Supplementary Table 1: Literature review and reference citations of studies targeting different classes of traits related to drought tolerance in rice. (Source: Kamoshita et al. 2008)

Population		Phenotyping environment	Measured or mapped traits					Reference
			Plant-type	Phenology	Primary	Secondary	Yield and integrative	
1	CT/IR 100,154	Upland (Si), lowland (W, Si)	-	-	-	CT, DRS, DS,LD, LR	GY, BY, GW, PSS	Zhang et al. (1999)
	CT/IR 104	Upland (S)	-	-	CMS	-	-	Tripathy et al. (2000)
	CT/IR 154	Upland (S, hardpan)	-	-	OA, PRL, PRT, PRW, RPI, RT, RPF, TRW	-	-	Zhang et al. (2001a)
	CT/IR 154	Lowland (W, seedling stage)	-	-	DR%, DRW, DRW-T, RD, RT	-	SDW	Kamoshita et al. (2002a)
	CT/IR n.a.	Upland (W)	PH, TN, TPL	-	RN, RSLR, TRW	-	-	Kanbar et al. (2002)
	CT/IR 154	Upland (W, Si, St;2 wet & 1 dryseasons)	-	-	-	LR, LD, RWC	GY, BY, HI, SN	Babu et al. (2003)
	CT/IR 154	Lowland (W, Si, St;wet season)	PN	-	-	-	GY, BY, SN, PSS, GW	Lanceras et al. (2004)
	CT/IR n.a.	Upland (W, S)	PH, PL, PTN	DH	EW	CT, LD, LR, RWC	GY, BY, HI, SY	Srinivasan (2005)
	CT/IR 105	Lowland (W, St;2 years)	-	DH	RPF, TRW		GY, BY, DFT,HI, PSS, SDW	Kumar et al. (2007)
2	Co/Mo 203	Upland (W), Upland (S; 3)	-	-	DRW-T, MRL, RSDR,RT, TRW,	LR	-	Champoux et al. (1995)
	Co/Mo 202	Upland (W,hardpan)	-	-	PRN, RN, RPI	-	-	Ray et al. (1996)
	Co/Mo 42	Upland (S)	-	-	DT, OA	RWC	-	Lilley et al. (1996)
3	IR/Az 105	Upland (W)	-	-	DRSR, DRW, DRW-T, MRL, RT, TRW	-	-	Yadav et al. (1997)
	IR/Az 85-105	Upland (S; 3 sites/seasons)	-	-	-	LD, LR, RWC	RGR	Courtois et al. (2000)
	IR/Az 56	Upland (W, S (mild vegetative))	PH, TN	-	MRL, RL, RN, RSDR, RT, TRW, TRW-T	-	SDW	Hemamalini et al. (2000)
	IR/Az 109	Upland (W, hardpan)	-	-	PRN, PRT, RN, RPI	-	-	Zheng et al. (2000)
	IR/Az 90	Lowland (W), upland (Si), uplandp (W, S)	PL, PTN, TN	DH, DM	MRL, RN, RSDR, RT, RV, TRW	-	GY, SDW, SY	Venuprasad et al. (2002)
	IR/Az 85	Upland (W, S (flowering); 3 dry seasons)	PH, PN	DH	-	-	GY, RGY, GP, GW, PSS, SN	Lafitte et al. (2002b)

4	Ba/Az 178	Lowland	-	-	MRL, RCL, RT	-	-	Price and Tomos (1997)
	Ba/Az 178	Upland		DH	-	MLRS, RSC, SR, TFSC	-	Price et al. (1997)
	Ba/Az n.a.	Upland	-	-	RL	-	-	Price and Courtois (1999)
	Ba/Az 104	Upland	-	-	PRN, RN, RPI	-	-	Price et al. (2000)
	Ba/Az 110-176	Upland (S; 2 sites in 3 dry seasons)	-	-	-	LD, LR, RWC	-	Price et al. (2002d)
	Ba/Az 140	Upland (S; 2 seedling drought)	-	-	DRN, DRW, MRL, RSDR, RT, TRW	-	-	Price et al. (2002b)
	Ba/Az n.a.	Upland (W; 2 dry seasons)	-	-	$d^{13}C$, SLA	-	-	Price et al. (2002c)
	Ba/Az 96	Upland (W, Si (flowering); 2 dry seasons)	P H, PN	DH	-	LD, LR, RWC	GY, BY, FSP, GP, GW, HI, SF	Lafitte et al. (2004b)
	Ba/Az 177	Upland	P H, PL	DH	-	LD, LR	GY, SY	Gomez et al. (2005)
	Ba/Az 168	Upland (W, S)	P H	-	MRL, RT, DRW		SDW	MacMillan et al. (2006)
5	IR/IR 166	Upland (W, hardpan)	-	-	PRL, PRN, RPI, PRT, RN	-	-	Ali et al. (2000)
	IR/IR 166	Lowland (W; seedling stage)	-	-	DR%, DRW, DRW-T, RD, RT	-	SDW	Kamoshita et al. (2002b)
6	IA/Co 125	Upland (W)	P H, TN	-	DRSR, DRW, DRW-T,MRL, RT, TRW	-	SDW	Courtois et al. (2003)
7	I/I 150	Upland (S)	-	-	OA	-	-	Robin et al. (2003)
8	I/A 150	Lowland (W), upland (W)	-	-	SRL	-	-	Zhang et al. (2001b)
	I/A 96	Lowland (W), upland (S; mild)	-	-	ARN, LRL, LRN, SRL	-	-	Zheng et al. (2003)
9	I/Yu 116	Lowland (W), upland (Sv), uplandp (Sv)	-	-	MRL, RN, RSDR, RSFR, RT, TRFW, TRW	-	GY, IDR	Li et al. (2005)
10	Z/I 180	Lowland (W, Si (reproductive); 2 soils), uplandp (W, St)	-	-	DRV, MRD, RGV, RT	CT, LD, LR	DFT, DRI, RGY, RSF	Yue et al. (2005)
	Z/I 150	Upland (W, Si (flowering))	-	-	DIRD, DIDRV,DRV, MRD, RGD, RGV, RV	DLR, LD	RGY, RBY, RFP, RGW, RHI, RSF, RSN	Yue et al. (2006)

	Z/I 187	Upland (W, Si)	P N	-	-	-	GY, GP, GW, SF	Zou et al. (2005)
	Z/I 187	Upland (W, Si (reproductive stage))	P L, PN	-	-	-	GP, PBN, PND, SBN, SN	Liu et al. (2008)
11	T/L 254	Lowland (W, St; dry season)	P H, PN	DH	-	-	GY, GW	Xu et al. (2005)
12	I/N n.a.	Upland (W, S)	P H, TN	DH	RT	CT, DRS, LD, LR, RWC	BY	Boopathi et al. (2005)
	I/N n.a.	Upland (W, S)	P H, PL, TN DH	-		CT, DRS, LD, LR, RWC	GY, BY, HI, SY	Beena (2005)
13	A/I 106	Lowland (W, S)	-	-	-	-	RGR, WUE	Kato et al. (2008)
	A/I 106	Lowland (W)	-	-	BI, RAL, TRW	-	-	Horii et al. (2006)
14	O/Y 98	Lowland (W, S)	P H, PN	-	MNRL, NRN, RA, RSDR, TRW	–	SDW, SPDW	Ikeda et al. (2007)
15	V/W 436	Upland (W, S in 2 dry seasons)	P H, PN	DH	-	-	GY, DFT, DRI, HI, BY	Bernier et al. (2007)

(1) Plant-type traits contain plant height (PH), panicle length (PL), panicle number (PN), productive tiller number (PTN), tiller number (TN), and total plant length (TPL).
(2) Phenology contains days to heading/flowering (DH), and days to maturity (DM).
(3) Primary traits contain (3a) constitutive root traits and (3b) other induced traits.
(3a) Constitutive root traits are total root weight (TRW), total root fresh weight (TRFW), root to shoot dry weight ratio (RSDR), root to shoot fresh weight ratio (RSFR), deep root weight (DRW), deep root to total root dry weight ratio (DR%), deep root weight per tiller (DRW-T), deep root number (DRN), deep root to shoot dry weight ratio (DRSR), rooting depth (RD), root length (RL),maximum root length (MRL), total root number (RN), root shoot length ratio (RSLR), adventitious root number (ARN), lateral root number (LRN), lateral root length (LRL), seminal root length (SRL), root thickness at different depth (RT), root cell length (RCL), maximum root depth (cm) (MRD), root volume (RV), deep root rate (%) in volume (DRV), root growth rate in depth (cm/day) (RGD), root growth rate in volume (ml/day) (RGV), root pulling force (RPF), root axis length (RAL), branching index (BI), new root number (NRN), maximum new root length (MNRL), rooting ability after transplanting (RA).
(3b) Other primary induced traits are drought induced root growth in depth (cm) (DIRD), deep root rate in volume (%) induced by drought (DIDRV), penetrated root number (PRN), penetrated root thickness (PRT), root penetration index (RPI), penetrated root weight (PRW), penetrated root length (PRL), osmotic adjustment (OA), cell membrane stability (CMS), carbon isotope discrimination as water use efficiency (d13C), specific leaf area (SLA), dehydration tolerance (DT).
(4) Secondary traits contain modified leaf rolling score (MLRS), leaf rolling (LR), number of days to leaf rolling (DLR), leaf drying (LD), drought score (DS), drought recovery score (DRS), relative water content (RWC), canopy temperature (CT), stomatal resistance (SR), rate of stomatal closure (RSC), time of fastest stomatal closure (TFSC).
(5) Grain yield (GY) and integrative traits contain straw yield (SY), biomass yield (BY), delay in flowering time by drought (DFT), primary and secondary branch number in panicles (PBN, SBN), panicle neck diameter (PND), spikelet number (SN), percent spikelet sterility (PSS), fraction sterile panicle (FSP), grains per panicle (GP), spikelet fertility (SF), 1000-grain weight (GW), harvest index (HI), shoot dry weight (SDW), single panicle dry weight (SPDW), water use efficiency (WUE), relative grain yield (RGY), relative growth rate (RGR), relative spikelet fertility (RSF), relative biomass (RBY), relative rate of fertile panicle (RFP), relative harvest index (RHI), relative grain weight (RGW), relative number of spikelets per panicle (RSN), panicle harvest index (PHI), drought response index (DRI), index of drought resistance (IDR).

Ali, M.L., Pathan, M.S., Zhang, J., Bai, G., Sarkarung, S., Nguyen, H.T., 2000. Mapping QTLs for root traits in a recombinant inbred population from two indica ecotypes in rice. Theoretical Applied Genetics 101, 756–766.

Babu, R.C., Nguyen, B.D., Chamarerk, V., Shanmugasundaram, P., Chezhian, P., Jeyaprakash, P., Ganesh, S.K., Palchamy, A., Sadasivam, S., Sarkarung, S., Wade, L.J., Nguyen, H.T., 2003. Genetic analysis of drought resistance in rice by molecular markers: association between secondary traits and field performance. Crop Science 43, 1457–1469.

Beena, 2005. Studies on physio-morphological traits and genetic markers associated with drought response in rice (O. sativa). PhD thesis. Tamil Nadu Agricultural University, Coimbatore, India.

Bernier, J., Kumar, A., Ramaiah, V., Spaner, D., Atlin, G., 2007. A large-effect QTL for grain yield under reproductive-stage drought stress in upland rice. Crop Science 47, 507–518.

Boopathi, N.M., Chezhain, P., Jeyaprakash, P., Satheesh Kumar, S., Gomez, M., Suresh, R., Atlin, G., Subudhi, P.K., Shanmugasundaram, P., Babu, R.C., 2005. QTL mapping of drought-resistance traits using indica rice (Oryza sativa L.) lines adapted to target population of environment. In: Proceedings of the 2nd International Conference on Integrated Approaches to Sustain and Improve Plant Production under Drought Stress. University of Rome, ''La Sapienza'', Rome, Italy, September 24–28 P6.05.

Champoux, M.C., Wang, G., Sarkarung, S., Mackill, D.J., O'Toole, J.C., Huang, N., McCouch, S.R., 1995. Locating genes associated with root morphology and drought avoidance in rice via linkage to molecular markers. Theoretical Applied Genetics 90, 969–981.

Courtois, B., McLaren, G., Sinha, P.K., Prasad, K., Yadav, R., Shen, L., 2000. Mapping QTLs associated with drought avoidance in upland rice. Molecular Breeding 6, 55–66.

Courtois, B., Shen, L., Petalcorin, W., Carandang, S., Mauleon, R., Li, Z., 2003. Locating QTLs controlling constitutive root traits in the rice population IAC165 Co39. Euphytica 134, 335–345.

Gomez, M., Babu, R.C., Shanmugasundaram, P., Satheesh Kumar, R., Suresh, R., Biji, K.R., Boopathi, N.M., Jeyaprakash, P., Gurumurthy, S., Price, A.H., 2005. QTL mapping and marker assisted selection for drought tolerance in rice (*Oryza sativa* L.). In: Proceedings of the 2nd International Conference on Integrated Approaches to Sustain and Improve Plant Production under Drought Stress. University of Rome, ''La Sapienza'', Rome, Italy, September 24–28 P6.19.

Hemamalini, G.S., Sashidhar, H.E., Hittalmani, S., 2000.Molecularmarker assisted tagging of morphological and physiological traits under two contrasting moisture regimes at peak vegetative stage in rice (Oryza sativa L.). Euphytica 112, 1–10.

Horii, H., Nemoto, K., Miyamoto, N., Harada, J., 2006. Quantitative trait loci for adventitious and lateral roots in rice (Oryza sativa L.). Plant Breeding 125, 198– 200.

Ikeda, H., Kamoshita, A., Manabe, T., 2007. Genetic analysis of rooting ability of transplanted rice (Oryza sativa L.) under different water conditions. Journal of Experimental Botany 58, 309–318.

Kamoshita, A., Wade, L.J., Ali, M.L., Pathan, M.S., Zhang, J., Sarkarung, S., Nguyen, H.T., 2002b. Mapping QTLs for root morphology of a rice population adapted to rainfed lowland conditions. Theoretical Applied Genetics 104, 880–893.

Kamoshita, A., Zhang, J., Siopongco, J., Sarkarung, S., Nguyen, H.T., Wade, L.J., 2002a. Effects of phenotyping environment on identification of QTL for rice root morphology under anaerobic conditions. Crop Science 42, 255–265.

Kanbar, A., Shashidhar, H.E., Hittalmani, S., 2002. Mapping QTL associated with root and related traits in DH population of rice. Indian Journal of Genetics 62, 287–290.

Kato, Y., Hirotsu, S., Nemoto, K., Yamagishi, J., 2008. Identification of QTLs controlling rice drought tolerance at seedling stage in hydroponic culture. Euphytica 160, 423–430.

Kumar, R., Venuprasad, R., Atlin, G.N., 2007. Genetic analysis of rainfed lowland rice drought tolerance under naturally-occurring stress in eastern India: heritability and QTL effects. Field Crops Research 103, 42–52.

Lafitte, H.R., Price, A.H., Courtois, B., 2004b. Yield response to water deficit in an upland rice mapping population: associations among traits and genetic markers. Theoretical Applied Genetics 109, 1237–1246.

Lafitte, R., Courtois, B., Arraudeau, M., 2002b. Genetic improvement of rice in aerobic systems: progress from yield to genes. Field Crops Research 75, 171–190.

Lanceras, J.C., Pantuwan, G., Jongdee, B., Toojinda, T., 2004. Quantitative trait loci associated with drought tolerance at reproductive stage in rice. Plant Physiology 135, 384–399.

Li, Z.,Mu, P., Li, C., Zhang, H., Li, Z., Gao, Y.,Wang, X., 2005. QTLmapping of root traits in a doubled haploid population from a cross between upland and lowland japonica rice in three environments. Theoretical Applied Genetics 110, 1244–1252.

Lilley, J., Ludlow, M., McCouch, S., O'Toole, J.C., 1996. Locating QTL for osmotic adjustment and dehydration tolerance in rice. Journal of Experimental Botany 47, 1427–1436.

Liu, G., Mei, H.W., Yu, X.Q., Zou, G.H., Liu, H.Y., Hu, S.P., Li, M.S., Wu, J.H., Chen, L., Luo, L.J., 2008. QTL analysis of panicle neck diameter, a trait highly correlated with panicle size, under well-watered and drought conditions in rice (Oryza sativa L.).Plant Science 174, 71–77.

MacMillan, K., Emrich, K., Piepho, H.P., Mullins, C.E., Price, A.H., 2006. Assessing the importance of genotype environment interaction for root traits in rice using a mapping population. II. Conventional QTL analysis. Theoretical Applied Genetics 113, 953–964.

Price, A.H., Cairns, J.E., Horton, P., Jones, H.G., Griffiths, H., 2002c. Linking drought resistance mechanisms to drought avoidance in upland rice using a QTL approach: progress and new opportunities to integrate stomatal and mesophyll responses. Journal of Experimental Botany 53, 989–1004.

Price, A.H., Courtois, B., 1999. Mapping QTLs associated with drought resistance in rice: progress, problems and prospects. Plant Growth Regulation 29, 123– 133.

Price, A.H., Steele, K.A., Moore, B.J., Barraclough, P.B., Clark, L.J., 2000. A combined RFLP and AFLP linkage map of upland rice (*Oryza sativa* L.) used to identify QTLs for root-penetration ability. Theoretical Applied Genetics 100, 49–56.

Price, A.H., Steele, K.A., Moore, B.J., Jones, R.G.W., 2002b. Upland rice grown in soil filled chambers and exposed to contrasting water-deficit regimes. II. Mapping quantitative trait loci for root morphology and distribution. Field Crops Research 76, 25–43

Price, A.H., Tomos, A.D., 1997. Genetic dissection of root growth in rice (*Oryza sativa* L.). II. Mapping quantitative trait loci using molecular markers. Theoretical Applied Genetics 95, 143–152.

Price, A.H., Townend, J., Jones, M.P., Audebert, A., Courtois, B., 2002d. Mapping QTLs associated with drought avoidance in upland rice grown in the Philippines and West Africa. Plant Molecular Biology 48, 683–695.

Price, A.H., Young, E.M., Tomos, A.D., 1997. Quantitative trait loci associated with stomatal conductance, leaf rolling and heading date mapped in upland rice (*Oryza sativa*). New Phytologist 137, 83–91.

Ray, J.D., Yu, L., McCouch, S.R., Champoux, M.C., Wang, G., Nguyen, H.T., 1996. Mapping quantitative trait loci associated with root penetration ability in rice. Theoretical Applied Genetics 92, 627–636.

Robin, S., Pathan, M.S., Courtois, B., Lafitte, R., Carandang, S., Lanceras, S., Amante, M., Nguyen, H.T., Li, Z., 2003. Mapping osmotic adjustment in an advanced backcross inbred population of rice. Theoretical Applied Genetics 107, 1288–1296.

Srinivasan, S., 2005. Studies on mapping QTLs linked to leaf epicuticular wax, physio-morphological and plant production traits under water stress and non-stress conditions in rice (*Oryza sativa* L.). PhD Thesis. Submitted to Tamil Nadu Agricultural University, Coimbatore, India.

Tripathy, J.N., Zhang, J., Robin, S., Nguyen, T.T., Nguyen, H.T., 2000. QTLs for cell membrane stability mapped in rice (Oryza sativa L.) under drought stress. Theoretical Applied Genetics 100, 1197–1202.

Venuprasad, R., Shashidhar, H.E., Hittalmani, S., Hemamalini, G.S., 2002. Tagging quantitative trait loci associated with grain yield and root morphological traits in rice (*Oryza sativa* L.) under contrasting moisture regimes. Euphytica 128, 293–300.

Xu, J.L., Lafitte, H.R., Gao, Y.M., Fu, B.Y., Torres, R., Li, Z.K., 2005. QTLs for drought escape and tolerance identified in a set of random introgression lines of rice. Theoretical Applied Genetics 111, 1642–1650.

Yadav, R., Courtois, B., Huang, N., McLaren, G., 1997. Mapping genes controlling root morphology and root distribution in a doubled-haploid population of rice. Theoretical Applied Genetics 94, 619–632.

Yue, B., Xiong, L., Xue, W., Xing, Y., Luo, L., Xu, C., 2005. Genetic analysis for drought resistance of rice at reproductive stage in field with different types of soil. Theoretical Applied Genetics 111, 1127–1136.

Yue, B., Xue, W., Xiong, L., Yu, Z., Luo, L., Cui, K., Jin, D., Xing, Y., Zhang, Q., 2006. Genetic basis of drought resistance at reproductive stage in rice: separation of drought resistance from drought avoidance. Genetics 172, 1213–1228.

Zhang, J., Babu, R.C., Pantuwan, G., Kamoshita, A., Blum, A., Wade, L.J., Sarkarung, S., O'Toole, J.C., Nguyen, H.T., 1999. Molecular dissection of drought tolerance in rice: from physio-morphological traits to field performance. In: Ito, O., O'Toole, J., Hardy, B. (Eds.), Genetic Improvement of Rice for Water-limited Environments. Proceedings of the Workshop on Genetic Improvement of Rice for Water-limited Environments, International Rice Research Institute, Los Banos, Philippines, December 1–3, 1998, pp. 331–343.

Zhang, J., Zheng, H.G., Aarti, A., Pantuwan, G., Nguyen, T.T., Tripathy, J.N., Sarial, A.K., Robin, S., Babu, R.C., Nguyen, B.D., Sarkarung, S., Blum, A., Nguyen, H.T., 2001a. Locating genomic regions associated with components of drought resistance inrice: comparative mapping within and across species. Theoretical Applied Genetics 103, 19–29.

Zhang, W.P., Shen, X.Y., Wu, P., Hu, B., Liao, C.Y., 2001b. QTLs and epistasis for seminal root length under a different water supply in rice (Oryza sativa L.). Theoretical Applied Genetics 103, 118–123.

Zheng, B.S., Yang, L., Zhang, W.P., Mao, C.Z., Wu, Y.R., Yi, K.K., Liu, F.Y., Wu, P., 2003. Mapping QTLs and candidate genes for rice root traits under different water supply conditions and comparative analysis across three populations. Theoretical Applied Genetics 107, 1505–1515.

Zheng, H.G., Babu, R.C., Pathan, Md.M.S, Ali, L., Huang, N., Courtois, B., Nguyen, H.T., 2000. Quantitative trait loci for root-penetration ability and root thickness in rice: comparison of genetic backgrounds. Genome 43, 53–61.

Zou, G.H.,Mei, H.W., Liu, H.Y., Liu, G.L., Hu, S.P., Yu, X.Q., Li,M.S.,Wu, J.H., Luo, L.J., 2005. Grain yield responses to moisture regimes in a rice population: association among traits and genetic markers. Theoretical Applied Genetics 112, 106–113.