Table S5 Gene action of QTLs identified by CIM in HSBCF$_1$ population across four environments

Trait[a]	QTL[b]	Env.[c]	Position[d]	A[e]	D[e]	A+D[e]	|D/A|or 2|D|/|(A+D)|[f]	GA[g]	Population
FL	qFL-C02-2	2015Yc	78.11		0.18			OD	HSBCF$_1$MPH
	qFL-Chr05-3	2014Bg	11.21	-1.16					RIL
	qFL-Chr05-4	2014Bg	40.01	-0.32					RIL
	qFL-C05-2	2015Bg	43.21			0.04		A	HSBCF$_1$
	qFL-Chr05-1	2014Yc	45.31	-0.37					RIL
	qFL-C05-3	2015Bg	50.81			0.24	6.21	OD	HSBCF$_1$
		2014Yc	51.61			1.25	1.21		HSBCF$_1$
		2014Yc	50.81		0.76				HSBCF$_1$MPH
	qFL-Chr05-2	2014Yc	52.11	-0.33					RIL
	qFL-Chr09-1	2014Bg	3.81	-0.30					RIL
	qFL-C09-1	2014Bg	12.91			-0.17		A	HSBCF$_1$
	qFL-C09-3	2015Bg	46.51			0.86		A	HSBCF$_1$
	qFL-Chr10-1	2014Yc	44.51	0.29					RIL
	qFL-C11-1	2015Yc	4.81			-1.73		A	HSBCF$_1$
		2014Bg	44.51	0.26					RIL
	qFL-Chr12-1	2014Yc	16.21	-0.33					RIL
	qFL-C13-2	2015Yc	30.61			0.56		A	HSBCF$_1$
	qFL-Chr14-1	2014Yc	14.21	-0.50					RIL
	qFL-Chr14-2	2014Yc	20.91	-0.41					RIL
	qFL-C14-4	2015Bg	23.21			-0.83		A	HSBCF$_1$
	qFL-Chr14-3	2014Yc	23.31	-0.46					RIL
		2014Bg	25.71	-0.27					RIL
	qFL-Chr15-1	2014Yc	13.11	-0.36					RIL
	qFL-C16-1	2014Yc	6.21			0.84		A	HSBCF$_1$
		2014Bg	12.31	-0.38					RIL
	qFL-C17-1	2014Bg	31.31			-0.08		A	HSBCF$_1$
	qFL-C18-1	2014Bg	59.01		-2.68			OD	HSBCF$_1$MPH
	qFL-C19-1	2014Yc	16.01			0.51	3.13	OD	HSBCF$_1$
		2014Yc	16.01		0.80				HSBCF$_1$MPH
	qFL-Chr19-1	2014Yc	22.51	0.46					RIL
	qFL-C19-3	2014Yc	26.51			-0.73		A	HSBCF$_1$
	qFL-C20-4	2014Yc	42.11			-0.31		A	HSBCF$_1$
		2015Bg	44.11			-0.45			HSBCF$_1$
	qFL-C21-1	2014Bg	44.61		-0.76			OD	HSBCF$_1$MPH
FU	**qFU-Chr01-1**	2014Bg	14.51	-0.61					RIL
	qFU-C01-1	2015Yc	30.31			0.89		A	HSBCF$_1$
	qFU-C01-2	2014Bg	41.71			0.50	29.41	OD	HSBCF$_1$
		2015Bg	45.71			-4.99	2.97		HSBCF$_1$
		2015Bg	45.71		-7.40				HSBCF$_1$MPH
	qFU-C01-3	2015Bg	50.41			-1.09		A	HSBCF$_1$
	qFU-C02-1	2015Bg	44.81			-4.44	2.72	OD	HSBCF$_1$

		2015Bg	44.81		-6.04				HSBCF$_1$MPH
	qFU-Chr05-1	2014Bg	45.31	-0.22					RIL
	qFU-C06-2	2015Bg	35.01			0.29	6.15	OD	HSBCF$_1$
		2015Yc	36.01		-0.90				HSBCF$_1$MPH
	qFU-C06-3	2015Bg	47.21			0.19		A	HSBCF$_1$
	qFU-Chr09-1	2014Yc	3.81	-0.24					RIL
		2014Bg	3.81	-0.29					RIL
					27.7				
	qFU-C09-1	2014Bg	17.81		0	-113.49		OD	HSBCF$_1$MPH
	qFU-Chr09-5	2014Bg	18.11	-0.24					RIL
	qFU-C09-2	2015Bg	25.01			9.04		A	HSBCF$_1$
	qFU-Chr09-2	2014Yc	47.11	-0.24					RIL
		2014Bg	47.11	-0.24					RIL
	qFU-C09-4	2014Yc	49.61			1.35		A	HSBCF$_1$
		2015Bg	53.01			9.05			HSBCF$_1$
	qFU-Chr09-3	2014Yc	52.61	0.30					RIL
		2014Bg	52.61	0.29					RIL
	qFU-Chr09-4	2014Yc	61.41	-0.20					RIL
	qFU-C13-1	2014Bg	32.41			0.31		A	HSBCF$_1$
	qFU-C14-2	2015Yc	37.41			0.16		A	HSBCF$_1$
	qFU-C16-1	2015Bg	72.91			-0.04	233.55	OD	HSBCF$_1$
		2015Bg	72.91		4.93				HSBCF$_1$MPH
	qFU-C17-1	2014Bg	27.91			-0.19		A	HSBCF$_1$
	qFU-C18-1	2015Bg	57.11			-9.44		A	HSBCF$_1$
	qFU-Chr19-1	2014Yc	20.81	-0.22					RIL
	qFU-C19-1	2014Bg	37.41			1.04		A	HSBCF$_1$
	qFU-C20-2	2015Bg	38.01			-0.09	107.50	OD	HSBCF$_1$
		2015Bg	38.01		4.69				HSBCF$_1$MPH
	qFU-C20-3	2015Yc	49.11		-0.70			OD	HSBCF$_1$MPH
	qFU-C20-4	2015Bg	57.81			-3.54	3.04	OD	HSBCF$_1$
		2015Bg	57.81		-5.39				HSBCF$_1$MPH
	qFU-C22-1	2015Yc	20.81			-0.72		A	HSBCF$_1$
	qFU-C26-1	2015Yc	2.51		0.39			OD	HSBCF$_1$MPH
	qFU-C26-2	2014Yc	38.31			0.32		A	HSBCF$_1$
MIC	**qMIC-Chr01-1**	2014Yc	14.51	0.24					RIL
	qMIC-C02-1	2015Yc	32.21			0.97		A	HSBCF$_1$
	qMIC-Chr05-1	2014Yc	12.61	-0.25					RIL
	qMIC-C05-1	2014Bg	48.31			0.53		A	HSBCF$_1$
	qMIC-Chr07-1	2014Bg	59.31	0.10					RIL
	qMIC-C08-1	2015Bg	35.91		0.68			OD	HSBCF$_1$MPH
	qMIC-C09-1	2015Yc	18.11			0.24		A	HSBCF$_1$
	qMIC-C11-1	2015Yc	17.11			0.41	0.03	PD	HSBCF$_1$
		2015Yc	18.11		0.01				HSBCF$_1$MPH
	qMIC-Chr10-1	2014Yc	62.61	0.16					RIL

	qMIC-C13-3	2014Yc	44.11			0.08		A	$HSBCF_1$
	qMIC-C14-1	2015Yc	4.01			0.74		A	$HSBCF_1$
	qMIC-Chr14-1	2014Yc	23.31	0.08					RIL
		2014Bg	20.91	0.11					RIL
	qMIC-C14-2	2014Yc	27.21			0.21		A	$HSBCF_1$
		2015Bg	30.91			0.01			$HSBCF_1$
		2015Yc	32.71			0.30			$HSBCF_1$
	qMIC-C14-3	2015Yc	43.81			-0.01		A	$HSBCF_1$
	qMIC-C15-1	2015Bg	20.51			0.27		PD	$HSBCF_1$
		2015Yc	20.51		0.07		0.50		$HSBCF_1MPH$
		2015Bg	20.51		0.07		0.50		$HSBCF_1MPH$
	qMIC-Chr16-1	2014Yc	51.01	0.08					RIL
		2014Bg	49.31	0.09					RIL
	qMIC-Chr16-2	2014Yc	57.01	0.09					RIL
		2014Bg	57.41	0.15					RIL
	qMIC-Chr17-1	2014Bg	44.81	0.12					RIL
	qMIC-C19-1	2014Yc	26.21			-0.06		A	$HSBCF_1$
	qMIC-Chr24-1	2014Bg	16.81	-0.11					RIL
	qMIC-C24-4	2015Yc	73.31			0.51		A	$HSBCF_1$
	qMIC-Chr24-2	2014Bg	73.31	0.44					RIL
FE	qFE-C01-2	2015Bg	15.91		0.19			OD	$HSBCF_1MPH$
	qFE-C01-3	2014Bg	25.71		-0.38			OD	$HSBCF_1MPH$
	qFE-C09-3	2015Bg	50.61		0.09			OD	$HSBCF_1MPH$
	qFE-Chr11-1	2014Bg	5.31	1.16					RIL
	qFE-Chr14-2	2014Bg	1.11	1.09					RIL
	qFE-C14-1	2014Yc	5.31			1.75		A	$HSBCF_1$
	qFE-Chr14-3	2014Bg	6.31	0.25					RIL
		2014Bg	15.71	0.26					RIL
	qFE-Chr14-1	2014Yc	16.81	0.30					RIL
	qFE-C14-4	2015Yc	20.51			0.01		A	$HSBCF_1$
	qFE-C15-1	2015Yc	27.81			-0.05		A	$HSBCF_1$
	qFE-Chr16-1	2014Bg	1.11	1.17					RIL
	qFE-C17-1	2014Yc	33.41			-0.17		A	$HSBCF_1$
	qFE-Chr17-1	2014Bg	42.31	0.18					RIL
	qFE-C19-1	2015Yc	52.21			0.08		A	$HSBCF_1$
	qFE-Chr18-1	2014Bg	57.51	0.76					RIL
	qFE-C20-1	2014Yc	29.71			0.18		A	$HSBCF_1$
		2014Bg	29.71			0.01			$HSBCF_1$
	qFE-Chr20-1	2014Yc	41.51	0.20					RIL
		2014Bg	47.11	0.44					RIL
	qFE-C21-2	2014Yc	20.11			-1.83		A	$HSBCF_1$
	qFE-C24-2	2015Bg	40.11		0.15			OD	$HSBCF_1MPH$
	qFE-Chr24-1	2014Yc	73.31	0.75					RIL
		2014Bg	73.31	0.62					RIL

FS	**qFS-Chr05-1**	2014Bg	54.81	0.52				RIL
	qFS-C08-1	2014Bg	45.01			-0.05	A	$HSBCF_1$
	qFS-C09-1	2015Bg	38.71			-0.78	A	$HSBCF_1$
	qFS-C09-2	2015Yc	50.61		-2.05		OD	$HSBCF_1$MPH
	qFS-C13-1	2014Yc	19.41			-0.27	A	$HSBCF_1$
	qFS-C13-3	2015Yc	39.21		-2.12		OD	$HSBCF_1$MPH
	qFS-Chr14-1	2014Yc	6.71	-0.21				RIL
	qFS-Chr14-2	2014Yc	14.21	-0.28				RIL
	qFS-Chr14-3	2014Yc	21.61	-0.26				RIL
	qFS-Chr14-4	2014Yc	40.11	-0.20				RIL
	qFS-C14-1	2014Yc	50.51			-3.12	A	$HSBCF_1$
	qFS-C15-1	2014Yc	15.61			-0.01	A	$HSBCF_1$
	qFS-Chr19-1	2014Bg	22.51	0.51				RIL
	qFS-Chr19-2	2014Bg	27.81	0.61				RIL
	qFS-C19-3	2015Yc	57.11			-2.76	A	$HSBCF_1$
	qFS-C20-1	2014Yc	39.01			-0.82	A	$HSBCF_1$
		2015Bg	39.01			-1.10		$HSBCF_1$
	qFS-Chr20-1	2014Yc	42.11	-0.50				RIL
	qFS-Chr20-2	2014Yc	59.61	-0.48				RIL
	qFS-C25-2	2015Yc	39.51			-3.91	A	$HSBCF_1$
		2015Bg	39.81			-3.67		$HSBCF_1$

[a] FL: fiber length; FU: fiber uniformity; MIC: micronaire; FE: fiber elongation; FS: fiber strength

[b] QTLs in bold are those identified by CIM in RILs in our previous study (Li et al. 2016), which was just used to estimate the gene action of $HSBCF_1$ population

[c] 2014Yc: Yacheng of Hainan Province in 2014; 2014Bg: Baogang of Hainan Province in 2014; 2015Yc: Yacheng of Hainan Province in 2015; 2015Bg: Baogang of Hainan Province in 2015

[d] Position of QTL located on chromosome: as cM distance from the top of each chromosome

[e] The genetic expectation of a QTL effect obtained is the additive effect (A) from the RILs, the additive and dominance effects (A+D) from the BCF_1s, and the dominance effect (D) from the MPH values

[f] |D/A|: |dominance/additive|; 2|D|/|(A+D)|: 2| dominance |/|(additive + dominance)|

[g] GA: gene action; PD/D partial dominance (|d/a| <= 1 or 2|d|/|(a+d)| <= 1); OD overdominance(|d/a| >1 or 2|d|/|(a+d)| > 1), here, 2|d|/|(a+d)| > 1 same to 2|*d*| > |*a* + *d*|; A: when QTL detected only in BCF_1 or both BCF_1 and RIL was referred to as additive (A).