainy summer typifies the tropical climate (Koppen classification Cwa). The long-term annual average (1970/2006) of temperatures are a maximum 26.10 C, minimum 15.30C and average 20.70C, with and annual average rainfall of 1,358.6 mm. The soil is a sandy clay loam, (kaolinitic, thermic Typic Haplorthox) with 630, 90 and 280 g kg-1 of clay, silt and sand, respectively, which was under NTS. The area was under NTS for five years. It was a five crop-growing experiment. 1. Soybean [Glycine max (L.) Merr.] in the spring-summer for two growing season (2004/2005 and 2005/2006); 2. White oat (Avena sativa L.) during two growing season (2005 and 2006) in the fall-winter; and 3. Corn for one growing season (2006/2007) in the spring-summer. The experimental design was a randomized complete block with 2 treatments and twelve replications (blocks). The treatments consisted of two previous crops: 1. corn monoculture and 2. corn intercropped with palisadegrass. Each plot consisted of ten (soybean), twenty (white oat), or seven (corn) 20m-long and 5.6 meters wide rows. Data samples were collected in the central rows, and 0.5 m from the end of each plant row and two, for soybean and white oat, and one, for corn, external rows constituted the edge. Soil chemical characteristics (pH, SOM, Presin, H+Al, Kex, Caex, Mgex, CEC, and S-SO4-2) were determined at layers 0-0.05, 0.05-0.10, 0.10-0.20 and 0.20-0.40 m only once. This determination was done on Dec. 2004, 60 days after previous crop desiccation. It was collected eight sub-samples for each composite sample in each plot. It was evaluated the leaves nutrition, yield components, and grain yield of the following cash crop (soybean, white oat and corn). Besides crop system efficiency (CSE) for all cash crops were evaluated by the ratio between kg of grain per kg of fertilizer applied of each crop (soybean and corn crops). As white oat was not fertilized we calculated the CSE by the formula ESC = kg of soybean grain + kg of white oat grain per kg of fertilizer).

Our results suggested that the use of corn and palisadegrass intercropped as a previous crop allowed increase the soil fertility with significant higher values of pH, SOM, P, K, Ca, Mg, S and CEC than in the soil under corn monoculture. Growing soybean, white oat and corn on palisadegrass (from corn and palisadegrass intercropped) allowed the significant highest cash crop leave nutrition and grain yield than on the fallow (from corn monoculture). Our results allow inferring that the introduction of perennial forage for short period of time in grain production area provided many benefits which could be seen on the three following growing season. Our trial showed that crop-livestock integration allows producing more foods in the same area with benefits to the environment and increased profits, allowing farmers to diversify activities in a sustainable agriculture system.

*Keywords*：*Crop-livestock integration; no-tillage system; perennial forage; crop system; crop rotation; sustain*