(DOI): 10.5777/PAeT.V5.N3.11

This article is presented in English with abstracts in Spanish and Portuguese.

Brazilian Journal of Applied Technology For Agricultural Science, Guarapuava-PR, v.5, n.3, p.85-88, 2012.

Technical Note

Evaluation of the development of corn culture one year after the realization of different soil preparation

Saulo Fernando Gomes de Sousa[1]

Tiago Pereira da Silva Correia[2]

Neilor Bugoni Riquetti[3]

Leandro Augusto Felix Tavares[4]

Paulo Roberto Arbex Silva[5]

Abstract

The preparation of soil for the establishement of crops is designed to provide ideal conditions for sowing germination and plant development, with this study aimed at evaluating the height and diameter of stem, of the maize crop in systems of no tillage one year after the completion of different soil tillage systems.The experiment was conducted at the Experimental Farm Lageado UNESP – Botucatu. The area was cultivated for 13 years in no-tillage, in the crop year of 2010/2011, we carried out the preparations, which were: no-tillage, chisel plow and disc harrow to 20cm to 15cm. In the same year soybean was sown in the area, in the growing season the area remained fallow. The following year, ie 2011/2012 corn was sown, and the plots had four rows of maize spaced 0.85, with 20m long, the assessments, however, were held in the two central lines using 5m of the central part of the plot. The measurements were performed 50 days after sowing the maize. The results showed that both the height and diameter of plants were higher when compared to conventional tillage and minimum with the no-tillage.

Keywords: Soil management, growth, plant height.

Avaliação do desenvolvimento da cultura do milho um ano após a realização de diferentes preparos de solo

Resumo

Os preparos de solo para a implantação das culturas têm por objetivo oferecer condições ideais para a semeadura, germinação, e os desenvolvimentos das plantas, com isso o presente trabalho objetivou-se em avaliar a altura e o diâmetro de colmo, da cultura do milho em sistema de plantio direto um ano após a realização de diferentes preparos de solo. O experimento foi realizado na Fazenda Experimental Lageado UNESP - Botucatu. A área foi cultivada durante 13 anos em sistema de plantio direto, no ano agrícola de 2010/2011, foi realizado os preparos, sendo eles: semeadura direta, escarificação a 20cm e gradagem pesada a 15cm. No mesmo ano foi semeado soja na área, na entre safra a área permaneceu em pousio. No ano seguinte, ou seja, 2011/2012 o milho foi semeado, sendo que as parcelas contavam com quatro linhas de milho espaçadas de 0,85m, com 20m de comprimento, as avaliações, porém foram realizadas nas duas linhas centrais utilizando 5m da parte central da parcela. As medidas foram realizadas 50 dias após a semeadura do milho. Os resultados encontrados mostraram que tanto a altura como o diâmetro das plantas foram maiores quando comparados os preparos convencional e mínimo com a semeadura direta.

Palavras-chave: manejo de solo; crescimento; altura de planta.

Evaluación del desarrollo del maíz un año después de diferentes preparos del suelo

Resumen

La preparación del suelo para la implantación de cultivos tiene como objetivo proporcionar las condiciones ideales para la siembra, germinación y desarrollo de las plantas. En el presente estudio se tuvo como objetivo evaluar la altura y diámetro

Received in: 16/03/2012 Accepted for publication: 26/10/2012

1 Agronomist Engineer, master student of Energy in Agriculture Program FCA – UNESP / Botucatu-SP, Rua: José Barbosa de Barros 1780, CEP: 18610-307, saulo@fca.unesp.br

2 Agronomist Engineer, master student of Energy in Agriculture Program FCA – UNESP / Botucatu-SP.

3 Agronomist Engineer, Doctoral student of Energy in Agriculture Program FCA – UNESP / Botucatu-SP.

4 Agronomist and Environmental Engineer, Doctoral student of Energy in Agriculture Program FCA – UNESP / Botucatu-SP.

5 Agronomist Engineer Dr., Professor. FCA – UNESP / Botucatu-SP.

del tallo, de las plantas de maíz un año después de realizar diferentes sistemas de preparo del suelo. El experimento se llevó a cabo en la Hacienda Experimental Lageado UNESP - Botucatu. El área fue cultivada durante 13 años en el sistema de siembra directa. En el año 2010/2011 se realizaran los preparos del suelo, siendo: siembra directa, escarificación a 20 cm y grada pesada a 15 cm. En el período entre cultivos se mantuvo el suelo en barbecho y en el mismo año se sembró soja en la zona. Al año siguiente, 2011/2012, se sembró maíz, en parcelas experimentales con cuatro hileras espaciados de 0,85 m con 20 m de largo. Las evaluaciones se llevaron a cabo en dos líneas centrales utilizando una porción de 5m de la parte central de la línea. Se hice las mediciones 50 días después de la siembra. Los resultados mostraron que tanto la altura como el diámetro de las plantas fueron mayores cuando se comparó los cultivos convencional y mínimo con la siembra directa.

Palabras clave: manejo del suelo, crecimiento, altura de la planta.

Introduction

The different soil preparation for deployment of cultures are intended to provide ideal conditions for sowing, germination and development of plants there implemented (Silva 2004). However even by the same author, this choice depends on several factors such as soil type, climate conditions and species to be implanted. Hence the importance of correct choice of techniques and equipment in order to prevent the accelerated degradation of natural resources, and high energy consumption. For this became adopted the so-called conservation methods.

To CASTRO FILHO et al. (1991), a conservation system is one that provides an adequate seedbed, maintaining considerable amounts of straw on the soil surface, among these methods stand out the direct cultivation and minimum cultivation.

In contrast to these methods conservationists cited above, this conventional tillage, which consists in the revolving of the soil surface layers. With a primary preparation which consists in the operation that aims to break the soil and may also be used for decompression of the surface layers, and a second stage called the secondary preparation, consists in the operation of loosening and leveling the ground surface, held by light grids (ALVARENGA, et al. 2010).

Though over the years some soil tillage systems may fail to provide the favorable conditions for crops, leading them to have difficulty in their development causing a decline in productivity. According to the foregoing the present study was to evaluate the development having by parameters, height and stem diameter, of maize crops in no-till system one year after the realization of different preparations in the area.

Material and Methods

The experiment was conducted at the Experimental Farm Lageado belonging to the University of Agricultural Sciences - UNESP of Botucatu, the experimental area was classified as Red Nitossolo Distroférrico[1].

The area was cultivated for 13 years in no-till system, in the agricultural year of 2010/2011 was held the preparations, namely: direct seeding, scarification at 20 cm depth characterizing the minimum cultivation, and heavy harrow at 15 cm depth being characterized the conventional tillage. In the same year was sown soybean in the whole area, between harvests the area remained in fallow. Before the maize sowing was done drying of the area using WG herbicide Roundup (Glyphosate) at a dosage of 2.5 kg ha^{-1} .

The seeds were sown in the plots using the fertilizer seeder of precision, equipped with 4 rows spaced at 0.85 m, equipped with flat front cutting discs; with furrow openers mechanisms of the type lagged double disc, tensioned by a farm tractor. The material used in the experiment was the simple hybrid 2B Hx 587 from Dow AgroSciences Company, and a fertilizer application of 300 kg ha^{-1} of fertilizer formulated 08-28-16. After 30 days of sowing, when the maize was in the V4 stage, that is, with 4 leaves completely unfolded, was performed the covering fertilization where urea was applied at a dose of 200 kg ha^{-1}, using a fertilizer cultivator, and also a herbicide application with Nortox Atrazine (Atrazine) SC 500, 500 g L^{-1} in a dosage of 3.0 L ha^{-1} and Sanson (Nicosulfuron) 40 SC 40 gL^{-1} at a dose of 0.4 L ha^{-1}. Both the herbicides were applied in conjunction with a spray volume of 200 L ha^{-1}.

The experiment had four rows of maize spaced at 0.85 m from each other with 20 m long, but the evaluations were conducted in the two central rows using 5 meters from the central part of the plot, thus totaling 10 meters of line per plot evaluated. The determinations of the measures were made 50 days after the sowing of maize.

To determine the height of the plants was used a measuring tape graded from 0.01 m attached to a wooden slat with dimensions of 0,025 x0, 025x2 m. The

1 Brazilian soil classification

determination of the stem diameter was performed at 0.1 m of height in relation to the ground. For determine this was used a digital caliper brand Messen with accuracy of 0.01 mm.

The results were submitted to analysis of variance. When the F test showed significant at 5% probability was applied the Tukey test for comparison between the averages of 5% probability.

Results and Discussion

Plant height and stem diameter were affected significantly among the soil preparations, being higher in minimum cultivation system and the conventional preparation in relation to no tillage, differing from the results found by SILVA (2000) and RIQUETTI (2011) which in their work found no statistical differences in height and diameter in relation to soil tillage.

Table 1. Synthesis of values for analysis of variance and the average test for the variables of soil preparation in relation to plant height and stem diameter.

	Plant Height (m)	Stem Diameter (mm)
Minimum Cultivation	0.95 a	26 a
Conventional Preparation	0.89 a	26 a
No Tillage	0.72 b	23 a
C. V. (%)	7.26	3.58

Averages followed by different letters, lowercase in the column, differ from each other by Tukey test at 5% probability.

One possible explanation for this result is which in the first days after sowing there was no precipitation, leading the seeds sown in the plots of no tillage to delay their germination, thereby causing also a delay in their development.

POSSAMAI et al. (2001) found opposite results because in the case of their study, the largest plant height and insertion of first ears were found in the no-tillage system. Though also in their work they attributed this to the fact which the maize plants implemented in the no-till system were established first, which resulted in greater plant growth.

Now CARVALHO et al. (2004) performed the planting of corn in no-tillage system and conventional in rotation with four crops used as green manure, in two consecutive years, and in both years the highest values of plant height and insertion of the first ear were found in the conventional system.

Conclusions

Under the conditions of this work the minimum cultivation and the conventional preparations showed the best results for the development of some vegetative organs of the maize crop. The results showed that both the height and the diameter of the plants were higher when compared to conventional preparation and minimum with direct sowing.

References

ALVARENGA, R.C. et al. Cultura do milho: manejo de solos. **Sistemas de produção 2.** Sete Lagoas, 4ed. Set. 2008. Disponível em: <http://www.cnpms.embrapa.br>. Acesso em: 12 Jan. 2012.

CARVALHO, M.A.C. et al. Produtividade do milho em sucessão a adubos verdes no sistema de plantio direto e convencional. **Pesquisa Agropecuária Brasileira,** v.39, n.1, p.47-53, 2004.

CASTRO FILHO, C. et al. Tillage methods and soil and water conservation in southern Brazil. **Soil and Tillage Research**, v.20, p.271-283, 1991.

POSSAMAI, J.M. et al. Sistemas de preparo do solo para o cultivo do milho safrinha. **Bragantia,** v.60, n.2, p.79-82, 2001.

RIQUETTI, N.B. **Efeito do manejo de solo nos parâmetros agronômicos e energéticos de híbridos de milho transgênico e não transgênico.** Dissertação (Mestrado em Agronomia/Energia na Agricultura) - Faculdade de Ciências Agronômicas, Universidade Estadual Paulista, Botucatu, 2011. 73f.

SILVA, A.R.B. **Comportamento de variedades/híbridos de milho (*Zea mays L.*) em diferentes tipos de preparo de solo.** Dissertação (Mestrado em Agronomia/Energia na Agricultura) – Faculdade de Ciências Agronômicas, Universidade Estadual Paulista, Botucatu, 2000. 95f.

SILVA, A.R.B. **Diferentes sistemas de manejo do solo e espaçamentos na cultura do milho (*Zea mays L.*).** Tese (Doutorado em Agronomia/Energia na Agricultura) – Faculdade de Ciências Agronômicas, Universidade Estadual Paulista, Botucatu, 2004. 167f.