**Table S2** Ecological location for measuring kernel length (KL), kernel width (KW), kernel thickness (KT), thousand-kernel weight (TKW), kernel length-width ratio (LWR), kernel size (KS), factor form density (FFD), spikelet number per spike (SNS), plant height (PH), productive tiller number (PTN), Anthesis date (AD), flag leaf length (FLL), flag leaf length width (FLW), spike length (SL), and spike density (SD).

|  |  |  |  |
| --- | --- | --- | --- |
| **Population** | **Traits** | **Environments** | **References** |
| 2SY | KL | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | KW | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | KT | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | TKW | 2017CZ 2017YA 2019CZ 2019WJ | [1] |
|  | TKW | 2018CZ 2018YA | this study |
|  | LWR | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | KS | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | FFD | 2017CZ 2017YA 2018CZ 2018YA 2019CZ 2019WJ | this study |
|  | SNS | 2017CZ 2017WJ 2017YA 2018WJ 2018CZ 2018YA | [1] |
|  | PH | 2017CZ 2017WJ 2017YA 2018WJ 2018CZ 2018YA | [1] |
|  | PTN | 2017CZ 2017WJ 2017YA 2019CZ 2019WJ 2019YA 2019KB | [1] |
|  | AD | 2017WJ 2017CZ 2018WJ 2018CZ | [1] |
|  | FLL | 2017CZ 2017WJ 2017YA 2018WJ 2018CZ 2018YA 2019WJ 2019CZ 2019YA | [2] |
|  | FLW | 2017CZ 2017WJ 2017YA 2018WJ 2018CZ 2018YA 2019WJ 2019CZ 2019YA | [2] |
|  | SL | 2017CZ 2017WJ 2017YA 2018CZ 2018WJ 2018YA 2018KB | [3] |
|  | SD | 2017CZ 2017WJ 2017YA 2018CZ 2018WJ 2018YA 2018KB | this study |
| SSY | KL | 2020CZ | this study |
| MTL4SY | KL | 2020CZ | this study |

**Note:**

Population: 2SY: 20828 / SY95-71; SSY: S849-8 / SY95-71; MTL4SY: MTL4 / SY95-71

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