# Onion Germplasm Selected for Resistance to Iris Yellow Spot

Christopher S. Cramer[1]

*Department of Plant and Environmental Sciences, Box 30003, MSC 3Q, New Mexico State University, Las Cruces, NM 88003-0003*

The New Mexico State Univ. Agricultural Experiment Station announces the release of 8 onion (*Allium cepa* L.) germplasm lines that were selected for resistance to Iris yellow spot. These germplasm lines were developed by selecting from plant introduction accessions that were screened for reduced Iris yellow spot symptom expression when challenged with *Iris yellow spot virus* (IYSV) in field evaluations. These lines are being released to augment breeding efforts by other onion plant breeders because no known germplasm is resistant to the disease.

## Origin and description

In Feb. 2009, seed of onion USDA plant introduction accessions PI 172703, PI 289689, and PI 546140 was sown in black plastic trays that contained Metro Mix 510. PI 172703 was collected from a market in Maras, Turkey on 11 Sept. 1948 by J. Harlan (USDA, 2013a). The accession produces bulbs that are globe-shaped and possess brown-colored outer dry scales (USDA, 2013b). PI 289689 was donated as 'Odourless Green Leaf' by the Arthur Yates and Co., Ltd. of Sydney, Australia on 25 Apr. 1963 (USDA, 2013c). The accession produces bulbs that are globe-shaped and possess yellow-colored outer dry scales (USDA, 2013d). These two accessions were selected because they possessed a minimal amount of epicuticular leaf wax or bloom when compared with other accessions (USDA, 2013b; 2013d). PI 546140 was donated as

'San Joaquin' by the Asgrow Seed Co. of Kalamazoo, Michigan, US, in 1961 (USDA, 2013e). Bulbs tend to be top-shaped and produce light yellow colored dry outer scales. 'San Joaquin' was developed jointly by the USDA in Beltsville, MD and the Calif. Agric. Expt. Stn. in Davis, CA and released in 1946 (Havey, 2013). The cultivar is open-pollinated and originated as a hybridization between 'Stockton S36' and 'Early Grano'.

In May 2009, 240 plants each of the three PI accessions were transplanted to a field at the Leyendecker Plant Science Research Center (LPSRC) in Las Cruces, NM. Plants were spaced 7.5 cm apart within two equally-spaced rows per plot. Plots were 0.6 m in width and 3.0 m in length. Accessions were arranged in a randomized complete block with 3 blocks. On the first and last bed of the study and at the front and back borders of the study, IYSV-infected bulbs, from a previous IYSV evaluation study, were placed to ensure IYSV inoculum in the field. The presence of IYSV in these bulbs was confirmed using ELISA and RT-PCR (Mohseni-Mohgadam et al., 2011). In addition, it was highly likely that adult onion thrips (*Thrips tabaci* L.), that possessed IYSV, resided within the dry outer scale layers of the dormant bulbs and these viriliferous thrips emerged once dormant bulbs broke dormancy and began to regrow. These viriliferous thrips had the ability to reinfect onion plants with IYSV.

On each third bed, IYSV-susceptible breeding lines were sown in Oct. 2008 to act as disease spreader rows. The field was designed such that, onion thrips would acquire IYSV from the infected bulbs, live on these bulbs until scape formation, then move to autumn-sown plants, and once these plants matured, then move to the test plants. At each move, thrips would transfer IYSV to those new plants. Onion plants were grown using standard cultural practices for growing onions in southern New Mexico except that chemical sprays were not applied for controlling onion thrips levels (Walker et al., 2009).

Bulbs were harvested when 80% or more of the plants in the plot had lodged. At this time, plants were selected that exhibited fewer foliar IYS disease symptoms and possessed softened leaf tissue in the neck region directly above the bulb (an indication of bulb maturity). Selected bulbs were self-pollinated and hybridized with a male-sterile line. Four lines (NMSU 10-578-1, 10-579-1, 10-580-1, and 10-583-1) were developed from PI 172703, two lines (NMSU 10-618-1 and NMSU 10-619-1) were developed from PI 289689, and two lines (NMSU 10-668-1 and 10-700) were developed from PI 546140. Based upon the sterility reading of the testcross progeny, NMSU 10-583-1 would be a maintainer line possessing N cytoplasm and two recessive *ms* alleles at the *Ms* locus. The other lines produced fertile progeny from the testcross indicating that they possess at least one dominant allele for fertility restoration at the *Ms* locus. In 2011, selected lines exhibited a 5-37% reduction in symptom severity depending upon the line as compared to 'Rumba' at 18 weeks after transplanting.

**Availability**

Seed samples may be obtained by contacting C.S. Cramer, Dept. of Plant and Environmental Sciences, MSC 3Q, Box 30003, New Mexico State Univ., Las Cruces, NM 88003, cscramer@nmsu.edu.

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David Thompson, Associate Dean and Director — Date

New Mexico Agricultural Experiment Station

3/6/13

Richard Pratt, Head — Date

Department of Plant and Environmental Sciences

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Christopher S. Cramer, Professor — Date

Department of Plant and Environmental Sciences