Crop Grain Yield Improvements By Incorporating Palisadegrass in Grain Areas

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INTRODUCTION

In tropical regions with dry winters, low plant biomass accumulation during the period between spring-summer crop cultivations can negatively impact soil resources and make the no-till (NT) system unsustainable. Incorporating palisadegrass [*Urochloa brizantha* (Hochst. Ex A.Rich.) R.D. Webster] in traditional grain production areas could improve soil quality for subsequent crops and lead to positive effects on grain yield. The objective of this study was to evaluate the effects of growing palisadegrass on soil fertility, plant nutrition, and grain yield of subsequent cash crops in a tropical region.

MATERIALS AND METHODS

The experiment was performed in southeastern Brazil in plots that were grown for two consecutive growing seasons (2002-2003 and 2003-2004) with either monocropped corn (*Zea mays* L.) or corn intercropped with palisadegrass. An initial evaluation of soil fertility was performed in November 2004 when the land was either fallow (following monocropped corn) or covered by palisadegrass (intercropped areas). After the preceding treatments, the following crops were cultivated: soybean [*Glycine max* (L.) Merr.] during the 2004-2005 and 2005-2006 spring-summer, white oat (*Avena sativa* L.) during the 2005 and 2006 fall-winter, and corn during the 2006-2007 spring-summer.

CONCLUSIONS

Intercropping palisadegrass with corn increased the soil fertility compared to monocropped corn. Soybean, white oat, and corn all had higher leaf macronutrient concentrations and grain yields in previously intercropped areas than in monocropped areas. Therefore, the periodic, short-term incorporation of a perennial forage grass, such as palisadegrass, as a cover crop is recommended to increase grain production and to improve the soil fertility of grain-production areas.

RESULTS AND DISCUSSION

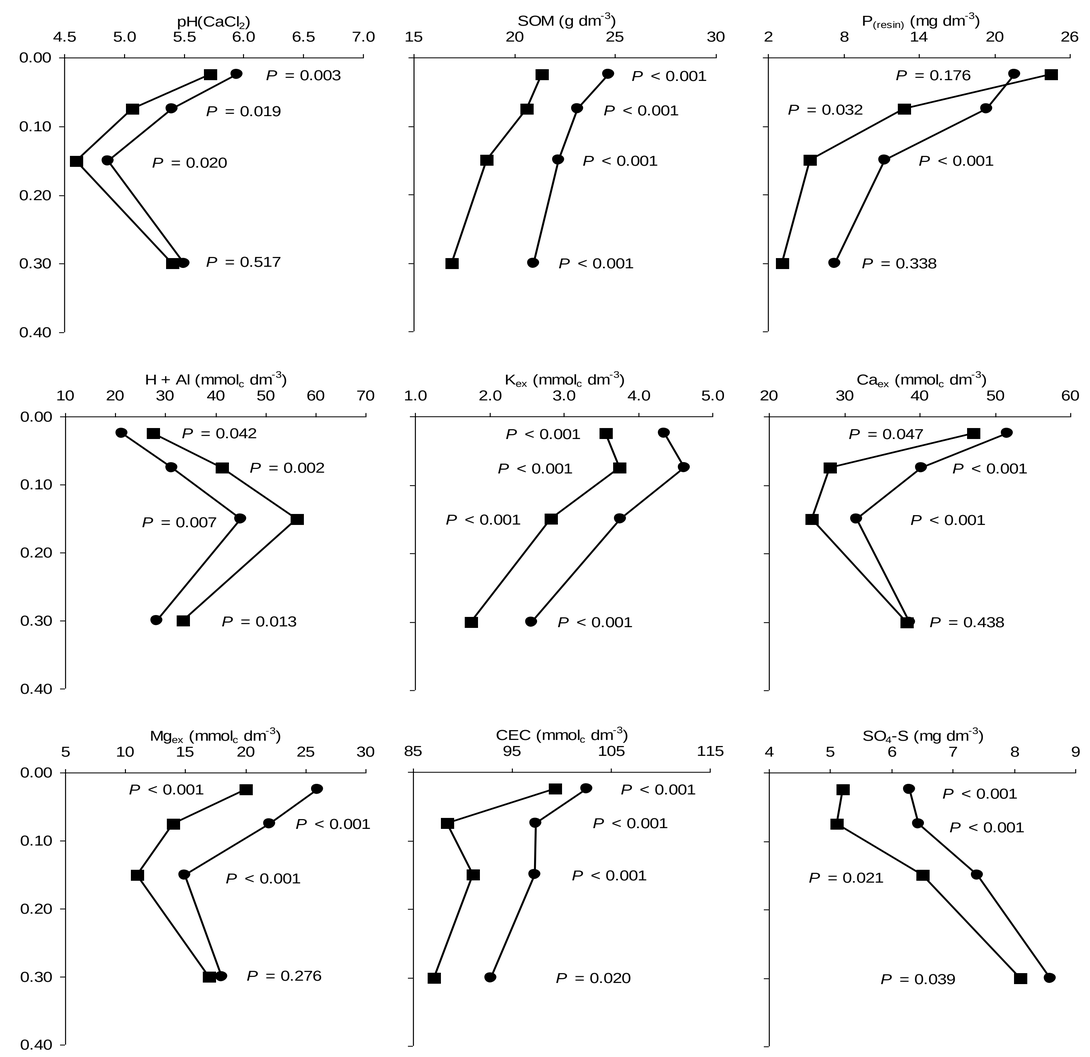

Fig. 1. Chemical characteristics of the soil. Squares = corn monocropped and circles = corn intercropped with palisadegrass.

Table 1. Nutrient (N, P, K, Ca, Mg, and S) concentrations in leaves, yield components, grain yield, and cropping system efficiency (CSE) of soybean and white oat crops in the 2005-2006 growing season as affected by the inclusion of palisadegrass in crop rotation during the 2002-2003 and 2003-2004 growing seasons, and analyses of variance at Botucatu, São Paulo State, Brazil.

Variable	Treatment			
	CMN†	CIP‡	CMN†	CIP‡
N in leaves, g kg^{-1}	43.0	52.0	44.0	52.0
P in leaves, g kg^{-1}	3.0	4.1	2.8	3.8
K in leaves, g kg^{-1}	20.0	26.0	20.0	26.0
Ca in leaves, g kg^{-1}	10.0	15.0	10.0	15.0
Mg in leaves, g kg^{-1}	5.4	7.4	5.8	7.2
S in leaves, g kg^{-1}	2.4	3.2	2.5	3.2
Final population, plant ha^{-1}	361,692	362,214	353,992	359,780
No. of pods per plant	33.0	40.0	32.0	36.0
No. of grains per pod	1.8	2.0	1.9	1.9
100-grain weight, g	16.1	17.4	15.7	16.8
Grain yield, kg ha^{-1}	**3373 b**	**3844 a**	**3328 b**	**3669 a**
CSE, kg grain kg^{-1} fertilizer applied	11.2	12.8	11.1	12.3
N in leaves, g kg^{-1}	23.0	28.0	23.0	29.0
P in leaves, g kg^{-1}	2.7	3.7	2.5	3.7
K in leaves, g kg^{-1}	20.0	27.0	22.0	28.0
Ca in leaves, g kg^{-1}	3.2	3.4	3.2	3.7
Mg in leaves, g kg^{-1}	2.6	2.8	2.3	2.8
S in leaves, g kg^{-1}	2.1	3.2	2.2	2.7
No. of panicles per m^2	192	236	225	248
No. of spikelets per panicle	41.0	42.0	43.0	47.0
Spikelet fertility, %	93.4	93.3	92.1	92.2
1000-grain weight, g	22.4	22.6	23.0	23.1
Grain yield, kg ha^{-1}	**1540 b**	**1910 a**	**2000 b**	**2290 a**

† CMN, corn monocropped during spring-summer and fallow during the fall-winter of the 2002-2003 and 2003-2004 growing seasons.
‡ CIP, corn intercropped with palisadegrass during spring-summer and palisadegrass growth during fall-winter of the 2002-2003 and 2003-2004 growing seasons.

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