

VCS-Brillante, variety of sorghum for the state of Sinaloa

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Abstract

Sinaloa occupies the second national place in sorghum planted surface with 227 thousand 753 hectares, after Tamaulipas. In terms of production, Sinaloa ranks third with 484 650 tons of grain and 341 605 tons of sorghum green fodder per year. The problems faced by sorghum in Sinaloa are drought, as well as the scarce use of conservation practices and the use of moisture. For this reason, INIFAP in Sinaloa, released the VCS-Brillante variety which is registered with the number SOG-283-231117 and breeder's title number 1891, in the National Catalog of Plant Varieties of the SINCS of Mexico. VCS-Brillante is a variety of intermediate vegetative cycle, cream or amber, is recommended for irrigation and temporary conditions. The average yield of the variety is 2 960 kg ha⁻¹ of grain and 36 515 kg ha⁻¹ of green forage, superior on average 5.4 and 44.6% respectively, to commercial hybrids of private companies. The bromatological quality of the forage is 6.7% of protein and 78.09% of digestibility, superior quality to the commercial control. It is tolerant to diseases that occur in the region, such as: ergot (*Claviceps africana*), anthracnose (*Colletotrichum graminicola*), blight of the panicle (*Fusarium moniliforme*) and carbonaceous rot of the stem (*Macrophomina phaseolina*), it has tolerance to the yellow aphid. sorghum (*Melanaphis sacchari* Zehntner). VCS-Brillante was released as a variety with potential to be grown in the state of Sinaloa.

Key words: *Sorghum bicolor*, grain, resistance to diseases.

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In Mexico, the area sown with sorghum (*Sorghum bicolor* L. Moench.) In 2016 was 1 669 239 ha, with a production of 4 million 629 thousand tons of grain and 2 million 285 thousand tons of green fodder. Sinaloa occupies the second national place in sorghum planted surface with 227 thousand 753 hectares, after Tamaulipas. In terms of production, Sinaloa ranks third with 484 650 tons of grain and 341 650 tons of green sorghum forage per year (SIAP, 2018).

Among the main problems facing sorghum cultivation in Sinaloa, are the drought, caused by the erratic distribution of rainfall (from 450 to 600 mm, during the period from July to November), as well as the scarce use of conservation practices and use of moisture (Hernández *et al.*, 2010). However, in the center and south of Sinaloa, commercial hybrids are predominantly sown under seasonal conditions susceptible to diseases and lodging of the plants, making mechanical harvesting and loss of grain yield impossible.

The germplasm that gave rise to the VCS-Brillante variety was introduced during 1986 to the Valley of Culiacan Experimental Field (CEVACU), in Sinaloa, Mexico, from ICRISAT. His progenitor lines were an androsterile female and a male restorer of fertility, of unknown genealogy; to the cross was assigned the denomination D (Sweet).

The selection of the segregating material of the cross was initiated from generation F₂, by the groove method per panicle or pedigree for seven generations F₇. Criteria such as plant health and performance were applied in the selection process. In this way, the advanced uniform line was obtained, which gave rise to 'VCS-Brillante', whose pedigree is: D-1-M-2-2-1-2-M-M.

From 1999 to 2009 this variety was evaluated in yield trials under rainfed and irrigated conditions, in several locations in the state of Sinaloa, Mexico and is registered in the National Catalog of Plant Varieties (CNVV) of SINCS with the number SOG -283-231117 and breeder's title number 1891.

The phenotypic description of the variety was made using the descriptors of the Union of Producers and Variety Producers (UPOV), the VCS-Brillante variety is of intermediate vegetative cycle, with 60 to 65 days at flowering and from 105 to 110 days at the harvest, with necessary requirements of average heat units of 711.9 at flowering and 1 363.5 at harvest, has a plant height of 2.6 m, its leaves are light green, medium texture, without anthocyanins; its stem has eight internodes at maturity and the juice of this one has a concentration of soluble solids of 18 to 19 °Brix, when the plants have the milky grain (Figura 1).

It has medium spikes (24 cm), open, with good exertion (18 cm) and glumes without anthocyanins in flowering, the grain is cream or amber, circular and semi-flat, with crystalline testa and endosperm, and medium texture. The characteristics of plant height, panicle length and exceeding length of VCS-Brillante, during the autumn winter cycle, under irrigation conditions, tend to have lower values than those in the rainy season (Figura 2).

In evaluations conducted under rainfed conditions in the southern and central zone of Sinaloa, VCS-Brillante showed similar behavior to commercial witnesses. In yield trials conducted over a period of five years (1999 to 2004) during the spring-summer cycle under temporary, VCS-Brillante presented an average yield of 2 960 kg ha⁻¹ grain, thus exceeding 5.4% yield average of three commercial witnesses.



Figure 1. Plant of the sorghum variety 'VCS-Brillante' reproduced in Culiacan, Sinaloa.



Figure 2. Representative panicle of the variety 'VCS-Brillante' reproduced in Culiacan, Sinaloa.

In the evaluation of forage production during spring-summer 2005 to 2009, established under temporary cycles. VCS-Brillante showed an average yield of 36 515 kg ha⁻¹ of green fodder, to surpass the commercial control average by 44.68%.

The bromatological quality of the forage under irrigation, during the autumn-winter cycles of 2005 to 2009, was of 78.09% of digestibility and 6.73% of protein, exceeds in digestibility and in content of protein to the commercial control with 21.89 and 0.93 percentage points, respectively. The level of yield and the bromatological quality of forage places the VCS-Brillante variety as a double-purpose material, whose potential can be used for silage.

Based on the physical and chemical analysis of grain sorghum, the physical dimensions of this variety (length, width and thickness) were 4.63, 4.01 and 2.61 mm, respectively, it has been reported that sorghum grains are typically round, although most have a flattened part (Reichert *et al.*, 1988). While the weight of 1000 grains of the VCS-Brillante variety was 34.63 ±0.26 g.

The chemical composition of the VCS-Brilliant sorghum grains showed a content percentage of proteins, lipids, ashes and carbohydrates of 14.22, 3.88, 1.82 and 80.08%, respectively, several researches have reported that sorghum contains a protein range of 10.4 to 12.41%, as well as lipid ranges from 3.1 to 3.6% and ranges from 1.5 to 1.7% of ashes (Rooney and Serna-Saldivar, 2000). Therefore, with the agronomic characteristics presented by VCS-Brillante, it was released as a new variety for the state of Sinaloa.

Conclusions

The basic seed is available to producers in the Valley of Culiacan Experimental Field, in Culiacan, Sinaloa. The generation of VCS-Brillante was supported by Fundacion Produce Sinaloa, AC; through, the project 'Generation of technology of varieties and hybrids of sorghum for seasonal and irrigation in Sinaloa'. Likewise, Octavio Macias and Lorenzo Vega are thanked for their hard collaboration in the breeding program for sorghum.

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