

# 甘肃省小麦品种(系)矮秆基因检测及分布规律

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**摘要:** 地方种是小麦育种的重要种质资源, 为了解矮秆基因在地方种中的分布, 本研究检测了甘肃省地方种矮秆基因等位变异类型及其在不同麦区的分布频率。结果表明: (1) 地方种 *Rht-B1b* 和 *Rht-D1b* 的频率极低; 41.4% 的地方种携带 *Rht8*, 且春麦区高于冬麦区; 46.7% 的地方种含 *Rht24b*, 春麦区低于冬麦区。 *Ppd-D1a* 的频率仅 17.8%, 且春麦区低于冬麦区。另外, 仅检测到 *Rht-D1b/Rht8*、*Rht-D1b/Rht24b* 和 *Rht8/Rht24b* 3 种组合, 频率分别为 0.2%、0.5% 和 12.8%。(2) 地方种携带的矮秆基因及其组合分布频率低于育成种, 且差异较大。不同来源育成品种携带的优势矮秆等位变异和频率不同, 清水试验站的品种以 *Rht-D1b*、*Rht8* 和 *Rht24b* 为主, 黄羊试验站的品种以 *Rht-B1b*、*Rht-D1b*、*Rht8* 和 *Rht24b* 为主, 甘谷试验站的品种以 *Rht8* 和 *Rht24b* 为主。清水和黄羊试验站的品种秆矮、丰产性好, 可在河西、沿黄灌区、陇南、陇东的小麦育种中应用; 甘谷试验站的品种茎秆高, 抗病性突出, 可应用于定西、天水、陇南和陇东等旱地小麦的抗病改良。(3) 基于分子标记检测结果, 筛选出 15 份地方种和 31 份育成种, 以上材料均携带 2 个及以上降秆基因 (包括矮秆基因或 *Ppd-D1a*), 可为甘肃不同麦区小麦矮秆育种提供亲本材料。

**关键词:** 甘肃; 地方种; 矮秆基因; 分子标记; 分布频率

## Detection and Distribution of Dwarf Genes of Wheat Varieties in Gansu Province

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**Abstract:** Landrace are important germplasm resources for wheat breeding. In order to uncover the distribution of dwarfing genes in landraces, we detected the allelic variation types of dwarfing genes and their distribution frequencies in different wheat regions of Gansu province. The results showed that: (1) the frequency of *Rht-B1b* and *Rht-D1b* in landraces was extremely low. 41.4% of landraces carried *Rht8*, with higher frequency in spring wheat regions than in winter wheat regions. 46.7% of landraces contained *Rht24b*, with lower frequency in spring wheat regions than in winter wheat regions. The frequency of *Ppd-D1a* was only 17.8%, with lower frequency in spring wheat regions than in winter wheat regions. In addition, only three combinations (*Rht-D1b/Rht8*, *Rht-D1b/Rht24b*, and *Rht8/Rht24b*) were detected, with frequencies of 0.2%, 0.5%, and

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12.8%, respectively. (2) The frequency and combination distribution of dwarfing genes carried by landraces were lower than those of cultivars, and the differences were significant. Different sources of cultivars carried the different dominant dwarfing allelic variations and frequencies. Cultivars Qingshui test station mainly carried *Rht-D1b*, *Rht8*, and *Rht24b*, cultivars from Huangyang test station mainly carried *Rht-B1b*, *Rht-D1b*, *Rht8*, and *Rht24b*, and cultivars from Gangu test station mainly carried *Rht8* and *Rht24b*. Cultivars from Qingshui and Huangyang test station had dwarf stature and high yield potential, suitable for wheat breeding in Hexi and Yellow River irrigation areas, Longnan and Longdong. Cultivars from Gangu test station had higher plant height and better disease resistance, suitable for disease improvement in dryland wheat in Dingxi, Tianshui, Longnan, and Longdong, etc. (3) Based on the molecular marker results, 15 landraces and 31 cultivars were selected with two or more dwarfing genes (including dwarfing genes or *Ppd-D1a*), which can provide parental materials for wheat breeding in different wheat areas of Gansu.

**Key words:** Gansu; landrace; dwarf genes; molecular marker; distribution frequency

小麦株高与抗倒和产量潜力关系密切,降低株高是小麦育种的重要目标。20世纪60年代以来,矮秆基因 *Rht1* 和 *Rht2* 的广泛应用在全球范围内极大提升小麦产量。迄今,国内外已定位25个矮秆基因,并鉴定30多个矮秆等位变异。其中,*Rht-B1b* (*Rht1*)、*Rht-D1b* (*Rht2*)、*Rht-B1c* (*Rht3*)、*Rht-D1c* (*Rht10*)、*Rht-B1e* (*Rht11*)、*Rht-B1p* (*Rht17*)为赤霉素不敏感型(GA-insensitive, gibberellic acid insensitive),而 *Rht8*、*Rht-B13b* (*Rht13*)、*Rht24*、*Rht25* 及其他矮秆基因均为赤霉素敏感型(GA-sensitive, gibberellic acid sensitive)<sup>[1-2]</sup>。*Rht1* 和 *Rht2* 位于4BS和4DS染色体<sup>[3-4]</sup>,来源于Daruma和Norin 10,是株高变异的主要贡献者,可解释表型变异的15.0%~41.0%,在小麦育种中应用最为广泛<sup>[5]</sup>。*Rht8*位于2DS染色体,来源于日本品种Akagomughi,与光周期基因*Ppd-D1a*紧密连锁。*Rht8*在20世纪30年代年由育种家Nazareno Strampelli引入意大利,随后传播至南欧和南美洲<sup>[4,6]</sup>,可解释表型变异的8.0%~15.0%<sup>[7-8]</sup>。部分研究结果表明*Rht8*的应用频度高于*Rht-B1b*和*Rht-D1b*<sup>[4,9]</sup>。*Rht24*位于6AL染色体,可解释表型变异的15.0%~51.0%<sup>[5,10]</sup>,来源于野生二粒小麦,其传播及应用早于*Rht1*、*Rht2*和*Rht8*<sup>[4]</sup>。目前,*Rht1*、*Rht2*、*Rht8*和*Rht24*已被克隆<sup>[11-13]</sup>,分子标记<sup>[4,14-16]</sup>得到广泛应用<sup>[4,8,17]</sup>。*Rht1*、*Rht2*在灌溉及高水肥条件下可增强抗倒性、提高收获指数,但也有利于赤霉病的病情发展<sup>[18-19]</sup>;在水分胁迫条件下,*Rht1*、*Rht2*对小麦农艺性状(如叶面积指数、胚芽鞘长度、苗期活力、收获指数等)有负向作用;而*Rht8*、*Rht24*对以上性状无负向效应<sup>[5,10,13]</sup>。

种质资源是小麦新品种选育的物质基础,现代小麦品种遗传基础狭窄,优异基因匮乏。从小麦近

缘种、地方种中鉴定优异等位基因势在必行。小麦地方种具有抗逆性强、耐瘠薄,不易落粒的优点。但由于植株高大、秆软且易倒伏等原因,限制了其在育种和生产中的广泛应用。利用分子标记检测小麦地方种矮秆基因的分布状况,有利于筛选携带目标矮秆基因的种质,可拓宽小麦育种亲本的选择范围。本研究以甘肃省小麦地方种为研究材料,利用分子标记对其矮秆基因进行检测,并以甘肃省农业科学院不同试验站的育成品种做比较,分析甘肃省不同麦区地方种矮秆基因的分布状况及来源,筛选优异地方种和育成品种,为小麦矮秆育种提供参考。

## 1 材料与方 法

### 1.1 试验材料

本研究采用甘肃省农作物种质资源库地方种445份(详见<https://doi.org/10.13430/j.cnki.jjpr.20230804001>,附表1),包括河西灌区春小麦117份、中部旱地春小麦47份、洮岷高寒春小麦39份、渭河上游冬小麦46份、陇东旱塬冬小麦45份、嘉陵江上游冬小麦50份和未标注来源地小麦101份。71份冬春小麦育成品种(系)来自甘肃省农业科学院3个生态试验站:清水试验站、甘谷试验站和黄羊试验站。小麦种子均由甘肃省农业科学院小麦研究所提供。

### 1.2 试验方法

**1.2.1 检测所采用标记** *Rht-B1*<sup>[15]</sup>、*Rht-D1*<sup>[15]</sup>和*Rht24*<sup>[5]</sup>等位变异检测分别采用KASP标记*Rht-B1-SNP*、*Rht-D1-SNP*和*S1066954*及*S983322*,*Rht8*<sup>[16]</sup>和*Ppd-D1*<sup>[20]</sup>分别采用STS标记*DG273*及*TaPpd-D1-F1*、*TaPpd-D1-R1*和*TaPpd-D1-R2*。基因位点、标记名称、引物序列、等位变异及参考文献信息见表1。

表 1 矮秆基因引物序列及其他信息

Table 1 Primer sequence and related information for dwarf gene used in this study

| 基因<br>Gene    | 标记<br>Marker           | 引物序列(5'-3')<br>Primer sequence (5'-3')       | 等位变异<br>Allelic variation               | 参考文献<br>Reference |
|---------------|------------------------|--|---|-------------------|
| <i>Rht-B1</i> | <i>Rht-B1_SNP-A</i>    | GAAGGTGACCAAGTTCATGCTCCCATGGCCATCTCCAGCTG    | FAM/G, <i>Rht-B1a</i>                   | [15]              |
|               | <i>Rht-B1_SNP-B</i>    | GAAGGTCGGAGTCAACGGATTCCCATGGCCATCTCCAGCTA    | HEX/A, <i>Rht-B1b</i>                   |                   |
|               | <i>Rht-B1_SNP-C</i>    | TCGGGTACAAGGTGCGGGCG                         |   |                   |
| <i>Rht-D1</i> | <i>Rht-D1_SNP-A</i>    | GAAGGTGACCAAGTTCATGCTCATGGCCATCTCGAGCTGCTC   | FAM/C, <i>Rht-D1a</i>                   | [15]              |
|               | <i>Rht-D1_SNP-B</i>    | GAAGGTCGGAGTCAACGGATTTCATGGCCATCTCGAGCTGCTA  | HEX/A, <i>Rht-D1b</i>                   |                   |
|               | <i>Rht-D1_SNP-C</i>    | CGGGTACAAGGTGCGCGCC                          |   |                   |
| <i>Rht8</i>   | <i>DG273-Fw</i>        | CTTGACGAGCTTGAAATGG                          | 391 bp <i>rht8</i> , 421 bp <i>Rht8</i> | [16]              |
|               | <i>DG273-Rv</i>        | GCAACAAGTGCTTCTGTCTG                         |   |                   |
| <i>Rht24</i>  | <i>S1066954-A</i>      | GAAGGTGACCAAGTTCATGCTAGTGTCCGCATGACTGATTCTCC | FAM/C, <i>Rht24a</i>                    | [5]               |
|               | <i>S1066954-B</i>      | GAAGGTCGGAGTCAACGGATTAGTGTCCGCATGACTGATTCTCA | HEX/A, <i>Rht24b</i>                    |                   |
|               | <i>S1066954-common</i> | CCAATCATCAAGGTGACTGTTCATCA                   |   |                   |
|               | <i>S983322-A</i>       | GAAGGTGACCAAGTTCATGCTCCCAGCGCAGTCTGTCCTG     | FAM/G, <i>Rht24b</i>                    | [5]               |
|               | <i>S983322-B</i>       | GAAGGTCGGAGTCAACGGATTAGCCAGCGCAGTCTGTCCTA    | HEX/A, <i>Rht24a</i>                    |                   |
|               | <i>S983322-common</i>  | ACGCCATGGAAATTCTCGAGAT                       |   |                   |
| <i>Ppd-D1</i> | <i>TaPpd-D1-F1</i>     | ACGCCTCCCACTACTACTG                          | 288 bp <i>Ppd-D1a</i>                   | [21]              |
|               | <i>TaPpd-D1-R1</i>     | TGTTGGTTCAAACAGAGAGC                         | 414 bp <i>Ppd-D1b</i>                   | [15]              |
|               | <i>TaPpd-D1-R2</i>     | CACTGGTGGTAGCTGAGATT                         |   |                   |

**1.2.2 PCR检测方法** KASP标记包括3条引物A、B和C,其中C为共用引物,标记*Rht-B1*、*Rht-D1*及*S1066954*的A引物带FAM荧光基团,激发蓝光,检测野生型,B带HEX荧光基团,激发红光,检测突变类型。而*S983322*标记A引物带FAM荧光基团,激发蓝光,检测突变型,B带HEX荧光基团,激发红光,检测野生型。*Rht-B1b*、*Rht-D1b*和*Rht-24b*矮秆基因的检测均采用标准的KASP体系:共用引物(100 μmol/L)40 μL,两条竞争性引物(100 μmol/L)各12 μL,反向引物(100 μmol/L)30 μL。KASP标记检测每个反应体系包含:2.5 μL 2×KASP master Mix(LGC,英国),0.06 μL KASP引物预混液,DNA模板1 μL(30~50 ng/μL),ddH<sub>2</sub>O补充到5 μL。PCR反应程序如下:先95℃预变性5 min,执行10个循环的touchdown程序(94℃变性20 s,65℃退火25 s,每个循环降0.8℃),再执行30个循环(95℃变性20 s,57℃退火60 s),4℃保存PCR产物。PCR完成后放在酶标仪中读取终端荧光数据,随后导入Kluster Caller软件进行基因分型。*DG273*标记扩增条带391 bp为高秆*rht8*基因类型,421 bp为矮秆*Rht8*类型。*Ppd-D1*位点3个标记采用多重PCR,288 bp片段为*Ppd-D1a*类型,414 bp片

段为*Ppd-D1b*类型<sup>[21]</sup>。

## 2 结果与分析

### 2.1 小麦地方种和育成品种矮秆基因等位变异类型及频率

所有检测材料(地方种和育成品种)中仅7份(1.4%)携带矮秆等位变异*Rht-B1b*,全部为育成品种(系);地方种除5份材料未成功分型及1份材料为杂合类型外,其余439份全部携带高秆等位变异*Rht-B1a*。针对*Rht-D1*位点,30份(5.8%)材料携带矮秆等位变异*Rht-D1b*,地方种仅4份(0.9%)材料携带该基因,即无芒大白麦(省库编号0599),紫粒小麦(0894),三根芒(0917),台子39(0876),其余均为高秆等位变异*Rht-D1a*。用*DG273*扩增所有材料,220份(42.6%)携带矮秆等位变异*Rht8*,其中184份(41.4%)地方种有*Rht8*。用*Rht24*的KASP标记*S1066954*和*S983322*分别检测所有材料,239份携带矮秆等位变异*Rht24b*,其中地方种208份(46.7%)携带该等位变异;用*TaPpd-D1-F1*、*TaPpd-D1-R1*和*TaPpd-D1-R2*的多重PCR检测所有参试材料,147份携带光周期非敏感性等位变异*Ppd-D1a*,其中79



份地方种(17.8%)有此等位变异。携带 *Rht8/Rht24*、*Rht-D1b/Rht8*、*Rht-D1b/Rht24b* 组合的地方种分别为 57 份(12.8%)、1 份(0.2%)和 2 份(0.5%)。育成品种中携带 *Rht-B1b*、*Rht-D1b*、*Rht8*、*Rht24b*、*Rht8/Rht24*、*Rht-B1b/Rht8*、*Rht-B1b/Rht24b*、*Rht-D1b/Rht8*、*Rht-D1b/Rht24b*、*Rht-D1b/Rht24b/Rht8* 和 *Ppd-D1a* 分布频率分别为 9.9%、36.6%、50.7%、43.7%、19.7%、1.4%、5.6%、5.6%、1.4%、5.6% 和 95.8%。综上所述,对 *Rht-B1b* 和 *Rht8* 而言,育成品种两基因分布频率较地方种净增加 9.9% 和 9.3%,*Rht24b* 在两类品种(系)中的分布频率较接近,而 *Rht8/Rht24* 组合在育成品种中的分布频率较地方种净增加近 7%,*Rht-B1b*、*Rht-D1b* 及组合(*Rht-B1b/Rht8*、*Rht-B1b/Rht24b*、*Rht-D1b/Rht24b*、*Rht-D1b/Rht24b/Rht8*) 和 *Ppd-D1a* 在育成品种(系)中分布频率明显高于地方品种,*Rht-B1b* 与 *Rht8* 等两个基因在育成品种中的净增加频率接近(表 2)。甘肃地区小麦地方种和育成品种的矮秆基因等位变异及其组合的频率分布差异较大。

## 2.2 矮秆基因及其组合在甘肃省不同麦区的分布频率

甘肃省地形复杂,东西长,南北窄,依据生态可分为春麦区(包括河西灌溉春麦区、洮岷高寒春麦区、中部旱地春麦区)和冬麦区(包括嘉陵江上游冬麦区、渭河上游冬麦区、陇东旱塬冬麦区)。*Rht-B1b* 和 *Rht-D1b* 在地方种中分布极低,分别为 0 和 4 份(0.9%)(表 3),其中,携带 *Rht-D1b* 地方品种中,1 份

在中部旱地春麦区,另 3 份未标注种植区域。检测到 184 份品种携带 *Rht8*(41.4%),其中,河西灌溉春麦区、洮岷高寒春麦区、中部旱地春麦区、嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别分布 59 份(50.4%)、19 份(48.7%)、19 份(40.4%)、17 份(34.0%)、11 份(23.9%)和 7 份(15.6%)。208 份(46.7%)地方种携带 *Rht24b*,在冬春麦区均有分布,其中,河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区分别有 49 份(41.9%)、14 份(35.9%)、7 份(14.9%);嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别有 39 份(78.0%)、34 份(73.9%)、36 份(80.0%),且春麦区低于冬麦区。*Ppd-D1a* 在地方种中分布仅为 79 份(17.8%),且春麦区低于冬麦区。河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区携带 *Ppd-D1a* 等位变异的品种分别有 11 份(9.4%)、2 份(5.1%)和 6 份(12.8%),嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别有 16 份(32.0%)、10 份(21.7%)和 16 份(35.6%)(表 3)。地方品种中仅检测到 *Rht-D1b/Rht8*、*Rht-D1b/Rht-24b* 和 *Rht8/Rht-24b* 3 种矮秆等位变异组合。其中,携带 *Rht-D1b/Rht8* 的材料仅 1 份(0.30%),来自中部旱地春麦区;携带 *Rht-D1b/Rht-24b* 的材料有 2 份(0.5%);携带 *Rht8/Rht-24b* 的材料有 57 份(12.8%)。其中,河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区分别有 17 份(14.5%)、6 份(15.4%)和 1 份(2.1%),嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分

表 2 甘肃小麦地方种和育成品种矮秆基因等位变异及其组合分布频率

Table 2 The frequency distribution of dwarf gene and their combination in landrace and cultivars from different wheat regions in Gansu

| 基因型<br>Combination         | 检测总材料<br>Total varieties |                    | 地方种<br>Landrace |                    | 育成品种(系)<br>Cultivar(line) |                    |
|----------------------------|--------------------------|--------------------|-----------------|--------------------|---------------------------|--------------------|
|                            | 份数<br>Number             | 频率(%)<br>Frequency | 份数<br>Number    | 频率(%)<br>Frequency | 份数<br>Number              | 频率(%)<br>Frequency |
|                            | <i>Rht-B1b</i>           | 7                  | 1.4             | 0                  | 0                         | 7                  |
| <i>Rht-D1b</i>             | 30                       | 5.8                | 4               | 0.9                | 26                        | 36.6               |
| <i>Rht8</i>                | 220                      | 42.6               | 184             | 41.4               | 36                        | 50.7               |
| <i>Rht24b</i>              | 239                      | 46.3               | 208             | 46.7               | 31                        | 43.7               |
| <i>Rht8/Rht24b</i>         | 71                       | 13.8               | 57              | 12.8               | 14                        | 19.7               |
| <i>Rht-B1b/Rht8</i>        | 1                        | 0.2                | 0               | 0                  | 1                         | 1.4                |
| <i>Rht-B1b/Rht24b</i>      | 4                        | 0.8                | 0               | 0                  | 4                         | 5.6                |
| <i>Rht-D1b/Rht8</i>        | 5                        | 1.0                | 1               | 0.2                | 4                         | 5.6                |
| <i>Rht-D1b/Rht24b</i>      | 3                        | 0.6                | 2               | 0.5                | 1                         | 1.4                |
| <i>Ppd-D1a</i>             | 147                      | 28.5               | 79              | 17.8               | 68                        | 95.8               |
| <i>Rht-D1b/Rht24b/Rht8</i> | 4                        | 0.8                | 0               | 0                  | 4                         | 5.6                |

频率为检测到材料占不同来源(总品种、地方品种和育成品种)品种数的比例

The frequency is the proportion of detected materials to the number of varieties of different origins (all the accessions, landraces and cultivars)

别有12份(24.0%)、5份(10.9%)、4份(8.9%)。甘肃省地方种在不同麦区的矮秆基因、*Ppd-D1a*及其组合的分布频率差异较大,有较高的多态性。

不同矮秆基因等位变异与*Ppd-D1a*的基因型组合(*Rht-D1b/Ppd-D1a*、*Rht8/Ppd-D1a*、*Rht-24b/Ppd-D1a*、*Rht-D1b/Rht-24b/Ppd-D1a*和*Rht8/Rht-24b/Ppd-D1a*)的频率相差较大。2份材料携带*Rht-D1b/Ppd-D1a*,其中1份来自中部旱地春麦区;含*Rht8/Ppd-D1a*组合的材料21份(4.7%),其中,河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区分别有3份(2.6%)、0份和2份(4.3%),嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别有5份(10.0%)、3份(6.5%)和1份(2.2%)。携带*Rht-24b/Ppd-D1a*组合的材料69份(15.5%),其中,河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区分别有7份(6.0%)、2份(5.1%)和4份(8.5%);嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别有15份(30.0%)、10份(21.7%)和16份(35.6%)。携带*Rht8/Rht-24b/Ppd-D1a*的材料14份(3.2%)。其中,河西灌溉春麦区、洮岷高寒春麦区和中部旱地春麦区分别有1份(0.9%)、0份和0份;嘉陵江上游冬麦区、渭河上游冬麦区和陇东旱塬冬麦区分别有4份

(8.0%)、3份(6.5%)和1份(2.2%)(表3)。携带*Rht-D1b/Rht-24b/Ppd-D1a*的材料2份,即紫粒小麦和台子39。以上结果表明,甘肃省不同麦区小麦地方种携带的不同矮秆基因及其组合与*Ppd-D1a*组合的分布频率差异较大,不同矮秆基因的等位变异及其多样性组合导致了甘肃小麦地方种株高的多态性。

被检测的不同来源的育成品种携带的矮秆基因及其组合不同,且等位变异类型及其分布频率差异较大(表4)。清水试验站材料携带的矮秆基因以*Rht-D1b*、*Rht8*、*Rht24b*为主,分布频率分别为66.7%、26.7%、30.0%;黄羊试验站材料携带的矮秆基因以*Rht-B1b*、*Rht-D1b*、*Rht8*、*Rht24b*为主,分布频率为41.7%、50.0%、25.0%和41.7%;甘谷试验站材料以*Rht8*、*Rht24b*为主,分布频率为86.2%和58.6%。除来自黄羊试验站材料携带的*Rht-B1b/Rht24b*(16.7%)和*Rht24b/Rht-D1b/Rht8*(16.7%)组合及甘谷试验站材料携带的*Rht8/Rht24b*(48.3%)组合分布频率较高外,其余矮秆基因组合(如*Rht-D1b/Rht24b*、*Rht-D1b/Rht8*等)在被检测的育成品种(系)中分布频率均很低(表4)。以上结果表明小麦现代矮秆育种策略有效聚合了多个矮秆基因,降低了小麦植株高度。

表3 小麦地方种携带的矮秆基因及其组合在不同麦区的分布频率

Table 3 Distribution frequency of dwarf genes and their combinations carried by landrace in different wheat regions

| 基因型<br>Combination             | 总份数<br>Total<br>varieties | 总频率<br>(%)<br>Total<br>frequency | 份数/频率(%)<br>Number/ Frequency |                       |                       |                         |                       |                       |                   |
|--------------------------------|---------------------------|----------------------------------|-------------------------------|-----------------------|-----------------------|-------------------------|-----------------------|-----------------------|-------------------|
|                                |                           |                                  | 河西灌区<br>春麦区<br>HEXISW         | 洮岷高寒<br>春麦区<br>TMGHSW | 中部旱地<br>春麦区<br>ZHBUSW | 嘉陵江上<br>游冬麦区<br>JLJSYWW | 渭河上游<br>冬麦区<br>WHSYWW | 陇东旱塬<br>冬麦区<br>LDHYWW | 未标注种<br>植区域<br>UM |
|                                |                           |                                  | <i>Rht-D1b</i>                | 4                     | 0.90                  | 0/0                     | 0/0                   | 1/2.3                 | 0/0               |
| <i>Rht8</i>                    | 184                       | 41.40                            | 59/50.4                       | 19/48.7               | 19/40.4               | 17/34.0                 | 11/23.9               | 7/15.6                | 52/51.5           |
| <i>Rht-24b</i>                 | 208                       | 46.70                            | 49/41.9                       | 14/35.9               | 7/14.9                | 39/78.0                 | 34/73.9               | 36/80.0               | 29/28.7           |
| <i>Ppd-D1a</i>                 | 79                        | 17.80                            | 11/9.4                        | 2/5.1                 | 6/12.8                | 16/32.0                 | 10/21.7               | 16/35.6               | 18/17.8           |
| <i>Rht-D1b/Rht-24b</i>         | 2                         | 0.50                             | 0/0                           | 0/0                   | 0/0                   | 0/0                     | 0/0                   | 0/0                   | 2/19.8            |
| <i>Rht8/Rht-24b</i>            | 57                        | 12.80                            | 17/14.5                       | 6/15.4                | 1/2.1                 | 12/24.0                 | 5/10.9                | 4/8.9                 | 12/11.9           |
| <i>Rht-D1b/Ppd-D1a</i>         | 2                         | 0.50                             | 0/0                           | 0/0                   | 1/2.1                 | 0/0                     | 0/0                   | 0/0                   | 1/1.0             |
| <i>Rht-D1b/Rht8</i>            | 1                         | 0.30                             | 0/0                           | 0/0                   | 1/2.1                 | 0/0                     | 0/0                   | 0/0                   | 0/0               |
| <i>Rht8/Ppd-D1a</i>            | 21                        | 4.70                             | 3/2.6                         | 0/0                   | 2/4.3                 | 5/10.0                  | 3/6.5                 | 1/2.2                 | 7/6.9             |
| <i>Rht-24b/Ppd-D1a</i>         | 69                        | 15.50                            | 7/6.0                         | 2/5.1                 | 4/8.5                 | 15/30.0                 | 10/21.7               | 16/35.6               | 15/14.9           |
| <i>Rht-D1b/Rht-24b/Ppd-D1a</i> | 2                         | 0.50                             | 0/0                           | 0/0                   | 0/0                   | 0/0                     | 0/0                   | 0/0                   | 2/19.8            |
| <i>Rht8/Rht-24b/Ppd-D1a</i>    | 14                        | 3.20                             | 1/0.9                         | 0/0                   | 0/0                   | 4/8.0                   | 3/6.5                 | 1/2.2                 | 5/5.0             |

HEXISW: Hexi irrigation spring wheat region; TMGHSW: High and cold Taomin spring wheat region; ZHBUSW: Central dry spring wheat region; JLJSYWW: Upper Jialing River winter wheat region; WHSYWW: Wei River winter wheat region; LDHYWW: Longdong winter drought tableland wheat area; UM: Unmarked

表4 小麦育成品种携带的矮秆基因及其组合在选育和应用区域的分布频率

Table 4 Distribution frequency of dwarf genes and their combinations carried by wheat varieties in breeding and application areas

| 来源<br>Origin                    | 总份数<br>Total varieties | 份数/频率(%)<br>Number/ Frequency |                |             |               |                |                            |                            |                          |                                      |                         |
|---------------------------------|------------------------|-------------------------------|----------------|-------------|---------------|----------------|----------------------------|----------------------------|--------------------------|--------------------------------------|-------------------------|
|                                 |                        | <i>Rht-B1b</i>                | <i>Rht-D1b</i> | <i>Rht8</i> | <i>Rht24b</i> | <i>Ppd-D1a</i> | <i>Rht-B1b/<br/>Rht24b</i> | <i>Rht-D1b/<br/>Rht24b</i> | <i>Rht-D1b/<br/>Rht8</i> | <i>Rht24b/<br/>Rht-D1b/<br/>Rht8</i> | <i>Rht8/<br/>Rht24b</i> |
| 清水试验站<br>Qingshui test station  | 30                     | 1/3.3                         | 20/66.7        | 8/26.7      | 9/30.0        | 29/96.7        | 1/3.3                      | 1/3.3                      | 3/10.0                   | 2/6.7                                | 0/0                     |
| 甘谷试验站<br>Gangu test station     | 29                     | 1/3.5                         | 0/0            | 25/86.2     | 17/58.6       | 28/96.6        | 1/3.5                      | 0/0                        | 0/0                      | 0/0                                  | 14/48.3                 |
| 黄羊试验站<br>Huangyang test station | 12                     | 5/41.7                        | 6/50.0         | 3/25.0      | 5/41.7        | 11/91.7        | 2/16.7                     | 0/0                        | 1/8.3                    | 2/16.7                               | 0/0                     |

### 2.3 品种(系)携带的矮秆基因来源推断

445 份地方种株高范围在 57.0 ~ 171.5 cm, 其中 90.7% 的材料超过 90 cm。绿色革命矮秆基因 *Rht-B1b* 和 *Rht-D1b* 的分布频率分别为 0 和 0.9%, *Rht8* 和 *Rht-24b* 的分布频率分别为 41.4% 和 46.7%; 育成品种以上等位变异分布频率分别为 9.9%、36.6%、50.7% 和 43.7%, 表明育成品种 *Rht-B1b* 和 *Rht-D1b* 分布频率远高于地方种, 但 *Rht8* 和 *Rht-24b* 的分布频率接近(表 2)。30 份清水试验站材料中 16 份的亲本之一为周麦衍生品系, 其他育成品种的亲本如济麦 22、矮抗 58、92R137、Flansers 和 Mo(s)311 等主产区优良品种或抗病材料, 均为水地矮秆品种; 12 份黄羊试验站材料主要以宁夏系

列的永字号、宁春号和北京的矮败小麦等为基础材料选育而成, 均为节水半矮秆类型。29 份甘谷试验站材料主要以高抗条锈病的贵农系、Cappelle Desprez、Pascal、豌豆麦等为遗传背景, 多为高秆抗旱类型。因地方种植株茎秆软而高, 445 份材料仅有 4 份(无芒大白麦、紫粒小麦、三根芒和台子 39)携带 *Rht-D1b* 等位变异, 且携带 *Rht-D1b* 的地方种株高(60.0 ~ 77.0 cm)远低于含 *Rht-D1a*(90.0 cm 以上)的地方种, 故推测这几份材料可能为外引或育成品种。甘肃育成品种中 *Rht-B1b* 和 *Rht-D1b* 来自河南山东等小麦主产区及宁夏永字号品种, *Rht8* 和 *Rht-24b* 伴随绿色革命矮秆基因的传播而保留下来(表 5)。

表5 育成品种系谱、株高及降秆等位变异相关信息

Table 5 Information on the pedigree, plant height, and allelic variation of the cultivars

| 序号<br>Code | 名称<br>Name | 系谱<br>Pedigree                                 | 株高<br>(cm)<br>Plant height |                |                |                |             |                | 来源<br>Origin |
|------------|------------|--|----------------------------|----------------|----------------|----------------|-------------|----------------|--------------|
|            |            |  |                            | <i>Rht-24b</i> | <i>Rht-B1b</i> | <i>Rht-D1b</i> | <i>Rht8</i> | <i>Ppd-D1a</i> |              |
| 1          | 兰天 33      | 兰天 23//周 92031                                 | 77.6                       | -              | -              | +              | -           | +              | 清水试验站        |
| 2          | 兰天 34      | SXAF4-7/87-121//周 9203                         | 74.0                       | -              | -              | +              | +           | +              | 清水试验站        |
| 3          | 兰天 35      | 兰天 25 号/周麦 11                                  | 86.0                       | +              | +              | -              | -           | +              | 清水试验站        |
| 4          | 兰天 36      | 周麦 17//SXAF4-7/87-121                          | 70.2                       | -              | -              | +              | -           | +              | 清水试验站        |
| 5          | 兰天 37      | 00-301//兰天 26                                  | 90.0                       | -              | -              | +              | -           | +              | 清水试验站        |
| 6          | 兰天 39      | SXAF4-7/87-121//周 92031///济麦 22                | 70.3                       | -              | -              | +              | -           | +              | 清水试验站        |
| 7          | 兰天 42      | SXAF4-7/87-121//周 92031///矮抗 58                | 80.0                       | -              | -              | +              | +           | +              | 清水试验站        |
| 8          | 兰天 43      | 兰天 23 号/周麦 18                                  | 77.0                       | -              | -              | +              | -           | +              | 清水试验站        |
| 9          | 兰天 45      | 8927V/周麦 16                                    | 77.0                       | +              | -              | +              | -           | +              | 清水试验站        |
| 10         | 兰天 47      | 天 94-3///中 4/S394//咸农 4 号洛 05-095//周麦 17/兰天 23 | 75.0                       | -              | -              | +              | +           | +              | 清水试验站        |
| 11         | 兰天 48      | 06-413/周麦 23                                   | 67.0                       | +              | -              | +              | +           | +              | 清水试验站        |
| 12         | 兰天 52      | /  | /                          | +              | -              | -              | +           | +              | 清水试验站        |

表5(续)

| 序号<br>Code | 名称<br>Name | 系谱<br>Pedigree                        | 株高<br>(cm)<br>Plant<br>height | <i>Rht-24b</i> | <i>Rht-B1b</i> | <i>Rht-D1b</i> | <i>Rht8</i> | <i>Ppd-D1a</i> | 来源<br>Origin |
|------------|------------|---------------------------------------|-------------------------------|----------------|----------------|----------------|-------------|----------------|--------------|
| 13         | 兰天53       | /                                     | /                             | -              | -              | +              | -           | +              | 清水试验站        |
| 14         | 兰天54       | 06-209/周麦36                           | 66.0                          | +              | -              | +              | +           | +              | 清水试验站        |
| 15         | 兰天55       | /                                     | /                             | -              | -              | +              | +           | +              | 清水试验站        |
| 16         | 兰天56       | 兰天33//GS冀麦38/92R137                   | 89.0                          | -              | -              | -              | -           | +              | 清水试验站        |
| 17         | 兰天59       | 兰天33号//豫麦47/PH82-2-2                  | 61.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 18         | 兰天60       | 周麦17//SXAF4-7/87-121///中麦60           | 65.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 19         | 兰天61       | 兰天34/06-129                           | 78.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 20         | 兰天11-224   | 06-03-10/周麦16                         | 96.0                          | +              | -              | -              | -           | +              | 清水试验站        |
| 21         | 兰天13-10    | 周麦17//SXAF4-7/87-121///06-209         | 84.0                          | /              | -              | +              | -           | +              | 清水试验站        |
| 22         | 兰天12-24    | 兰天30/Yr15                             | 98.0                          | +              | -              | -              | -           | +              | 清水试验站        |
| 23         | 兰天14-157   | SXAF4-7/87-121//周92031///FVNDRL-EA900 | 88.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 24         | 兰天14-66    | SXAF4-7/87-121//周9203///06-129        | 86.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 25         | 阿夫         | 意大利                                   | 107.0                         | -              | -              | -              | +           | -              | 清水试验站        |
| 26         | 辉县红选系      | /                                     | 65.0                          | -              | -              | +              | -           | +              | 清水试验站        |
| 27         | 兰天25       | 92-72/Mo(s)311                        | 90.0                          | +              | -              | -              | -           | +              | 清水试验站        |
| 28         | 兰天26       | Flansers/兰天10                         | 100.0                         | -              | -              | -              | -           | +              | 清水试验站        |
| 29         | 兰航选122     | 兰天10诱变                                | 96.0                          | /              | -              | -              | -           | +              | 清水试验站        |
| 30         | 晋麦47       | 12057//旱522/K37-20                    | 100.0                         | +              | -              | -              | -           | +              | 清水试验站        |
| 31         | 武春8号       | 石1269///叶考拉/榆293//卡捷姆/榆293            | 85.0                          | -              | +              | -              | -           | +              | 黄羊试验站        |
| 32         | 武春10号      | 兰杂7086/E64-242                        | 84.0                          | -              | +              | -              | -           | +              | 黄羊试验站        |
| 33         | 陇春30       | /                                     | 85.0                          | +              | -              | +              | +           | +              | 黄羊试验站        |
| 34         | 陇春39       | 永765/蒙优1                              | 87.0                          | -              | +              | -              | -           | +              | 黄羊试验站        |
| 35         | 陇春41       | /                                     | 86.0                          | +              | -              | +              | +           | +              | 黄羊试验站        |
| 36         | 陇春42       | 永2312//作871/永3263                     | 85.0                          | -              | -              | +              | -           | +              | 黄羊试验站        |
| 37         | 陇春44       | 99W77-6-1-2/龙96-4839//m248            | 86.0                          | +              | +              | -              | -           | +              | 黄羊试验站        |
| 38         | WAU23      | /                                     | 75.0                          | -              | -              | +              | -           | -              | 黄羊试验站        |
| 39         | 永1265      | /                                     | 83.0                          | -              | -              | +              | -           | +              | 黄羊试验站        |
| 40         | 益鉴13号      | /                                     | 86.0                          | +              | -              | -              | -           | +              | 黄羊试验站        |
| 41         | 京吉611      | /                                     | 94.0                          | +              | +              | -              | -           | +              | 黄羊试验站        |
| 42         | 宁春51       | 永3002/宁春4                             | 84.0                          | -              | -              | +              | +           | +              | 黄羊试验站        |
| 43         | 陇鉴9825     | 8924-6/兰天13//Pascal                   | 88.0                          | +              | +              | -              | +           | +              | 甘谷试验站        |
| 44         | 陇鉴9826     | 贵农19/兰天13                             | 96.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |
| 45         | 陇鉴9827     | 定鉴1/洮157MD                            | 110.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 46         | 陇鉴9828     | 8654-1/兰天15                           | 110.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 47         | 陇鉴9832     | 贵农19/兰天13                             | 115.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 48         | 陇鉴9833     | 贵农19/兰天18                             | 108.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 49         | 陇鉴9834     | 周98165/兰天6                            | 85.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |

表 5 (续)

| 序号<br>Code | 名称<br>Name   | 系谱<br>Pedigree                   | 株高<br>(cm)<br>Plant<br>height | <i>Rht-24b</i> | <i>Rht-B1b</i> | <i>Rht-D1b</i> | <i>Rht8</i> | <i>Ppd-D1a</i> | 来源<br>Origin |
|------------|--------------|----------------------------------|-------------------------------|----------------|----------------|----------------|-------------|----------------|--------------|
| 50         | ZL17BDNA     | /                                | 114.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 51         | ZL17BDNA-70  | /                                | 109.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 52         | ZL17BDNA-33  | /                                | 112.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 53         | ZL17BDNA-147 | /                                | 109.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 54         | ZL17BDNA-32  | /                                | 107.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 55         | ZL25HY       | /                                | 115.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 56         | ZL25HY-3     | /                                | 117.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 57         | ZL25HY-9     | /                                | 118.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 58         | ZL25HY-4     | /                                | 114.0                         | -              | -              | -              | -           | -              | 甘谷试验站        |
| 59         | ZL25HY-7     | /                                | 115.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 60         | ZL25HY-10    | /                                | 112.0                         | /              | -              | -              | +           | +              | 甘谷试验站        |
| 61         | ZL25HY-8     | /                                | 114.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 62         | 16-6-8       | 贵协 1/兰天 20                       | 95.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |
| 63         | 16-9-32      | 陇鉴 9343//Cappelle Desprez/兰天 10  | 102.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 64         | 16-9-1       | 陇鉴 9343//Cappelle Desprez)/兰天 10 | 99.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |
| 65         | 16-6-10      | 贵协 1/ Cappelle Desprez/兰天 10     | 95.0                          | -              | -              | -              | +           | +              | 甘谷试验站        |
| 66         | 16-9-2       | 陇鉴 9343/Cappelle Desprez/兰天 10   | 105.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |
| 67         | 16-1-2       | 贵协 011-2-6/天 98294               | 116.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 68         | 16-9-3-2     | 陇鉴 9343/ Cappelle Desprez/兰天 10  | 105.0                         | -              | -              | -              | +           | +              | 甘谷试验站        |
| 69         | 12-10-1      | 陇鉴 9821/黑 2-7-1                  | 95.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |
| 70         | 12-9-7-4     | 贵农 19/兰天 13                      | 97.0                          | +              | -              | -              | +           | +              | 甘谷试验站        |
| 71         | LY935BDNA-17 | /                                | 113.0                         | +              | -              | -              | +           | +              | 甘谷试验站        |

/表示无数据;+表示有该等位变异;-表示无该等位变异;下同

/ represents no data;+ represents the presence of this allele variation; - represents the absence of this allele variation;The same as below

#### 2.4 携带两个以上矮秆基因的地方种和育成品种(系)

植株高度与抗倒性、产量密切相关,株高主要由矮秆基因决定。携带 *Rht-B1b* 和 *Rht-D1b* 的材料在水肥条件下可增强抗倒性,并大幅提升产量,但在干旱少雨条件下不利于提升植株生长活力及产量。*Rht-24b* 和 *Rht8* 在干旱条件下不会影响产量潜力的发挥,且在不同降雨量年份株高变化不大,携带这两种基因的材料抗倒性好。鉴于此,从被检测的 445 份地方种和 71 份育成品种(系)中筛选携带 2 个及以上矮秆基因的材料共计 46 份,其中地方种 15 份,主要携带 *Rht-24b*、*Rht8* 和 *Ppd-D1a*;这些材料植株高,但抗寒性、抗旱性较强,耐瘠薄,可在甘肃定西安定区、兰州新区、永登、皋兰等高寒旱区小麦育

种中充分应用。含有两个矮秆基因,且其中一个为 *Rht-D1b* 的地方种仅 4 份,可在甘肃河西、河东等灌区育种中发挥作用。本研究共筛选到含有两个以上矮秆基因的育成品种(系)共计 31 份,其中,清水试验站含 9 份(全部为水地材料),主要携带 *Rht-24b*、*Rht-D1b*、*Rht8* 和 *Ppd-D1a*;黄羊试验站 5 份,主要携带 *Rht-B1b*、*Rht-D1b*、*Rht8*、*Rht-24b* 和 *Ppd-D1a*;甘谷试验站 17 份,主要携带 *Rht8* 和 *Rht-24b*(表 4)。其中清水试验站和黄羊试验站品种植株矮、丰产性好,可在灌溉条件较好的渭河流域、泾河流域、河西灌区、沿黄灌区等生态区域的小麦生产和育种中应用;甘谷试验站品种(系)茎秆高,抗病性好,可充分应用于定西、天水、陇南和陇东等旱地小麦的抗病性改良。



表 6 46 份地方种和育成品种(系)中携带两个以上矮秆基因的材料信息

Table 6 Information on accessions carrying two or more dwarf genes in Forty-six landrace and cultivars (lines)

| 序号<br>Code | 名称<br>Name   | 类型<br>Type | <i>Rht-24b</i> | <i>Rht-B1b</i> | <i>Rht-D1b</i> | <i>Rht8</i> | <i>Ppd-D1a</i> |
|------------|--------------|------------|----------------|----------------|----------------|-------------|----------------|
| 1          | 瞎八斗          | 地方种        | +              | -              | -              | +           | -              |
| 2          | 青芒子          | 地方种        | +              | -              | -              | +           | -              |
| 3          | 老红早麦         | 地方种        | +              | -              | -              | +           | -              |
| 4          | 火里炎          | 地方种        | +              | -              | -              | +           | -              |
| 5          | 无芒大白麦        | 地方种        | -              | -              | +              | -           | +              |
| 6          | 紫粒小麦         | 地方种        | +              | -              | +              | -           | +              |
| 7          | 三根芒          | 地方种        | -              | -              | +              | +           | +              |
| 8          | 白不麦          | 地方种        | +              | -              | -              | +           | +              |
| 9          | 大口麦          | 地方种        | +              | -              | -              | +           | -              |
| 10         | 固原红          | 地方种        | +              | -              | -              | +           | +              |
| 11         | 有须小麦         | 地方种        | +              | -              | -              | +           | +              |
| 12         | 白扎芒          | 地方种        | +              | -              | -              | +           | -              |
| 13         | 一枝麦          | 地方种        | +              | -              | -              | +           | -              |
| 14         | 台子39         | 地方种        | +              | -              | +              | -           | +              |
| 15         | 有芒蚂蚱麦        | 地方种        | +              | -              | -              | +           | +              |
| 16         | 兰天34         | 育成品种       | -              | -              | +              | +           | +              |
| 17         | 兰天35         | 育成品种       | +              | +              | -              | -           | +              |
| 18         | 兰天42         | 育成品种       | -              | -              | +              | +           | +              |
| 19         | 兰天45         | 育成品种       | +              | -              | +              | -           | +              |
| 20         | 兰天47         | 育成品种       | -              | -              | +              | +           | +              |
| 21         | 兰天48         | 育成品种       | +              | -              | +              | +           | +              |
| 22         | 兰天52         | 育成品种       | +              | -              | -              | +           | +              |
| 23         | 兰天54         | 育成品种       | +              | -              | +              | +           | +              |
| 24         | 兰天55         | 育成品种       | -              | -              | +              | +           | +              |
| 25         | 陇春30         | 育成品种       | +              | -              | +              | +           | +              |
| 26         | 陇春41         | 育成品种       | +              | -              | +              | +           | +              |
| 27         | 陇春44         | 育成品种       | +              | +              | -              | -           | +              |
| 28         | 京吉611        | 育成品种       | +              | +              | -              | -           | +              |
| 29         | 宁春51         | 育成品种       | -              | -              | +              | +           | +              |
| 30         | 陇鉴9825       | 育成品种       | +              | +              | -              | +           | +              |
| 31         | 陇鉴9826       | 育成品种       | +              | -              | -              | +           | +              |
| 32         | 陇鉴9827       | 育成品种       | +              | -              | -              | +           | +              |
| 33         | 陇鉴9828       | 育成品种       | +              | -              | -              | +           | +              |
| 34         | 陇鉴9832       | 育成品种       | +              | -              | -              | +           | +              |
| 35         | 陇鉴9833       | 育成品种       | +              | -              | -              | +           | +              |
| 36         | 陇鉴9834       | 育成品种       | +              | -              | -              | +           | +              |
| 37         | ZL17BDNA     | 育成品种       | +              | -              | -              | +           | +              |
| 38         | ZL17BDNA-33  | 育成品种       | +              | -              | -              | +           | +              |
| 39         | ZL17BDNA-147 | 育成品种       | +              | -              | -              | +           | +              |
| 40         | ZL17BDNA-32  | 育成品种       | +              | -              | -              | +           | +              |
| 41         | 16-6-8       | 育成品种       | +              | -              | -              | +           | +              |
| 42         | 16-9-1       | 育成品种       | +              | -              | -              | +           | +              |
| 43         | 16-9-2       | 育成品种       | +              | -              | -              | +           | +              |
| 44         | 12-10-1      | 育成品种       | +              | -              | -              | +           | +              |
| 45         | 12-9-7-4     | 育成品种       | +              | -              | -              | +           | +              |
| 46         | LY935BDNA-17 | 育成品种       | +              | -              | -              | +           | +              |

### 3 讨论

地方种是小麦育种的重要种质资源,为了解矮秆基因在地方种中的分布,本研究检测了4种矮秆等位变异(*Rht-B1b*、*Rht-D1b*、*Rht8*、*Rht24b*)和一种光周期基因非敏感等位变异(*Ppd-D1a*)类型及其在不同麦区的分布。在地方种和育成品种中*Rht8*、*Rht24b*及*Rht8/Rht24*分布频率较接近,而育成品种*Rht-B1b*、*Rht-D1b*、*Ppd-D1a*及其组合*Rht-B1b/Rht8*、*Rht-B1b/Rht24b*、*Rht-D1b/Rht8*、*Rht-D1b/Rht24b*、*Rht-D1b/Rht24b/Rht8*的分布远高于地方种。4种矮秆等位变异的频率分布趋势为*Rht-B1b* < *Rht-D1b* < *Rht8* < *Rht24b*,与前人的研究结果一致<sup>[4,17,22-24]</sup>。*Rht24b*广泛分布在全球小麦材料中,美国频率最低(8.0%),中国频率最高(61.0%)<sup>[5]</sup>,Tian等<sup>[4]</sup>发现中国优良小麦品种中*Rht24b*分布频率达84.2%。本研究甘肃省地方种(46.7%)、育成品种(43.7%)的*Rht24b*分布频率相对较低。*Ppd-D1a*分布与对光周期的敏感程度有关,一般高纬度地区较低纬度区域分布频率低<sup>[21]</sup>。

*Rht-B1b*和*Rht-D1b*在不同生态区域的分布具有一定的偏好性,地方种仅4份材料携带*Rht-D1b*,而育成品种*Rht-B1b*(9.9%)和*Rht-D1b*(36.6%)的频率较高,且在清水试验站(66.7%)材料中*Rht-D1b*的分布频率最高。地方种中*Rht8*的分布频率春麦区较冬麦区稍高,但冬麦区*Rht-24b*的分布频率远高于春麦区,在春麦区组合*Rht8/Rht-24b*的分布频率和冬麦区差异不大;而育成品种中甘谷试验站材料中*Rht8*(86.2%)和*Rht-24b*(58.6%)分布频率最高,且*Rht8/Rht-24b*仅在甘谷试验站检测材料中存在,分布频率为48.3%。本研究中90.7%的地方种株高大于90.0 cm,与不具*Rht-B1b*和*Rht-D1b*等位变异有关;而检测的黄羊试验站和清水试验站的品种株高低于甘谷试验站品种(系),与前两者携带高比例*Rht-B1b*和*Rht-D1b*有关。由此可见,*Rht-B1b*和*Rht-D1b*基本分布在水肥条件较好的区域,*Rht8*和*Rht-24b*的适应性强,在所有麦区均有分布<sup>[4,25-27]</sup>。

株高是影响小麦生产潜力的重要农艺性状,适当降低株高能够增强小麦的抗倒伏能力,有助于提高收获指数,促进高产稳产。*Rht-B1b*和*Rht-D1b*基因分布广泛,世界上70.0%的育成品种中至少含有其一,但本研究育成材料中携带以上两基因的频率仅为46.5%,未发现同时携带这两种基因的材料。清水试验站材料亲本多为周麦系列(来自黄淮麦

区),且携带*Rht-D1b*的频率高,黄羊试验站材料基本以北部冬麦区材料为遗传背景,且*Rht-B1b*的频率高,这与以上麦区携带对应矮秆等位变异的频率较高有关<sup>[17,24,28-30]</sup>。甘谷试验站材料除陇鉴9825外,其余均不携带*Rht-B1b*或*Rht-D1b*,这可能与该生态区属条锈病常发区,与把抗病性作为重要选择目标有关。

*Rht-B1b*和*Rht-D1b*最早随日本Norin 10号传播到美国,再到墨西哥的国际玉米小麦改良中心(CIMMYT)<sup>[31]</sup>,而广泛应用的矮秆基因*Rht8*最早由日本地方种Akakomugi渗入意大利的Mentana<sup>[32]</sup>,进而传播到世界各地,*Rht24*随着*Rht-B1b*、*Rht-D1b*和*Rht8*在世界范围内的传播而扩展,在世界小麦改良中发挥了重要作用<sup>[4,33]</sup>。中国不同麦区优良小麦和骨干亲本携带的主要矮秆基因的种类和分布频率不同<sup>[17,22-24,33]</sup>,矮秆基因传播路径和应用途径不同,但均来源于Norin 10、Akakomugi、Mentana等;本研究育成品种携带的基因型及亲本来源进一步验证了这一点。而本研究地方种仅4份材料(无芒大白麦、紫粒小麦、三根芒、台子39)携带*Rht-D1b*矮秆基因,无*Rht-B1b*分布,清水试验站材料株高均在80 cm以下,显著矮于其他地方种,推测以上材料中的*Rht-D1b*可能来自外引或育成品种,而*Rht24*和*Rht8*(*Ppd-D1a*)则来自国内地方种。

此外,矮秆基因在降低株高,提高产量和收获指数的同时,*Rht-B1b*和*Rht-D1b*也可降低花药出粉率,提高赤霉病的侵染率<sup>[18-19]</sup>。*Rht-B1b*和*Rht-D1b*和*Rht8c*可使植株的赤霉病严重度分别提高19.0%、52.0%和19.0%,*Rht-B1b*和*Rht8c*与野生型无显著不同<sup>[19]</sup>;但*Rht-24b*不会提高赤霉病的侵染率<sup>[34]</sup>。另外,在干热环境下*Rht-B1b*和*Rht-D1b*具有负向作用,胚芽鞘缩短、苗期活力不足导致出苗率低,生物量不足,从而影响收获指数;而*Rht8*可降低株高,但不影响胚芽鞘的生长和苗期活力,在产量形成上有正向作用<sup>[35]</sup>。*Rht8*和*Ppd-D1a*降低株高,提高籽粒可育小穗数,进而提高籽粒产量和其构成因素。另外,*Ppd-D1a*也可加速植株生长,提早抽穗开花<sup>[8]</sup>。鉴于此,本研究筛选出的46份材料中的地方种可作为育种亲本应用,而育成种可在生产或育种中利用,如携带*Rht-B1b*、*Rht-D1b*、*Rht8*或*Rht-24b*、*Ppd-D1a*及其组合的材料可在河西春麦区、渭河上游冬麦区、泾河上游冬麦区及类似生态区域的小麦育种中广泛应用,但在嘉陵江流域赤霉病易发生区域应减少应用含*Rht-D1b*、*Rht-B1b*和*Rht8c*的材料,而含

*Rht-24b*、*Ppd-D1a* 的材料可大量应用。*Rht-24b* 和 *Rht8* 降秆率较低,也不会因降雨量的变化导致株高显著降低,携带 *Rht-24b*、*Rht8*、*Ppd-D1a* 及其组合的材料可在中部旱地春麦区、天水、陇东和陇南旱塬冬麦区适当应用。

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附表 1 用于株高基因检测的甘肃省地方品种

Table S1 The landraces used for the detection of the dwarfing genes from Gansu

| 库编号<br>Number | 名称<br>Name | 抽穗期<br>Heading<br>date | 株高 (cm)<br>Plant height | <i>Rht-24</i>   |                |                |                |             | <i>Ppd-D1</i>          | 来源<br>Origin |
|---------------|------------|------------------------|-------------------------|-----------------|----------------|----------------|----------------|-------------|------------------------|--------------|
|               |            |                        |                         | <i>S1066954</i> | <i>S983322</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> |                        |              |
| 0770          | 兰麦         | 5/11                   | 120.7                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区     |
| 0402          | 大兰麦        | 5/16                   | 127.2                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0025          | 白兰麦        | 5/1                    | 110.2                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0033          | 青兰麦        | 5/1                    | 120.7                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0053          | 红兰麦        | 5/4                    | 121.2                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -                      | 洮岷高寒春麦区      |
| 0504          | 老兰麦        | 5/6                    | 119.8                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区     |
| 0627          | 白老兰麦       | 5/1                    | 104.5                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b/Ppd-D1a</i> | -            |
| 0077          | 大头兰麦       | 5/1                    | 113.5                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 洮岷高寒春麦区      |
| 0061          | 秃头兰麦       | 5/1                    | 118.9                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 洮岷高寒春麦区      |
| 0028          | 定西兰麦       | 6/15                   | 139.0                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -                      | 中部旱地春麦区      |
| 0020          | 老芒麦        | 5/18                   | 113.3                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0540          | 白老芒麦       | 5/11                   | 101.3                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0812          | 白穗老芒麦      | 5/11                   | 102.5                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0803          | 春老芒麦       | 5/12                   | 113.5                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0906          | 红老芒麦       | 5/4                    | 113.0                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区      |
| 0006          | 短红芒麦       | 5/14                   | 103.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 渭河上游冬麦区      |
| 0032          | 小红芒麦       | 5/1                    | 116.7                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0039          | 高芒麦        | 5/14                   | 102.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | -              | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 洮岷高寒春麦区      |
| 0143          | 黑芒麦        | 5/17                   | 101.0                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区      |
| 0393          | 一芒麦        | 5/18                   | 124.7                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0361          | 有芒麦        | 5/21                   | 121.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0714          | 凉州扎芒麦      | 5/21                   | 128.5                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区      |
| 0097          | 大和尚头       | 5/11                   | 123.3                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0098          | 小和尚头       | 5/22                   | 88.0                    | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区      |
| 0004          | 红齐麦        | 5/15                   | 102.5                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0388          | 清水-芒红齐麦    | 5/12                   | 122.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0516          | 老齐麦        | 5/12                   | 135.3                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区      |
| 0036          | 硬粒小麦       | 5/16                   | 132.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -                      | 洮岷高寒春麦区      |
| 0069          | 波兰小麦       | 5/18                   | 131.0                   | <i>Rht-24b</i>  | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -                      | 洮岷高寒春麦区      |
| 0202          | 安西小麦       | -                      | 105.0                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区      |
| 0059          | 铁小麦        | 5/19                   | 92.7                    | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 洮岷高寒春麦区      |
| 0134          | 白小麦        | 5/21                   | 109.0                   | <i>Rht-24a</i>  | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区      |

|      |            |      |       |                |                |                |                |             |                |                |
|------|------------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|
| 0691 | 白小麦子       | 5/17 | 104.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0043 | 黑芒白麦       | 5/16 | 136.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0833 | 庆阳陕西<br>白麦 | 5/17 | 122.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区        |
| 0541 | 白麦儿        | 5/2  | 87.7  | -              | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 渭河上游冬麦区        |
| 0766 | 老白麦        | 5/17 | 110.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0377 | 早白麦        | 5/5  | 118.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区        |
| 0447 | 红白麦        | 5/13 | 128.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0774 | 齐头白麦       | 5/22 | 108.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0042 | 大麦         | 5/18 | 117.0 | -              | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0673 | 红大麦        | 5/22 | 95.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0192 | 白大麦        | 5/27 | 98.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | -              | 河西灌区春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0728 | 有芒白大<br>麦  | 5/29 | 103.0 | <i>Rht-24a</i> | -              | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 河西灌区春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0807 | 老红麦        | 5/13 | 121.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区        |
| 0162 | 红麦子        | 5/18 | 118.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0724 | 兰州红麦<br>子  | 5/12 | 111.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0734 | 兰州红        | 5/23 | 101.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0745 | 兰州麦        | -    | 108.5 | -              | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0056 | 短麦         | 5/19 | 105.2 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0067 | 尕麦         | 5/24 | 96.8  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0820 | 尕麦子        | 5/21 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0115 | 糜麦         | 5/18 | 118.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0057 | 苏麦         | 5/8  | 105.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0185 | 冰麦         | 5/23 | 129.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | -              | 河西灌区春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0763 | 金麦         | 5/19 | 87.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区        |
| 0710 | 春麦         | 5/29 | 109.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区        |
| 0662 | 老春麦        | 5/22 | 105.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0078 | 秃光头        | 5/23 | 114.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0141 | 青光头        | 6/1  | 110.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 河西灌区春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0692 | 大光头        | 5/24 | 112.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0109 | 白木铣板       | 5/6  | 123.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区        |
| 0165 | 红木铣板       | 5/24 | 130.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0703 | 红铣板        | 5/22 | 128.3 | -              | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0626 | 瞎八斗        | 5/13 | 118.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0285 | 合水瞎八<br>斗  | 5/10 | 86.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 陇东旱塬冬麦区        |
| 0605 | 瞎石八        | 4/26 | 111.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 河西灌区春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0663 | 瞎石五        | 5/20 | 108.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |

|      |               |      |       |                |                |                |                |             |                        |          |
|------|---------------|------|-------|----------------|----------------|----------------|----------------|-------------|------------------------|----------|
| 0347 | 红半芒           | 5/22 | 122.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0347 | 红半芒           | 5/21 | 127.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0547 | 白蚂蚱           | 5/22 | 134.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0547 | 华池白蚂蚱         | 5/8  | 109.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0423 | 镇原白蚂蚱         | 5/8  | 104.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0412 | 有芒白蚂蚱         | 5/11 | 105.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0518 | 秃蚂蚱           | 5/8  | 103.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 渭河上游冬麦区  |
| 0491 | -芒蚂蚱          | 5/8  | 105.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 渭河上游冬麦区  |
| 0364 | 齐蚂蚱           | 5/7  | 94.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0430 | 红蚂蚱           | 5/20 | 114.2 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0455 | 白秃蚂蚱          | 5/21 | 105.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0787 | 小青芒           | 5/29 | 108.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区  |
| 0789 | 环县小青芒         | 5/7  | 106.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0637 | 红青芒           | 5/21 | 116.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区  |
| 0708 | 青芒子<br>(短、有毛) | 5/28 | 105.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 洮岷高寒春麦区  |
| 0794 | 大青芒           | 5/16 | 108.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 中部旱地春麦区  |
| 0623 | 宁县和盛<br>兰花麦   | 5/10 | 97.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0623 | 兰花麦           | 5/6  | 105.0 | <i>Rht-24b</i> | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0405 | 白花麦           | 5/27 | 111.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | -              | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0296 | 庆阳白箭<br>头     | 5/8  | 115.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0296 | 白箭头           | 5/11 | 125.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0489 | 箭头红           | 5/20 | 123.7 | -              | -              | -              | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0369 | 箭儿头           | 5/25 | 140.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0569 | 箭儿麦           | 5/28 | 132.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0834 | 庆阳白鱼<br>儿麦    | 5/10 | 101.2 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0557 | 鱼儿麦           | 5/10 | 83.3  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 嘉陵江上游冬麦区 |
| 0328 | 镇原红曹<br>麦     | 5/10 | 107.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0328 | 红曹麦           | 5/10 | 100.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b/Ppd-D1a</i> | 陇东旱塬冬麦区  |
| 0514 | 红巢麦           | 5/16 | 107.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0281 | 正宁菜黄<br>麦     | 5/9  | 103.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0281 | 菜花黄           | 5/9  | 97.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0283 | 正宁宫河<br>饿死牛   | 5/12 | 87.3  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |

|      |       |           |       |                |                       |                |                |                |                        |          |
|------|-------|-----------|-------|----------------|-----------------------|----------------|----------------|----------------|------------------------|----------|
| 0283 | 饿死牛   | 5/6       | 91.0  | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0282 | 正宁三月黄 | 5/11      | 104.0 | -              | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0730 | 三月黄   | 5/24      | 133.3 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1a</i>         | 嘉陵江上游冬麦区 |
| 0154 | 红火烧麦  | 5/27      | 118.0 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0128 | 红火穗   | 5/29      | 116.8 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0581 | 火穗子   | 5/25      | 87.0  | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0048 | 火麦    | 5/8-5/16  | 118.2 | <i>Rht-24a</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 岷高寒春麦区   |
| 0652 | 红穗红火麦 | 6/6       | 114.8 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0749 | 大红火禾  | 5/10-5/21 | 109.8 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 中部旱地春麦区  |
| 0760 | 小红火穗  | 5/23      | 123.3 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0155 | 红雀扎头  | 6/1       | 99.5  | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0157 | 长芒雀儿头 | 6/7       | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0333 | 红键头   | 5/16      | 101.8 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0492 | 红巧头   | 5/23-5/25 | 125.2 | -              | <i>Rht24b/Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0371 | 红焦头   | 5/10      | 105.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0372 | 红梢头   | 5/9       | 110.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1a</i>         | 渭河上游冬麦区  |
| 0548 | 有芒红梢头 | 5/27      | 129.7 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0550 | 短芒红梢麦 | 5/23-5/26 | 134.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0548 | 红芒红梢麦 | 5/8-5/26  | 125.7 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b/Ppd-D1a</i> | 渭河上游冬麦区  |
| 0121 | 红秃头   | 5/10      | 113.8 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0536 | 红秃麦   | 5/7       | 111.3 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1a</i>         | 渭河上游冬麦区  |
| 0753 | 紫秆白秃头 | 5/17      | 106.8 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0138 | 银包金   | 5/7       | 97.7  | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0727 | 有芒金包银 | 5/18-5/20 | 116.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | -                      | 河西灌区春麦区  |
| 0495 | 老红早麦  | 5/13      | 122.5 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0828 | 老早麦   | 5/9       | 113.3 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0433 | 白早麦   | 5/10      | 115.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0421 | 红早麦   | 5/13      | 115.8 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | -              | <i>RHT8</i>    | <i>Ppd-D1a</i>         | 嘉陵江上游冬麦区 |
| 0545 | 火麦儿   | 5/13      | 126.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0747 | 火麦子   | 5/21      | 122.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0511 | 小火麦   | 5/11      | 123.3 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0715 | 大火麦   | 5/18      | 127.0 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0484 | -芒白火麦 | 5/11      | 137.8 | <i>Rht-24a</i> | <i>Rht-24a</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 中部旱地春麦区  |
| 0621 | 白火麦   | 5/11      | 143.7 | <i>Rht-24b</i> | <i>Rht-24b</i>        | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i>    | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |



|      |           |      |       |                |                  |                |                |             |                |                |
|------|-----------|------|-------|----------------|------------------|----------------|----------------|-------------|----------------|----------------|
| 0559 | -芒洋麦      | 5/5  | 105.2 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区       |
| 0560 | 有芒洋麦      | 5/5  | 98.2  | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区       |
| 0564 | 白川麦       | 5/7  | 119.3 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区       |
| 0451 | 红川麦       | 5/16 | 133.5 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0606 | 火里燃       | 5/21 | 115.3 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0699 | 火里炎       | 5/16 | 122.7 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0502 | 小头麦       | 5/12 | 145.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0084 | 秃头麦       | 5/15 | 123.7 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0690 | 有芒白头<br>麦 | 5/21 | 117.7 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0046 | 秃芒齐头<br>麦 | 5/14 | 124.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | 洮岷高寒春麦区        |
| 0815 | 小齐头       | 5/19 | 120.5 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0817 | 红齐头       | 5/6  | 123.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0221 | 白齐头       | 5/8  | 140.5 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区        |
| 0737 | 小白芒       | 5/22 | 111.3 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区        |
| 0791 | 大白芒       | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0792 | 红芒子       | 5/23 | 130.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0768 | 小红芒       | 5/17 | 101.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0788 | 老红芒       | 5/25 | 119.3 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0181 | 白光葫芦<br>头 | 5/27 | 111.5 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0175 | 白壳葫芦<br>头 | 5/24 | 109.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0182 | 半芒子       | 5/30 | 105.0 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0676 | 灰麦子       | 5/16 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0194 | 龙麦子       | 5/18 | 127.3 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0183 | 麦子        | 5/19 | 105.5 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0280 | 白露仁       | 5/6  | 111.7 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区        |
|      |           |      |       |                |                  |                |                |             |                | <i>Rht-D1a</i> |
| 0323 | 红露仁       | 5/13 | -     | -              | <i>Rht-24b</i>   | -              | -              | <i>rht8</i> | <i>Ppd-D1a</i> | 陇东旱塬冬麦区        |
| 0785 | 长芒        | 5/10 | 81.5  | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区        |
| 0830 | 长芒紫麦<br>子 | 5/23 | 99.0  | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区        |
| 0379 | 青熟麦       | 5/5  | 78.8  | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区        |
| 0408 | 有芒青熟<br>麦 | 5/10 | 106.0 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区       |
| 0438 | 白葛条       | 5/23 | 128.8 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0436 | 红葛条       | 5/24 | 137.8 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0414 | 白锁条       | 5/14 | 119.3 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0415 | 红锁条       | 5/23 | 121.8 | <i>Rht-24a</i> | <i>Rht-24a</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0349 | 大红齐       | 5/5  | 95.7  | <i>Rht-24b</i> | <i>Rht-24b/R</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区        |
|      |           |      |       |                | <i>ht24a</i>     |                |                |             |                |                |
| 0041 | 红大芒       | 5/16 | 121.2 | <i>Rht-24b</i> | <i>Rht-24b</i>   | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 洮岷高寒春麦区        |

|                |      |      |       |                |                |                |                |             |                |          |
|----------------|------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------|
| 0446           | 红神仙  | 5/15 | 128.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0449           | 红索条  | 5/21 | 133.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0112           | 红婊麦  | 5/19 | 113.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0119           | 红短芒  | 5/16 | 132.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0113           | 红穗子  | 5/29 | 105.5 | -              | <i>Rht-24a</i> | -              | -              | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0813           | 红桃红  | 5/22 | 98.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0759           | 红玉皮  | 5/13 | 127.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| <i>Rht-D1a</i> |      |      |       |                |                |                |                |             |                |          |
| 0503           | 红茧麦  | 6/6  | 96.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0617           | 红二齐  | 5/13 | 88.3  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东早塬冬麦区  |
| 0647           | 红青秆  | 5/30 | 114.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区  |
| 0686           | 红板麦  | 5/14 | 106.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0701           | 红羊尾  | 5/23 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0908           | 红金麦  | 5/16 | 83.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | -              | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东早塬冬麦区  |
| 0124           | 红老来变 | 5/14 | 108.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0704           | 红扎芒子 | 5/12 | 107.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0694           | 红长穗子 | 5/23 | 73.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区  |
| 0723           | 红毛麦子 | 5/18 | 98.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0163           | 红扎芒  | 5/28 | 105.6 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0531           | 老敲头  | 5/21 | 124.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0160           | 泉头   | 6/2  | 138.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0729           | 塔泉   | 5/18 | 78.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| <i>Rht-D1a</i> |      |      |       |                |                |                |                |             |                |          |
| 0901           | 小鹅杂  | 5/6  | 99.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东早塬冬麦区  |
| 0122           | 茭茭台  | -    | -     | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0146           | 马尾巴  | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0795           | 回高粱  | 5/8  | 75.3  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 中部旱地春麦区  |
| <i>Rht-D1a</i> |      |      |       |                |                |                |                |             |                |          |
| 0187           | 山西红  | 5/13 | 91.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区  |
| 0224           | 白和尚  | 5/12 | 91.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0576           | 五爪龙  | 6/2  | 128.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区  |
| 0624           | 白金麦  | 5/9  | 72.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 陇东早塬冬麦区  |
| 0090           | 歪脖子  | -    | -     | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区  |
| 0087           | 小禾麦  | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | -              | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0086           | 小青麦  | -    | 100.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0742           | 三下齐  | 5/18 | 84.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0083           | 榆中红  | 5/29 | 101.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0114           | 紫杆子  | -    | 113.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0522           | 硬棍子  | 5/27 | 115.7 | -              | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0012           | 九头牛  | 6/1  | 139.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 中部旱地春麦区  |
| <i>Rht-D1a</i> |      |      |       |                |                |                |                |             |                |          |
| 0010           | 洋青稞  | 5/26 | 114.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 中部旱地春麦区  |
| <i>Rht-D1a</i> |      |      |       |                |                |                |                |             |                |          |
| 0123           | 白老来变 | 5/28 | 110.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |

|      |      |          |       |                |                |                |                |             |                      |          |
|------|------|----------|-------|----------------|----------------|----------------|----------------|-------------|----------------------|----------|
| 0752 | 大白见口 | 5/23-5/2 | 123.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
|      |      | 6        |       |                |                |                |                |             |                      |          |
| 0755 | 小翠芥口 | 5/8      | 112.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0145 | 漏斗眼子 | 5/26     | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -                    | 河西灌区春麦区  |
|      |      |          |       |                |                |                | <i>Rht-D1a</i> |             |                      |          |
| 0604 | 建条推子 | -        | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0644 | 新源井平 | -        | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 中部旱地春麦区  |
|      | 麦    |          |       |                |                |                |                |             |                      |          |
| 0754 | 长粒大鞞 | 5/28     | 121.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | -                    | 河西灌区春麦区  |
|      | 麦    |          |       |                |                |                | <i>Rht-D1a</i> |             |                      |          |
| 0191 | 白长芒  | -        | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -                    | 河西灌区春麦区  |
| 0110 | 白利芒  | 5/29     | 106.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0726 | 白东东  | 5/30     | 110.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0702 | 白羊尾  | 5/29     | 96.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0272 | 白金塔  | 5/29     | 125.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>       | 河西灌区春麦区  |
| 0284 | 白马莲  | 5/17     | 104.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 陇东旱塬冬麦区  |
| 0905 | 白软秆  | 5/23     | 120.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 陇东旱塬冬麦区  |
| 0133 | 白大毛  | 5/21     | 106.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0052 | 金黄麦  | 5/31     | 102.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0055 | 兰选麦  | 5/23     | 97.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0060 | 铁堡麦  | 5/19     | 102.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0016 | 冰糖麦  | 6/5      | 150.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | -                    | 嘉陵江上游冬麦区 |
|      |      |          |       |                |                |                | <i>Rht-D1a</i> |             |                      |          |
| 0638 | 高岔麦  | 5/25     | 125.2 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 中部旱地春麦区  |
| 0148 | 镇番麦  | 5/29     | 102.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0520 | 关东麦  | 5/18     | 112.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 渭河上游冬麦区  |
| 0706 | 金塔麦  | 5/21     | 104.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0719 | 陇东麦  | 5/30     | 95.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0822 | 白矮麦  | -        | 110.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0824 | 老毛麦  | 5/28     | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 洮岷高寒春麦区  |
| 0670 | 灰毛麦  | 6/6      | 87.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0765 | 泾阳麦  | 5/22     | 132.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 河西灌区春麦区  |
| 0779 | 长矮麦  | 5/28     | 89.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>       | 中部旱地春麦区  |
| 0289 | 五籽麦  | 5/17     | 95.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b/Ppd-D</i> | 陇东旱塬冬麦区  |
|      |      |          |       |                |                |                |                |             | <i>1a</i>            |          |
| 0381 | 凤翔麦  | 5/17     | 111.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 渭河上游冬麦区  |
| 0382 | 下县麦  | 5/6      | 104.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>       | 渭河上游冬麦区  |
| 0401 | 川儿麦  | 5/8      | 81.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>       | -        |
| 0450 | 茧儿麦  | 5/18     | 117.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 嘉陵江上游冬麦区 |
| 0835 | 宁县石鼓 | 5/8      | 106.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>       | 陇东旱塬冬麦区  |
|      | 石大头  |          |       |                |                |                |                |             |                      |          |
| 0836 | 正宁瓦沟 | 5/13     | 111.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 陇东旱塬冬麦区  |
|      | 圈红二笨 |          |       |                |                |                |                |             |                      |          |
| 0832 | 庆阳连麸 | 5/15     | 126.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>       | 陇东旱塬冬麦区  |

|      |       |      |       |                |                |                |                |             |                |          |  |
|------|-------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------|--|
|      | 白     |      |       |                |                |                |                |             |                |          |  |
| 0831 | 庆阳露里  | 5/9  | 104.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区  |  |
|      | 滴     |      |       |                |                |                |                |             |                |          |  |
| 0339 | 有芒河南  | 5/10 | 108.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 陇东旱塬冬麦区  |  |
|      | 红     |      |       |                |                |                |                |             |                |          |  |
| 0047 | 绿秃头   | 5/18 | 105.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0740 | 秋蝉头   | 5/24 | 111.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0213 | 扁大头(中 | 5/28 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 芒)    |      |       |                |                |                |                |             |                |          |  |
| 0176 | 红葫芦头  | 5/26 | 105.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0923 | 和尚头   | 5/27 | 85.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |  |
| 0100 | 黑芒和尚  | 5/27 | 128.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | -        |  |
|      | 头     |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |  |
| 0761 | 有短芒红  | 5/23 | 95.8  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 光头    |      |       |                |                |                |                |             |                |          |  |
| 0539 | 秃白麦   | 5/14 | 118.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |  |
|      |       |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |  |
| 0773 | 黑芒大白  | 5/26 | 115.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0599 | -芒大白麦 | 5/5  | 77.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db</i>  | <i>rht8</i> | <i>Ppd-D1a</i> | -        |  |
| 0610 | -芒白麦  | 5/25 | 111.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0609 | 有芒白麦  | 5/21 | 117.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0207 | 定边-芒白 | 5/6  | 96.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0239 | 神木-芒白 | 5/12 | 108.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0896 | 有芒白麦  | 5/12 | 89.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |  |
|      | 14    |      |       |                |                |                |                |             |                |          |  |
| 0555 | 长芒麦   | 5/16 | 102.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |  |
| 0208 | 定边芒麦  | 5/28 | 112.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
| 0643 | 海原白芒  | 5/22 | 101.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0640 | 左岔红芒  | 5/21 | 106.2 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0829 | 固原红芒  | 5/6  | 97.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0641 | 同心老芒  | 5/28 | 103.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0814 | 红穗老芒  | 5/23 | 109.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 麦     |      |       |                |                |                |                |             |                |          |  |
| 0008 | 大犏力秃  | 5/23 | 94.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |
|      | 芒麦    |      |       |                |                |                |                |             |                |          |  |
| 0215 | 红皮小麦  | 5/25 | 103.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |  |
| 0210 | 景阳小麦  | 5/27 | 105.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |  |



|      |        |      |       |                |                |                |                |             |                |          |
|------|--------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------|
| 0596 | 黑颖小麦   | 5/21 | 101.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0211 | 徐州小麦   | 5/25 | 104.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0894 | 紫粒小麦   | 5/12 | 60.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db</i>  | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0746 | 西宁小麦   | 5/29 | 102.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
|      | 子      |      |       |                |                |                |                |             |                |          |
| 0592 | 白麦子    | 5/19 | 101.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0577 | 毛麦子    | 5/18 | 103.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0586 | 西宁麦子   | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0711 | 建条配    | 5/18 | 111.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0593 | 建条穗    | 5/10 | 123.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0591 | -芒红长穗  | 5/18 | 105.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0214 | 红长穗    | 5/28 | 98.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0219 | 白芒穗子   | 5/24 | 112.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0587 | 六十黄    | 5/22 | 111.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0229 | 菜子黄    | 5/5  | 98.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0767 | 大红芒    | 5/20 | 99.3  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0802 | 白茎红芒   | 5/20 | 113.5 | -              | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0801 | 半岔红芒   | 5/13 | 96.7  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -        |
| 0709 | 青芒子    | 5/18 | 107.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -        |
|      | (长、-毛) |      |       |                |                |                |                |             |                |          |
| 0777 | 青芒     | 5/21 | 115.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0070 | 老短芒    | 5/17 | 114.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0933 | 老白芒    | 5/22 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0267 | 红长芒    | 5/6  | 77.2  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -        |
| 0917 | 三根芒    | 5/10 | 65.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db</i>  | <i>RHT8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区  |
| 0209 | 武功半芒   | 5/22 | 114.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0570 | 武都兰麦   | 5/5  | 126.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 嘉陵江上游冬麦区 |
| 0607 | 白毛麦    | 5/29 | 109.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -        |
| 0903 | 白不麦    | 5/5  | 99.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -        |
| 0668 | 红紫麦    | 5/19 | 117.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0899 | 红头麦    | 5/10 | 72.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -        |
| 0799 | 榆中火麦   | 5/15 | 125.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0206 | 榆中春麦   | 5/11 | 94.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0893 | 内蒙火燎   | 5/8  | 111.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
|      | 麦      |      |       |                |                |                |                |             |                |          |
| 0509 | 秃头红火   | 5/19 | 113.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
|      | 麦      |      |       |                |                |                |                |             |                |          |
| 0222 | 白禾麦    | 5/5  | 102.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -        |
| 0226 | 大口麦    | 5/6  | 102.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0237 | 雷麦     | 5/3  | 113.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0914 | 绿麦     | 5/13 | 158.0 | <i>Rht-24b</i> | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | 中部旱地春麦区  |
| 0263 | 北山麦    | 5/23 | 100.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0538 | 秃儿麦    | 5/20 | 126.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | 渭河上游冬麦区  |
| 0258 | 短芒红麦   | 5/20 | 108.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |

|      |            |      |       |                |                |                |                |             |                |                |
|------|------------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------------|
| 0381 | 凤翔麦        | 5/6  | 103.2 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 渭河上游冬麦区        |
| 0831 | 红穗长芒<br>紫麦 | 5/19 | 99.3  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -              |
| 0646 | 白节口        | 5/23 | 110.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0243 | 绿见口        | 5/14 | 113.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0741 | 大见口        | 5/26 | 110.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0930 | 白尖口        | 5/31 | 86.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -              |
| 0363 | -芒白蚂蚱      | 5/7  | 101.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 渭河上游冬麦区        |
| 0413 | 短芒红蚂<br>蚱  | 5/7  | 90.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | -              | <i>RHT8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区       |
| 0583 | 七根毛        | 5/16 | 119.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0732 | 744        | 5/21 | 105.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | -              |
| 0919 | 阿勃         | 5/7  | 74.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 中部旱地春麦区        |
| 0927 | 结巴         | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0744 | 大红水禾       | 5/17 | 110.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0735 | 陇东红        | 5/10 | 102.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0909 | 固原红        | 5/5  | 96.8  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -              |
| 0780 | 朱哥一号       | 5/18 | 115.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0928 | 正选1号       | 5/16 | 117.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -              |
| 0231 | 大脑壳        | 5/14 | 111.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -              |
| 0236 | 歪担三        | 5/5  | 91.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -              |
| 0233 | 吴蚣须        | 5/22 | 90.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0235 | 贼不偷        | 5/8  | 98.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -              |
| 0232 | 紫椴芥        | 5/3  | 102.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -              |
| 0269 | 红瞎石        | -    | -     | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -              |
| 0926 | 老陈龙        | 5/8  | 104.2 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | -              |
| 0868 | 毛红麦        | 5/13 | 91.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -              |
| 0027 | 定西红麦       | 5/15 | 112.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 中部旱地春麦区        |
| 0018 | 短腰麦        | 5/21 | 82.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0017 | 长腰麦        | 5/10 | 124.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0650 | 中孚红芒<br>麦  | 5/11 | 109.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0024 | 二芒麦        | 5/13 | 110.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0013 | 洋春麦        | 5/13 | 117.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区       |
| 0049 | 禾春麦        | 5/21 | 110.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0045 | 方齐头        | 5/22 | 110.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0104 | 小齐头麦       | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区        |
| 0838 | 齐头麦        | 5/17 | 129.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0064 | 河州大麦       | 5/19 | 119.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 洮岷高寒春麦区        |
|      |            |      |       |                |                |                |                |             |                | <i>Rht-D1a</i> |
| 0142 | 青楞头大<br>麦  | 5/17 | 98.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |
| 0079 | 小麦         | 5/22 | 113.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区        |
| 0159 | 丁新小麦       | 5/21 | 112.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区        |

|      |       |      |       |                |                |                |                |             |                |          |
|------|-------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------|
| 0890 | 大田区小麦 | 5/17 | 114.0 | -              | <i>Rht-24b</i> | -              | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0889 | 二区小麦  | 5/20 | 95.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0839 | 梁来友小麦 | 5/17 | 108.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | -        |
|      |       |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |
| 0881 | 龙门小麦  | 5/18 | 101.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0886 | 有芒小麦  | 5/1  | 99.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0888 | 有须小麦  | 4/28 | 98.3  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0878 | 忠信小麦  | 5/16 | 127.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0102 | 长芒芒   | 5/18 | 130.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
|      |       |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |
| 0151 | 白半芒   | 5/16 | 101.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0140 | 青大芒   | 5/6  | 129.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0179 | 白扎芒   | 5/6  | 129.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0841 | 大青芒   | 5/12 | 148.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | -        |
|      |       |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |
| 0877 | 黑芒    | 5/16 | 128.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0135 | 灰黄子小麦 | 5/13 | 117.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
|      | 白麦    |      |       |                |                |                |                |             |                |          |
| 0875 | 短白麦   | 5/6  | 114.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0660 | 白光光头  | 5/13 | 113.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0651 | 白雀儿头  | 5/12 | 117.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0152 | 白光头   | 5/1  | 95.7  | -              | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区  |
| 0589 | 白秃头   | 5/9  | 106.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0682 | 灰大头   | 5/10 | 120.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0201 | 大红头   | 5/18 | 106.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0167 | 紫麦子   | 5/16 | 128.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0657 | 早麦子   | 5/18 | 128.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0654 | 腊穗子   | 5/13 | 132.2 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0029 | 白芒子   | 5/16 | 120.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | -              | -              | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0846 | 红秃子   | 5/13 | 126.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | -        |
| 0656 | 红燕子子  | 5/22 | 133.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0116 | 毛穗子   | 5/13 | 122.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0712 | 红毛麦   | 5/13 | 124.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0823 | 红矮麦   | 5/17 | 124.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区  |
| 0810 | 豌豆麦   | 5/10 | 123.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区  |
| 0168 | 白矮麦   | 5/9  | 125.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0186 | 黑麦    | 5/16 | 144.0 | -              | -              | <i>Rht-B1a</i> | <i>Rht-Db/</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
|      |       |      |       |                |                |                | <i>Rht-D1a</i> |             |                |          |
| 0600 | 大景麦   | 5/14 | 124.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0597 | 红泉麦   | 5/25 | 120.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | 河西灌区春麦区  |
| 0588 | 有芒冰麦  | 5/11 | 125.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0883 | 油麦    | 5/19 | 120.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0058 | 一枝麦   | 5/13 | 121.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区  |

|      |             |      |       |                |                |                |                |             |                |          |
|------|-------------|------|-------|----------------|----------------|----------------|----------------|-------------|----------------|----------|
| 0879 | 增城麦         | 5/13 | 129.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0850 | 白短麦         | 5/13 | 124.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0885 | 长穗麦         | 5/3  | 104.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0844 | 山麦          | 5/19 | 97.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0887 | 糠麦          | 5/3  | 104.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0863 | 拉木台板<br>麦   | 5/10 | 104.8 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0009 | 小犍力麦        | 5/6  | 101.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0880 | 上饶种         | 5/6  | 116.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0882 | 大粒种         | 5/5  | 81.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0014 | 卷芒和尚<br>头   | 5/15 | 104.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |
| 0188 | 红毛壳         | 6/1  | 112.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0871 | 白剑口         | 5/20 | 93.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0872 | 杂老汉         | 5/18 | 104.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | -        |
| 0870 | 六月黄         | 5/19 | 105.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0892 | 密头红         | 5/5  | 102.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0876 | 台子 39       | 5/3  | 67.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-Db</i>  | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0687 | 黑颖          | 5/20 | 136.7 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -              | 河西灌区春麦区  |
| 0089 | 杂丽巴         | 5/10 | 118.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0655 | 泾阳杆         | 5/28 | 98.0  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0653 | 芒白长穗        | 5/23 | 112.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0658 | 白鞭梢         | 5/16 | 106.5 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0246 | 白春麦         | 5/16 | 129.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0689 | 白大头         | 5/28 | 104.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0750 | 白疙瘩         | 5/15 | 105.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1a</i> | 河西灌区春麦区  |
| 0266 | 白见口         | 5/6  | 92.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0063 | 白麦          | 5/27 | 144.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 洮岷高寒春麦区  |
| 0030 | 白芒麦         | 5/23 | 102.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0639 | 白芒麦         | 5/19 | 90.0  | <i>Rht-24a</i> | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 陇东旱塬冬麦区  |
| 0378 | 白齐麦         | 5/10 | 67.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0665 | 白齐麦         | 5/29 | 97.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | -           | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0026 | 白玉麦         | 5/13 | 111.7 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0816 | 半截芒         | -    | 120.2 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区  |
| 0821 | 大白麦         | 5/20 | 102.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 洮岷高寒春麦区  |
| 0257 | 大红麦         | 5/22 | 114.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | -        |
| 0147 | 佛手麦         | 5/23 | 125.8 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | -              | 河西灌区春麦区  |
| 0034 | 和尚头         | 5/21 | 119.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 中部旱地春麦区  |
| 0071 | 和尚头         | 5/28 | 101.3 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i> | 河西灌区春麦区  |
| 0245 | 红春麦         | 5/30 | 121.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 渭河上游冬麦区  |
| 0268 | 红大头         | 5/6  | 94.3  | <i>Rht-24b</i> | <i>Rht-24b</i> | A/G            | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | -        |
| 0453 | 红疙瘩         | 5/13 | 90.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i> | 嘉陵江上游冬麦区 |
| 0428 | 红疙瘩<br>(有芒) | 5/21 | 116.3 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i> | 嘉陵江上游冬麦区 |

|      |            |      |       |                |                |                |                |             |                        |          |
|------|------------|------|-------|----------------|----------------|----------------|----------------|-------------|------------------------|----------|
| 0659 | 红光光头       | 6/9  | 76.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | -                      | 河西灌区春麦区  |
| 0125 | 红光头        | 5/28 | 111.0 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0510 | 红火麦        | 5/16 | 94.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 渭河上游冬麦区  |
| 0054 | 红麦         | 5/27 | 116.5 | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 洮岷高寒春麦区  |
| 0161 | 红芒麦        | 5/15 | 57.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 河西灌区春麦区  |
| 0318 | 红齐麦        | 5/12 | 82.5  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1a</i>         | 陇东旱塬冬麦区  |
| 0270 | 红小麦        | -    | -     | -              | -              | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0166 | 金包银        | 5/26 | 83.0  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0764 | 蚂蚱麦        | 5/27 | 97.5  | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 河西灌区春麦区  |
| 0429 | 蚂蚱麦<br>(白) | 5/18 | -     | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |
| 0001 | 青芒麦        | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0681 | 小白麦        | -    | -     | <i>Rht-24a</i> | <i>Rht-24a</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>RHT8</i> | <i>Ppd-D1b</i>         | 陇东旱塬冬麦区  |
| 0705 | 小红麦        | 5/21 | 113.0 | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b/Ppd-D1a</i> | 陇东旱塬冬麦区  |
| 0498 | 有芒红蚂<br>蚱  | 5/28 | 96.7  | <i>Rht-24b</i> | <i>Rht-24b</i> | <i>Rht-B1a</i> | <i>Rht-D1a</i> | <i>rht8</i> | <i>Ppd-D1b</i>         | 嘉陵江上游冬麦区 |