

Supplementary data

Rapid separation and identification of wheat HMW glutenin subunits by UPLC and comparative analysis with HPLC

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Supplementary Table 1. HMW-GS compositions of 111 common wheat cultivars and related species germplasms used in this study .

| No. | Cultivars and accessions | Species | Origin | HMW-GS compositions | | |
|-------|--|--------------------|--------|---------------------|---------------|---------------|
| | | | | <i>Glu-A1</i> | <i>Glu-B1</i> | <i>Glu-D1</i> |
| 1-2 | Nongda 99, Nongda 3214, | <i>T. aestivum</i> | China | N | 6+8 | 2+12 |
| 3-6 | Chinese Spring, Zhengmai 9023, CA9722, Ji 3475, | <i>T. aestivum</i> | China | N | 7+8 | 2+12 |
| 7-8 | Nongda 3197, Jinmai 50 | <i>T. aestivum</i> | China | N | 7+8 | 3+12 |
| 9-11 | Zhongyou 9701, Zhongyou 9814, Zhengzhou 81-1 | <i>T. aestivum</i> | China | N | 7+8 | 5+10 |
| 12-18 | Xiaoyan 6, Xiaoyan 54, HP82-2-2, HP85-16, Linfen 137, Lumai 23, Shannong 990525 | <i>T. aestivum</i> | China | 1 | 20x+20y | 2+12 |
| 19-21 | Shanyou 225, Wanmai 33, PH1521, Shan 229 | <i>T. aestivum</i> | China | 1 | 20x+20y | 5+10 |
| 23 | Ji Z76 | <i>T. aestivum</i> | China | N | 20x+20y | 4+12 |
| 24 | Jimai 19 | <i>T. aestivum</i> | China | N | 13+16 | 5+10 |
| 25-26 | Lu 955159, Jimai 20 | <i>T. aestivum</i> | China | 1 | 13+16 | 4+12 |
| 27-29 | Yannong 15, Shan 302518, Shannong 664 | <i>T. aestivum</i> | China | 1 | 7+9 | 4+12 |
| 30-32 | Neixiang 188, Zhongyou 9507, Bussard | <i>T. aestivum</i> | China | 1 | 7+9 | 5+10 |
| 33-38 | Jingdong 8, CA8686, Zhongyou 5, Yumai 21, Shan 7859, Yangmai 5 | <i>T. aestivum</i> | China | N | 7+9 | 2+12 |
| 39-41 | Yuandong 6, Jinnong 207, Yangmai 9 | <i>T. aestivum</i> | China | N | 7+9 | 5+10 |
| 42-52 | Gaocheng 8901, Yumai 34, Lumai 21, Liken 2, Annong 91168, Nongda 152, Jinan 17, Zhongyou 14, Zhongyou16, Zhongyou 9843, Zhongyou 9844, | <i>T. aestivum</i> | China | 1 | 7+8 | 5+10 |
| 53-54 | Karl, Splendor | <i>T. aestivum</i> | USA | 1 | 7+8 | 5+10 |
| 55-61 | Ningchun 4, Gaoyou 503, Yumai 47, Shan 150, Shan 160; Nongda 116, Jinan 16 | <i>T. aestivum</i> | China | 1 | 7+8 | 2+12 |

| | | | | | | |
|---------|---|-----------------------|-----------|-------|--------------|--------|
| 62-63 | CB037, Ji 5066 | <i>T. aestivum</i> | China | 1 | 17+18 | 2+12 |
| 64-65 | CB037-B, Yanyou 361 | <i>T. aestivum</i> | China | 1 | 17+18 | 5+10 |
| 66-67 | Hortag, Sunstate | <i>T. aestivum</i> | Australia | 1 | 17+18 | 5+10 |
| 68 | CS-1C(1A) | <i>T. aestivum</i> | Germany | Cx2** | 7 | 3*+12 |
| 69 | CS-1S ¹ (1B) | <i>T. aestivum</i> | Germany | N | Sx2.3*+Sy18* | 2+12 |
| 70-71 | Imbross, Hanno | <i>T. aestivum</i> | Germany | 1 | 14+15 | 5+10 |
| 72 | History-1 | <i>T. aestivum</i> | Germany | 1 | 14+15 | 2+12 |
| 73-74 | Rochbergers fruher Dinke, Waggershauser Hohenheimer | <i>T. spelta</i> | Germany | N | 13*+19* | 2+12 |
| 75-77 | Reiners weisser schlegel, Renval, TRI9885/74 | <i>T. spelta</i> | Germany | 1 | 13*+19* | 2+12 |
| 78-86 | Duhamelianum, Neuegger weisskorn, Schwabenkorn, Zuger Dinkel, Voglers Dinkel, Albin, Alkor, Ostro, Oberkulmer Rotkorn | <i>T. spelta</i> | Germany | 1 | 6.1+22.1 | 2+12 |
| 87 | Hubel | <i>T. spelta</i> | Germany | 1 | 6.1+22.1 | 5+10 |
| 88 | NGB4798.1 | <i>T. spelta</i> | Sweden | N | 7 | 5+10 |
| 89-90 | Spelt 99, Spelt 127 | <i>T. spelta</i> | Germany | 1 | 6.1 | 2+12 |
| 91-92 | Spelt 137, Spelt 186 | <i>T. spelta</i> | Germany | 2.1* | 13+22* | 2+12 |
| 93-95 | Baulander Spelz, TRI4318/75, TRI12943/84 | <i>T. spelta</i> | Germany | 1 | 13+16 | 2+12 |
| 96 | Spelt 166 | <i>T. spelta</i> | Germany | 1 | 13+16 | 12 |
| 97-99 | Spelt 16, Spelt 182, Spelt 183 | <i>T. spelta</i> | Germany | 1 | 13+22* | 2+12 |
| 100 | Spelt 217 | <i>T. spelta</i> | Germany | 1 | 13+22.1 | 2+12 |
| 101-102 | Grey, TRI2128/75 | <i>T. spelta</i> | England | 1 | 13+16 | 3+12 |
| 103 | Simeto | <i>T. durum</i> | Italy | N | 7+8 | - |
| 104 | Bidi 17 | <i>T. durum</i> | Italy | N | 20x+20y | - |
| 105 | PI377653, | <i>T. dicoccum</i> | Serbia | 2* | 14.1+22* | - |
| 106 | PI94659 | | | | | |
| 107 | NGB7201 | <i>T. dicoccum</i> | Sweden | 2.1* | 6+8 | - |
| 108 | KU1952 | <i>T. dicoccoides</i> | Germany | 1 | 16* | - |
| 109-110 | TD11, TD13 | <i>T. tauschii</i> | Germany | - | - | 5+12.2 |
| 111 | TD159 | <i>T. tauschii</i> | Germany | - | - | 12.1 |

Supplementary Table 2. UPLC pattern changes of HMW-GS from three spring wheat cultivars growing in three growing locations (Yingchuan, Xining and Beijing)

| Cultivars | HMW-GS | Migration time (min) | RSD% | Peak height (1000 uV) | RSD% | Peak areas (1000 uV/S) | RSD% |
|------------|--------|----------------------|-------|-----------------------|--------|-------------------------|--------|
| CB037 | 1 | 10.90±0.02 | 0.18% | 125716.75±38513.70** | 30.64% | 2503453.75±713410.05** | 28.50% |
| | 2 | 9.11±0.01 | 0.11% | 276630.50±86973.01** | 31.44% | 4762223.75±1058788.76** | 22.23% |
| | 17 | 9.97±0.02 | 0.20% | 274822.75±83599.64** | 30.42% | 4830699.75±1157777.06** | 23.97% |
| | 18 | 7.99±0.01 | 0.13% | 114093±52794.70** | 46.27% | 1825498.75±510553.40** | 27.97% |
| | 12 | 6.15 ±0.01 | 0.16% | 150352.50±72078.39** | 47.94% | 2248255±709771.43** | 31.56% |
| CB037-B | 1 | 10.89±0.05 | 0.46% | 172936.30±56671.35** | 32.77% | 4075745.70±1658866.40** | 40.70% |
| | 5 | 9.08±0.04 | 0.44% | 419207.20±84192.91** | 20.08% | 7731998.00±1282952.08** | 16.59% |
| | 17 | 9.87±0.03 | 0.30% | 368495.70±73882.72** | 20.05% | 7936533.20±2048028.27** | 25.81% |
| | 18 | 8.10±0.02 | 0.25% | 133550.3±41107.11** | 30.78% | 2745238.70±815555.04** | 29.71% |
| | 10 | 6.29±0.01 | 0.16% | 190980.5±64334.97** | 33.67% | 3289365.30±417377.61** | 12.69% |
| Ningchun 4 | 1 | 10.88±0.03 | 0.28% | 132664.57±10315.95* | 7.78% | 2999300.43±554360.85** | 18.48% |
| | 2 | 9.12±0.03 | 0.33% | 333988.29±29438.36* | 8.81% | 6411967.00±995452.07** | 15.52% |
| | 7 | 9.81±0.04 | 0.41% | 282840.29±34151.46** | 12.07% | 5535962.29±1444907.09** | 26.10% |
| | 8 | 8.01±0.03 | 0.48% | 89813.71±12315.80** | 13.71% | 1742326.43±435764.96** | 25.01% |
| | 12 | 6.18±0.05 | 0.86% | 156229.86±18433.88** | 11.80% | 2855732.57±634842.42** | 22.20% |

* and **indicate the significant level between different growing locations at P = 0.05 and 0.01, respectively.