

BRS 275 (BRS Dão): Hybrid clone of dwarf x common or giant cashew

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ABSTRACT – *BRS Dão* is a cashew clone developed by the Brazilian Agricultural Research Corporation Embrapa, sector Tropical Agro-industry, in partnership with the Companhia Industrial de Óleos do Nordeste (CIONE). It was selected from a plant derived from the cross between the dwarf clone CCP 1001 and the common genotype CP 12. It is recommended for cultivation without irrigation along the coastline in the Northeast of Brazil and in similar environmental conditions for both nut and peduncle production for the fruit juice industry.

Key words: *Anacardium occidentale*, cultivar, commercial planting.

INTRODUCTION

The cashew crop has been an important source of jobs and income for thousands of people in many tropical countries around the world. In Brazil its importance is particularly concentrated in the Northeastern region, in the states of Ceará, Rio Grande do Norte and Piauí, which are among the poorest of the country. There, this agro-industry is responsible for an export volume worth about 200 million dollars in kernels per year, besides taxes and indirect incomes in activities linked to the cashew production chain. Despite the socio-economic importance and the continuous expansion of the cultivated area, the low usage of agronomic technology in the orchards led to a drop in

yields from 635 kg ha⁻¹ in the beginning of the 1970s to 236 kg of kernels ha⁻¹ in the end of the 1990s (Barros et al. 2002). There has been a slow change in the scenery due to the cultivation of some dwarf selections. A clear yield increase with the release of more productive new selections suitable for a wide range of environments is expected.

In addition to the lack of raw material, the low nut quality is another factor that currently contributes to the lower competitiveness of the Brazilian industry compared to that of India and Vietnam, the main competitors in the international market of cashew kernel. Consequently there is already a gradual reduction in the expansion of the cultivated area which would

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obviously cause serious economic and social problems for these states. Raising the yield and nut quality will certainly strengthen the position of farmers in negotiations for better raw nut prices once the industry will be more competitive in the kernel market. In the search for higher profits in the production as well as industry sectors, Embrapa Agroindústria Tropical is developing new cashew clones as an alternative to the currently grown dwarf type. More variability has been found in common than in dwarf cashew germplasm for biotic and abiotic stresses as well as for nut and kernel weight. The objective is to breed medium-sized plants suitable for cultivation in the Cerrado and transition areas between the Restinga and the semi-arid vegetation besides producing nuts and kernels with favorable industrial characteristics. The first result of the cited breeding program is the BRS 275 clone, the first hybrid selection of cashew tree released for production in Brazil.

METHODOLOGY OF CLONE SELECTION

BRS 275 resulted from individual phenotypic selection within a progeny of controlled pollination derived from the cross between a dwarf cashew clone (CCP 1001) and a common or giant cashew (CP 12). The methodology used consisted of obtaining full-sib progenies, followed by an evaluation of the hybrids and parentals in the same experiment, to evaluate the hybrid performance with regard to the parent performance. The following traits were evaluated for this purpose: plant height (PH in meter) and canopy diameter (CD – in meter), in one to eight-year-old trees; nut yield (PROD – in kg ha⁻¹) and number of kernels per plant, in three, four, and five-year-old trees; mean weight of 10 kernels (NW – in grams per plant), mean weight of 10 kernels (KW – in grams per plant) and percentage kernel weight/nut weight multiplied by 100 [(KW / NW) x 100], in four and five-year-old trees (Cavalcanti et al. 2000).

The clone was experimentally evaluated in a design of random blocks together with 39 other clones (40 treatments), three replications, five trees per plot and spacing of 10 m x 10 m, on the Fazenda Jacaju that belongs to the partner company in this project, the Companhia Industrial de Óleos do Nordeste (CIONE),

at km 01 of the federal highway BR 304, Beberibe County, Ceará State. The following traits were evaluated:

Plant height: annual measurement in all trees in the period from 2000 to 2007;

Canopy diameter: annual measurement of canopy projection diameter between 2000 and 2007;

Yield: evaluation of nut weight per clone in the period from 2002 to 2006;

Pest severity: evaluated three times a year (April, August and December) by recording the presence of pest species and the attack intensity.

To evaluate the technological indicators, nuts of the 40 clones were processed in the factory-school of the Embrapa Agroindústria Tropical by a semi-mechanized system. The kernels were autoclaved at a pressure of 2 kgf cm⁻², shelled in hand-operated machines, dried at 55° C, and hand-peeled (Lima et al. 1995). A sample of nuts of each clone (approximately 5 kg) was collected in the period of 2004 to 2006 and evaluated for the following traits: nut weight, kernel weight, percentage of kernel nut⁻¹, percentage of whole kernels, percentage of nuts broken at cutting and halves percentage.

PERFORMANCE

The agronomic traits and agro-industrial indicators of nut and peduncle of clone BRS 274 (BRS Jacaju) are listed as follows:

Plant traits: medium plant height, average height of 5.1 m and average canopy diameter of 11.0 m in eight-year-old trees; recommended spacing of 12 m x 10 m, in rectangular system or 11 m x 11 m, in a square system, both with 83 trees ha⁻¹; moderate resistance to anthracnose and resistance to black mold.

Nut yield: evolution of nut yield per hectare at different ages (Table 1), demonstrating the yield potential of the clone.

Agro-industrial indicators: the agro-industrial indicators for nut are presented in Table 2 and peduncle in Table 3.

Recommendation: traits of clone BRS 275 (BRS Dão) in non-irrigated cultivation indicate it for both nut and apple exploitation for commercial fruit juice production.

Table 1. Evolution of nut yield of clone BRS 275 (BRS Dão) in a commercial orchard in rainfed cultivation in the county of Beberibe, CE

Years of evaluation	Plant age (year)	Yield (kg ha ⁻¹) ¹
1	3	524,7
2	4	873,3
3	5	1,204.9
4	6	1,156.8
5	7	1,225.7

¹ Evaluation in rainfed cultivation, at a spacing of 10 m x 10 m and density of 100 trees ha⁻¹.

Table 2. Agro-industrial indicators of nut and kernel of clone BRS 275 (BRS Dão)

Traits	BRS 275
Nut weight (g)	11.4
Kernel weight (g)	3.13
Percentage kernel nut ⁻¹ (%)	27.46
Whole nuts (%)	89.15
Nuts broken at cutting (%)	9.44
Percentage of nut halves (%)	5.59

Table 3. Agro-industrial indicators of the peduncle of clone BRS 275 (BRS Dão)

Traits	BRS 275
Peduncle weight (g)	108.0
Coloration	Orange
Fruit firmness (N)	11.0
Total soluble solids - TSS (°brix)	12.0
Total titratable acidity - TTA (%)	0.34
TSS/TTA	35.40
Vitamin C content (mg 100 g pulp ⁻¹)	249.65
Dimeric phenolic compounds (%)	0.13
Oligomeric phenolic compounds (%)	0.26
Polymeric phenolic compounds (%)	0.14
Anthocyanin (mg 100 g pulp ⁻¹)	5.63

STRATEGY OF CLONE DISTRIBUTION FOR COMMERCIAL CULTIVATION

The formal procedure for distribution of any clone to farmers by Embrapa Agroindustria Tropical begins with the registration by the Ministério da Agricultura e Pecuária e Abastecimento – MAPA (Ministry of Agriculture Animal Husbandry and Supply) followed by the installation of a clone orchard in the Experimental Field of Pacajus, in the county of Pacajus, CE. Then

plantlets are distributed to commercial nurseries registered by the Ministério da Agricultura in order to accelerate the multiplication and distribution of the new cashew clone. This ongoing distribution process has already made clone BRS 75 accessible to farmers.

REFERENCES

- Barros LM, Paiva JR, Cavalcanti JJV and Araújo JPP (2002) **Cajueiro**. In: Bruckner CH (ed.) *Melhoramento de Fruteiras Tropicais*. Editora UFV, Viçosa, p.159-176.
- Cavalcanti JJV, Pinto CABP, Crisóstomo JR and Ferreira DF (2000) Análise dialéctica para avaliação de híbridos interpopulacionais de cajueiro. **Pesquisa Agropecuária Brasileira** 35: 1567-1575.
- IBGE (2007) Indicadores. Produção Agrícola. <http://www.ibge.gov.br/home/estatistica/indicadores/agropecuaria/lspa/default.shtm>. (accessed in 18 June).
- Lima AC, Chagas FA, Paiva FFA, Paula Pessoa PFA and Leite LAS (1995) **Análise técnico-econômica de uma micro-unidade de processamento de castanha de caju**. Fortaleza, 12 p.