

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
WASHINGTON D.C.
AND
INSTITUTO PARAGUAYO DE TECNOLOGÍA AGRARIA
ASUNCIÓN, PARAGUAY
AND
CÁMARA PARAGUAYA DE EXPORTADORES DE CEREALES Y OLEAGINOSAS
ASUNCIÓN, PARAGUAY

NOTICE OF RELEASE OF
HIGH YIELDING SOYBEAN CULTIVAR CM422 WITH RESISTANCE TO ASIAN SOYBEAN
RUST

The Agricultural Research Service, of the U.S Department of Agriculture, the Instituto Paraguayo de Tecnología Agraria of Paraguay, and the Cámara Paraguaya de Exportadores de Cereales y Oleaginosas announce the release of soybean [*Glycine max* (L.) Merr.] CM422, a maturity group V high-yielding cultivar with resistance to Asian soybean rust (ASR) (*Phakospora pachyrhizi* Syd.). Resistance to ASR was derived from PI 459025 via L87-0482 (PI 547879), a maturity group III breeding line developed by R. L. Bernard, which carries the Rpp4 gene for resistance. ASR occurs in Africa and the USA, but can be especially severe in regions of Asia and South America. This is the first southern US cultivar release with Rpp4 resistance to ASR. Scientists participating in the development of CM422 were J.R. Smith, J.D. Ray, R. Frederick, and A. Mengistu (USDA-ARS, Stoneville, MS; Ft. Detrick, MD; and Jackson, TN), A. Morel and W. Morel (IPTA, Capitán Miranda, Paraguay), and E. Rodríguez (CAPECO, Asunción, Paraguay). CM422 is being released because of its high yield potential and resistance to ASR. It will be highly useful as source material in breeding programs for improving resistance to ASR, while maintaining high yield potential, but especially as a semi-early cultivar in South America.

CM422 originated as a single F6 plant derived from the cross '5601T' x L87-0482. 5601T was derived from the cross 'Hutcheson' x TN89-39, whereas L87-0482 was derived from 'Williams 82' (6) x PI 459025. The cross of 5601T x L87-0482 was made at Stoneville, MS in 2004, and F1 plants were grown at the Tropical Agriculture Research Station at Isabela, Puerto Rico from December 2004 to April 2005. The F2 and F3 generations were advanced using pedigree selection of single plants based on agronomic traits at Stoneville, MS in 2005 and 2006, respectively. The resistance of these selections to ASR was verified on an F2-derived F3 line and then on an F3-derived F4 line on the basis of a reddish-brown (RB) lesion reaction to ASR in the field at Capitán Miranda, Paraguay in 2006 and 2007, respectively. The resistant F3-derived F4 line was bulk harvested in Paraguay in 2007 and then again as an F3-derived F5 line later in 2007. A single resistant F6 plant was selected from the F3-derived F6 resistant line in 2008 on the basis of agronomic traits and field rust ratings in Paraguay. Seed from this F6 plant were bulked and increased in 2008 to form CM422. Initial yield tests were conducted at Capitán Miranda, Paraguay in 2009. CM422 was assayed with rust isolates IN73-1, PI177-1, TI101-1, TW72-1, TW80-2, and ZM01-1 at Ft. Detrick, MD in 2010 and had an RB reaction type for each isolate.

CM422 was tested for three years (2009-2011) in Paraguay across 13 environments. Across 12 environments in 2010 and 2011, CM422 matured 1 day later than 'CD-215,' and had larger seed (15.0 versus 12.2 g 100-l seed), was substantially taller (93 versus 70 cm), and had greater seed yield (3835 versus 3432 kg ha-1). Comparing fungicide-treated (triazoles plus strobilurins) with non-treated yield plots under moderate ASR pressure at Capitán Miranda in 2011, CM422 yielded 4592 and 4587 kg ha-1 in treated and non-treated plots, respectively. In the same trial NK-3363 yielded 4459 and 3593 kg ha-1 in treated and non-treated plots, respectively, a 19 percent yield loss. In a similar trial under heavy ASR pressure at Capitán Miranda in 2011, CM422 yielded 2873 and 2444 kg ha-1 in treated and non-treated



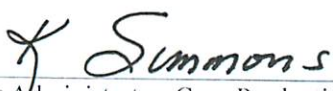
plots (15 percent yield loss), respectively. However, in the same trial 5601T yielded 2626 and 1611 kg ha-1 in treated and non-treated plots (39 percent yield loss), respectively.

At Stoneville in 2010, CM422 matured 11 days later than 'Osage' and 6 days later than 5601T. It had larger seed than Osage (12.9 and 10.3 g 100-1 seed, respectively), but similar seed size with 5601T (12.3 g 100-1 seed). CM422 was substantially taller than both Osage and 5601T (141, 51, and 42 cm, respectively), lodged more than Osage and 5601T (3, 1, and 1, respectively, where 1 indicates no lodging and 5 indicates prostrate plants), and yielded more than 5601T, but less than Osage (3615, 3131, and 4629 kg ha-1, respectively).

CM422 is late MG V in the U.S. and semi-early in maturity in Paraguay. It is indeterminate and has white flowers, gray pubescence, tan pods, and buff hila. CM422 carries the Rpp4 gene for resistance to ASR, which will provide resistance to many naturally occurring rust isolates worldwide. In tests at Stoneville in 2010, CM422 had a similar level of resistance to charcoal rot (*Macrophomina phaseolina*) as did moderately resistant DT97-4290. The charcoal rot colony-forming unit indices for CM422 and DT97-4290 were 3.1 percent and 6.1 percent, respectively, relative to susceptible check Osage. Based on data from ACTS, Inc. (Carroll, IA), CM422 carries the Rps1k gene and is resistant to races 4 and 7 of *Phytophthora* root rot (*Phytophthora sojae*), while being susceptible to race 25.

A limited quantity of seed is available from J.R. Smith (USDA-ARS, Crop Genetics Research Unit, P.O. Box 345, Stoneville, MS 38776, rusty.smith@ars.usda.gov). Seed of this release will be deposited in the National Plant Germplasm System where it will be available for research purposes, including development and commercialization of new cultivars. It is requested that appropriate recognition be made if this cultivar contributes to the development of new germplasm and cultivars.


Signatures:


Deputy Administrator, Crop Production and Protection
Agricultural Research Service, U.S. Department of Agriculture

Nov. 17, 2014
Date


President, Instituto Paraguayo de Tecnología Agraria

04/08/2014-
Date


President, Cámara Paraguaya de Exportadores de Cereales
y Oleaginosas

25-07-14
Date