



Genome Wide QTL Mapping for Resistance to Verticillium Wilt, Fiber Quality and Yield Traits in Cotton Chromosome Segment Substitution Lines

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Figure 1 The details of CSSLs development

G. hirsutum CCRI36 (♀) × *G. barbadense* Hai 1 (♂)

↓
CCRI36 × F₁

↓
CCRI36 × BC₁ F₁ 2,292 loci, Shi et al, 2016

↓
CCRI36 × BC₂ F₁

↓
CCRI36 × BC₃ F₁

↓
CCRI36 × BC₄ F₁

↓
BC₅ F₁

⊗ Multiple generations of selfing

300 BC₅ F_{3:5} CSSLs

↓ Verticillium wilt traits and fiber yield and quality (Anyang and Shihezi, 2015 and 2016)

↓ QTL validation (597 SSR)

↓ QTL map

QTL forVerticillium wilt resistance(DI), fiber quality and yield related traits

- A total of **251** QTLs have been detected. Among them **98** of the fiber quality traits and **93** of the yield
- related traits,**60** for forVerticillium wilt resistance(DI) . Of these, **86** QTLs are consistent
- Three chromosomes **Chr05, Chr19 and Chr20** contained more QTLs

Table 1 QTL details in the CSSL population

	DI	FL	FS	FU	FM	FE	BW	LP	SI	PH	Total QTLs
Total QTLs	60	32	21	8	24	13	38	18	10	27	251
Stable QTLs	32	12	8	0	5	2	10	6	5	6	86
Located on Chr No.	21	15	11	6	16	9	17	10	5	15	-
Max. on one Chr.	15	6	5	2	3	3	4	4	5	5	-
Chr. having Max. No.	5	20	20	19	15	05	19	18	20	05	-

clusters for VW disease index and fiber related traits

- A total of **30** on **16** chromosomes. Chromosome **19** (**6** clusters)
- Most of the QTLs for **fiber traits** were clustered with the **disease index**.
- **Six** clusters, **C01-cluster-1**, **C05-cluster-4**, **C07-cluster-1**, **C19-cluster-2**, **C22-cluster-1** and **C22-cluster-2**, which had **positive** correlation between VW resistance and fiber quality traits.

➤ **Two** clusters, **C10-cluster-1** and **C25-cluster-1**

had also **positive** correlation between VW resistance and yield related traits, **boll weight** and **lint percentage**.

➤ **One** cluster, **C20-cluster-1** is important for both VW resistance and fiber related traits.

QTLs	Env	Triats	LOD	Add	PV (%)
qVW-Chr20-1	AYJuly15	VW	3.64	-6.31	6.74
	AYAUG15	VW	2.73	-4.07	4.53
	AYJul16	VW	2.80	-4.56	4.89
	AYAUG16	VW	3.41	-5.61	6.15
	XJJul16	VW	6.52	-6.54	11.14
	XJAug16	VW	5.73	-7.87	9.69
qBW-Chr20-1	AY15	BW	3.07	0.26	5.26
	XJ15	BW	2.56	0.14	4.72
	XJ16	BW	3.22	0.15	5.42
qLP-Chr20-1	XJ15	LP	5.76	1.01	9.46
	AY16	LP	2.87	1.01	4.99
	XJ16	LP	6.24	1.05	10.06
qFL-Chr20-5	AY15	FL	4.89	0.66	8.21
	XJ16	FL	4.19	0.44	7.26
	XJ15	FL	2.64	0.37	4.67
qFS-Chr20-5	AY15	FS	5.34	1.35	9.20
qFM-Chr20-1	XJ16	FM	3.56	0.12	6.46
	AY15	FM	3.60	0.13	5.48
qPH-Chr20-3	PHAY15	PH	2.92	3.18	4.77
	PHAY16	PH	3.39	4.07	5.70
	PHXJ16	PH	3.09	2.10	5.44
	PHAY16	PH	3.30	3.03	5.06