

# California Blackeye Varietal Improvement

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Blackeye cowpea (*Vigna unguiculata* L. Walp) grown in central California for grain production, soil improvement and pest management. Aphid, lygus bug, root-knot nematodes and fusarium wilt disease are prevalent in this region, causing significant reductions in yield and quality of current blackeye cultivars. Sources of genetic resistance found in African cowpea germplasm are bred into susceptible blackeye cultivars through marker-assisted backcrossing.

Aphid-resistant cultivar CB77 (a version of CB46) has been released. Foundation seed is being produced by UC Davis Foundation Seed Program. Other pest-resistant versions of CB46 & CB5 are being evaluated in on-station and on-farm trials.

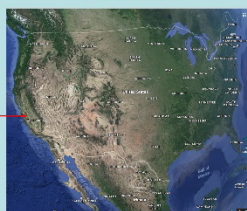
## (A) Crop significance

Blackeye-type cowpeas (*Vigna unguiculata*)  
A traditional dry-grain legume in cropping systems in California and southern USA

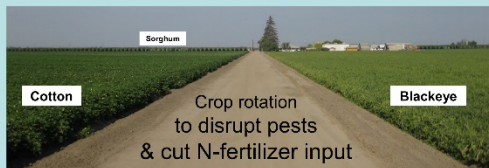
Typical grains



Central Valley of California



Production field



## (B) Main biotic stresses – targets for resistance breeding



Aphids



Lygus bugs



Root-knot nematodes

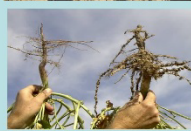
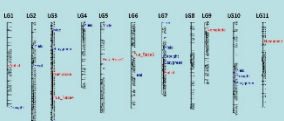


Fusarium wilts

## (C) Genetic/genomic resources



UCR germplasm collection ~ 6,000 accessions  
2 primary Genepools ★ ★ centered in Africa



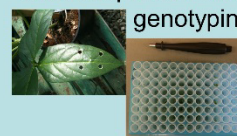
Multiple resistance sources  
genetic maps and trait markers

## (D) Breeding strategy

Greenhouse-grown progeny



Leaf samples for SNP genotyping



Marker-Assisted Selection

Making crosses



Desirable plants kept



New improved versions of local elite varieties

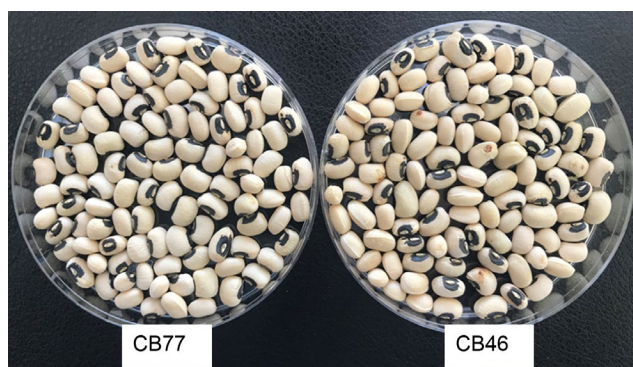
**Acknowledgements:** California Dry Bean Advisory Board. USAID FtF Innovation Lab for Legume Systems Research. California Crop Improvement Association. UCD GEMINI project. Kearney Ag Center (Vincent Silva, Dan Spalding, Rodolfo Cisneros and staff), UCR Ag Ops (Peggy Mauk, Mike Cardey and staff). Grower participants (Rick and Jared Borges, Wallace Brothers, and Martin Squires, Ronny Clark, Greg Watte, and Darren DeCraemer). Cal-Bean & Grain Cooperative (Chad Vander Feer). Advisor (Jeff Ehlers). UCCE Lab Assistants (Pahoua Yang, Ben Halleck, Ramandeep Brar, and Ruben Chavez).

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# New Release: California Blackeye No. 77 (CB77)

## BREEDING HISTORY & DESCRIPTION<sup>1</sup>

CB77 is an aphid resistant blackeye cowpea (*Vigna unguiculata*) that was developed using marker-assisted backcrossing. The initial F1 cross was made in Oct. 2012 between the recurrent parent California Blackeye No. 46 (CB46) and a donor parent carrying two aphid-resistance loci from the African breeding line IT97K-556-6, followed by five backcross cycles. Single nucleotide polymorphism (SNP) markers were used in foreground and background selection strategies.



CB77 has the botanical and morphological characteristics similar to its recurrent parent CB46 with respect to seed size, leaf shape (ovate), flower color (white), and growth habit (erect). CB77 yields comparably to CB46 and higher than California Blackeye No. 5 (CB5). CB77 has whiter seeds with less lygus damage than CB46 and CB5. Its black pigmented portion, or 'eye', does not leak dark pigment during boiling or canning.

## ADAPTATION

CB77 is recommended for the Central Valley of California, from Tulare to Colusa, and other production regions where aphids are present.

## PEST & DISEASE RESISTANCE

CB77 is resistant to cowpea aphids (*Aphis craccivora* Koch), root-knot nematode (*Meloidogyne incognita*) and Fusarium wilt (*Fusarium oxysporum* f.sp. *tracheiphilum*) Race 3.



(Photos courtesy: R. Long and S. Light)

## SEED CLASSES & PRODUCTION

Classes of seed are breeder, foundation, and certified. Breeder Seed of CB77 was sent to the UC Davis Foundation Seed Program (FSP) for Foundation Seed production in summer 2023. The FSP will sell the Foundation Seed to blackeye seed producers, who will then produce Registered Seed in 2024, and Certified Seed in 2025.

The FSP will maintain foundation seed through 'Foundation to Foundation' seed increases as appropriate to maintain amount to meet market demand for Foundation and Certified seed. The University of California Riverside will maintain Breeder seed in the event it is needed by the UC Davis Foundation Seed Program.

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<sup>1</sup> Huynh B.-L., Duong T., Clark N.E., Long R., Light S.E., Dahlquist-Willard R.M., Ehlers J.D., Close T.J., Roberts P.A. (2022) Registration of aphid-resistant 'California Blackeye 77' cowpea. *Journal of Plant Registrations* 16:13-20. DOI: <https://doi.org/10.1002/plr2.20176>.