

### Accessory Publication

**Table S1. Analysis of variance for yield of six wheat sister lines and parents grown in irrigated and drought environments for 2 years in NW Mexico**

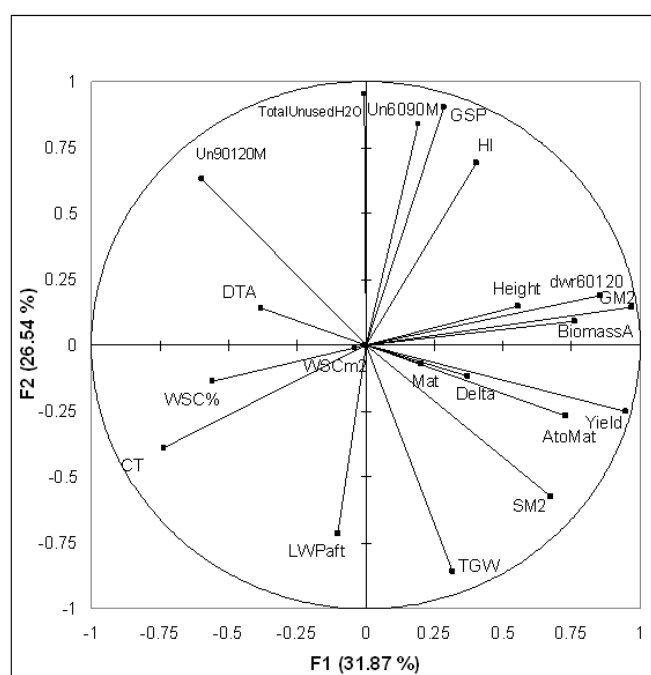
Degrees of freedom (DF) for each source of variation, year, environment, genotype effects and interactions between these factors is shown with sum of squares and corresponding percentage of variance explained by each factor. Contrasts were used to partition genotype effects (sum of squares) in ‘between parents’, ‘among lines’ and ‘between lines and parents’. \*\*\*, significant at  $P < 0.005$ ; \*\*, significant at  $P < 0.01$ ; ns, not significant

Source	DF	Sum of squares (explained %)
Year	1	29144 (1.1)***
Environment	1	2339877 (91.4)***
Year*Environment	1	4459 (0.2)**
Year*Environment*Block	4	6835 (0.3)*
Genotype	7	108344 (4.2)***
Between parents	1	24531 (1.2)***
Among lines	5	53803 (2.1)***
Between lines and parents	1	30010 (0.9)***
Year*Genotype	7	3247 (0.1)ns
Environment*Genotype	7	27429 (1.1)***
Year*Environment*Genotype	7	24202 (0.9)***
Error	28	17477 (0.7)

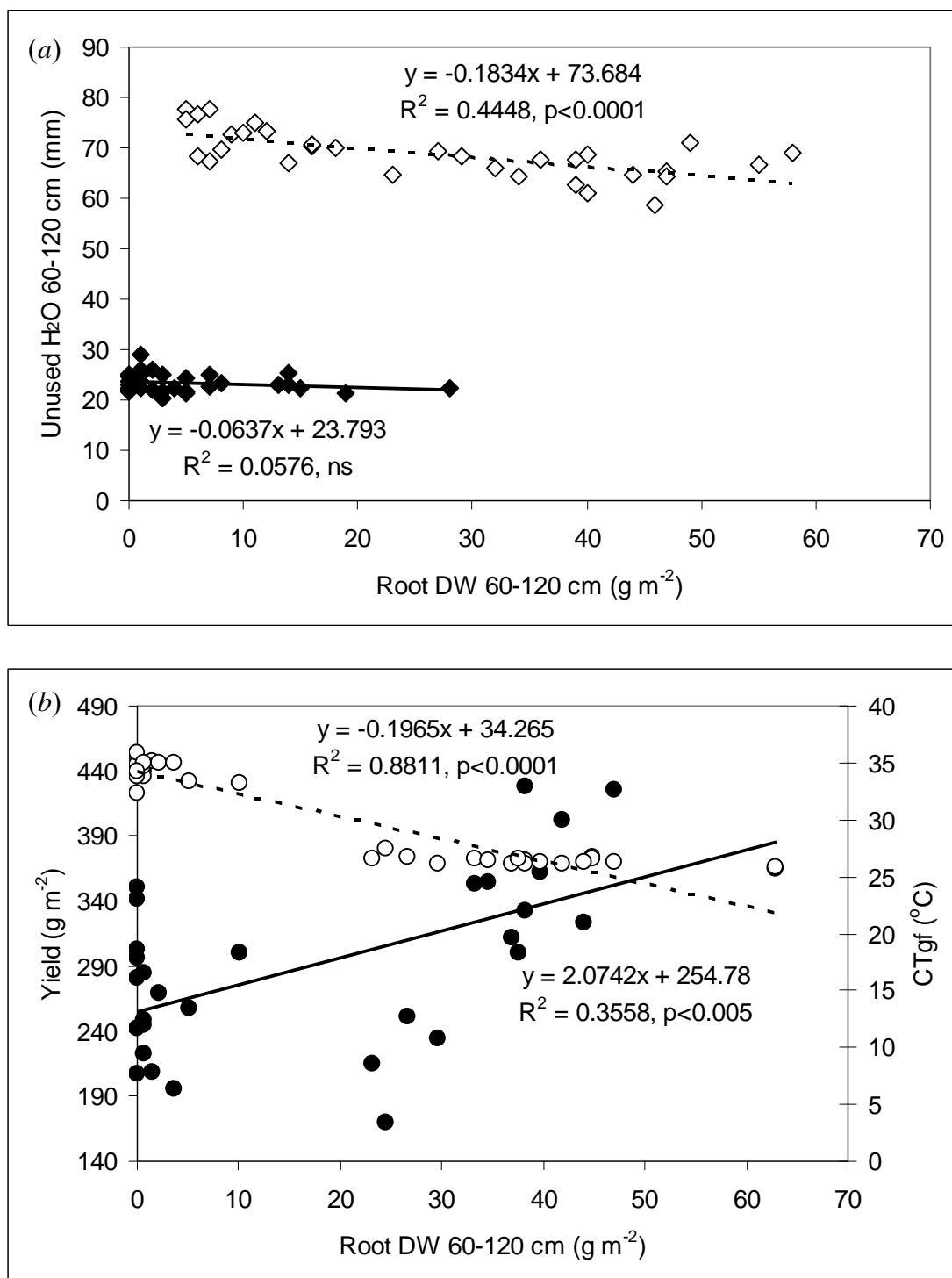
**Table S2. Analysis of variance for agronomic and physiological traits under drought of a group of six sister lines and parents measured during two seasons (2006 and 2007)**

Yield potential corresponds to mean yield of 2 years under optimal irrigation. ‡  $P = 0.18$ ; \*\*\* significant at  $P < 0.005$ ; \*\* significant at  $P < 0.01$ ; \* significant at  $P < 0.05$ ; ns, not significant; nd, not determined. Abbreviations used: yield potential (yield under irrigated conditions), yield (yield measured under drought), TGW (thousand grain weight), Biomass A (biomass at anthesis), HI (harvest index), DTA (days to anthesis), WSC A (%) (water soluble carbohydrates at around anthesis in %), WSC ( $\text{g m}^{-2}$ ) (water soluble carbohydrates expressed on an area basis), CT<sub>gf</sub> (canopy temperature at grain filling), RWC<sub>gf</sub> (relative water content at grain filling), LWP<sub>aft</sub> (leaf water potential measured in the afternoon), Root DW 10–120 cm (root dry weight at the specified depth at anthesis), unused H<sub>2</sub>O 60–120 cm (water left in the soil at the specified depth taken at maturity),  $\Delta^{13}\text{C}$  leaf and grain (leaf and grain carbon isotope discrimination)

Trait/Df	Year	Year*Block	Gen	Year*Gen	Error
	1	2	7	7	14
Yield potential	7.1*	1.1ns	61.3***	17.7ns	12.8
Yield	19.5***	4.1*	61.4***	9.6*	5.4
Stress index	14.0***	5.0*	54.1***	20.5**	6.4
Height	7.4*	5.1ns	42.5**	27.5*	17.5
Grains $\text{m}^{-2}$	7.0**	4.5*	67.4***	13.2*	7.9
Spikes $\text{m}^{-2}$	25.1***	6.1*	48.1***	12.1*	8.6
Grains spike <sup>-1</sup>	9.8*	2.2ns	58.5***	15.3ns	14.2
TGW	69.8***	0.2ns	20.0***	6.9*	3.1
Biomass A	23.1***	14.1**	17.1*	31.7**	13.9
HI	80.5***	0.4ns	5.9**	11.2***	2.0
Shoots $\text{m}^{-2}$	78.9***	0.0ns	0.9ns	8.7ns	11.3
Root to shoot	63.6***	6.9ns	5.7ns	4.8ns	18.9
DTA	3.4*	0.3ns	86.8***	5.4ns	4.1
Days to maturity	44.8***	2.4ns	31.3**	11.9ns	9.6
Days anthesis to maturity	40.8***	1.8ns	37.1**	8.7ns	11.6
WSC A (%)	56.9***	0.2ns	30.6***	4.1ns	8.2
WSC ( $\text{g m}^{-2}$ )	81.8***	0.5ns	9.6*	3.0ns	5.1
CT <sub>gf</sub>	97.2***	0.1ns	1.5*	0.7ns	0.5
RWC <sub>gf</sub>	34.4***	1.2ns	25.3ns	18.0ns	21.1
LWP <sub>aft</sub>	74.1***	3.0*	9.2**	10.2**	3.5
Wax	46.6***	5.1ns	13.3ns	10.5ns	24.5
Leaf rolling	7.7*	8.2*	47.8**	21.3*	15.0
Root DW 10–60 cm	81.6***	2.0ns	2.1ns	1.3ns	13.0
Root DW 60–120 cm	75.5***	2.1ns	8.3‡	4.4ns	9.7
Unused H <sub>2</sub> O 60–90 cm	98.9***	0.1ns	0.4*	0.3ns	0.3
Unused H <sub>2</sub> O 90–120 cm	98.7***	0.0ns	0.7*	0.2ns	0.4
$\Delta^{13}\text{C}$ leaf	Nd	nd	86.5***	nd	13.5
$\Delta^{13}\text{C}$ grain	0.6ns	3.4ns	64.4***	16.9ns	14.7ns



**Fig. S1.** Principal component analysis (F1 and 2) of performance and traits measured under drought for six wheat sister lines and parents in a combined analysis for 2006 and 2007. Variables included in the PCA: yield, grains  $\text{m}^{-2}$  (GM2), biomass at anthesis (BiomassA), thousand grain weight (TGW), harvest index (HI), spikes  $\text{m}^{-2}$  (SM2), grains spike $^{-1}$  (GSP), plant height (Height), unused water at 60–90 and 90–120 cm (Un6090M and Un90-120M), grain carbon isotope discrimination (Delta), grain filling duration (AtoMat), days to maturity (Mat), canopy temperature at grain filling (CT), water soluble carbohydrates in percentage and per square meter (WSC % and WSC in  $\text{g m}^{-2}$  respectively) leaf water potential measured in the afternoon (LWPaft) and days to anthesis (DTA).



**Fig. S2.** Phenotypic associations under drought conditions between root dry weight at 60–120 cm depth and unused H<sub>2</sub>O at 60–120 cm in 2006 (dark diamonds and solid line) and in 2007 (open diamonds and dashed line) (a). In (b) root dry weight (60–120 cm) with yield (dark circles and solid line) and canopy temperature at grain filling (CTgf) (open circles and dashed line) using means of both years. Regression equations, R<sup>2</sup> and probabilities are shown.