Description of cultivar

CENEB Oro C2017: new variety of durum wheat for northwest Mexico

Gabriela Chávez-Villalba[1§]
Miguel Alfonso Camacho-Casas[2]
Karim Ammar[3]
Jorge Ivan Alvarado-Padilla[4]
Guillermo Fuentes Dávila[1]
Alberto Borbon-Gracia[1]

[1]Norman E. Borlaug Experimental Field-INIFAP. Norman E. Borlaug Street 12 km, Cd. Obregón, Sonora, Mexico. AP. 155. CP. 85000. Tel. 01(55) 38718700. (fuentes.guillermo@inifap.gob.mx; borbon.alberto@inifap.gob.mx). [2]Mills Southeast SA. of CV. Group The Moderna. Isidro Favela 1000, Col. Industrial, Barrio of Tlacopa, Toluca of Lerdo, Mexico. CP. 50010. (miguel_camacho@hotmail.com). [3]Durum wheat program-CIMMYT. Highway México-Veracruz km 45, El Batán, Texcoco, Estate of Mexico. (k.ammar@cgiar.org). [4] Experimental Field of Mexicali Valley-INIFAP. Road to San Felipe km 7.5, Mexicali, Baja California. CP. 2110. Tel. 01(55) 38718700, ext. 81604. (alvarado.jorge@inifap.gob.mx).

[§]Corresponding author: chavez.gabriela@inifap.gob.mx.

Abstract

The cultivation of crystalline or hard wheat (*Triticum durum* L.) is one of the agricultural activities that generates more wealth in the State of Sonora, because this type of grain is commercialized in the international market. In 2017, the state exported this cereal for 176.3 million dollars, representing 6.6% of agricultural exports to South America, Europe and Africa (SAGARHA, 2018). In response to this importance of crystalline wheat and based on grain yield assessments conducted at the Norman E. Borlaug Experimental Field (CENEB), it was proposed to release the experimental line of durum wheat CNDO/PRIMADUR//HAI-OU_17/3/SNITAN/4/JUPAREC 2001/5/CNDO/PRIMADUR//HAIOU_17/3/SNITAN/6/RISSA/GAN//POHO_1/3/PLATA_3// CREX/ALLA∗2/4/ARMENT//SRN_3/NIGRIS_4/3/CANELO_9.1, as a new variety called "CENEB Oro C2017". Your crossover number and selection history is CDSS07Y00184S-099Y-099M-12Y-1M-04Y-0B. The study of progenitors, crossbreeding, selection of segregating populations and preliminary yield trials were conducted by the International Center for Maize and Wheat Improvement, and the performance trials quality evaluations, purifications and phenotypic characterization were carried out by the Institute National Agricultural and Livestock Forestry Research at CENEB, located in the Yaqui Valley, Sonora. The comparisons of yield and quality were made since 2011 with respect to CIRNO C2008, which has been the most planted variety in Sonora in recent years, but it lost its resistance to leaf rust and lacks color in the semolina. produces. CENEB Oro C2017, was registered in accordance with the Federal Seed Certification and Marketing Act in force in Mexico and has the definitive registration TRI-146-231117 of the National Catalog of Plant Varieties of the National Inspection and Certification Service of Seeds and the breeder's title with registration number 1897.

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The most important phenotypic characteristics for the description of this variety, according to the guidelines of the International Union for the Protection of New Varieties of Plants (UPOV), CENEB Oro C2017 presents a strong anthocyanin coloration in coleoptile, the growth habit in the stems it is erect and with very low frequency of plants with curved flag leaf.

The spike of parallel edges, is dense and its length is medium. In the middle third of the spike the shoulder of the glume is narrow and inclined, with a median tip. The glume is oblong in shape with no villi on the outer surface. The amber grain is semi-elliptical in shape, with short length of the villus of the grain brush in dorsal view and when treated with 1% phenol it does not show coloration. It is a plant that is characterized by its short size and is slightly precocious (Figure 1).

Figure 1. CENEB Oro C2017 (right) his tasseling is slightly early and short size, compared to CIRNO C2008 (left) of tasseling medium sized and very short.

Performance and industrial quality involve parameters controlled by genetic, environmental and management factors Alvarado *et al*. (2018). These variables were evaluated during six years in the CENEB, starting from the agricultural cycle 2011-2012 until the 2016-2017 cycle. The results obtained indicate that the performance of CENEB Oro C2017 equals the average performance of the CIRNO C 2008 control with 5.9 tha^{-1} when handled with four irrigation risks.

But the new variety exceeds the control by 250 kilos when they undergo restricted irrigation (Table 1). Given the limited availability of water in the dams in Sonora, mainly in the Valley of the Mayo and before a need to reduce the volumes of water in the wheat crop, CENEB Oro C2017 is considered an option for the sustainability of the wheat crop in Sonora (Chávez *et al*., 2017).

Table 1. Grain yield of CENEB Oro C2017 compared to CIRNO C2008. Cycles 2011-2012 to 2016-2017.

Agricultural cycle	CENEB Oro C2017			CIRNO C 2008		
	4 irrigations	2 irrigations	Average	4 irrigations	2 irrigations	Average
2011-12†	7.04	6.59	5.94	6.59	4.82	5.7
2012-13†	6.81	7.04	6.03	7.04	5.09	6.07
2013-14†	5.24	5.34	5.19	5.34	5.23	5.28
2014-15†	4.91	4.79	4.94	4.79	4.52	4.66
2015-16†	5.09	5.65	5.12	5.65	4.77	5.21
2016-17†	6.53	6.32	6.37	6.32	5.6	5.96
Average	5.94	5.26	5.6	5.95	5.01	5.48

†= average with irrigation treatments on different sowing dates.

In the Table 2 shows the indicators of industrial quality compared with the control, obtained from 12 evaluations per year. The milling industry for the extraction of semolina and the pasta manufacturer require producing varieties. Of a grain with a high specific weight, to guarantee a high extraction rate. A high protein content that ensures the integrity of the pasta cooking. And a yellow index, much desired by the final consumer. CENEB Oro C2017 averaged a specific weight of 82.1 kg hL^{-1}, 12.4% protein in grain and a pigment value of 26.5 points on the 'b' scale of the Minolta equipment (Table 2).

Table 2. Industrial quality of CENEB Oro C2017 compared to CIRNO C2008. Cycles 2011-2012 to 2016-2017.

Variable	CIRNO C2008	CENEB Oro C2017
Specific weight (kg hL^{-1})	82	82
Protein-grain (%)	13.3	12.4
Color (b-Minolta)	19	26
Weight thousand grains (g)	53	43
White belly (%)	1	1.1

The INIFAP-CENEB maintains the original and basic seed categories of this variety (Figure 2). The registered and certified seed will be increased in the 2017-2018 cycle by the Board of Agricultural Research and Experimentation of the State of Sonora (PIEAES, AC).

Figure 2. CENEB Oro C2017 (right) with greater yellow pigment than CIRNO C2008 (left).

Conclusions

CENEB Oro C2017, is considered an option for the sustainability of the wheat crop due to its behavior with reduced irrigation and to improve the yield of crystalline wheat in the south of Sonora, where the environmental conditions that prevail during the wheat cycle are suitable for incidence of leaf rust, foliar disease caused by the fungus *Puccinia triticina*, to which CENEB Oro C2017 showed resistance until the 2016-2017 cycle. In addition, CENEB Oro C2017 represents an option for exporters of crystalline wheat because of the intensity of the yellow color in its semolina.

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Cited literature

Alvarado, P. J. I.; Chávez, V. G; Ammar, K.; Villaseñor, M. H. E.; Camacho, C. M. A; Huerta, E. J.; Figueroa, L. P.; Vargas, R. Y. N. y Alvarado, P. E. S. 2018. Martínez C2016, nueva variedad de trigo cristalino para Mexicali Baja California y San Luis Río Colorado, Sonora. Rev. Fitotec. Mex. 41(2):217-218.

Chávez, V. G.; Camacho, C. M A.; Ammar, K.; Fuentes, D. G. y Alvarado P. J. I. 2017. Línea Candidata a nueva variedad de trigo cristalino para el estado de Sonora. Congreso Internacional de Ciencias Agrícolas, Méxicali. 895 p.

SAGARPA. 2018. Secretaría de Agricultura, Ganadería, Recursos Hidráulicos, Pesca y Acuacultura. http://oiapes.sagarhpa.sonora.gob.mx/notas/econo/prod-exportados.pdf.

UPOV (Unión Internacional para la Producción de las Observaciones Vegetales). 1988. Guidelines for the conduct of tests for distinctness, homogeneity and stability Durum Wheat (*Triticum durum* Desf.) 34 p.