

## Supplementary Material

### Development and evaluation of a field-based high-throughput phenotyping platform

*Pedro Andrade-Sanchez<sup>A,E</sup>, Michael A. Gore<sup>B,C</sup>, John T. Heun<sup>A</sup>, Kelly R. Thorp<sup>B</sup>, A. Elizabete Carmo-Silva<sup>B,D</sup>, Andrew N. French<sup>B</sup>, Michael E. Salvucci<sup>B</sup> and Jeffrey W. White<sup>B</sup>*

<sup>A</sup>Department of Agricultural and Biosystems Engineering, University of Arizona, Maricopa Agricultural Center, 37860 W. Smith-Enke Road, Maricopa, AZ 85138, USA.

<sup>B</sup>US Department of Agriculture, Agricultural Research Service, Arid-Land Agricultural Research Center, 21881 North Cardon Lane, Maricopa, AZ 85138, USA.

<sup>C</sup>Present address: Department of Plant Breeding and Genetics, Cornell University, Ithaca, NY 14853, USA.

<sup>D</sup>Present address: Rothamsted Research, Plant Biology and Crop Science Department, Harpenden, Hertfordshire, AL5 2JQ, UK.

<sup>E</sup>Corresponding author. Email: pandrade@ag.arizona.edu

Dirt Road

Range:

Border 1 WW

S + N  
W  
E

Border 2 WL

Dirt Road

11 10 9 8 7 6 5 4 3 2 1	R O W  P H Y 0 0  0  0  0  0  0  0  0	Rep3 1 Range of PHY 800 Rep4 0.85 m										R O W  P H Y 0 0  0  0  0  0  0  0  0	1 1 1 1 1 1 1 1 1 1 1	R O W  P H Y 0 0  0  0  0  0  0  0  0  0	S E P T E M B E R 1 0 0
		321 Pima S-4 22	322 P70 8	323 Pima S-6 1	324 Pima S-2 12	325 St. Vin. 9	421 Mon. S.I. 2	422 Pima 32 13	423 Pima S-3 19	424 St. Vin. 9	425 Old Pima 14				
		316 89590 3	317 P73 6	318 PSI 425 21	319 Mon. S.I. 2	320 P62 24	416 Pima S-6 1	417 Pima S-5 17	418 OA360 25	419 P62 24	420 94220 4				
		311 OA360 25	312 94217 10	313 Pima S-1 10	314 Amsak 14	315 Old Pima 14	411 94217 11	412 Pima S-7 11	413 93260 7	414 P73 6	415 Pima S-2 12				
		306 Pima S-3 19	307 94220 4	308 Pima S-7 23	309 P53 15	310 8810 16	406 P53 15	407 PSI 425 21	408 P76 20	409 Pima S-4 22	410 Pima S-1 10				
		301 93260 7	302 P76 20	303 PSI 113 5	304 Pima S-5 17	305 Pima 32 13	401 8810 16	402 PSI 113 5	403 89590 3	404 P70 8	405 Amsak 18				
		1 Range of PHY 800													
		121 Pima S-2 12	122 P62 24	123 P53 15	124 Amsak 18	125 Pima 32 13	221 PSI 113 5	222 Pima S-3 19	223 Pima S-4 22	224 P62 24	225 94217 11				
		116 Pima S-5 17	117 8810 16	118 Old Pima 14	119 P73 6	120 Pima S-4 22	216 P70 8	217 Pima 32 13	218 94220 4	219 Pima S-1 10	220 P73 6				
		111 Mon. S.I. 2	112 Pima S-1 10	113 PSI 113 5	114 Pima S-7 23	115 Pima S-6 1	211 Pima S-6 1	212 P53 15	213 Old Pima 14	214 89590 3	215 93260 7				
		106 PSI 425 21	107 93260 7	108 P70 8	109 Pima S-3 19	110 OA360 25	206 Pima S-7 23	207 PSI 425 21	208 St. Vin. 9	209 Amsak 18	210 Pima S-5 17				
101 St. Vin. 9	102 P76 20	103 94220 4	104 89590 3	105 94217 11	201 Pima S-2 12	202 OA360 25	203 P76 20	204 8810 16	205 Mon. S.I. 2						
Rep1 1 Range of PHY 800 Rep2 0.85 m															

11 10 9 8 7 6 5 4 3 2 1	R O W  P H Y 0 0  0  0  0  0  0  0  0  0  0	Rep3 1 Range of PHY 800 Rep4 0.85 m										R O W  P H Y 0 0  0  0  0  0  0  0  0  0	1 1 1 1 1 1 1 1 1 1 1	R O W  P H Y 0 0  0  0  0  0  0  0  0  0	S E P T E M B E R 1 0 0
		321 8810 16	322 Pima S-1 10	323 P62 24	324 Pima S-2 12	325 Pima 32 13	421 PSI 113 5	422 Pima S-3 19	423 Amsak 18	424 Pima S-1 10	425 89590 3				
		316 OA360 25	317 PSI 113 5	318 Pima S-4 22	319 PSI 425 21	320 93260 7	416 P62 24	417 Old Pima 14	418 P73 6	419 93260 7	420 P76 20				
		311 89590 3	312 Pima S-5 19	313 P73 6	314 94220 4	315 P70 8	411 Pima S-2 12	412 Mon. S.I. 2	413 P53 15	414 OA360 25	415 P70 8				
		306 Pima S-3 19	307 St. Vin. 9	308 Mon. S.I. 2	309 94217 11	310 Old Pima 14	406 Pima S-4 22	407 8810 16	408 94217 11	409 94220 4	410 Pima S-7 23				
		301 P76 20	302 Pima S-6 1	303 P53 15	304 Pima S-7 23	305 Amsak 18	401 PSI 425 21	402 St. Vin. 9	403 Pima S-5 17	404 Pima S-6 1	405 Pima 32 13				
		1 Range of PHY 800													
		121 OA360 25	122 Pima S-6 1	123 94220 4	124 Old Pima 14	125 Pima S-1 10	221 Mon. S.I. 2	222 P73 6	223 PSI 113 5	224 Pima S-6 1	225 8810 16				
		116 Pima S-7 23	117 Pima S-3 19	118 Pima S-2 12	119 PSI 425 21	120 P73 6	216 Pima S-1 10	217 P70 8	218 P76 20	219 94217 11	220 PSI 425 21				
		111 P76 20	112 Pima 32 13	113 Pima S-4 22	114 89590 3	115 Mon. S.I. 2	211 Old Pima 14	212 Pima S-4 22	213 Amsak 18	214 Pima S-2 12	215 Pima S-5 17				
		106 Amsak 18	107 P70 8	108 8810 16	109 93260 7	110 St. Vin. 9	206 Pima S-3 19	207 93260 7	208 P53 15	209 94220 4	210 Pima 32 13				
101 94217 11	102 P53 15	103 Pima S-5 17	104 PSI 113 5	105 P62 24	201 89590 3	202 Pima S-7 23	203 St. Vin. 9	204 P62 24	205 OA360 25						
Rep1 1 Range of PHY 800 Rep2 0.85 m															

Not drawn to scale

Dry Ravine and Paved Road

**Fig. S1.** Schematic of the experimental design used for field evaluation of the 25 Pima cotton (*Gossypium barbadense* L.) cultivars under well-watered (WW) and water-limited (WL) conditions. For the set of 25 cultivars, a WW and WL trial was arranged as a 5×5 alpha (0,1) lattice design with four replications, for a total of 200 plots. Experimental units were one-row plots 8.8 m long with a 1.02 m inter-row spacing. There was a 0.61 m alley at the end of each plot. Plots were thinned to approximately 4.1 plants m<sup>-2</sup>. To reduce border effects, one-row plots of PHY 800 were planted on all sides of each 5×5 replicate. With the inclusion of border plots, the total field consisted of 24 rows that had an inter-row spacing of 1.02 m and length of 109.73 m.