

Table 1 Suppl. Some drought-responsive QTLs discovered recently in cereal and food-legume crops.

Crops	Mapping population/diverse panel	Cross name/accessions	Targeted traits	Number of total QTL	Chromosome/linkage group	References
Wheat	RIL	Halberd × Karl92	Multiple trait (total yield, biomass, days to heading, days to maturity, grain-filling duration, <i>etc.</i>)	2	2DS and 5DL	Mason <i>et al.</i> 2013
	RIL	SeriM82 × Hartog	Root number	2	4A and 6A	Christopher <i>et al.</i> 2013
	RIL	SeriM82 × Hartog	Root angle	4	2A, 3D, 6A, 6B	Christopher <i>et al.</i> 2013
	RIL	C306 × HUW206	Drought resistance by several physiological traits	3	1D, 3B and 4A	Kumar <i>et al.</i> 2012
	DHL F ₂	ChineseSpring × Ciano 67	abscisic acid (ABA) concentration	1	5A	Quarrie <i>et al.</i> 1994
	RIL	Kofa × Svevo	yield and morpho-physiological traits under water-stressed conditions	76	1A, 3A, 5A.1, 5A.2, 6A, 7A, 1B.1, 1B.2, 1B.3, 2B, 3B, 4B, 6B and 7B	Graziani <i>et al.</i> 2014
	RIL and DH	24 Populations	drought and heat stress	66	1A, 1B, 1D, 2A, 2B, 2D, 3A, 3B, 3D, 4A, 4B, 4D, 5A, 5B, 5D, 6A, 6B, 6D, 7A, 7B and 7D	Acuña-Galindo <i>et al.</i> 2014
Rice		f OMI1490/WAB880-1-38-18-20-PI-HB	flowering, dry rootweight, rootlength, plant height, grain yield	4,3, 3, 2, 5	1,2,4,5,6, 8, 9, 10 and 12	Lang <i>et al.</i> 2013
	DH	Maybelle(<i>japonica</i>) × Baiyeqiu(<i>indica</i>)		5	3,5,6	Qun <i>et al.</i> 2011
	RIL and NIL	IR64 × Kinandang Patong (KP)	Deeprooting	1	9	Uga <i>et al.</i> 2011
	F ₂	ARC5955 × KPPinulupotl × KPTupa729 × KP	Deeprooting	1	4	Uga <i>et al.</i> 2013
	IL	Lemont × Teqing reciprocals	fertility and yield under stress	29 and 23		Wang <i>et al.</i> 2014
		N22 × MTU1010 and BSA for N22 × Swarna and N22 × IR64	at reproduction – genetic background grain yields affected by reproductive stage under drought			Vikram <i>et al.</i> 2011
			Root length		1	
Maize			Yield under drought	15	6	Obara <i>et al.</i> 2010
	DH, RIL, BC ₁ , BC ₂ , BC ₃ and F _{3,4}	15 different populations (meta-QTL study)			1, 2, 3, 4, 8, 10 and 12	Swamy <i>et al.</i> 2011
	F ₄	Os420 × IABO78	Leaf ABA	17	1,2 and 4	Sanguineti <i>et al.</i> 1999
	RIL	Ac7643 × Ac7729/ITZSR	Leaf elongation rate in correspondence with anthesis-silking interval (ASI)	5	1,2,5 and 8	Welcker <i>et al.</i> 2007
			Leaf temperature and seedling dry mass under drought stress	9	1,2,9 and 10	Liu <i>et al.</i> 2011
	RIL	Zong3 × 87-1	Roots traits and yield	1	-	Landi <i>et al.</i> 2010
	NIL	Lo964 × Lo1016	Leaf ABA concentration	16	1,2,3,4,6,7,9 and 10	Tuberosa <i>et al.</i> 1998

Barley	F _{2,3} or BC ₁ F ₃	threepopulations	grain yield and ASI over locations	multiple (8 Major)	1, 3, 4, 5, 7 and 10	Almeida <i>et al.</i> 2013
	Introgression lines (ILs)	18 populations	grain yield and ASI	65	1-10	Semagn <i>et al.</i> 2013
	BC ₃ -DHL	(Scarlett× <i>Hordeumvulgare</i> ssp. <i>sp.ontaneum</i>) × Scarlett	Growth under drought stressed	44		Honsdorf <i>et al.</i> 2014
		Brenda × <i>H. vulgare</i> ssp. <i>spontaneum</i>	Stem reserve utilization, grain development, and yield under terminal drought	7 'Hot spots'	1H,2H,3H,6H and7H	Kalladan <i>et al.</i> 2013
	RIL	-	variousregulatorycandidategenes chloroplast functionunderdrought	12	1H,2H,5H,6H and 7H 2H	Tondelli <i>et al.</i> 2006
PearlMillet		Arta × <i>Hordeumspontaneum</i> 41-1		2		Guo <i>et al.</i> 2008
	DHL	Derkado × B83-12/21/5	rootsize	-	1H,3H,4H,5H and 7H 1-7	Chloupek <i>et al.</i> 2006
	233 diverse	Landraces, cultivaed and wild	Genome wide association mapping for drought tolerance related traits	-		Varshney <i>et al.</i> 2012
	accessions	genotypes				
	RIL	Tadmor × Er/Amp	Osmotic adjustment under drought	12	1(7H), 6H	Teulat <i>et al.</i> 1997
Sorghum	BC ₂ DH	Scarlett ×ISR42-8	proline content	4	3H, 4H, 5H and 6H.	Sayed <i>et al.</i> 2012
			Leaf wilting	4	1H, 2H, 3H and 4H	
	F ₂ and F ₃	STH754 × STH836	Gas exchange, photochemical activity of photosystem II, and membrane integrity	18	All chromosomes except 1H	Wójcik-Jagla <i>et al.</i> 2013
			transpiration, water use efficiency	15	2H, 4H, 5H and 6H 1,2,4 and 7	Kholová <i>et al.</i> 2012
	RIL	Suweren × MOB12044		multipleQT		
Soybean		H77/833-2 × PRLT2/89-33		L		
		(PRLT 2/89-33) × (H 77/833-2)		1 Major	2	Sharma <i>et al.</i> 2014
		-	Different developmental stages	QTL		
				9	1, 2, 3 and 10	Sakhi <i>et al.</i> 2013
	Aassociation mapping panel		stay green	4	2, 3 and 5	Harris <i>et al.</i> 2007
Commonbean	NIL	BT3642 × RT37000	Nodal root angle, root and shoot dry masst, leaf area	4,3,2,3	1,2,5,8 and 10	Mace <i>et al.</i> 2012
	RIL		Seed yield per plant and drought susceptibility index	19 and 10	BI,C2, D1, H, I, J, K, L, and M	Du <i>et al.</i> 2009
	F _{2,7,11}	Kefeng1 × Nannong1138-2	Slow wilting trait	7	2,4,5,12,14,17 and 19	Haleem <i>et al.</i> 2012
	RIL	PI 416937 × Benning	Physiological traits	6	D2, G, M and N.	Yang <i>et al.</i> 2014
	Backcross inbred line (BIL)	SNWS0048 × Jinda73	roottraits, root and shoot biomass, root:shoot ratio	15	1,8,9,10 and 11	Asfaw and Blair 2012
Commonbean	RIL	BAT 477 × DOR 364	Traits like harvest index, leaf area index, canopy temperatured epression, SPAD chlorophyll meter reading	69	1-11	Asfaw <i>et al.</i> 2012
	RIL	BAT 477 × DOR 364	performance underdrought stress	14	1,3, 4, 7, 8, and 9	Mukeshimana <i>et al.</i> 2014
	RIL	SEA5 × CAL96				

Chickpea	RIL	ICC 283 × ICC 8261 and ICC 4958 × ICC 1882	drought-relevant root traits	45	1,2,3,4,5,6,7 and 8	Varshney <i>et al.</i> 2014
	RIL	ILC 588 × ILC 3279	grain yield under terminal drought stress	15	-	Rehman <i>et al.</i> 2011
Cowpea	RIL	IT93K503-1 × CB46	Seedling drought induced senescence	12	1,2,3,5,6,7,9, and 10	Muchero <i>et al.</i> 2009, 2010
	RIL	Mélodie/2 × ILB 938/2	Canopy temperature and stomatal traits	15	-	Khazaei <i>et al.</i> 2014

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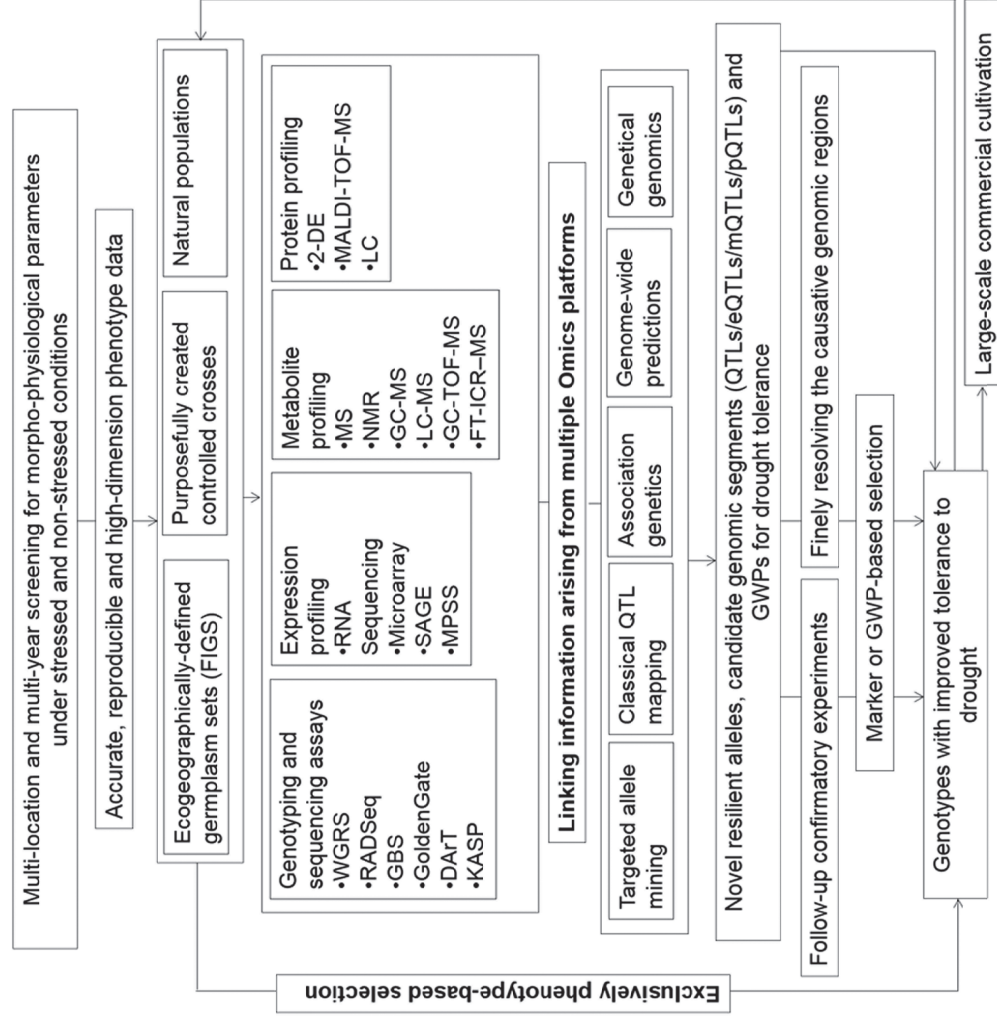


Fig. 1. The figure illustrates the rational integration of a range of "omics" assays to efficiently examine and utilize the trait variation. The trait-linked DNA markers/QTLs or genome wide association study (GWPs) can be used to select drought tolerant candidates. Once the tolerant genotype is identified, it can either be used directly for large-scale commercial cultivation or re-introduced as donor to the next cycle.