

Corn silages of plants cultivated under different arrangements - Costs of production

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Introduction In a great part of rural properties in the Northwest of Rio Grande do Sul, silage production have fallen short of the genetic potential of the hybrid corn currently commercialized, owing to edaphoclimatic changes that most of the times are not minimized or completely corrected, such as water deficit and the correction of soil fertility for plants that will be ensiled. However, when there is the use of inputs and pesticides in order to improve the plant phenotype, the cost of production increases. Therefore, it is necessary to know discriminately the investments that have been performed, aiming to the profit from the livestock production (milk and meat), which may ensure the permanence of producers in the rural activity. An alternative for reducing production costs per unit produced can be the management of available resources. According to Argenta et al. (2001), the arrangement of plants in different row spacings can provide better utilization of soil nutrients, resulting in higher production and besides it is possible to dilute the costs. Then, the aim of this paper was to evaluate the production costs of silage corn plants grown in different row spacings.

Materials and Methods The experiment was performed in Palmeira das Missões – RS. According to Streck et al. (2002), the soil is classified as a typical dystrophic red latosol. On November 11th, 2010, it was carried out a desiccation with herbicide and then the seeds were sowed under direct planting system on straw. A hybrid of an early-maturing corn with grain tendency and also with orange semi-hard grain type was planted, totalizing 65,000 seeds per hectare. The evaluated treatments were 30, 45, 60, 75, and 90 centimeters between each row spacing, distributed in plots (25m²), according to the randomized block design with four replications. The fertilization for maintenance corresponded to 300 kg of monoammonium phosphate and 100 kg of potassium chloride. The 400 kg of urea per hectare nitrogen top dressing fertilization were divided into three applications. It was also accomplished two insecticide applications to control the fall armyworm (*Spodoptera sp.*) occurrence. At the ensilage process, plants were weighed separately according to the treatments and then chopped in a harvester. After that, mini-silos were confectioned in two-liter buckets; they were sealed right after the silage was over and sent to the laboratory. An economic analysis was carried out based on the results of production per hectare, on the inputs price quotation and on the implements sold in Palmeira das Missões. To determine the silage production operating costs, the following expenditures were considered: financial value of the inputs needed (seeds, fertilizers and pesticides), cost of tractor conservation and refueling (lubricant and diesel oil), harvesting and transportation of fresh material to the silo, compaction, sealing, implements depreciation, labor costs and social taxes.

Results and Discussion The most costly operations are sowing and fertilization (Table 1), which were accounted in a single cost in this paper, because the producer works with compatible technological levels. Considering that to reach genetic potential expression of the seed it is

necessary to conduct steps such as fertilization and soil management to optimize the phenotype characteristics of the seed. The total operating costs concerning the corn cultivation and ensiling in one hectare were R\$ 2,573.53 in May 2011. From this amount, the seed and the fertilizer corresponded to 52.33% of the production cost and it was necessary to manage properly the other available resources considering the high initial investment. The present trial was carried out in plots and the sowing and harvesting were performed manually. So, it is necessary to evaluate treatments under field conditions to determine the losses of silage during the harvest from each small row spacing. Thus, the smallest spacings produced greater amount of silage per hectare (Table 2), which has diluted the costs. Comparing the spacings 45 and 90 cm there was a variation of 9.28% and 8.67% in the costs per hectare and per kilogram, respectively.

Conclusions Each row spacing has led to different production costs.

References

- Argenta, G., Silva, P. R. F., Bortolini, C. G., Forsthofer, E. L., Manjabosco, E. A. and Beheregary Neto, V. 2001. Resposta de híbridos simples a redução do espaçamento entrelinhas. Pesquisa Agropecuária Brasileira, 36, n1, p 1-8.
- Streck, E. V., Kampf, N., Dalmolin, R. S. D., Klamt, E., Nascimento, P. C. and Schneider, P. 2002. Solos do Rio Grande do Sul. Porto Alegre. EMATER-RS/UFRGS.

Table 1. Total operating cost of crop production and corn silage per hectare

Operation	Costs (R\$/ha)	Percentage
Desiccation	113.545	4.41
Sowing + fertilization	1,346.976	52.33
Pulverization	94.450	3.67
Harvesting	296.196	11.50
Transport	272.134	10.57
Distribution and Compaction	340.298	13.22
Sealing	109.928	4.30
Total	2,573.527	100

Table 2. Production and cost of dry matter produced per hectare under different row spacing (cm)

Row spacing (cm)	DM production (kg/ha)	Cost/ton of DM (R\$)	Cost/kg of DM (R\$)
30	18,666	137.872	0.137
45	17,147	150.077	0.150
60	17,205	149.580	0.150
47	16,688	154.208	0.154
90	15,692	163.999	0.163