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| **Supplementary Table 2.** Description of the different phenotypic datasets used for QTL validation through genomewide association mapping.  |
| **Dataset** | **Description** |
| ABLUP | BLUP across all environments |
| ABLUP10 | BLUP across all environments, 2010 |
| ABLUP11 | BLUP across all environments, 2011 |
| ABLUPH | BLUP across environments with *H2*> 0.50 |
| ABLUPH10 | BLUP across all environments with *H2*> 0.50, 2010 |
| ABLUPH11 | BLUP across all environments with *H2*> 0.50, 2011 |
| AFRBLUP | BLUP across all African environments |
| AFRBLUP10 | BLUP across all African environments, 2010 |
| AFRBLUP11 | BLUP across all African environments, 2011 |
| AFRBLUPH | BLUP across all African environments with *H2*> 0.50 |
| ASIABLUP | BLUP across all Asian environments |
| ASIABLUP10 | BLUP across all Asian environments, 2010 |
| ASIABLUP11 | BLUP across all Asian environments, 2011 |
| ASIABLUPH | BLUP across all Asian environments with *H2* > 0.50 |
| BJ10BLUE | BLUE across Bangladesh (Joydebpur) environment, 2010 |
| BJ11BLUE | BLUE across Bangladesh (Joydebpur) environment, 2011 |
| BLUPBANG | BLUP across Bangladesh environments |
| BLUPBANGH | BLUP across Bangladesh environments, *H2*> 0.50 |
| BLUPEGYPT | BLUP across Egypt environments |
| BLUPEGYPTH | BLUP across Egypt environments, *H2*> 0.50 |
| BLUPIND | BLUP across India environments |
| BLUPINDH | BLUP across India environments, *H2* > 0.50 |
| BLUPMEX | BLUP across Mexico environments |
| BLUPMEXH | BLUP across Mexico environments, *H2* > 0.50 |
| BLUPNEPAL | BLUP across Nepal environments |
| BLUPNEPALH | BLUP across Nepal environments, *H2* > 0.50 |
| BLUPPAKISTAN | BLUP across Pakistan environments |
| BLUPPAKISTANH | BLUP across Pakistan environments, *H2* > 0.50 |
| BLUPSUD | BLUP across Sudan environments |
| BLUPSUDH | BLUP across Sudan environments, *H2*> 0.50 |
| EE10BLUE | BLUE across Egypt (El mat) environment, 2010 |
| ES10BLUE | BLUE across Egypt (Souhag) environment, 2010 |
| ID10BLUE | BLUE across India (Delhi) environment, 2010 |
| ID11BLUE | BLUE across India (Delhi) environment, 2011 |
| IH10BLUE | BLUE across India (Dharwad) environment, 2010 |
| IH11BLUE | BLUE across India (Dharwad) environment, 2011 |
| II10BLUE | BLUE across India (Indore) environment, 2010 |
| II11BLUE | BLUE across India (Indore) environment, 2011 |
| IK10BLUE | BLUE across India (Karnal) environment, 2010 |
| IK11BLUE | BLUE across India (Karnal) environment, 2011 |
| IL10BLUE | BLUE across India (Ludhiana) environment, 2010 |
| IL11BLUE | BLUE across India (Ludhiana) environment, 2011 |
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| **Supplementary Table 2.** Description of the different phenotypic datasets used for QTL validation through genomewide association mapping (Cont.). |
| **Dataset** | **Description** |
| IV10BLUE | BLUE across India (Varanasi) environment, 2010 |
| MD10BLUE | BLUE across Mexico (Obregon) environment, 2010, Drought |
| MEXBLUP | BLUP across all Mexico environments; also equivalent to BLUP across all North American locations |
| MEXBLUP10 | BLUP across all Mexico environments; also equivalent to BLUP across all North American locations, 2010 |
| MEXBLUP11 | BLUP across all Mexico environments; also equivalent to BLUP across all North American locations, 2011 |
| MEXBLUPH | BLUP across all Mexico environments with *H2* > 0.50; also equivalent to BLUP across all North American locations |
| MEXBLUPH10 | BLUP across all Mexico environments; also equivalent to BLUP across all North American locations, 2010, *H2*> 0.50 |
| MEXBLUPH11 | BLUP across all Mexico environments; also equivalent to BLUP across all North American locations, 2011, *H2*> 0.50 |
| MH10BLUE | BLUE across Mexico (Obregon) environment, 2010, Heat |
| MHD10BLUE | BLUE across Mexico (Obregon) environment, 2010, Heat Drought |
| MI10BLUE | BLUE across Mexico (Obregon) environment, 2010, Irrigated |
| NB10BLUE | BLUE across Nepal (Bhairahwa) environment, 2010 |
| NB11BLUE | BLUE across Nepal (Bhairahwa) environment, 2011 |
| PI10BLUE | BLUE across Pakistan (Islamabad) environment, 2010 |
| SD10BLUE | BLUE across Sudan (Dongola) environment, 2010 |
| SH10BLUE | BLUE across Sudan (Hudeiba) environment, 2011 |
| SW10BLUE | BLUE across Sudan (Wad Madani) environment, 2010 |