A Research and Network Strategy for Sustainable Sorghum and Pearl Millet Production Systems for Latin America

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Pearl Millet in Brazil - New Approaches and Prospects

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Resumen

El millo perla se ha convertido en un cultivo alternativo en Brasil debido al mejor nível tecnológico en las áreas sin sistemas de arado. Esta especie es cultivada en Brasil porque enriquece el contenido orgánico de los suelos y el uso de su grano como alimento por la industria avícola, donde este cultivo proporciona 60 a 100% de la energía. Las principales áreas de producción son en el sistema "safrinha" del Cerrado (en la región Centro-Oeste), con siembras en los meses de Febrero o Marzo, e immediatemente después de la cosecha de la soya. La baja fertilidad del suelo, la sequía, las enfermades, y las altas temperaturas fueron consideradas como los mayores problemas que afectan a este cultivo en esta región. Varias líneas A y B asi como poblaciones de millo perla son conservadas en el Centro Nacional de Pesquisa para Milho e Sorgho en Siete Lagoas. Los avances en fitomejoramiento se mencionan en este artículo, que indica que la variedad de polinizacion liberada BRS 150 fue libreda para su cultivo en sistemas sin arado en Brasil.

Pearl millet (*Pennisetum glaucum (L.)* R.Br.) can be considered to be the sixth most important crop in economic terms, in the tropical area of the world, principally in the semi-arid regions. In Brazil, recently, due to an increase in the level of technology by the farms and in the areas under "no tillage systems", either for grain or for feeding beef cattle, pearl millet has become a very important alternative crop in the *Cerrado* areas of the Central part of Brazil.

The pearl millet plant, due to such characteristics as high-yield potential, high growth rate and high tillering ability, has adapted well to harsh environments. In Brazil, it is usually sown in summer in the Central and Southern areas, where up to 10-15 tons of dry matter ha^{-1} are obtained. In winter in the Northeast region, on the other hand, under semi-arid conditions, these yields normally drop to less than 50%.

The grain production of pearl millet can be used almost entirely in poultry industries. On average, 60 -100% of the energy component of the final products can be met by pearl millet as a viable alternative.

The demand for grain in Brazil has increased significantly in this last decade. The dependence on grain stocks, principally of maize, and the close relationship of maize productivity with precipitation make the demand for grain even greater. In this context, pearl millet appears to be a viable crop of economic significance to fulfil this grain supply gap.

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In Brazil, the crop-growing areas currently are Minas Gerais, Goias, Bahia, Mato Grosso, Mato Grosso do Sul, Sao Paulo, Parana, and Rio Grande do Sul States. It is estimated that over 2 million ha are planted with pearl millet under "no till systems", principally, in the Cerrado area of the Center-West region. In this area, a particular planting system called *safrinha* has increased and is spreading very fast. This starts usually towards end of summer planting season, usually in mid-February or March just after the soybean harvest.

The *safrinha* is considered to be a low-cost production system and may contribute greatly to the maintenance of the overall sustainability of the cropping system of the Cerrados.

Through the breeding techniques of population improvement, new cultivars are being developed to cope with some limiting environmental plant-growth conditions such as low soil fertility, drought, disease, and high temperature.

The majority of the cultivars presently in use were introduced from non-tropical areas so the adaptation for tropical conditions is of great importance. The EMBRAPA Milho e Sorgo Germplasm Bank, in Sete Lagoas, comprises 1019 varieties, 56 male-sterile lines, 518 R-lines, where 15 are resistant to downy mildew and 6 have photoperiod sensitivity genes.

In 1998, the variety BRS 1501 was released by EMBRAPA Milho e Sorgo, for no-till systems with average grain yield of close to 2.5 t h^{-1}. The results of some plant parameters of some of the selected materials are shown in Tables 1 and 2.

Table 1. Average values of plant height (cm), green and dry matter yield (t ha^{-1}).

Cultivars	Height (cm)	Yield (t ha^{-1}) Forage mass	Dry mass
CMS 03	169^{abc}	45.78^{a}	7.73^{a}
CMS 1	181^{a}	44.67^{a}	7.15^{ab}
BN 2	175^{ab}	47.73^{a}	7.08^{ab}
9317461	174^{abc}	36.14^{b}	6.43*
9317484	161^{cd}	37.59^{b}	6.31^{bc}
9317464	163^{bcd}	37.29^{b}	6.20^{bcd}
CMS 2	145^{e}	35.86^{b}	5.79^{cd}
9317006	169^{abc}	31.55*	5.38^{cd}
NPM1-ALT	152^{de}	29.14^{cd}	5.13^{c}
9317482	166*	31.68^{bc}	5.12^{c}
NPM1-BX	128^{f}	23.76^{de}	3.86^{e}
NPM3-ALT	114^{g}	20.98^{e}	3.39^{e}
Mean	158	35.18	5.80
C.V (%)	7.90	16.57	18.08

Items followed by the same letters do not differ significantly at 0.05 probability.

Table 2. Minimum and maximum values of plant height(cm) and biomass yield (t ha^{-1}) in three different environments, Brazil, 1998.

	Height (cm)		Yield (t ha-^{1})			
			Forage mass		Dry mass	
Cultivars	Min.	*Mix.*	Min.	Max.	Min.	Max.
CMS 03	150	206	39.75	55.60	6.09	9.25
CMS 1	160	202	38.67	55.60	6.34	8.46
BN 2	147	223	40.50	55.20	6.55	7.55
9317461	150	211	30.08	42.93	6.39	7.70
9317484	142	195	33.00	46.27	4.49	7.63
9317464	150	188	31.83	44.13	5.40	7.06
CMS 2	107	189	31.58	40.00	5.35	6.12
9317006	152	199	29.58	33.07	4.47	6.05
NPM1-ALT	130	208	21.00	36.93	3.25	6.15
9317482	132	218	25.92	37.87	4.41	6.43
NPM1-BX	85	192	15.92	28.93	2.76	4.44
NPM3-ALT	77	184	13.33	28.53	2.23	4.36