Performance of Millet Cultivars in Succession to Field Crop of Beans in Southern Portion of State of Minas Gerais - Brazil

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PERFORMANCE OF MILLET CULTIVARS IN SUCCESSION TO FIELD CROP OF BEANS IN SOUTHERN PORTION OF STATE OF MINAS GERAIS - BRAZIL

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Abstract

This trial was carried out at the Department of Animal Science - Universidade Federal de Lavras (UFLA), from February to June, 1997. It was evaluated the performance of three millet [*Pennisetum glaucum* (L.) R. Br.] cultivars, as a second crop (Common, BN 2 and CMS 02) and four sowing dates (02/22, 03/14, 04/03 and 04/23). The three millet cultivars were sown after a cropping of beans (*Phaseolus vulgaris* L.) by the end of the rainy season, with no additional fertilization. It was used the randomized block design in a split-plot scheme, allocating the sowing dates on the main plots and the cultivars on the subplots. There was a significant effect of sowing dates upon tiller height and density of millet cultivars. The residual fertilization of the rainy season beans' crop was not enough to allow a millet to reach high yields. The average yield value for the three cultivars and four sowing dates was 3.27 $t.ha^{-1}$ of DM. For the region of Lavras-MG, millet can be used in a succession cultivation, as the second crop, using cultivars Common and BN 2 sowed up to mid-March and it is necessary to use at least nitrogen and potassium for topdress

fertilization.

Keywords: Residual fertilization, sowing dates, summer/fall cultivation, tiller height and density

Introduction

In the southern part of the State of Minas Gerais, the main brazilian milk producing area, it is also traditionally cultivated coffee (*Coffea arabica* L.), corn (*Zea mays* L.) and beans (*Phaseolus vulgaris* L.). These three crops are widely cultivated in this area. Recently, a growing interest of the milk producers has been observed for the use of millet [*Pennisetum glaucum* (L.) R. Br.], as second crop, above all in succession to the corn used in the silage making production process, mainly due to its high resistance to drought, tolerance to acid soils and its good growth under low temperatures, taking advantage of the residual fertilization of the previous crop. This work was carried out with the objective of evaluating the performance of three cultivars of millet (Common, BN 2 and CMS 02) used as a second crop, having the bean grown in the raining season as the first crop.

Material and Methods

The experiment was conducted from February to June of 1997, at the Animal Science Department - Universidade Federal de Lavras (UFLA), located at 21°14'30" of south latitude and 45°00'10" of longitude west of Greenwich, 918 m above sea level and annual precipitation of 1,493.2 mm. The soil used was a clayey Dusky-Red latosol with pH in water = 5.9; P and K = 3.0 and 66.0 $mg.dm^{-3}$, respectively; Ca, Mg and Al = 3.2, 0.6 and 0.0 $cmol_c.dm^{-3}$, respectively; V = 52.0% and organic matter = 3.4 $dag.kg^{-1}$. The area was limed in October of 1996, before the sowing of the bean, with 1.0 $t.ha^{-1}$ of calcite calcareous, and with PRNT 75% and fertilized with 20, 90 and 45 $kg.ha^{-1}$ of N, P_2O_5 and

K_2O, respectively, plus 2 $kg.ha^{-1}$ of FTE (Zn-9.0%; B-1.8%; Cu-0.8%; Fe-3.0%; Mn-2.0%; Mo-0.1%). The studied treatments were four sowing dates (02/22, 03/14, 04/03 and 04/23/97) and three millet cultivars (Common, BN 2 and CMS 02), in a complete block design, with 4 replications and the 12 treatments arranged in a split plot scheme. The sowing dates were allocated in the main plots, measuring 12.0 x 5.0 m, each and the cultivars in the sub-plots (5.0 x 4.0 m, each). The sowing of the millet (10 $kg.ha^{-1}$ of seeds) was accomplished manually, after the crop of beans, spaced 0.5 m from furrow to furrow, without an additional fertilization. The cultivars sowed on 02/22 and 03/14/97 were cut three times (45, 75 and 105 days after the sowing date); the cultivars sowed on 04/03/97 was cut twice (45 and 75 days after the sowing) and the ones sowed on 04/23/97 was cut just once 70 days after the sowing. During the cutting time it was measured plant height and tiller density; later on these data were statistically analyzed, and the DM production were added for all cuts of each sowing date. The statistical analyses were processed, using the SAS program (SAS Institute Inc., 1985) and the averages compared by Tukey test at 5% probability level.

Results and Discussion

Tiller heights were different ($P<0.01$), and the maximum height was reached in the sowing date of 02/22, decreasing in the other sampling occasions, with the values of 0.52, 0.47, 0.29 and 0.19 m, respectively, for the sowing dates of 02/22, 03/14, 04/03 and 04/23/97. Also, the cultivars of millet presented different heights ($P<0.01$), and the cultivar BN 2 presented the highest value (0.41 m) and the cultivars Common (0.34 m) and CMS 02 (0.36 m) were equal. The climatic and edafic factors prevalent at the end of the Summer and at the Autumn exercised a strong influence, reducing the height of the millet tillers,

once in Spring cultivation sometimes they will reach 3.0 m, in the same place (Chaves, 1997). The three millet cultivars showeddifferent ($P<0.05$) tiller densities, as a function of the sowing dates (Table 1). In general, the cultivars Common had the largest tiller density. Also, in a general way, at the sowing date of 02/22/97 it was observed the largest tiller densities for the three cultivars. The reduction of the tiller density in response to the delay in the sowing dates agrees with Ferraris et al. (1973) who inform that with the late cultivation comes a reduction of the plant cycle and, as a consequence, there is a reduction in tiller number and in DM production, reflecting the negative effects of the low rainfall and temperature and the short fotoperiods. The values of DM production differed ($P<0.05$) among sowing dates and cultivars, so in the sowing date of 02/22/97 the Common cultivar was the most productive, with 1,941.1 $kg.ha^{-1}$ of DM. The total DM production of BN 2 cultivar was greater than for the other two cultivars, with the value of 3,524.7 $kg.ha^{-1}$ against 3,292.3 and 3,002.4 $kg.ha^{-1}$ for Common and CMS 02 cultivars, respectively (Table 2). These results were below that obtained by Mattos (1995) who found values equal to 5,065 $kg.ha^{-1}$ of DM, in Summer culture fertilized regularly with N topdressing.

In the region of Lavras-MG, Brazil, it is feasible to cultivate millet in succession to wet season of crop of beans, using Common and BN 2 cultivars **s**owed up to mid March and fertilized with nitrogen and potassium.

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Table 1- Tiller density ($n^o./m^{-2}$) of millet according to sowing date and cultivars

	Cultivars		
Sowing date	Common	BN 2	CMS 02
1 - 02 / 22	217.25 aA	96.25 aB	93.67 aB
2 - 03 / 14	131.92 bA	91.17 aAB	75.34 abB
3 - 04 / 03	107.25 bA	61.62 abB	64.63 abAB
4 - 04 / 23	58.00 cA	41.50 bA	33.50 bA
CVa 26.95		CVb 27.93	

Means followed by different letters, small in the columns and capital in the rows, are different ($P<0.05$) by Tukey test

Table 2 – Dry matter production (kg.ha^{-1}) of millet according to sowing date and cultivars

Sowing date	Cultivars		
	Common	BN 2	CMS 02
1 - 22 / 02	1,941.1 aA	1,544.8 aB	1,576.0 aB
2 - 03 / 14	1,093.0 bB	1,552.9 aA	1,030.5 bB
3 - 04 / 03	208.6 cA	355.1 bA	363.4 cA
4 - 04 / 23	49.6 cA	71.9 bA	32.5 cA
Total	3,292.3	3,524.7	3,002.4
CVa 25.38		CVb 24.9	

Means followed by different letters, small in the columns and capital in the rows, are different ($P<0.05$) by Tukey test