GB/T XXXXX—201X

中华人民共和国国家标准

ICS 07.080

A 21

植物转基因成分测定 目标区域测序法

**Determination for ingredients of genetically modified plants—Target region sequencing methods**

（征求意见稿）



**国家市场监督管理总局**

**中国国家标准化管理委员会**

发布

发布

201X-XX-XX 发布

201X-XX-XX实施

1. 前言

本标准按照GB/T 1.1—2009给出的规则起草。

本标准由中国标准化研究院提出并归口。

本标准起草单位：

本标准主要起草人：

**植物转基因成分测定 目标序列测序法**

1 范围

本标准规定了植物转基因成分目标序列测序法的原理、试剂或材料、仪器设备、测定步骤、结果分析与表述。

本标准适用于植物及其产品中的外源基因和转基因品系的定性和定量检测。

本方法外源基因的定性检出低限（LOD）为0.1%，定量检测低限（LOQ）为10%。

2 规范性引用文件

下列文件对于本文件的应用是必不可少的。凡是注日期的引用文件，仅注日期的版本适用于本文件。凡是不注日期的引用文件，其最新版本（包括所有的修改单）适用于本文件。

GB/T 6682 分析实验室用水规格和试验方法

GB/T 19495.2 转基因产品检测实验室技术要求

GB/T 19495.3 转基因产品检测核酸提取纯化方法

GB/T 19495.5转基因产品检测实时荧光定量聚合酶链式反应（PCR）检测方法

GB/T 19495.7 转基因产品检测抽样和制样方法

GB/T 27403 实验室质量控制规范食品分子生物学检测

3 术语和定义

下列术语和定义适用于本文件。

3.1

内标准基因 endogenous reference gene

在植物不同物种中普遍存在且拷贝数恒定的基因。

3.2

外源基因 exogenous gene

利用生物工程技术转入的使生物品种表现新的生物学性状的其他生物基因。

3.3

质控样品 control sample

与待测样品平行制样，用于显示待测样品在制样过程中是否被污染的样品。

3.4

模板片段 template DNA fragment

由高通量测序片段中一组具有相同随机条形码的测序片段推测的一条模板DNA序列。

3.5

定性检出低限limit of detection，LOD

经过实验确认的，外源基因被可靠检出的最低含量。

3.6

定量检测低限limit of quantitation，LOQ

经过实验确认的，外源基因能在合适的定量精确度水平下被检测出的最低含量。

4 原理

通过抽样与制样获得待测样品与质控样品，提取并片段化样品基因组DNA、连接接头序列、PCR扩增连接产物、探针捕获扩增产物、扩增捕获产物获得测序文库、高通量测序、分析测序数据、进行质量控制并得出检测结论。

5试剂或材料

除非另有规定，仅使用分析纯试剂。

5.1 水：GB/T 6682一级。

5.2文库构建试剂盒。

5.3高通量测序试剂盒。

5.4探针：见附录A。

5.5 人工DNA：见附件B。

6 仪器设备

6.1 样品粉碎仪或研磨机。

6.2 恒温孵育器或水浴锅。

6.3 PCR扩增仪。

6.4 离心机。

6.5 高压灭菌锅。

6.6 涡旋振荡器。

6.7生物安全柜。

6.8电泳仪。

6.9DNA破碎仪。

6.10凝胶成像仪。

6.11超微量分光光度计：最小样品进样量1µL。

6.12 微量移液器：2 µL、10 µL、20 µL、100 µL、200 µL和1000 µL。

6.13实时定量PCR仪。

6.14高通量测序仪。

7 测定步骤

7.1 抽样和制样

7.1.1 待测样品抽样与制样

按GB/T 19495.7中规定的方法执行。

7.1.2质控样品制样

从待测样品制样开始到结束的过程中，把1 ng/µL的人工DNA的溶液暴露于制样环境中，作为质控样品。

7.2 DNA提取与纯化

7.2.1按GB/T19495.3的方法或具有相同效果的基因组DNA提取试剂盒提取并纯化待测样品和质控样品DNA。

7.3文库构建

利用文库构建试剂盒及其操作说明进行文库构建。

7.3.1 DNA片段化

利用酶切消化或机械破碎的方法，将待测样品和质控样品基因组DNA片段化至100 bp-1000 bp。片段化时，基因组DNA的最低加入量参照GB/T 19495.5-2018的附录B中规定的定量下限为0.1%时DNA模板最低加入量。

7.3.2 末端修复与接头连接

对7.3.1中获得的产物进行末端修复并连接接头序列。接头序列应包括三个部分：约20个碱基的通用序列、8个碱基组成的随机条形码序列和12个碱基的样品条形码序列。其中，不同的待测样品或质控样品使用不同的样品条形码序列，且在同一个实验室中相同的样品条形码序列在30天内，只使用一次。

纯化连接产物。

7.3.3 PCR扩增

利用7.3.2中接头上的通用序列设计引物对7.3.2中获得的产物进行扩增，扩增循环数≤15个。其中，所设计的引物序列包含高通量测序仪的测序引物序列。

纯化扩增产物。

将具有不同样品条形码的待测样品或质控样品等质量混合后成为混合样品，每个混合样品中待测样品或质控样品的数目不宜超过4个。

7.3.4 杂交捕获

将附录A中的探针等摩尔质量混合，形成混合探针，利用混合探针对7.3.3中获得的产物进行杂交捕获。

纯化捕获产物。

7.3.5 PCR扩增

利用高通量测序仪的测序引物序列对7.3.4中的产物进行扩增，扩增循环数≦20个，获得测序文库。

纯化测序文库。

7.4高通量测序

利用高通量测序试剂盒及其操作说明对测序文库进行高通量测序，每个待测样品的测序碱基数据量设置为大于等于1 G。

8 质量控制

利用转基因鉴定软件对获得的测序数据进行质量控制，并输出质量控制结论。

8.1当质量控制结论为制样过程中存在交叉污染时，从7.1开始重新实验。

8.2 当质量控制结论为模板片段数量不足时，加大基因组DNA用量后从7.3或之前的步骤开始重新实验。

8.3 当质量控制结论为文库构建失败时，从7.3或之前的步骤开始重新实验

8.5 当质量控制结论为测序数据量不足时，从7.4或之前的步骤开始重新实验。

8.6 当质量控制结论为测序数据质量合格时，进行结果分析。

9结果分析与表述

9.1 结果分析

利用转基因鉴定软件计算待测样品中，外源基因的模板片段的数目（）和外源基因的含量（）。

注：市场上的水稻、玉米和油菜等待测样品往往来源于杂交种，外源基因在待测样品中有纯合状态和杂合状态两种形式。

对于纯合状态，的值与以重量为依据测得的含量相同。

对于杂合状态，的值为以重量为依据测得的含量的一半。

9.2 结果表述

9.2.1 当时，表述为“未检出XX外源基因”。

9.2.2当且时，表述为“检出XX外源基因（或XX转基因品系）”。

9.2.3当且时，表述为“检出XX外源基因（或XX转基因品系），含量为XX%”。

9.2.4对于无法有效提取DNA的样品，表述为“未检出核酸成分”。

10防污染措施

7.1至7.3.2的测定步骤的防污染措施按GB/T 27403和GB/T19495.2中的规定执行。7.3.3至7.4的测定步骤在规定的区域按单一方向进行操作且保持实验室通风良好，不同区域的仪器和设备应专用。

附录A

（规范性附录）

探针序列

## 外源基因探针序列

### 花椰菜花叶病毒的35S启动子（pCaMV35S）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GACCTAACAGAACTCGCCGTAAAGACTGGCGAACAGTTCATACAGAGTCTCTTACGACTCAATGACAAGAAGAAAATCTTCGTCAACATGGTGGAGCACGACACGCTTGTCTACTCCAAA |
| 2 | AATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGTCACTTTATTGTGAAGATA |
| 3 | GTGGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTG |
| 4 | GAAAAAGAAGACGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTATATAAGGA |
| 5 | TAACAGCACAGTTGCTCCTCTCAGAGCAGAATCGGGTATTCAACACCCTCATATCAACTACTACGTTGTGTATAACGGTCCACATGCCGGTATATACGATGACTGGGGTTGTACAAAGGC |
| 6 | GGCAACAAACGGCGTTCCCGGAGTTGCACACAAGAAATTTGCCACTATTACAGAGGCAAGAGCAGCAGCTGACGCGTACACAACAAGTCAGCAAACAGACAGGTTGAACTTCATCCCCAA |
| 7 | AGGAGAAGCTCAACTCAAGCCCAAGAGCTTTGCTAAGGCCCTAACAAGCCCACCAAAGCAAAAAGCCCACTGGCTCACGCTAGGAACCAAAAGGCCCAGCAGTGATCCAGCCCCAAAAGA |
| 8 | GACTCCTTTGCCCCGGAGATTACAATGGACGATTTCCTCTATCTTTACGATCTAGGAAGGAAGTTCGAAGGTGAAGGTGACGACACTATGTTCACCACTGATAATGAGAAGGTTAGCCTC |
| 9 | TTCAATTTCAGAAAGAATGCTGACCCACAGATGGTTAGAGAGGCCTACGCAGCAGGTCTCATCAAGACGATCTACCCGAGTAACAATCTCCAGGAGATCAAATACCTTCCCAAGAAGGTT |
| 10 | AAAGATGCAGTCAAAAGATTCAGGACTAATTGCATCAAGAACACAGAGAAAGACATATTTCTCAAGATCAGAAGTACTATTCCAGTATGGACGATTCAAGGCTTGCTTCATAAACCAAGG |
| 11 | CAAGTAATAGAGATTGGAGTCTCTAAAAAGGTAGTTCCTACTGAATCTAAGGCCATGCATGGAGTCTAAGATTCAAATCGAGGATCTAACAGAACTCGCCGTGAAGACTGGCGAACAGTT |
| 12 | CATACAGAGTCTTTTACGACTCAATGACAAGAAGAAAATCTTCGTCAACATGGTGGAGCACGACACTCTGGTCTACTCCAAAAATGTCAAAGATACAGTCTCAGAAGACCAAAGGGCTAT |
| 13 | TGAGACTTTTCAACAAAGGATAATTTCGGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGTCACTTCATCGAAAGGACAGTAGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTG |
| 14 | CGATAAAGGAAAGGCTATCATTCAAGATCCCTCTGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAAAAGAAGACGTTCCAACCACGTCTTCAAAGCAAGT |
| 15 | GGATTGATGTGACATCTCCACTGACGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCTTCCTCTATATAAGGAAGTTCATTTCATTTGGAGAGGACACGCTGAAATCACCA |

### 花椰菜花叶病毒终止子（t35S）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CGCTGAAATCACCAGTCTCTCTCTACAAATCTATCTCTCTCTATAATAATGTGTGAGTAGTTCCCAGATAAGGGAATTAGGGTTCTTATAGGGTTTCGCTCATGTGTTGAGCATATAAGA |
| 2 | TAATAATGTGTGAGTAGTTCCCAGATAAGGGAATTAGGGTTCTTATAGGGTTTCGCTCATGTGTTGAGCATATAAGAAACCCTTAGTATGTATTTGTATTTGTAAAATGCTTCTATCAAT |

### 玄参花叶病毒的35S启动子（pFMV35S）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GTCGTCACTGCGTTCGTCATACGCATTAGTGAGTGGGCTGTCAGGACAGCTCTTTTCCACGTTATTTTGTTCCCCACTTGTACTAGAGGAATCTGCTTTATCTTTGCAATAAAGGCAAAG |
| 2 | ATGCTTTTGGTAGGTGCGCCTAACAATTCTGCACCATTCCTTTTTTGTCTGGTCCCCACAAGCCAGCTGCTCGATGTTGACAAGATTACTTTCAAAGATGCCCACTAACTTTAAGTCTTC |
| 3 | GGTGGATGTCTTTTTCTGAAACTTACTGACCATGATGCATGTGCTGGAACAGTAGTTTACTTTGATTGAAGATTCTTCATTGATCTCCTGTAGCTTTTGGCTAATGGTTTGGAGACTCTG |
| 4 | TACCCTGACCTTGTTGAGGCTTTGGACTGAGAATTCTTCCTTACAAACCTTTGAGGATGGGAGTTCCTTCTTGGTTTTGGCGATACCAATTTGAATAAAGTGATATGGCTCGTACCTTGT |
| 5 | TGATTGAACCCAATCTGGAATGCTGCTAAATATTTTGATGAATATAGCTGCATCTTTTGCATTTAAAACCTTTTTTCGAAAGTTTTTAATTGCTTTAACAATTCCTTCTGGGAACCATTT |
| 6 | TAGTTCCTGTAGGTTAGGACTCGGATAGATGACCTTGGCTAATCCTGCTCGGAATGCTGTGTGAACCAGATAAGGTTCTGCGTTTTCAACAAAAGTGTATGTACTTTTGCTTGCTGAATC |
| 7 | GTTGGTGTAGAACTTTTCTTGTACACCATCTTCAAGATCTGAAAGTCTTGATTTTTCCCATATCTGACGAAACTCATCAAATTGTATGGTTTGTTCTGCTGCAATGGCCTTGAACTTCAA |
| 8 | TGGCTGTGCTGCTCTTTCTTCTTTGACTAGTTTGACTGGTCTTAGAAAATTTACTGGGTCTTGGATGTCTTTGTTGTAAAGACTGATAGACACTTCAGCTTGCTCCTTTGATCGGAATCT |

### 农杆菌的胭脂碱合成酶基因启动子（pNOS）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | AGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTAAGGGAGTCACGTTATGACCCCCGCCGATGACGCGGGACAAGCCGTTTTACGTTTGGAACTGACAGAACCGCAACGATTGAAG |
| 2 | GGGACAAGCCGTTTTACGTTTGGAACTGACAGAACCGCAACGATTGAAGGAGCCACTCAGCCGCGGGTTTCTGGAGTTTAATGAGCTAAGCACATACGTCAGAAACCATTATTGCGCGTT |
| 3 | TGGAGTTTAATGAGCTAAGCACATACGTCAGAAACCATTATTGCGCGTTCAAAAGTCGCCTAAGGTCACTATCAGCTAGCAAATATTTCTTGTCAAAAATGCTCCACTGACGTTCCATAA |

### 农杆菌的胭脂碱合成酶基因终止子（tNOS）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CAAACATTTGGCAATAAAGTTTCTTAAGATTGAATCCTGTTGCCGGTCTTGCGATGATTATCATATAATTTCTGTTGAATTACGTTAAGCATGTAATAATTAACATGTAATGCATGACGT |
| 2 | TATTTATGAGATGGGTTTTTATGATTAGAGTCCCGCAATTATACATTTAATACGCGATAGAAAACAAAATATAGCGCGCAAACTAGGATAAATTATCGCGCGCGGTGTCATCTATGTTAC |

### 新霉素磷酸转移酶基因（NPTⅡ）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATGGATGGTGAAGATGTTCAAGCTGGATCGTTTCGCATGATTGAACAAGATGGATTGCACGCAGGTTCTCCGGCCGCTTGGGTGGAGAGGCTATTCGGCTATGACTGGGCACAACAGACA |
| 2 | TGACTGGGCACAACAGACAATCGGCTGCTCTGATGCCGCCGTGTTCCGGCTGTCAGCGCAGGGGCGCCCGGTTCTTTTTGTCAAGACCGACCTGTCCGGTGCCCTGAATGAACTGCAGGA |
| 3 | CCCTGAATGAACTGCAGGACGAGGCAGCGCGGCTATCGTGGCTGGCCACGACGGGCGTTCCTTGCGCAGCTGTGCTCGACGTTGTCACTGAAGCGGGAAGGGACTGGCTGCTATTGGGCG |
| 4 | GACTGGCTGCTATTGGGCGAAGTGCCGGGGCAGGATCTCCTGTCATCTCACCTTGCTCCTGCCGAGAAAGTATCCATCATGGCTGATGCAATGCGGCGGCTGCATACGCTTGATCCGGCT |
| 5 | GCATACGCTTGATCCGGCTACCTGCCCATTCGACCACCAAGCGAAACATCGCATCGAGCGAGCACGTACTCGGATGGAAGCCGGTCTTGTCGATCAGGATGATCTGGACGAAGAGCATCA |
| 6 | ATCTGGACGAAGAGCATCAGGGGCTCGCGCCAGCCGAACTGTTCGCCAGGCTCAAGGCGCGCATGCCCGACGGCGAGGATCTCGTCGTGACTCATGGCGATGCCTGCTTGCCGAATATCA |
| 7 | GCCTGCTTGCCGAATATCATGGTGGAAAATGGCCGCTTTTCTGGATTCATCGACTGTGGCCGGCTGGGTGTGGCGGACCGCTATCAGGACATAGCGTTGGCTACCCGTGATATTGCTGAA |
| 8 | CGTGATATTGCTGAAGAGCTTGGCGGCGAATGGGCTGACCGCTTCCTCGTGCTTTACGGTATCGCCGCTCCCGATTCGCAGCGCATCGCCTTCTATCGCCTTCTTGACGAGTTCTTCTGA |

### 潮霉素磷酸转移酶基因（HPT）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATGAAAAAGCCTGAACTCACCGCGACGTCTGTCGAGAAGTTTCTGATCGAAAAGTTCGACAGCGTCTCCGACCTGATGCAGCTCTCGGAGGGCGAAGAATCTCGTGCTTTCAGCTTCGAT |
| 2 | CTCGTGCTTTCAGCTTCGATGTAGGAGGGCGTGGATATGTCCTGCGGGTAAATAGCTGCGCCGATGGTTTCTACAAAGATCGTTATGTTTATCGGCACTTTGCATCGGCCGCGCTCCCGA |
| 3 | TGCATCGGCCGCGCTCCCGATTCCGGAAGTGCTTGACATTGGGGAGTTTAGCGAGAGCCTGACCTATTGCATCTCCCGCCGTGCACAGGGTGTCACGTTGCAAGACCTGCCTGAAACCGA |
| 4 | CAAGACCTGCCTGAAACCGAACTGCCCGCTGTTCTACAACCGGTCGCGGAGGCTATGGATGCGATCGCTGCGGCCGATCTTAGCCAGACGAGCGGGTTCGGCCCATTCGGACCGCAAGGA |
| 5 | GCCCATTCGGACCGCAAGGAATCGGTCAATACACTACATGGCGTGATTTCATATGCGCGATTGCTGATCCCCATGTGTATCACTGGCAAACTGTGATGGACGACACCGTCAGTGCGTCCG |
| 6 | CGACACCGTCAGTGCGTCCGTCGCGCAGGCTCTCGATGAGCTGATGCTTTGGGCCGAGGACTGCCCCGAAGTCCGGCACCTCGTGCACGCGGATTTCGGCTCCAACAATGTCCTGACGGA |
| 7 | TCCAACAATGTCCTGACGGACAATGGCCGCATAACAGCGGTCATTGACTGGAGCGAGGCGATGTTCGGGGATTCCCAATACGAGGTCGCCAACATCTTCTTCTGGAGGCCGTGGTTGGCT |
| 8 | TCTGGAGGCCGTGGTTGGCTTGTATGGAGCAGCAGACGCGCTACTTCGAGCGGAGGCATCCGGAGCTTGCAGGATCGCCACGACTCCGGGCGTATATGCTCCGCATTGGTCTTGACCAAC |
| 9 | CCGCATTGGTCTTGACCAACTCTATCAGAGCTTGGTTGACGGCAATTTCGATGATGCAGCTTGGGCGCAGGGTCGATGCGACGCAATCGTCCGATCCGGAGCCGGGACTGTCGGGCGTAC |
| 10 | ACTGTCGGGCGTACACAAATCGCCCGCAGAAGCGCGGCCGTCTGGACCGATGGCTGTGTAGAAGTACTCGCCGATAGTGGAAACCGACGCCCCAGCACTCGTCCGAGGGCAAAGAAATAG |

### β-葡萄糖苷酸酶基因（GUS）

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GTCCTGTAGAAACCCCAACCCGTGAAATCAAAAAACTCGACGGCCTGTGGGCATTCAGTCTGGATCGCGAAAACTGTGGAATTGATCAGCGTTGGTGGGAAAGCGCGTTACAAGAAAGCC |
| 2 | GGGCAATTGCTGTGCCAGGCAGTTTTAACGATCAGTTCGCCGATGCAGATATTCGTAATTATGCGGGCAACGTCTGGTATCAGCGCGAAGTCTTTATACCGAAAGGTTGGGCAGGCCAGC |
| 3 | GTATCGTGCTGCGTTTCGATGCGGTCACTCATTACGGCAAAGTGTGGGTCAATAATCAGGAAGTGATGGAGCATCAGGGCGGCTATACGCCATTTGAAGCCGATGTCACGCCGTATGTTA |
| 4 | TTGCCGGGAAAAGTGTACGTATCACCGTTTGTGTGAACAACGAACTGAACTGGCAGACTATCCCGCCGGGAATGGTGATTACCGACGAAAACGGCAAGAAAAAGCAGTCTTACTTCCATG |
| 5 | ATTTCTTTAACTATGCCGGAATCCATCGCAGCGTAATGCTCTACACCACGCCGAACACCTGGGTGGACGATATCACCGTGGTGACGCATGTCGCGCAAGACTGTAACCACGCGTCTGTTG |
| 6 | ACTGGCAGGTGGTGGCCAATGGTGATGTCAGCGTTGAACTGCGTGATGCGGATCAACAGGTGGTTGCAACTGGACAAGGCACTAGCGGGACTTTGCAAGTGGTGAATCCGCACCTCTGGC |
| 7 | AACCGGGTGAAGGTTATCTCTATGAACTGTGCGTCACAGCCAAAAGCCAGACAGAGTGTGATATCTACCCGCTTCGCGTCGGCATCCGGTCAGTGGCAGTGAAGGGCGAACAGTTCCTGA |
| 8 | TTAACCACAAACCGTTCTACTTTACTGGCTTTGGTCGTCATGAAGATGCGGACTTGCGTGGCAAAGGATTCGATAACGTGCTGATGGTGCACGACCACGCATTAATGGACTGGATTGGGG |
| 9 | CCAACTCCTACCGTACCTCGCATTACCCTTACGCTGAAGAGATGCTCGACTGGGCAGATGAACATGGCATCGTGGTGATTGATGAAACTGCTGCTGTCGGCTTTAACCTCTCTTTAGGCA |
| 10 | TTGGTTTCGAAGCGGGCAACAAGCCGAAAGAACTGTACAGCGAAGAGGCAGTCAACGGGGAAACTCAGCAAGCGCACTTACAGGCGATTAAAGAGCTGATAGCGCGTGACAAAAACCACC |
| 11 | CAAGCGTGGTGATGTGGAGTATTGCCAACGAACCGGATACCCGTCCGCAAGGTGCACGGGAATATTTCGCGCCACTGGCGGAAGCAACGCGTAAACTCGACCCGACGCGTCCGATCACCT |
| 12 | GCGTCAATGTAATGTTCTGCGACGCTCACACCGATACCATCAGCGATCTCTTTGATGTGCTGTGCCTGAACCGTTATTACGGATGGTATGTCCAAAGCGGCGATTTGGAAACGGCAGAGA |
| 13 | AGGTACTGGAAAAAGAACTTCTGGCCTGGCAGGAGAAACTGCATCAGCCGATTATCATCACCGAATACGGCGTGGATACGTTAGCCGGGCTGCACTCAATGTACACCGACATGTGGAGTG |
| 14 | AAGAGTATCAGTGTGCATGGCTGGATATGTATCACCGCGTCTTTGATCGCGTCAGCGCCGTCGTCGGTGAACAGGTATGGAATTTCGCCGATTTTGCGACCTCGCAAGGCATATTGCGCG |
| 15 | TTGGCGGTAACAAGAAAGGGATCTTCACTCGCGACCGCAAACCGAAGTCGGCGGCTTTTCTGCTGCAAAAACGCTGGACTGGCATGAACTTCGGTGAAAAACCGCAGCAGGGAGGCAAAC |

### 烟草花叶病毒外壳蛋白（TMV-CP）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TGTCTTACAGTATCACTACCCCATCTCAGTTCGTGTTCTTGTCATCAGCGTGGGCCGACCCAATAGAGTTAATTAATTTATGTACTAATGCCTTAGGAAATCAGTTTCAAACACAACAAG |
| 2 | CTAGAACTGTCGTTCAAAGACAATTCAGTGAGGTGTGGAAACCTTCACCACAAGTAACTGTTAGGTTCCCCGACAGTGACTTTAAGGTGTACAGGTACAATGCGGTATTAGACCCGCTAG |
| 3 | TCACAGCACTGTTAGGTGCATTCGACACTAGAAATAGAATAATAGAAGTTGAAAATCAGGCGAACCCCACGACTGCCGAAACGTTAGACGCTACTCGTAGAGTAGACGACGCAACGGTGG |
| 4 | CCATAAGGAGCGCTATAAATAATTTAGTAGTAGAATTGATCAGAGGAACCGGACCTTATAATCGGAGCTCTTTCGAGAGCTCTTCTGGTTTGGTTTGGACCTCTGGTCCTGCAACTTGA |

### 黄瓜花叶病毒外壳蛋白（CMV-CP）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TCGCAACCGTCGACGTCGTCCGCGTCGTGGTTCCCGCTCCGCTTCCTCCTCCGCGGATGCCAACTTTAGAGTCTTGTCGCAGCAACTTTCGCGACTTAACAAGACGTTGGCAGCTGGTCG |
| 2 | TCCTACCATTAACCACCCAACCTTTGTGGGGAGTGAACGTTGTAAACCTGGGTACACGTTCACATCTATTACCCTGAAGCCACCAAAAATAGACCGTGGGTCTTATTATGGTAAAAGGTT |
| 3 | GTTACTACCTGATTCAGTCACGGAATTCGATAAGAAGCTTGTTTCGCGCATTCAAATTCGAGTTAATCCTTTGCCGAAATTTGATTCTACCGTGTGGGTGACAGTCCGTAAAGTTCCTGC |
| 4 | CTCCTCGGACTTGTCCGTCCCCGCCATCTCTGCTATGTTTGCGGACGGAGCCTCACCGGTACTAGTTTATCAGTATGCTGCATCCGGAGTCCAAGCCAACAATAAATTGTTGTATGATCT |
| 5 | TTCGGCGATGCGCGCTGATATTGGTGACATGAGGAAGTACGCCGTACTCGTGTATTCAAAAGACGATGCACTCGAGACGGACGAATTAGTACTCCATGTCGACATTGAGCACCAACGCAT |

### 马铃薯卷叶病毒复制酶（PLRVrep）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CCCAGTCTGGAACCTTGCTTTTTGACCAAAGATTTAAACTTTCAAAGTTTCTCTTCGTTGTCATTGCAACAGGCTTTCCTCTTCTCCTGCAGCAAGCGAGCTTAATTTACGGCTATAATC |
| 2 | ATGAACAGATTTACCGCATATGCCGCTCTTTTCTTTATGTTCTCCCTTTGCTCAACTGCAAAAGAGGCAGGATTTCTACATCCGGCCTTCAACTTCCGAGGCACCTCCACTATGAGTGCC |
| 3 | TCGAGTGGGGATTACTCTGCGGCACCCACCCCGCTATACAAATCGTGGGCCCTACCATCGTCATTAAACTTGACGACCCAACCACTGCCGCCGCTTACAGATCGGAGCTACTACGAGTTA |
| 4 | GTTCAAGCTCTTATATCCAAAATGCGGCTGGATTGTCAAACGGTTGGGGACATGACATGGAGGCATTTGTCAGAAATGCTATTTGCCTCCTGGAACTCCGTGAAAGAAGTATCCCTCAAA |
| 5 | GCGGCCTCCGTGACCTTATGGGCAATTATCAGCATTTGGTTCGGTCTTTATTGGACGCTTGCAAGGTTGATCACTTTGTTCCTCTGGACTTTCAGCATAGAAGCCTTATGCTTAATTTTG |
| 6 | CTCGGTTGTATAACCAGCTTGATCTACAGGGGCGTGCTAAGTCTTTCAGAGCACTTACCGGTTTTCCTGTTTATGTCCCCTCTGAAGATTATTTGGAGGGCAGCTTTCTCCAAAAAGAAT |

### 马铃薯Y病毒外壳蛋白基因（PVYcp）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GCAAATGACACAATTGATGCAGGAGGAAACAGCAAGAAAGATGCAAGACCAGAGCAAGGCAGCATCCAGTCAAACCCGAACAAAGGAAAAGATAAGGATGTGAATGCTGGTACATCTGGG |
| 2 | ATGTGAATGCTGGTACATCTGGGACACATACTGTGCCGAGAATCAAGGCTATCACGTCCAAAATGAGAATGCCCAAAAGCAAGGGAGCAACCGTGCTAAACTTAGAACACTTGCTTGAGT |
| 3 | AAACTTAGAACACTTGCTTGAGTATGCTCCACAACAAATTGATATTTCAAATACTCGGGCAACTCAATCACAGTTTGATACGTGGTATGAGGCAGTGCGGATGGCATACGACATAGGAGA |
| 4 | CGGATGGCATACGACATAGGAGAAACTGAGATGCCAACTGTGATGAATGGGCTTATGGTTTGGTGCATTGAAAATGGAACCTCGCCAAATGTCAACGGAGTTTGGGTTATGATGGATGGG |
| 5 | GAGTTTGGGTTATGATGGATGGGAATGAACAAGTTGAGTACCCGTTGAAACCAATCGTTGAGAATGCAAAACCAACCCTTAGGCAAATCATGGCACATTTCTCAGATGTTGCAGAAGCGT |
| 6 | TTTCTCAGATGTTGCAGAAGCGTATATAGAAATGCGCAACAAAAAGGAACCATATATGCCACGATATGGTTTAATTCGAAATCTGCGGGATGTGGGTTTAGCGCGTTATGCCTTTGACTT |
| 7 | TTAGCGCGTTATGCCTTTGACTTTTATGAGGTCACATCACGAACACCAGTGAGGGCTAGGGAAGCGCACATTCAAATGAAGGCCGCAGCATTGAAATCAGCCCAACCTCGACTTTTCGGG |
| 8 | GCCCAACCTCGACTTTTCGGGTTGGATGGTGGCATCAGTACACAAGAGGAGAACACAGAGAGGCACACCACCGAGGATGTCTCTCCAAGTATGCATACTCTACTTGGAGTTAAGAACATG |

### 腈水解酶基因（BXN）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATAGTAGGGGCTTGAAGAGATACGCTGTTTGTCGAGCCATCAAAATAAGGGGATTTTCATGGACACCACTTTCAAAGCAGCCGCTGTTCAGGCCGAACCGGTATGGATGGATGCCGCTGC |
| 2 | AACAGCCGATAAGACCGTGACGCTAGTAGCTAAAGCCGCAGCGGCTGGCGCGCAGCTCGTCGCATTTCCCGAATTGTGGATTCCGGGCTACCCAGGATTCATGCTCACGCACAACCAAAC |
| 3 | CGAAACCCTACCATTCATCATTAAATACCGCAAGCAGGCAATCGCCGCCGATGGACCAGAAATCGAAAAAATTCGCTGCGCGGCTCAGGAGCATAACATTGCGCTCTCCTTTGGGTACAG |
| 4 | CGAACGGGCTGGCCGTACGCTCTACATGTCACAAATGCTTATCGATGCCGATGGCATCACCAAAATTCGTCGTCGAAAGCTCAAACCAACCCGCTTTGAACGAGAACTCTTTGGCGAAGG |
| 5 | TGACGGATCGGACTTACAGGTCGCCCAAACTAGCGTTGGTCGGGTGGGTGCCCTCAACTGCGCGGAGAATTTGCAGTCGCTAAACAAGTTTGCGCTTGCTGCCGAGGGTGAACAGATACA |
| 6 | TATCTCCGCCTGGCCATTCACGCTTGGAAGCCCTGTGCTCGTCGGAGACTCCATCGGCGCCATCAACCAGGTCTACGCGGCCGAGACGGGGACCTTCGTTCTCATGTCGACGCAGGTGGT |
| 7 | TGGACCGACCGGCATCGCCGCCTTCGAGATCGAAGACAGGTACAACCCGAATCAGTATCTTGGTGGTGGGTACGCGCGGATCTACGGGCCTGACATGCAGTTGAAGAGCAAGTCGTTGTC |
| 8 | ACCGACCGAAGAGGGCATCGTCTACGCCGAGATCGACCTGTCGATGCTTGAGGCAGCAAAGTACTCGCTCGATCCCACGGGCCACTATTCGCGCCCTGATGTGTTCAGCGTGTCGATTAA |
| 9 | CCGGCAACGGCAGCCTGCGGTGTCAGAAGTTATCGACTCAAACGGTGACGAGGACCCGAGAGCAGCATGCGAGCCCGACGAGGGGGATCGTGAGGTCGTAATCTCTACGGCAATAGGGGT |
| 10 | TCTACCCCGTTATTGCGGACATTCCTAATAAAAAGAGACACGTTGTACCAAAGGGGTGTTCATGTCCAGACGCAGAAAATATAGCCCAGAGTTAAAACGCGAAGCCATCGCTTTAACCCG |

### 核糖核酸酶基因（BARNASE）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GAAGCACAGGTTATCAACACGTTTGACGGGGTTGCGGATTATCTTCAGACATATCATAAGCTACCTGATAATTACATTACAAAATCAGAAGCACAAGCCCTCGGCTGGGTGGCATCAAAA |
| 2 | TACATTACAAAATCAGAAGCACAAGCCCTCGGCTGGGTGGCATCAAAAGGGAACCTTGCAGACGTCGCTCCGGGGAAAAGCATCGGCGGAGACATCTTCTCAAACAGGGAAGGCAAACTC |
| 3 | GGGAAAAGCATCGGCGGAGACATCTTCTCAAACAGGGAAGGCAAACTCCCGGGCAAAAGCGGACGAACATGGCGTGAAGCGGATATTAACTATACATCAGGCTTCAGAAATTCAGACCGG |

### BARNASE基因的特异抑制基因（BARSTAR）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TAACGGGGAACAAATCAGAAGTATCAGCGACCTCCACCAGACATTGAAAAAGGAGCTTGCCCTTCCGGAATACTACGGTGAAAACCTGGACGCTTTATGGGATTGTCTGACCGGATGGGT |
| 2 | GGAGTACCCGCTCGTTTTGGAATGGAGGCAGTTTGAACAAAGCAAGCAGCTGACTGAAAATGGCGCCGAGAGTGTGCTTCAGGTTTTCCGTGAAGCGAAAGCGGAAGGCTGCGACATCAC |

### 草丁膦乙酰转移酶基因（BAR）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TGGGGATCTACCATGAGCCCAGAACGACGCCCGGCCGACATCCGCCGTGCCACCGAGGCGGACATGCCGGCGGTCTGCACCATCGTCAACCACTACATCGAGACAAGCACGGTCAACTTC |
| 2 | CCACTACATCGAGACAAGCACGGTCAACTTCCGTACCGAGCCGCAGGAACCGCAGGAGTGGACGGACGACCTCGTCCGTCTGCGGGAGCGCTATCCCTGGCTCGTCGCCGAGGTGGACGG |
| 3 | GCTATCCCTGGCTCGTCGCCGAGGTGGACGGCGAGGTCGCCGGCATCGCCTACGCGGGCCCCTGGAAGGCACGCAACGCCTACGACTGGACGGCCGAGTCGACCGTGTACGTCTCCCCCC |
| 4 | ACGGCCGAGTCGACCGTGTACGTCTCCCCCCGCCACCAGCGGACGGGACTGGGCTCCACGCTCTACACCCACCTGCTGAAGTCCCTGGAGGCACAGGGCTTCAAGAGCGTGGTCGCTGTC |
| 5 | GGCACAGGGCTTCAAGAGCGTGGTCGCTGTCATCGGGCTGCCCAACGACCCGAGCGTGCGCATGCACGAGGCGCTCGGATATGCCCCCCGCGGCATGCTGCGGGCGGCCGGCTTCAAGCA |

### 草丁膦乙酰转移酶基因（PAT）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CGACATGTCTCCGGAGAGGAGACCAGTTGAGATTAGGCCAGCTACAGCAGCTGATATGGCCGCGGTTTGTGATATCGTTAACCATTACATTGAGACGTCTACAGTGAACTTTAGGACAGA |
| 2 | CATTGAGACGTCTACAGTGAACTTTAGGACAGAGCCACAAACACCACAAGAGTGGATTGATGATCTAGAGAGGTTGCAAGATAGATACCCTTGGTTGGTTGCTGAGGTTGAGGGTGTTGT |
| 3 | CCCTTGGTTGGTTGCTGAGGTTGAGGGTGTTGTGGCTGGTATTGCTTACGCTGGGCCCTGGAAGGCTAGGAACGCTTACGATTGGACAGTTGAGAGTACTGTTTACGTGTCACATAGGCA |
| 4 | AGTTGAGAGTACTGTTTACGTGTCACATAGGCATCAAAGGTTGGGCCTAGGATCCACATTGTACACACATTTGCTTAAGTCTATGGAGGCGCAAGGTTTTAAGTCTGTGGTTGCTGTTAT |
| 5 | GGCGCAAGGTTTTAAGTCTGTGGTTGCTGTTATAGGCCTTCCAAACGATCCATCTGTTAGGTTGCATGAGGCTTTGGGATACACAGCCCGGGGTACATTGCGCGCAGCTGGATACAAGCA |

### 6-磷酸甘露糖异构酶基因（PMI）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATGCAAAAACTCATTAACTCAGTGCAAAACTATGCCTGGGGCAGCAAAACGGCGTTGACTGAACTTTATGGTATGGAAAATCCGTCCAGCCAGCCGATGGCCGAGCTGTGGATGGGCGCA |
| 2 | CTGTGGATGGGCGCACATCCGAAAAGCAGTTCACGAGTGCAGAATGCCGCCGGAGATATCGTTTCACTGCGTGATGTGATTGAGAGTGATAAATCGACTCTGCTCGGAGAGGCCGTTGCC |
| 3 | GGAGAGGCCGTTGCCAAACGCTTTGGCGAACTGCCTTTCCTGTTCAAAGTATTATGCGCAGCACAGCCACTCTCCATTCAGGTTCATCCAAACAAACACAATTCTGAAATCGGTTTTGCC |
| 4 | GAAATCGGTTTTGCCAAAGAAAATGCCGCAGGTATCCCGATGGATGCCGCCGAGCGTAACTATAAAGATCCTAACCACAAGCCGGAGCTGGTTTTTGCGCTGACGCCTTTCCTTGCGATG |
| 5 | CCTTTCCTTGCGATGAACGCGTTTCGTGAATTTTCCGAGATTGTCTCCCTACTCCAGCCGGTCGCAGGTGCACATCCGGCGATTGCTCACTTTTTACAACAGCCTGATGCCGAACGTTTA |
| 6 | GATGCCGAACGTTTAAGCGAACTGTTCGCCAGCCTGTTGAATATGCAGGGTGAAGAAAAATCCCGCGCGCTGGCGATTTTAAAATCGGCCCTCGATAGCCAGCAGGGTGAACCGTGGCAA |
| 7 | GGTGAACCGTGGCAAACGATTCGTTTAATTTCTGAATTTTACCCGGAAGACAGCGGTCTGTTCTCCCCGCTATTGCTGAATGTGGTGAAATTGAACCCTGGCGAAGCGATGTTCCTGTTC |
| 8 | GCGATGTTCCTGTTCGCTGAAACACCGCACGCTTACCTGCAAGGCGTGGCGCTGGAAGTGATGGCAAACTCCGATAACGTGCTGCGTGCGGGTCTGACGCCTAAATACATTGATATTCCG |
| 9 | TACATTGATATTCCGGAACTGGTTGCCAATGTGAAATTCGAAGCCAAACCGGCTAACCAGTTGTTGACCCAGCCGGTGAAACAAGGTGCAGAACTGGACTTCCCGATTCCAGTGGATGAT |
| 10 | ATTCCAGTGGATGATTTTGCCTTCTCGCTGCATGACCTTAGTGATAAAGAAACCACCATTAGCCAGCAGAGTGCCGCCATTTTGTTCTGCGTCGAAGGCGATGCAACGTTGTGGAAAGGT |
| 11 | TGGAAAGGTTCTCAGCAGTTACAGCTTAAACCGGGTGAATCAGCGTTTATTGCCGCCAACGAATCACCGGTGACTGTCAAAGGCCACGGCCGTTTAGCGCGTGTTTACAACAAGCTGTAA |

### 苏云金芽孢杆菌杀虫毒蛋白基因（BT）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CAACGAGTGCATCCCCTACAACTGCCTGAGCAACCCCGAGGTGGAGGTGCTGGGCGGCGAGCGCATCGAGACCGGCTACACCCCCATCGACATCAGCCTGAGCCTGACCCAGTTCCTGCT |
| 2 | GAGCGAGTTCGTGCCCGGCGCCGGCTTCGTGCTGGGCCTGGTGGACATCATCTGGGGCATCTTCGGCCCCAGCCAGTGGGACGCCTTCCTGGTGCAGATCGAGCAGCTGATCAACCAGCG |
| 3 | CATCGAGGAGTTCGCCCGCAACCAGGCCATCAGCCGCCTGGAGGGCCTGAGCAACCTGTACCAAATCTACGCCGAGAGCTTCCGCGAGTGGGAGGCCGACCCCACCAACCCCGCCCTGCG |
| 4 | CGAGGAGATGCGCATCCAGTTCAACGACATGAACAGCGCCCTGACCACCGCCATCCCCCTGTTCGCCGTGCAGAACTACCAGGTGCCCCTGCTGAGCGTGTACGTGCAGGCCGCCAACCT |
| 5 | GCACCTGAGCGTGCTGCGCGACGTCAGCGTGTTCGGCCAGCGCTGGGGCTTCGACGCCGCCACCATCAACAGCCGCTACAACGACCTGACCCGCCTGATCGGCAACTACACCGACCACGC |
| 6 | CGTGCGCTGGTACAACACCGGCCTGGAGCGCGTGTGGGGTCCCGACAGCCGCGACTGGATCAGGTACAACCAGTTCCGCCGCGAGCTGACCCTGACCGTGCTGGACATCGTGAGCCTGTT |
| 7 | CCCCAACTACGACAGCCGCACCTACCCCATCCGCACCGTGAGCCAGCTGACCCGCGAGATTTACACCAACCCCGTGCTGGAGAACTTCGACGGCAGCTTCCGCGGCAGCGCCCAGGGCAT |
| 8 | CGAGGGCAGCATCCGCAGCCCCCACCTGATGGACATCCTGAACAGCATCACCATCTACACCGACGCCCACCGCGGCGAGTACTACTGGAGCGGCCACCAGATCATGGCCAGCCCCGTCGG |
| 9 | CTTCAGCGGCCCCGAGTTCACCTTCCCCCTGTACGGCACCATGGGCAACGCTGCACCTCAGCAGCGCATAGTGGCACAGCTGGGCCAGGGAGTGTACCGCACCCTGAGCAGCACCCTGTA |
| 10 | CCGTCGACCTTTCAACATCGGCATCAACAACCAGCAGCTGAGCGTGCTGGACGGCACCGAGTTCGCCTACGGCACCAGCAGCAACCTGCCCAGCGCCGTGTACCGCAAGAGCGGCACCGT |
| 11 | GGACAGCCTGGACGAGATCCCCCCTCAGAACAACAACGTGCCACCTCGACAGGGCTTCAGCCACCGTCTGAGCCACGTGAGCATGTTCCGCAGTGGCTTCAGCAACAGCAGCGTGAGCAT |
| 12 | CATCCGTGCACCTATGTTCAGCTGGATTCACCGCAGTGCCGAGTTCAACAACATCATCGCCTCCGACTCCATCACCCAGATCCCGGCTGTGAAGGGCAACTTCCTCTTCAACGGCTCCGT |
| 13 | GATCTCCGGTCCAGGCTTCACCGGTGGCGACCTCGTGCGCCTCAACTCCTCCGGCAACAACATCCAGAACCGCGGTTACATCGAGGTGCCGATCCACTTCCCGTCCACCTCCACCCGCTA |
| 14 | CCGCGTGCGCGTGCGCTACGCCTCCGTGACCCCGATCCACCTCAACGTGAACTGGGGCAACTCCTCCATCTTCTCCAACACCGTGCCAGCCACCGCCACCTCCCTCGACAACCTCCAGTC |
| 15 | CTCCGACTTCGGCTACTTCGAGTCCGCCAACGCCTTCACCTCCTCCCTCGGCAACATCGTGGGCGTGCGCAACTTCTCCGGCACCGCTGGCGTGATCATCGACCGCTTCGAGTTCATCCC |
| 16 | GGTGACCGCCACCCTCGAAGCCGAGTACAACCTTGAGCGCGCTCAGAAGGCCGTGAACGCCCTCTTCACCTCCACCAACCAGCTCGGCCTCAAGACCAACGTGACCGACTACCACATCGA |
| 17 | CCAGGTGCCCGGGCGCGGCGGCGGCGGCAAGCTCAAGAACCAGGACAAGCACCAGTCCTTCTCCTCCAACGCCAAGGTGGACAAGATTTCCACCGACTCCCTCAAGAACGAGACCGACAT |
| 18 | CGAACTCCAGAACATCAACCACGAGGACTGCCTCAAGATGTCCGAGTACGAGAACGTGGAGCCGTTCGTGTCCGTGTCCACCATCCAGACCGGCATCGGCATCGCCGGCAAGATCCTCGG |
| 19 | CAACCTCGGCGTGCCGTTCGCAGGCCAGGTGGCCTCCCTCTACTCCTTCATCCTCGGCGAGCTTTGGCCGAAGGGCAAGTCCCAGTGGGAAATCTTCATGGAGCACGTGGAGGAACTCAT |
| 20 | CAACCAGAAGATTTCCACCTACGCCCGCAACAAGGCCCTCGCCGACCTCAAGGGCCTCGGCGACGCCCTCGCCGTGTACCACGAGTCCCTTGAGTCCTGGATCAAGAACCGCAACAACAC |
| 21 | CCGCACCCGCTCCGTGGTGAAGTCCCAGTACATCACCCTCGAACTCATGTTCGTGCAGTCCCTCCCGTCCTTCGCCGTGTCCGGAGAGGAGGTGCCGCTCCTCCCGATCTACGCCCAGGC |
| 22 | AGCCAACCTCCACCTCCTCCTCCTCCGCGACGCCTCCATCTTCGGCAAGGAGTGGGGCCTCTCCGACTCCGAGATATCCACCTTCTACAACCGCCAGGTGGAGCGCACCTCCGACTACTC |
| 23 | CGACCACTGCACCAAGTGGTTCGACACCGGCCTCAACCGCCTCAAGGGCTCCAACGCCGAAATCTGGGTGAAGTACAACCAGTTCCGCCGCGACATGACCCTCATGGTGCTCGACCTCGT |
| 24 | GGCCCTCTTCCAGTCCTACGACACCCACATGTACCCGATCAAGACCACCGCCCAGCTCACCCGCGAGGTGTACACCAACGCCATCGGCACCGTGCACCCGCACCCGTCCTTCGCCTCCAC |
| 25 | CACCTGGTACAACAACAACGCCCCTTCCTTCTCCGCCATCGAGGCCGCCGTGATCCGCTCCCCGCACCTCCTCGACTTCCTTGAGCAGGTGACCATCTACTCCCTCCTCTCCCGCTGGTC |
| 26 | CAACACCCAGTACATGAACATGTGGGGAGGCCACAAACTTGAGTTCCGCACCATCGGTGGCACCCTCAACACCTCCACCCAGGGCTCCACCAACACCTCCATCAACCCGGTGACCCTCCC |
| 27 | GTTCACCTCCCGCGACATCTACCGCACCGAGTCCCTCGCCGGCCTCAACCTCTTCCTCACCCAGCCGGTGAACGGCGTGCCTCGCGTGGACTTCCACTGGAAGTTCGTGACCCACCCGAT |
| 28 | CGCCTCCGACAACTTCTACTACCCTGGCTACGCCGGCATCGGCACCCAGCTCCAGGACTCCGAGAACGAACTCCCTCCGGAGACCACCGGCCAGCCGAACTACGAGTCCTACTCCCACCG |
| 29 | CCTCTCCCACATCGGCCTCATCTCCGCCTCCCACGTGAAGGCCCTCGTGTACTCCTGGACCCACCGCTCCGCCGACCGCACCAACACCATCCACTCCGACTCCATCACCCAGATCCCGCT |
| 30 | CGTGAAGGCCCACACCCTCCAGTCCGGCACCACCGTGGTGAAGGGTCCAGGCTTCACCGGTGGCGACATCCTCCGCCGCACCTCCGGAGGCCCGTTCGCCTTCTCCAACGTGAACCTCGA |
| 31 | CTGGAACCTCTCCCAGCGCTACCGCGCTCGCATCCGCTACGCCTCCACCACCAACCTCCGCATGTACGTGACCATCGCAGGCGAGCGCATCTTCGCAGGCCAGTTCAACAAGACCATGAA |
| 32 | CACAGGCGACCCGCTCACCTTCCAGTCCTTCTCCTACGCCACCATCGACACCGCCTTCACCTTCCCGACCAAGGCCTCCTCCCTCACCGTGGGAGCTGACACCTTCTCCTCCGGCAACGA |
| 33 | GGTGTACGTGGACCGCTTCGAACTCATCCCGGTGACCGCCACCCTTGAGGCCGTGACCGACCTAGAACGCGCTCAGAAGGCCGTGCACGAACTCTTCACCTCCACCAACCCTGGTGGCCT |
| 34 | CAAGACCGACGTGAAGGACTACCACATCGACCAGGTGTCCAACCTCGTGGAGTCCCTCTCCGACGAGTTCTACCTCGACGAGAAGCGCGAACTCTTCGAGATCGTGAAGTACGCCAAGCA |
| 35 | TGATCAACCATGGCCAACCCCAACAATCGCTCCGAGCACGACACGATCAAGGTCACCCCCAACTCCGAGCTCCAGACCAACCACAACCAGTACCCGCTGGCCGACAACCCCAACTCCACC |
| 36 | CAACTCCACCCTGGAAGAGCTGAACTACAAGGAGTTCCTGCGCATGACCGAGGACTCCTCCACGGAGGTCCTGGACAACTCCACCGTCAAGGACGCCGTCGGGACCGGCATCTCCGTCGT |
| 37 | TCTCCGTCGTTGGGCAGATCCTGGGCGTCGTTGGCGTCCCCTTCGCAGGTGCTCTCACCTCCTTCTACCAGTCCTTCCTGAACACCATCTGGCCCTCCGACGCCGACCCCTGGAAGGCCT |
| 38 | TGGAAGGCCTTCATGGCCCAAGTCGAAGTCCTGATCGACAAGAAGATCGAGGAGTACGCCAAGTCCAAGGCCCTGGCCGAGCTGCAAGGCCTGCAAAACAACTTCGAGGACTACGTCAAC |
| 39 | CTACGTCAACGCGCTGAACTCCTGGAAGAAGACGCCTCTGTCCCTGCGCTCCAAGCGCTCCCAGGACCGCATCCGCGAGCTGTTCTCCCAGGCCGAGTCCCACTTCCGCAACTCCATGCC |
| 40 | ACTCCATGCCGTCCTTCGCCGTCTCCAAGTTCGAGGTCCTGTTCCTGCCCACCTACGCCCAGGCTGCCAACACCCACCTCCTGTTGCTGAAGGACGCCCAGGTCTTCGGCGAGGAATGGG |
| 41 | GAGGAATGGGGCTACTCCTCGGAGGACGTCGCCGAGTTCTACCGTCGCCAGCTGAAGCTGACCCAACAGTACACCGACCACTGCGTCAACTGGTACAACGTCGGCCTGAACGGCCTGAGG |
| 42 | CGGCCTGAGGGGCTCCACCTACGACGCATGGGTCAAGTTCAACCGCTTCCGCAGGGAGATGACCCTGACCGTCCTGGACCTGATCGTCCTGTTCCCCTTCTACGACATCCGCCTGTACTC |
| 43 | GCCTGTACTCCAAGGGCGTCAAGACCGAGCTGACCCGCGACATCTTCACGGACCCCATCTTCCTGCTCACGACCCTCCAGAAGTACGGTCCCACCTTCCTGTCCATCGAGAACTCCATCC |
| 44 | AACTCCATCCGCAAGCCCCACCTGTTCGACTACCTCCAGGGCATCGAGTTCCACACGCGCCTGAGGCCAGGCTACTTCGGCAAGGACTCCTTCAACTACTGGTCCGGCAACTACGTCGAG |
| 45 | CTACGTCGAGACCAGGCCCTCCATCGGCTCCTCGAAGACGATCACCTCCCCTTTCTACGGCGACAAGTCCACCGAGCCCGTCCAGAAGCTGTCCTTCGACGGCCAGAAGGTCTACCGCAC |
| 46 | TCTACCGCACCATCGCCAACACCGACGTCGCGGCTTGGCCGAACGGCAAGGTCTACCTGGGCGTCACGAAGGTCGACTTCTCCCAGTACGATGACCAGAAGAACGAGACCTCCACCCAGA |
| 47 | TCCACCCAGACCTACGACTCCAAGCGCAACAATGGCCACGTCTCCGCCCAGGACTCCATCGACCAGCTGCCGCCTGAGACCACTGACGAGCCCCTGGAGAAGGCCTACTCCCACCAGCTG |
| 48 | CCACCAGCTGAACTACGCGGAGTGCTTCCTGATGCAAGACCGCAGGGGCACCATCCCCTTCTTCACCTGGACCCACCGCTCCGTCGACTTCTTCAACACCATCGACGCCGAGAAGATCAC |
| 49 | AGAAGATCACCCAGCTGCCCGTGGTCAAGGCCTACGCCCTGTCCTCGGGTGCCTCCATCATTGAGGGTCCAGGCTTCACCGGTGGCAACCTGCTGTTCCTGAAGGAGTCCTCGAACTCCA |
| 50 | TCGAACTCCATCGCCAAGTTCAAGGTCACCCTGAACTCCGCTGCCTTGCTGCAACGCTACCGCGTCCGCATCCGCTACGCCTCCACCACGAACCTGCGCCTGTTCGTCCAGAACTCCAAC |
| 51 | GAACTCCAACAATGACTTCCTGGTCATCTACATCAACAAGACCATGAACAAGGACGATGACCTGACCTACCAGACCTTCGACCTCGCCACCACGAACTCCAACATGGGCTTCTCGGGCGA |
| 52 | ATGACGGCCGACAACAACACCGAGGCCCTGGACAGCAGCACCACCAAGGACGTGATCCAGAAGGGCATCAGCGTGGTGGGCGACCTGCTGGGCGTGGTGGGCTTCCCCTTCGGCGGCGCC |
| 53 | GGCGGCGCCCTGGTGAGCTTCTACACCAACTTCCTGAACACCATCTGGCCCAGCGAGGACCCCTGGAAGGCCTTCATGGAGCAGGTGGAGGCCCTGATGGACCAGAAGATCGCCGACTAC |
| 54 | GCCGACTACGCCAAGAACAAGGCACTGGCCGAGCTACAGGGCCTCCAGAACAACGTGGAGGACTATGTGAGCGCCCTGAGCAGCTGGCAGAAGAACCCCGCTGCACCGTTCCGCAACCCC |
| 55 | CGCAACCCCCACAGCCAGGGCCGCATCCGCGAGCTGTTCAGCCAGGCCGAGAGCCACTTCCGCAACAGCATGCCCAGCTTCGCCATCAGCGGCTACGAGGTGCTGTTCCTGACCACCTAC |
| 56 | ACCACCTACGCCCAGGCCGCCAACACCCACCTGTTCCTGCTGAAGGACGCCCAAATCTACGGAGAGGAGTGGGGCTACGAGAAGGAGGACATCGCCGAGTTCTACAAGCGCCAGCTGAAG |
| 57 | CAGCTGAAGCTGACCCAGGAGTACACCGACCACTGCGTGAAGTGGTACAACGTGGGTCTAGACAAGCTCCGCGGCAGCAGCTACGAGAGCTGGGTGAACTTCAACCGCTACCGCCGCGAG |
| 58 | CGCCGCGAGATGACCCTGACCGTGCTGGACCTGATCGCCCTGTTCCCCCTGTACGACGTGCGCCTGTACCCCAAGGAGGTGAAGACCGAGCTGACCCGCGACGTGCTGACCGACCCCATC |
| 59 | GACCCCATCGTGGGCGTGAACAACCTGCGCGGCTACGGCACCACCTTCAGCAACATCGAGAACTACATCCGCAAGCCCCACCTGTTCGACTACCTGCACCGCATCCAGTTCCACACGCGT |
| 60 | CACACGCGTTTCCAGCCCGGCTACTACGGCAACGACAGCTTCAACTACTGGAGCGGCAACTACGTGAGCACCCGCCCCAGCATCGGCAGCAACGACATCATCACCAGCCCCTTCTACGGC |
| 61 | TTCTACGGCAACAAGAGCAGCGAGCCCGTGCAGAACCTTGAGTTCAACGGCGAGAAGGTGTACCGCGCCGTGGCTAACACCAACCTGGCCGTGTGGCCCTCTGCAGTGTACAGCGGCGTG |
| 62 | AGCGGCGTGACCAAGGTGGAGTTCAGCCAGTACAACGACCAGACCGACGAGGCCAGCACCCAGACCTACGACAGCAAGCGCAACGTGGGCGCCGTGAGCTGGGACAGCATCGACCAGCTG |
| 63 | GACCAGCTGCCCCCCGAGACCACCGACGAGCCCCTGGAGAAGGGCTACAGCCACCAGCTGAACTACGTGATGTGCTTCCTGATGCAGGGCAGCCGCGGCACCATCCCCGTGCTGACCTGG |
| 64 | CTGACCTGGACCCACAAGAGCGTCGACTTCTTCAACATGATCGACAGCAAGAAGATCACCCAGCTGCCCCTGGTGAAGGCCTACAAGCTCCAGAGCGGCGCCAGCGTGGTGGCAGGCCCC |
| 65 | GCAGGCCCCCGCTTCACCGGCGGCGACATCATCCAGTGCACCGAGAACGGCAGCGCCGCCACCATCTACGTGACCCCCGACGTGAGCTACAGCCAGAAGTACCGCGCCCGCATCCACTAC |
| 66 | ATCCACTACGCCAGCACCAGCCAGATCACCTTCACCCTGAGCCTGGACGGGGCCCCCTTCAACCAATACTACTTCGACAAGACCATCAACAAGGGCGACACCCTGACCTACAACAGCTTC |
| 67 | ATGACTGCAGACAACAACACCGAAGCCCTCGACAGTTCTACCACTAAGGATGTTATCCAGAAGGGTATCTCCGTTGTGGGAGACCTCTTGGGCGTGGTTGGATTTCCCTTCGGTGGAGCC |
| 68 | GGTGGAGCCCTCGTGAGCTTCTATACAAACTTTCTCAACACCATTTGGCCAAGCGAGGACCCTTGGAAAGCATTCATGGAGCAAGTTGAAGCTCTTATGGATCAGAAGATTGCAGATTAT |
| 69 | GCAGATTATGCCAAGAACAAGGCTTTGGCAGAACTCCAGGGCCTTCAGAACAATGTGGAGGACTACGTGAGTGCATTGTCCAGCTGGCAGAAGAACCCTGTTAGCTCCAGAAATCCTCAC |
| 70 | AATCCTCACAGCCAAGGTAGGATCAGAGAGTTGTTCTCTCAAGCCGAATCCCACTTCAGAAATTCCATGCCTAGCTTTGCTATCTCCGGTTACGAGGTTCTTTTCCTCACTACCTATGCT |
| 71 | ACCTATGCTCAAGCTGCCAACACCCACTTGTTTCTCCTTAAGGACGCTCAAATCTATGGAGAAGAGTGGGGATACGAGAAAGAGGACATTGCTGAGTTCTACAAGCGTCAACTTAAGCTC |
| 72 | CTTAAGCTCACCCAAGAGTACACTGACCATTGCGTGAAATGGTATAACGTTGGTCTCGATAAGCTCAGAGGCTCTTCCTACGAGTCTTGGGTGAACTTCAACAGATACAGGAGAGAGATG |
| 73 | AGAGAGATGACCTTGACTGTGCTCGATCTTATCGCACTCTTTCCCTTGTACGATGTGAGACTCTACCCAAAGGAAGTGAAAACTGAGCTTACCAGAGACGTGCTCACTGACCCTATTGTC |
| 74 | CCTATTGTCGGAGTCAACAACCTTAGGGGTTATGGAACTACCTTCAGCAATATCGAAAACTACATTAGGAAACCACATCTCTTCGACTATCTTCACAGAATTCAATTCCACACAAGGTTT |
| 75 | ACAAGGTTTCAACCAGGATACTATGGTAACGACTCCTTCAACTATTGGTCCGGTAACTATGTTTCCACCAGACCAAGCATTGGATCTAATGACATCATCACATCTCCCTTCTATGGTAAC |
| 76 | TATGGTAACAAGTCCAGTGAACCTGTGCAGAACCTTGAGTTCAACGGCGAGAAAGTCTATAGAGCCGTCGCAAACACCAATCTCGCTGTGTGGCCATCCGCAGTTTACTCAGGCGTCACA |
| 77 | GGCGTCACAAAGGTGGAGTTTAGTCAGTATAACGATCAGACCGATGAGGCCAGCACCCAGACTTACGACTCCAAACGTAACGTTGGCGCAGTCTCTTGGGATTCTATCGACCAATTGCCT |
| 78 | CAATTGCCTCCAGAAACCACAGACGAACCATTGGAGAAGGGCTACAGCCACCAACTTAACTATGTGATGTGCTTCTTGATGCAAGGTTCCAGAGGGACCATTCCAGTGTTGACCTGGACA |
| 79 | ACCTGGACACACAAGTCCGTGGACTTCTTCAACATGATCGATAGCAAGAAGATCACTCAACTTCCCTTGGTGAAAGCCTACAAGCTGCAATCTGGTGCTTCCGTTGTCGCAGGTCCCAGA |
| 80 | GGTCCCAGATTCACTGGAGGTGACATCATCCAGTGCACAGAGAACGGCAGCGCAGCTACTATCTACGTGACACCTGATGTGTCTTACTCTCAGAAGTACAGGGCACGTATTCATTACGCA |
| 81 | CATTACGCATCTACCAGCCAGATCACCTTCACACTCAGCTTGGATGGAGCACCCTTCAACCAGTATTACTTTGACAAGACCATCAACAAAGGTGACACTCTCACATACAATAGCTTCAAC |
| 82 | ACGAATGCATTCCATACAACTGCTTGAGTAACCCAGAAGTTGAAGTACTTGGTGGAGAACGCATTGAAACCGGTTACACTCCCATCGACATCTCCTTGTCCTTGACACAGTTTCTGCTCA |
| 83 | GCGAGTTCGTGCCAGGTGCTGGGTTCGTTCTCGGACTAGTTGACATCATCTGGGGTATCTTTGGTCCATCTCAATGGGATGCATTCCTGGTGCAAATTGAGCAGTTGATCAACCAGAGGA |
| 84 | TCGAAGAGTTCGCCAGGAACCAGGCCATCTCTAGGTTGGAAGGATTGAGCAATCTCTACCAAATCTATGCAGAGAGCTTCAGAGAGTGGGAAGCCGATCCTACTAACCCAGCTCTCCGCG |
| 85 | AGGAAATGCGTATTCAATTCAACGACATGAACAGCGCCTTGACCACAGCTATCCCATTGTTCGCAGTCCAGAACTACCAAGTTCCTCTCTTGTCCGTGTACGTTCAAGCAGCTAATCTTC |
| 86 | ACCTCAGCGTGCTTCGAGACGTTAGCGTGTTTGGGCAAAGGTGGGGATTCGATGCTGCAACCATCAATAGCCGTTACAACGACCTTACTAGGCTGATTGGAAACTACACCGACCACGCTG |
| 87 | TTCGTTGGTACAACACTGGCTTGGAGCGTGTCTGGGGTCCTGATTCTAGAGATTGGATTAGATACAACCAGTTCAGGAGAGAATTGACCCTCACAGTTTTGGACATTGTGTCTCTCTTCC |
| 88 | CGAACTATGACTCCAGAACCTACCCTATCCGTACAGTGTCCCAACTTACCAGAGAAATCTATACTAACCCAGTTCTTGAGAACTTCGACGGTAGCTTCCGTGGTTCTGCCCAAGGTATCG |
| 89 | AAGGCTCCATCAGGAGCCCACACTTGATGGACATCTTGAACAGCATAACTATCTACACCGATGCTCACAGAGGAGAGTATTACTGGTCTGGACACCAGATCATGGCCTCTCCAGTTGGAT |
| 90 | TCAGCGGGCCCGAGTTTACCTTTCCTCTCTATGGAACTATGGGAAACGCCGCTCCACAACAACGTATCGTTGCTCAACTAGGTCAGGGTGTCTACAGAACCTTGTCTTCCACCTTGTACA |
| 91 | GAAGACCCTTCAATATCGGTATCAACAACCAGCAACTTTCCGTTCTTGACGGAACAGAGTTCGCCTATGGAACCTCTTCTAACTTGCCATCCGCTGTTTACAGAAAGAGCGGAACCGTTG |
| 92 | ATTCCTTGGACGAAATCCCACCACAGAACAACAATGTGCCACCCAGGCAAGGATTCTCCCACAGGTTGAGCCACGTGTCCATGTTCCGTTCCGGATTCAGCAACAGTTCCGTGAGCATCA |
| 93 | TCAGAGCTCCTATGTTCTCATGGATTCATCGTAGTGCTGAGTTCAACAATATCATTCCTTCCTCTCAAATCACCCAAATCCCATTGACCAAGTCTACTAACCTTGGATCTGGAACTTCTG |
| 94 | TCGTGAAAGGACCAGGCTTCACAGGAGGTGATATTCTTAGAAGAACTTCTCCTGGCCAGATTAGCACCCTCAGAGTTAACATCACTGCACCACTTTCTCAAAGATATCGTGTCAGGATTC |
| 95 | GTTACGCATCTACCACAAACTTGCAATTCCACACCTCCATCGACGGAAGGCCTATCAATCAGGGTAACTTCTCCGCAACCATGTCAAGCGGCAGCAACTTGCAATCCGGCAGCTTCAGAA |
| 96 | CCGTCGGTTTCACTACTCCTTTCAACTTCTCTAACGGATCAAGCGTTTTCACCCTTAGCGCTCATGTGTTCAATTCTGGCAATGAAGTGTACATTGACCGTATTGAGTTTGTGCCTGCCG |
| 97 | CATCCCGTACAACTGCCTCAGCAACCCTGAGGTCGAGGTGCTCGGCGGTGAGCGCATCGAGACCGGTTACACCCCCATCGACATCTCCCTCTCCCTCACGCAGTTCCTGCTCAGCGAGTT |
| 98 | CGTGCCAGGCGCTGGCTTCGTCCTGGGCCTCGTGGACATCATCTGGGGCATCTTTGGCCCCTCCCAGTGGGACGCCTTCCTGGTGCAAATCGAGCAGCTCATCAACCAGAGGATCGAGGA |
| 99 | GTTCGCCAGGAACCAGGCCATCAGCCGCCTGGAGGGCCTCAGCAACCTCTACCAAATCTACGCTGAGAGCTTCCGCGAGTGGGAGGCCGACCCCACTAACCCAGCTCTCCGCGAGGAGAT |
| 100 | GCGCATCCAGTTCAACGACATGAACAGCGCCCTGACCACCGCCATCCCACTCTTCGCCGTCCAGAACTACCAAGTCCCGCTCCTGTCCGTGTACGTCCAGGCCGCCAACCTGCACCTCAG |
| 101 | CGTGCTGAGGGACGTCAGCGTGTTTGGCCAGAGGTGGGGCTTCGACGCCGCCACCATCAACAGCCGCTACAACGACCTCACCAGGCTGATCGGCAACTACACCGACCACGCTGTCCGCTG |
| 102 | GTACAACACTGGCCTGGAGCGCGTCTGGGGCCCTGATTCTAGAGACTGGATTCGCTACAACCAGTTCAGGCGCGAGCTGACCCTCACCGTCCTGGACATTGTGTCCCTCTTCCCGAACTA |
| 103 | CGACTCCCGCACCTACCCGATCCGCACCGTGTCCCAACTGACCCGCGAAATCTACACCAACCCCGTCCTGGAGAACTTCGACGGTAGCTTCAGGGGCAGCGCCCAGGGCATCGAGGGCTC |
| 104 | CATCAGGAGCCCACACCTGATGGACATCCTCAACAGCATCACTATCTACACCGATGCCCACCGCGGCGAGTACTACTGGTCCGGCCACCAGATCATGGCCTCCCCGGTCGGCTTCAGCGG |
| 105 | CCCCGAGTTTACCTTTCCTCTCTACGGCACGATGGGCAACGCCGCTCCACAACAACGCATCGTCGCTCAGCTGGGCCAGGGCGTCTACCGCACCCTGAGCTCCACCCTGTACCGCAGGCC |
| 106 | CTTCAACATCGGTATCAACAACCAGCAGCTGTCCGTCCTGGATGGCACTGAGTTCGCCTACGGCACCTCCTCCAACCTGCCCTCCGCTGTCTACCGCAAGAGCGGCACGGTGGATTCCCT |
| 107 | GGACGAGATCCCACCACAGAACAACAATGTGCCCCCCAGGCAGGGTTTTTCCCACAGGCTCAGCCACGTGTCCATGTTCCGCTCCGGCTTCAGCAACTCGTCCGTGAGCATCATCAGAGC |
| 108 | TCCTATGTTCTCCTGGATTCATCGCAGCGCGGAGTTCAACAATATCATTCCGTCCTCCCAAATCACCCAAATCCCCCTCACCAAGTCCACCAACCTGGGCAGCGGCACCTCCGTGGTGAA |
| 109 | GGGCCCAGGCTTCACGGGCGGCGACATCCTGCGCAGGACCTCCCCGGGCCAGATCAGCACCCTCCGCGTCAACATCACCGCTCCCCTGTCCCAGAGGTACCGCGTCAGGATTCGCTACGC |
| 110 | TAGCACCACCAACCTGCAATTCCACACCTCCATCGACGGCAGGCCGATCAATCAGGGTAACTTCTCCGCCACCATGTCCAGCGGCAGCAACCTCCAATCCGGCAGCTTCCGCACCGTGGG |
| 111 | TTTCACCACCCCCTTCAACTTCTCCAACGGCTCCAGCGTTTTCACCCTGAGCGCCCACGTGTTCAATTCCGGCAATGAGGTGTACATTGACCGCATTGAGTTCGTGCCAGCCGAGGTCAC |
| 112 | CTTCGAAGCCGAGTACGACCTGGAGAGAGCCCAGAAGGCTGTCAATGAGCTCTTCACGTCCAGCAATCAGATCGGCCTGAAGACCGACGTCACTGACTACCACATCGACCAAGTCTCCAA |
| 113 | CCTCGTGGAGTGCCTCTCCGATGAGTTCTGCCTCGACGAGAAGAAGGAGCTGTCCGAGAAGGTGAAGCATGCCAAGCGTCTCAGCGACGAGAGGAATCTCCTCCAGGACCCCAATTTCCG |
| 114 | CGGCATCAACAGGCAGCTCGACCGCGGCTGGCGCGGCAGCACCGACATCACGATCCAGGGCGGCGACGATGTGTTCAAGGAGAACTACGTGACTCTCCTGGGCACTTTCGACGAGTGCTA |
| 115 | CCCTACCTACTTGTACCAGAAGATCGATGAGTCCAAGCTCAAGGCTTACACTCGCTACCAGCTCCGCGGCTACATCGAAGACAGCCAAGACCTCGAGATTTACCTGATCCGCTACAACGC |
| 116 | CAAGCACGAGACCGTCAACGTGCCCGGTACTGGTTCCCTCTGGCCGCTGAGCGCCCCCAGCCCGATCGGCAAGTGTGCCCACCACAGCCACCACTTCTCCTTGGACATCGATGTGGGCTG |
| 117 | CCTTTCTATCGGACCTTGTCAGATCCTGTCTTCGTCCGAGGAGGCTTTGGCAATCCTCACTATGTACTCGGTCTTAGGGGAGTGGCCTTTCAACAAACTGGTACGAATCACACCCGCACA |
| 118 | CTTAGGGGAGTGGCCTTTCAACAAACTGGTACGAATCACACCCGCACATTCAGGAACTCCGGGACCATTGACTCTCTAGATGAGATACCACCTCAAGACAACAGCGGCGCACCTTGGAAT |
| 119 | TCTCTAGATGAGATACCACCTCAAGACAACAGCGGCGCACCTTGGAATGACTACTCCCATGTGCTGAATCATGTTACCTTTGTGCGCTGGCCAGGTGAGATCTCAGGTTCCGACTCATGG |
| 120 | TCTCGGGCGACAAGAATGAACTGATCATTGGTGCTGAGTCCTTCGTCTCCAACGAGAAGATCTACATCGACAAGATCGAGTTCATCCCCGTCCAGCTGTGATAGGAACTCTGATTGAATT |
| 121 | CTGGCCAGCTTCAGCACCCCTTTCGAGCTGAGCGGCAACAACCTCCAGATCGGCGTGACCGGCCTGAGCGCCGGCGACAAGGTGTACATCGACAAGATCGAGTTCATCCCCGTGAACTAG |
| 122 | AACTTGGCAAGTTTCAGCACACCATTTGAACTCTCAGGCAACAATCTTCAGATCGGCGTCACCGGTCTCAGCGCCGGAGACAAAGTCTACATCGACAAGATTGAGTTCATCCCAGTGAAC |

### 二磷酸核酮糖羧化酶E9基因的终止子（Te9）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATCGGTTTCGACAACGTTCGTCAAGTTCAATGCATCAGTTTCATTGCGCACACACCAGAATCCTACTGAGTTTGAGTATTATGGCATTGGGAAAACTGTTTTTCTTGTACCATTTGTTGT |
| 2 | GCTTGTAATTTACTGTGTTTTTTATTCGGTTTTCGCTATCGAACTGTGAAATGGAAATGGATGGAGAAGAGTTAATGAATGATATGGTCCTTTTGTTCATTCTCAAATTAATATTATTTG |
| 3 | TTTTTTCTCTTATTTGTTGTGTGTTGAATTTGAAATTATAAGAGATATGCAAACATTTTGTTTTGAGTAAAAATGTGTCAAATCGTGGCCTCTAATGACCGAAGTTAATATGAGGAGTAA |
| 4 | AACACTTGTAGTTGTACCATTATGCTTATTCACTAGGCAACAAATATATTTTCAGACCTAGAAAAGCTGCAAATGTTACTGAATACAAGTATGTCCTCTTGTGTTTTAGACATTTATGAA |
| 5 | CTTTCCTTTATGTAATTTTCCAGAATCCTTGTCAGATTCTAATCATTGCTTTATAATTATAGTTATACTCATGGATTTGTAGTTGAGTATGAAAATATTTTTTAATGCATTTTATGACTT |

### 豇豆的胰蛋白酶抑制剂基因（CpTI）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATGATGGTGCTAAAGGTGTGTGTGCTGGTACTTTTCCTTGTAGGGGTTACTACTGCAGCCATGGATCTGAACCACCTCGGAAGTAATCATCATGATGACTCAAGCGATGAACCTTCTGAG |
| 2 | GAACCACCTCGGAAGTAATCATCATGATGACTCAAGCGATGAACCTTCTGAGTCTTCAGAACCATGCTGCGATTCATGCATCTGCACTAAATCAATACCTCCTCAATGCCATTGTACAGA |
| 3 | GCGATTCATGCATCTGCACTAAATCAATACCTCCTCAATGCCATTGTACAGATATCAGGTTGAATTCGTGTCACTCGGCTTGCAAATCCTGCATGTGTACACGATCAATGCCAGGCAAGT |

### 叶绿体转运肽（CTP2）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TGATCAACCATGGCGCAAGTTAGCAGAATCTGCAATGGTGTGCAGAACCCATCTCTTATCTCCAATCTCTCGAAATCCAGTCAACGCAAATCTCCCTTATCGGTTTCTCTGAAGACGCAG |
| 2 | ATCTCCAATCTCTCGAAATCCAGTCAACGCAAATCTCCCTTATCGGTTTCTCTGAAGACGCAGCAGCATCCACGAGCTTATCCGATTTCGTCGTCGTGGGGATTGAAGAAGAGTGGGATG |

### 5-莽草酸-3-磷酸合成酶基因（CP4-EPSPS）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ACAACATGGCACAAGGGATACAAACCCTTAATCCCAATTCCAATTTCCATAAACCCCAAGTTCCTAAATCTTCAAGTTTTCTTGTTTTTGGATCTAAAAAACTGAAAAATTCAGCAAATT |
| 2 | CTATGTTGGTTTTGAAAAAAGATTCAATTTTTATGCAAAAGTTTTGTTCCTTTAGGATTTCAGCATCAGTGGCTACAGCCTGCATGCTTCACGGTGCAAGCAGCCGGCCCGCAACCGCCC |
| 3 | GCAAATCCTCTGGCCTTTCCGGAACCGTCCGCATTCCCGGCGACAAGTCGATCTCCCACCGGTCCTTCATGTTCGGCGGTCTCGCGAGCGGTGAAACGCGCATCACCGGCCTTCTGGAAG |
| 4 | GCGAGGACGTCATCAATACGGGCAAGGCCATGCAGGCCATGGGCGCCAGGATCCGTAAGGAAGGCGACACCTGGATCATCGATGGCGTCGGCAATGGCGGCCTCCTGGCGCCTGAGGCGC |
| 5 | CGCTCGATTTCGGCAATGCCGCCACGGGCTGCCGCCTGACCATGGGCCTCGTCGGGGTCTACGATTTCGACAGCACCTTCATCGGCGACGCCTCGCTCACAAAGCGCCCGATGGGCCGCG |
| 6 | TGTTGAACCCGCTGCGCGAAATGGGCGTGCAGGTGAAATCGGAAGACGGTGACCGTCTTCCCGTTACCTTGCGCGGGCCGAAGACGCCGACGCCGATCACCTACCGCGTGCCGATGGCCT |
| 7 | CCGCACAGGTGAAGTCCGCCGTGCTGCTCGCCGGCCTCAACACGCCCGGCATCACGACGGTCATCGAGCCGATCATGACGTGCGATCATACGGAAAAGATGCTGCAGGGCTTTGGCGCCA |
| 8 | ACCTTACCGTCGAGACGGATGCGGACGGCGTGCGCACCATCCGCCTGGAAGGCCGCGGCAAGCTCACCGGCCAAGTCATCGACGTGCCGGGCGACCCGTCCTCGACGGCCTTCCCGCTGG |
| 9 | TTGCGGCCCTGCTTGTTCCGGGCTCCGACGTCACCATCCTCAACGTGCTGATGAACCCCACCCGCACCGGCCTCATCCTGACGCTGCAGGAAATGGGCGCCGACATCGAAGTCATCAACC |
| 10 | TGCGCCTTGCCGGCGGCGAAGACGTGGCGGACCTGCGCGTTCGCTCCTCCACGCTGAAGGGCGTCACGGTGCCGGAAGACCGCGCGCCTCCGATGATCGACGAATATCCGATTCTCGCTG |
| 11 | TCGCCGCCGCCTTCGCGGAAGGGGCGACCGTGATGAACGGTCTGGAAGAACTCCGCGTCAAGGAAAGCGACCGCCTCTCGGCCGTCGCCAATGGCCTCAAGCTCAATGGCGTGGATTGCG |
| 12 | ATGAGGGCGAGACGTCGCTCGTCGTGCGTGGCCGCCCTGACGGCAAGGGGCTCGGCAACGCCTCGGGCGCCGCCGTCGCCACCCATCTCGATCACCGCATCGCCATGAGCTTCCTCGTCA |
| 13 | TGGGCCTCGTGTCGGAAAACCCTGTCACGGTGGACGATGCCACGATGATCGCCACGAGCTTCCCGGAGTTCATGGACCTGATGGCCGGGCTGGGCGCGAAGATCGAACTCTCCGATACGA |
| 14 | CCGCAACCGCCCGCAAATCCTCTGGCCTTTCCGGAACCGTCCGCATTCCCGGCGACAAGTCGATCTCCCACCGGTCCTTCATGTTCGGCGGTCTCGCGAGCGGTGAAACGCGCATCACCG |
| 15 | GCCTTCTGGAAGGCGAGGACGTCATCAATACGGGCAAGGCCATGCAGGCCATGGGCGCCAGGATCCGTAAGGAAGGCGACACCTGGATCATCGATGGCGTCGGCAATGGCGGCCTCCTGG |
| 16 | CGCCTGAGGCGCCGCTCGATTTCGGCAATGCCGCCACGGGCTGCCGGCTGACCATGGGCCTCGTCGGGGTCTACGATTTCGACAGCACCTTCATCGGCGACGCCTCGCTCACAAAGCGCC |
| 17 | CGATGGGCCGCGTGTTGAACCCGCTGCGCGAAATGGGCGTGCAGGTGAAATCGGAAGACGGTGACCGTCTTCCCGTTACCTTGCGCGGGCCGAAGACGCCGACGCCGATCACCTACCGCG |
| 18 | TGCCGATGGCCTCCGCACAGGTGAAGTCCGCCGTGCTGCTCGCCGGCCTCAACACGCCCGGCATCACGACGGTCATCGAGCCGATCATGACGCGCGATCATACGGAAAAGATGCTGCAGG |
| 19 | GCTTTGGCGCCAACCTTACCGTCGAGACGGATGCGGACGGCGTGCGCACCATCCGCCTGGAAGGCCGCGGCAAGCTCACCGGCCAAGTCATCGACGTGCCGGGCGACCCGTCCTCGACGG |
| 20 | CCTTCCCGCTGGTTGCGGCCCTGCTTGTTCCGGGCTCCGACGTCACCATCCTCAACGTGCTGATGAACCCCACCCGCACCGGCCTCATCCTGACGCTGCAGGAAATGGGCGCCGACATCG |
| 21 | AAGTCATCAACCCGCGCCTTGCCGGCGGCGAAGACGTGGCGGACCTGCGCGTTCGCTCCTCCACGCTGAAGGGCGTCACGGTGCCGGAAGACCGCGCGCCTTCGATGATCGACGAATATC |
| 22 | CGATTCTCGCTGTCGCCGCCGCCTTCGCGGAAGGGGCGACCGTGATGAACGGTCTGGAAGAACTCCGCGTCAAGGAAAGCGACCGCCTCTCGGCCGTCGCCAATGGCCTCAAGCTCAATG |
| 23 | GCGTGGATTGCGATGAGGGCGAGACGTCGCTCGTCGTGCGTGGCCGCCCTGACGGCAAGGGGCTCGGCAACGCCTCGGGCGCCGCCGTCGCCACCCATCTCGATCACCGCATCGCCATGA |
| 24 | GCTTCCTCGTCATGGGCCTCGTGTCGGAAAACCCTGTCACGGTGGACGATGCCACGATGATCGCCACGAGCTTCCCGGAGTTCATGGACCTGATGGCCGGGCTGGGCGCGAAGATCGAAC |

### 水稻肌动蛋白1基因的启动子（pActin1）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TCGAGGTCATTCATATGCTTGAGAAGAGAGTCGGGATAGTCCAAAATAAAACAAAGGTAAGATTACCTGGTCAAAAGTGAAAACATCAGTTAAAAGGTGGTATAAAGTAAAATATCGGTA |
| 2 | GTAAAATATCGGTAATAAAAGGTGGCCCAAAGTGAAATTTACTCTTTTCTACTATTATAAAAATTGAGGATGTTTTTGTCGGTACTTTGATACGTCATTTTTGTATGAATTGGTTTTTAA |
| 3 | GAATTGGTTTTTAAGTTTATTCGCTTTTGGAAATGCATATCTGTATTTGAGTCGGGTTTTAAGTTCGTTTGCTTTTGTAAATACAGAGGGATTTGTATAAGAAATATCTTTAAAAAAACC |
| 4 | TCTTTAAAAAAACCCATATGCTAATTTGACATAATTTTTGAGAAAAATATATATTCAGGCGAATTCTCACAATGAACAATAATAAGATTAAAATAGCTTTCCCCCGTTGCAGCGCATGGG |
| 5 | TTGCAGCGCATGGGTATTTTTTCTAGTAAAAATAAAAGATAAACTTAGACTCAAAACATTTACAAAAACAACCCCTAAAGTTCCTAAAGCCCAAAGTGCTATCCACGATCCATAGCAAGC |
| 6 | GATCCATAGCAAGCCCAGCCCAACCCAACCCAACCCAACCCACCCCAGTCCAGCCAACTGGACAATAGTCTCCACACCCCCCCACTATCACCGTGAGTTGTCCGCACGCACCGCACGTCT |
| 7 | CGCACCGCACGTCTCGCAGCCAAAAAAAAAAAAAGAAAGAAAAAAAAGAAAAAGAAAAAACAGCAGGTGGGTCCGGGTCGTGGGGGCCGGAAACGCGAGGAGGATCGCGAGCCAGCGACG |
| 8 | GCGAGCCAGCGACGAGGCCGGCCCTCCCTCCGCTTCCAAAGAAACGCCCCCCATCGCCACTATATACATACCCCCCCCTCTCCTCCCATCCCCCCAACCCTACCACCACCACCACCACCA |
| 9 | CACCACCACCACCACCTCCACCTCCTCCCCCCTCGCTGCCGGACGACGAGCTCCTCCCCCCTCCCCCTCCGCCGCCGCCGCGCCGGTAACCACCCCGCCCCTCTCCTCTTTCTTTCTCCG |
| 10 | TCTTTCTTTCTCCGTTTTTTTTTTCCGTCTCGGTCTCGATCTTTGGCCTTGGTAGTTTGGGTGGGCGAGAGGCGGCTTCGTGCGCGCCCAGATCGGTGCGCGGGAGGGGCGGGATCTCGC |
| 11 | GGGCGGGATCTCGCGGCTGGGGCTCTCGCCGGCGTGGATCCGGCCCGGATCTCGCGGGGAATGGGGCTCTCGGATGTAGATCTGCGATCCGCCGTTGTTGGGGGAGATGATGGGGGGTTT |
| 12 | ATGATGGGGGGTTTAAAATTTCCGCCATGCTAAACAAGATCAGGAAGAGGGGAAAAGGGCACTATGGTTTATATTTTTATATATTTCTGCTGCTTCGTCAGGCTTAGATGTGCTAGATCT |
| 13 | AGATCTTTCTTTCTTCTTTTTGTGGGTAGAATTTGAATCCCTCAGCATTGTTCATCGGTAGTTTTTCTTTTCATGATTTGTGACAAATGCAGCCTCGTGCGGAGCTTTTTTGTAGGTAGA |

### 玉米泛素基因的启动子（pUbi）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GGGTACCAGCTTGCATGCCTGCAGTGCAGCGTGACCCGGTCGTGCCCCTCTCTAGAGATAATGAGCATTGCATGTCTAAGTTATAAAAAATTACCACATATTTTTTTTGTCACACTTGTT |
| 2 | ACACTTGTTTGAAGTGCAGTTTATCTATCTTTATACATATATTTAAACTTTACTCTACGAATAATATAATCTATAGTACTACAATAATATCAGTGTTTTAGAGAATCATATAAATGAACA |
| 3 | AAATGAACAGTTAGACATGGTCTAAAGGACAATTGAGTATTTTGACAACAGGACTCTACAGTTTTATCTTTTTAGTGTGCATGTGTTCTCCTTTTTTTTTGCAAATAGCTTCACCTATAT |
| 4 | CACCTATATAATACTTCATCCATTTTATTAGTACATCCATTTAGGGTTTAGGGTTAATGGTTTTTATAGACTAATTTTTTTAGTACATCTATTTTATTCTATTTTAGCCTCTAAATTAAG |
| 5 | TAAATTAAGAAAACTAAAACTCTATTTTAGTTTTTTTATTTAATAATTTAGATATAAAATAGAATAAAATAAAGTGACTAAAAATTAAACAAATACCCTTTAAGAAATTAAAAAAACTAA |
| 6 | AAAAACTAAGGAAACATTTTTCTTGTTTCGAGTAGATAATGCCAGCCTGTTAAACGCCGTCGACGAGTCTAACGGACACCAACCAGCGAACCAGCAGCGTCGCGTCGGGCCAAGCGAAGC |
| 7 | AAGCGAAGCAGACGGCACGGCATCTCTGTCGCTGCCTCTGGACCCCTCTCGAGAGTTCCGCTCCACCGTTGGACTTGCTCCGCTGTCGGCATCCAGAAATTGCGTGGCGGAGCGGCAGAC |
| 8 | GCGGCAGACGTGAGCCGGCACGGCAGGCGGCCTCCTCCTCCTCTCACGGCACCGGCAGCTACGGGGGATTCCTTTCCCACCGCTCCTTCGCTTTCCCTTCCTCGCCCGCCGTAATAAATA |
| 9 | TAATAAATAGACACCCCCTCCACACCCTCTTTCCCCAACCTCGTGTTGTTCGGAGCGCACACACACACAACCAGATCTCCCCCAAATCCACCCGTCGGCACCTCCGCTTCAAGGTACGCC |
| 10 | AGGTACGCCGCTCGTCCTCCCCCCCCCCCCCTCTCTACCTTCTCTAGATCGGCGTTCCGGTCCATGGTTAGGGCCCGGTAGTTCTACTTCTGTTCATGTTTGTGTTAGATCCGTGTTTGT |
| 11 | CGTGTTTGTGTTAGATCCGTGCTGCTAGCGTTCGTACACGGATGCGACCTGTACGTCAGACACGTTCTGATTGCTAACTTGCCAGTGTTTCTCTTTGGGGAATCCTGGGATGGCTCTAGC |
| 12 | GGCTCTAGCCGTTCCGCAGACGGGATCGATTTCATGATTTTTTTTGTTTCGTTGCATAGGGTTTGGTTTGCCCTTTTCCTTTATTTCAATATATGCCGTGCACTTGTTTGTCGGGTCATC |
| 13 | CGGGTCATCTTTTCATGCTTTTTTTTGTCTTGGTTGTGATGATGTGGTCTGGTTGGGCGGTCGTTCTAGATCGGAGTAGAATTCTGTTTCAAACTACCTGGTGGATTTATTAATTTTGGA |
| 14 | AATTTTGGATCTGTATGTGTGTGCCATACATATTCATAGTTACGAATTGAAGATGATGGATGGAAATATCGATCTAGGATAGGTATACATGTTGATGCGGGTTTTACTGATGCATATACA |
| 15 | GCATATACAGAGATGCTTTTTGTTCGCTTGGTTGTGATGATGTGGTGTGGTTGGGCGGTCGTTCATTCGTTCTAGATCGGAGTAGAATACTGTTTCAAACTACCTGGTGTATTTATTAAT |
| 16 | TTTATTAATTTTGGAACTGTATGTGTGTGTCATACATCTTCATAGTTACGAGTTTAAGATGGATGGAAATATCGATCTAGGATAGGTATACATGTTGATGTGGGTTTTACTGATGCATAT |
| 17 | GATGCATATACATGATGGCATATGCAGCATCTATTCATATGCTCTAACCTTGAGTACCTATCTATTATAATAAACAAGTATGTTTTATAATTATTTTGATCTTGATATACTTGGATGATG |
| 18 | TGATGGCATATGCAGCAGCTATATGTGGATTTTTTTAGCCCTGCCTTCATACGCTATTTATTTGCTTGGTACTGTTTCTTTTGTCGATGCTCACCCTGTTGTTTGGTGTTACTTCTGCAG |

### 水稻白叶枯病抗性基因（Xa21）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | ATGATATCACTCCCATTATTGCTCTTCGTCCTGTTGTTCTCTGCGCTGCTGCTCTGCCCTTCAAGCAGTGACGACGATGGTGATGCTGCCGGCGACGAACTCGCGCTGCTCTCTTTCAAG |
| 2 | TTTCAAGTCATCCCTGCTATACCAGGGGGGCCAGTCGCTGGCATCTTGGAACACGTCCGGCCACGGCCAGCACTGCACATGGGTGGGTGTTGTGTGCGGCCGCCGCCGCCGCCGGCACCC |
| 3 | GGCACCCACACAGGGTGGTGAAGCTGCTGCTGCGCTCCTCCAACCTGTCCGGGATCATCTCGCCGTCGCTCGGCAACCTGTCCTTCCTCAGGGAGCTGGACCTCGGCGACAACTACCTCT |
| 4 | TACCTCTCCGGCGAGATACCACCGGAGCTCAGCCGTCTCAGCAGGCTTCAGCTGCTGGAGCTGAGCGATAACTCCATCCAAGGGAGCATCCCCGCGGCCATTGGAGCATGCACCAAGTTG |
| 5 | CAAGTTGACATCGCTAGACCTCAGCCACAACCAACTGCGAGGTATGATCCCACGTGAGATTGGTGCCAGCTTGAAACATCTCTCGAATTTGTACCTTTACAAAAATGGTTTGTCAGGAGA |
| 6 | CAGGAGAGATTCCATCCGCTTTGGGCAATCTCACTAGCCTCCAGGAGTTTGATTTGAGCTTCAACAGATTATCAGGAGCTATACCTTCATCACTGGGGCAGCTCAGCAGTCTATTGACTA |
| 7 | TTGACTATGAATTTGGGACAGAACAATCTAAGTGGGATGATCCCCAATTCTATCTGGAACCTTTCGTCTCTAAGAGCGTTTAGTGTCAGAGAAAACAAGCTAGGTGGTATGATCCCTACA |
| 8 | CCCTACAAATGCATTCAAAACCCTTCACCTCCTCGAGGTGATAGATATGGGCACTAACCGTTTCCATGGCAAAATCCCTGCCTCAGTTGCTAATGCTTCTCATTTGACAGTGATTCAGAT |
| 9 | TTCAGATTTATGGCAACTTGTTCAGTGGAATTATCACCTCGGGGTTTGGAAGGTTAAGAAATCTCACAGAACTGTATCTCTGGAGAAATTTGTTTCAAACTAGAGAACAAGATGATTGGG |
| 10 | GATTGGGGGTTCATTTCTGACCTAACAAATTGCTCCAAATTACAAACATTGAACTTGGGAGAAAATAACCTGGGGGGAGTTCTTCCTAATTCGTTTTCCAATCTTTCCACTTCGCTTAGT |
| 11 | GCTTAGTTTTCTTGCACTTGAATTGAATAAGATCACAGGAAGCATTCCGAAGGATATTGGCAATCTTATTGGCTTACAACATCTCTATCTCTGCAACAACAATTTCAGAGGGTCTCTTCC |
| 12 | CTCTTCCATCATCGTTGGGCAGGCTTAAAAACTTAGGCATTCTACTCGCCTACGAAAACAACTTGAGCGGTTCGATCCCGTTGGCCATAGGAAATCTTACTGAACTTAATATCTTACTGC |
| 13 | TTACTGCTCGGCACCAACAAATTCAGTGGTTGGATACCATACACACTCTCAAACCTCACAAACTTGTTGTCATTAGGCCTTTCAACTAATAACCTTAGTGGTCCAATACCCAGTGAATTA |
| 14 | TGAATTATTCAATATTCAAACACTATCAATAATGATCAATGTATCAAAAAATAACTTGGAGGGATCAATACCACAAGAAATAGGGCATCTCAAAAATCTAGTAGAATTTCATGCAGAATC |
| 15 | CAGAATCGAATAGATTATCAGGTAAAATCCCTAACACGCTTGGTGATTGCCAGCTCTTACGGTATCTTTATCTGCAAAATAATTTGTTATCTGGTAGCATCCCATCAGCCTTGGGTCAGC |
| 16 | GGTCAGCTGAAAGGTCTCGAAACTCTTGATCTCTCAAGCAACAATTTGTCAGGCCAGATACCCACATCCTTAGCAGATATTACTATGCTTCATTCCTTGAACCTTTCTTTCAACAGCTTT |
| 17 | CAGCTTTGTGGGGGAAGTGCCAACCATTGGTGCTTTCGCAGCTGCATCCGGGATCTCAATCCAAGGCAATGCCAAACTCTGTGGTGGAATACCTGATCTACATCTGCCTCGATGTTGTCC |
| 18 | GTTGTCCATTACTAGAGAACAGAAAACATTTCCCAGTTCTACCTATTTCTGTTTCTCTGGCCGCAGCACTGGCCATCCTCTCATCACTCTACTTGCTTATAACCTGGCACAAGAGAACTA |
| 19 | AGAACTAAAAAGGGAGCCCCTTCAAGAACTTCCATGAAAGGCCACCCATTGGTCTCTTATTCGCAGTTGGTAAAAGCAACAGATGGTTTCGCGCCGACCAATTTGTTGGGTTCTGGATCA |
| 20 | TGGATCATTTGGCTCAGTATACAAAGGAAAGCTTAATATCCAAGATCATGTTGCAGTGAAGGTACTAAAGCTTGAAAATCCTAAGGCGCTCAAGAGTTTCACTGCCGAATGTGAAGCACT |
| 21 | AAGCACTACGAAATATGCGACATCGAAATCTTGTCAAGATAGTTACAATTTGCTCGAGCATTGATAACAGAGGGAACGATTTCAAAGCAATTGTGTATGACTTCATGCCCAACGGCAGTC |
| 22 | GGCAGTCTGGAAGATTGGATACACCCTGAAACAAATGATCAAGCAGACCAGAGGCACTTGAATCTGCATCGAAGAGTGACCATACTACTTGATGTTGCCTGCGCACTGGACTATCTTCAC |
| 23 | TCTTCACCGCCATGGCCCTGAACCTGTTGTACACTGTGATATTAAATCAAGCAATGTGCTGTTAGATTCTGATATGGTAGCCCATGTTGGAGATTTTGGGCTTGCAAGAATACTTGTTGA |
| 24 | TTGTTGATGGGACCTCATTGATACAACAGTCAACAAGCTCGATGGGATTTATAGGGACAATTGGCTATGCAGCACCAGAGTATGGCGTTGGGCTCATTGCATCAACGCATGGAGATATTT |
| 25 | GATATTTACAGCTATGGAATTCTAGTGCTGGAAATAGTAACCGGGAAGCGGCCAACTGACAGTACATTCAGACCCGATTTGGGCCTCCGTCAGTACGTTGAACTGGGCCTACATGGCAGA |
| 26 | TGGCAGAGTGACGGATGTTGTTGACACGAAGCTCATTTTGGATTCTGAGAACTGGCTGAACAGTACAAATAATTCTCCATGTAGAAGAATCACTGAATGCATTGTTTGGCTGCTTAGACT |
| 27 | TCTCAGGAATTGCCATCGAGTAGAACGCCAACCGGAGATATCATCGACGAACTGAATGCCATCAAACAGAATCTCTCCGGATTGTTTCCAGTGTGTGAAGGTGGGAGCCTTGAATTCTGA |

### 谷氨酰胺转移酶7基因（tg7）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TTAATTCCCATCTTGAAAGAAATATAGTTTAAATATTTATTGATAAAATAACAAGTCAGGTATTATAGTCCAAGCAAAAACATAAATTTATTGATGCAAGTTTAAATTCAGAAATATTTC |
| 2 | AAGTCAGGTATTATAGTCCAAGCAAAAACATAAATTTATTGATGCAAGTTTAAATTCAGAAATATTTCAATAACTGATTATATCAGCTGGTACATTGCCGTAGATGAAAGACTGAGTGCG |

### 淀粉酶（Amy）探针序列

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | GGATCCACCATGAGGGTGTTGCTCGTTGCCCTCGCTCTCCTGGCTCTCGCTGCGAGCGCCACCAGCGCTAAGTACCTGGAGCTGGAGGAGGGCGGCGTGATCATGCAGGCGTTCTACTGG |
| 2 | AGGCGTTCTACTGGGACGTCCCGAGCGGAGGCATCTGGTGGGACACCATCCGCCAGAAGATCCCCGAGTGGTACGACGCCGGCATCTCCGCGATCTGGATACCGCCAGCTTCCAAGGGCA |
| 3 | AGCTTCCAAGGGCATGTCCGGGGGCTACTCGATGGGCTACGACCCGTACGACTACTTCGACCTCGGCGAGTACTACCAGAAGGGCACGGTGGAGACGCGCTTCGGGTCCAAGCAGGAGCT |
| 4 | TCCAAGCAGGAGCTCATCAACATGATCAACACGGCGCACGCCTACGGCATCAAGGTCATCGCGGACATCGTGATCAACCACAGGGCCGGCGGCGACCTGGAGTGGAACCCGTTCGTCGGC |
| 5 | ACCCGTTCGTCGGCGACTACACCTGGACGGACTTCTCCAAGGTCGCCTCCGGCAAGTACACCGCCAACTACCTCGACTTCCACCCCAACGAGCTGCACGCGGGCGACTCCGGCACGTTCG |
| 6 | CTCCGGCACGTTCGGCGGCTACCCGGACATCTGCCACGACAAGTCCTGGGACCAGTACTGGCTCTGGGCCTCGCAGGAGTCCTACGCGGCCTACCTGCGCTCCATCGGCATCGACGCGTG |
| 7 | GGCATCGACGCGTGGCGCTTCGACTACGTCAAGGGCTACGGGGCCTGGGTGGTCAAGGACTGGCTCAACTGGTGGGGCGGCTGGGCGGTGGGCGAGTACTGGGACACCAACGTCGACGCG |
| 8 | CCAACGTCGACGCGCTGCTCAACTGGGCCTACTCCTCCGGCGCCAAGGTGTTCGACTTCCCCCTGTACTACAAGATGGACGCGGCCTTCGACAACAAGAACATCCCGGCGCTCGTCGAGG |
| 9 | GGCGCTCGTCGAGGCCCTGAAGAACGGCGGCACGGTGGTCTCCCGCGACCCGTTCAAGGCCGTGACCTTCGTCGCCAACCACGACACGGACATCATCTGGAACAAGTACCCGGCGTACGC |
| 10 | TACCCGGCGTACGCCTTCATCCTCACCTACGAGGGCCAGCCCACGATCTTCTACCGCGACTACGAGGAGTGGCTGAACAAGGACAAGCTCAAGAACCTGATCTGGATTCACGACAACCTC |
| 11 | TTCACGACAACCTCGCGGGCGGCTCCACTAGTATCGTGTACTACGACTCCGACGAGATGATCTTCGTCCGCAACGGCTACGGCTCCAAGCCCGGCCTGATCACGTACATCAACCTGGGCT |
| 12 | CATCAACCTGGGCTCCTCCAAGGTGGGCCGCTGGGTGTACGTCCCGAAGTTCGCCGGCGCGTGCATCCACGAGTACACCGGCAACCTCGGCGGCTGGGTGGACAAGTACGTGTACTCCTC |
| 13 | AAGTACGTGTACTCCTCCGGCTGGGTCTACCTGGAGGCCCCGGCCTACGACCCCGCCAACGGCCAGTACGGCTACTCCGTGTGGTCCTACTGCGGCGTCGGCTCCGAGAAGGACGAGCTG |

## 品系特异性探针序列

|  |  |  |
| --- | --- | --- |
| 物种名称 | 品系名称 | 探针序列 |
| 水稻 | TT51 | CGTATTACCGCCTTTGAGTGAGCTGATACCGCTCGCCGCAGCCGAACGACCGAGCGCAGCTGCTGCTTCGTCAGGCTTAGATGTGCTAGATCTTTCTTTCTTCTTTTTGTGGGTAGAATT |
| GAGTTGCTCTTGCCCGGCGTCAATACGGGATAATACCGCGCCACATAGCAGAACTTTAACCCCCGAACATCGCCTCGCTCCAGTCAATGACCGCTGTTATGCGGCCATTGATTTGTAGAG |
| G6Hl | GCTGGTGGCGATACATCCATCGATCCATCATCTTATATATTGTGGTGTAAACAAATTGACGCTTAGACAACTTAATAACACATTGCGGACGTTTTTAATGTACTGAATTAACGCCGAATT |
| LLRICE62 | ACTGCTAACGGGTGCATCGTCTATCAATAAAAACCAGGTGGACTAAAAGTATAAATAATCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGGATGTGCTGCAAGGCGATT |
| KMDF1 | CGTCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAATTTGTTTACACCACAATATATCCCGAGATGGGCAGGCATATCGGCGTACGCACGCAGCCCGGTGAGACCCGCCGCAGTTGGAGC |
| T1C-19 | GATAAGCCAGGAGCAACTGTGTTGTAGGTATGTTTGCTTGGCTGTTTGCTCTCTCTCTCTCTCTCTTTCTCAGTTCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGAC |
| M12 | TATGCAGCACCAGGTCAGCAAGTCCTTCCAGTATTTTGCATTTTCTGATCTCTAGTGCTCCAGCGAGTCAGTGAGCGAGGAAGCGGAAGAGCGCCTGATGCGGTATTTTCTCCTTACGCA |
| LLRICE601 | TACCGCCCCGTCCGGTCCTGCCCGTCACCGAGATCTGAGATCACGCGTTCTAGGATCCGAAGCAGATCGTTCCACCTCCCAACAATAAAAGCGCCTGCACACTCCGCGCCCTCCCATTGG |
| CTGAGATCACGCGTTCTAGGATCCGAAGCAGATCGTTCCACCTCCCAACAATAAAAGCGCCTGCACACTCCGCGCCCTCCCATTGGTCCAGACACACCATCGCTGGTAAGTACTACTAGT |
| KF2 | TAGAGCAGCTTGAGCTTGGATCAGATTGTTTGCTCTAGTTGCGAATCGCGCATATGAAATCACACCATGTAGTGTATTGACCGATTCCTTGCGGTCCGAATGGGCCGAACCCGCTCGTCT |
|  | GCGAATCGCGCATATGAAATCACACCATGTAGTGTATTGACCGATTCCTTGCGGTCCGAATGGGCCGAACCCGCTCGTCTGGCTAAGATCGGCCGCAGCGATCGCATCCTTAGGTCAAGC |
| T2A-1 | AAAGCTAGCCTCGTTTATTCCTGGTCATCGTCAACGAATCTTCCTGTCTGCCTGCTAGCTATTGGTACCTAGCTTAAACTGTACGAACGCTAG |
| 玉米 | MON863 | AAAGGAATTAGATCTGTGTGTGTTTTTTGGATCCCCGGGGCGGCCGCGGGGAATTCGGTCTCCCTATAGAGCAGAGCATAGTGACAAAAGTTCCATTTAGATATGGTTGTATCATATGTA |
| NK603 | GTTCATGTCTTCATCGTAAGAAGACACTCAGTAGTCTTCGGCCAGAATGGCCTAACTCAAGGCCCTCACTCCGCTTGATCTTGGCAAAGATATTTGACGCATTTATTAGTATGTGTTAAT |
|  | ACCCTAGAGACGTGCGTCCCTGGTGGGCTGCTCGGCCAGCAAGCCTTGTAGCGGCCCACGCGTGGTACCAAGCTTGATATCCCTAGGGCGGCCGCGTTAACAAGCTTACTCGAGGTCATT |
| MON88017 | GACCTCGAGTAAGCTTGTTAACGCGGCCGCCCTAGGGATATCAAGCTTGGTACCACGCGACACACTTCCACTCTAGTGTTTGAGTGGATCCTGTTATCTCTTCTCGAACCATAACAGACT |
| GACCTGCAGAAGCTAGCTTGATGGGGATCAGATTGTCGTTTCCCGCCTTCAGTTTAAACAGAGTCGGGTTTGGATGGTCAACTCCGGCATACTGCCGAAAACAAACCAATCCGTCACCGT |
| BT11 | GAACCCCTATTTGTTTATTTTTCTAAATACATTCAAATATGTATCCGCTCATGGAGGGATTCTTGGATTTTTGGTGGAGACCATTTCTTGGTCTAAAATCTGTAGGTGTTAGCCTCTAGT |
| MON810 | ACCACTTCTCCTTGGACATCGATGTGGGCTGCACCGACCTGAACGAGGACTTTCGGTAGCCTTCTTTCATTTCCGAATTTGCTTGCGAGCAGTCAGGTCCTTTTGATTCATCTGAGTTTG |
| TC1507 | GTTCATGTCTTCATCGTAAGAAGACACTCAGTAGTCTTCGGCCAGAATGGCCTAACTCAAGGCCCTCACTCCGCTTGATCTTGGCAAAGATATTTGACGCATTTATTAGTATGTGTTAAT |
| T25 | ATGATACTCCTTCCACCGCCGTGCGACAGCGACAATGGCGGAACGACTCAATGACAAGAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAAGAAAATCTTC |
| Bt176 | AGCTGGACTTCAGCCTGCCGGTACTGCCCCGTCCGGTCCTGCCCGTCACCGAGATCTGATGTTCTCTCCTCCATTGATGCACGCCATCAATGGCCTTGAAGCCTTGGCCGACCGTTTCTC |
| MIR604 | CATGGATGACGCGGCACGGCAGCTAGCCGAGCAGGCGCTCTGCGCACGCAATTCAACAGAAGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTAAGGGAGTCACGTTATGACCCCC |
| CAGGAAATTTACCGGTGCCCGGGCGGCCAGCATGGCCGTATCCGCAATGTGTTATTAAGAGTTGGTGGTACGGGTACTTTAACTAACGAGGTGTGTCGCGCAGCGCTCCTGCACGGATGT |
| 3272 | ATCAGACCAGATTCTCTTTTATGGCCGGCCGGCCGGCCCTGCTGACTGCTGACGCGGCCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTAA |
|  | CGTATCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAATTTGTTTACACCACAATATATTCAAGTCATCTGCATGTGAAATAAACATCTTGTCCCTCCTCGATGATCCACCTCTCTCTCT |
| LY038 | TGTTTGGGGGTGGGGGCCAATCCCTGCGCAGAATCTCAGGATCCGAGCGGAGTTTATGGGTCGACGGTATCGATAAGCTTGATATCGAATTCCTGCAGCCCGGGCCGAGTGCCATCCTTG |
|  | CGAAGTTATTCTAGAGCGGCCGCCACCGCGGTGGAGCTCGGATCCACTAGTAACGGCCGCCATAATTATTGCCCAGTCTTTCAGGGTATTACAGTGTACAATGTTTCAGTATTTTAGACT |
| MON89034 | AATATTTAAAAATGGAAGTAATACTATATTAAAATGATTCATGTGGAACTCCTGCGCTTCTTTTTGAAGTTTCAAAAGGGAGCTTTCAGGGTCGCTTAGAGTTTGTTTGGTTGGAAATAC |
| MON87460 | GAAAATGGATTGGAGGGAGTATGTAGATAAATTTTCAAAGCGTTAGACGGCTGTCTTTGAGGAGGATCGCGAGCCAGCGACGAGGCCGGCCCTCCCTCCGCTTCCAAAGAAACGCCCCCC |
| BVLA430101 | CGCGGACTCGAACCCGATCCGCCCCGTCACCGACCGCGCGGCCTCCGCGCTCGAGGGATCAATGCTGGCAGTCCCCGCCTCGAGAAATCAGTCCACTTGCGATACGGTCGATCAG |
| MIR162 | CCCGGGTCTAGACAATTCAGTACATTAAAAACGTCCGCCATGGTCTGAAGGCAACAGATAAGGCATACTGGGCCTTGTGGTAGTTGTTTTACTGGGC |
| DAS-40278-9 | CCAGCACGAACCATTGAGTTACAATCAACAGCACCGTACCTTGAAGCGGAATACAATGAAGGTTAGCTACGATTTACAGCAAAGCCAGAATACAATGAACCATAAAGTGATTGAAGCTCG |
| DAS-59122 | TCATAAAAATTCTTGGAGGGACGGAAGAAAGAGTGAAGGGATAAGCAAGTAAAAGCGCTCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCATGAGCGGAGAATTA |
| GCAATTCAGTACATTAAAAACGTCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAATTTTTCCCTTCTATGGTCCCGTTTGTTTATCCTCTAAATTATATAATCCAGCTTAAATAAGTTA |
| 双抗12-5 | TAGAGCAGCTTGAGCTTGGATCAGATTGTCGTTTCCCGCCTTCAGTTTAAACTATCAGTCTCGTTGTAGCGTCGGGCGATGTGGTTGAGCTCGAGCCCGTAGAACTTGTCTTCCAGGCAC |
| IE09S034 | CTTGTGCAGGAGAAGTTTGATGGACAAATCAAGAAGCAGGTCCCAGTATATTTTGTGGTGTAAACAAATTGACGCTTAGACAACTTAATAACACATTGCGGACGTTTTTAATGTACTGAA |
| Maize5307 | CATGGCCGTATCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAATTTGTTTACACCACAATATACCCTCTTCCCTGGGCCAGGCTGGGCCCACTGGCAAAGGGTGCA |
| MON87427 | ACGGAAACGGTCGGGTCAAATGTAGAAAATCGGGACAATATGGAGAAAAAGAAAGAGTAATTACCAATATGGAGAAAACCGGGAAATCTACATGG |
| DP-098140-6 | GTGTGTATGTCTCTTTGCTTGGTCTTTCTCTATCGATCCCCCTCTTTGATAGTTTAAACTGAAGGCGGGAAACGACAATC |
| MON87411 | CTCTGTAACAGAAAACACCATCTAGAGCGGCCGCGTTTAAACTATCAGTGTTTAGAGAATCACAAACCTCTAGATGTATTAATCTACCCTAGAACTAGTTCACTTTTGT |
| Bt10 | CACACAGGAGATTATTATAGGGTTACTCACATTTCCCCGAATGTTGAGACAATAACCCTGATAAATGCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGT |
| 大豆 | MON87769 | TTGGAAAGGGATAACCTTTTGAAGGAGAAGAAGTTGGTTGAACAGCAATGTAGATTGATCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTTGAT |
| ACCATCATACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGCCATTTACAATTGACCATCATACTCAAAACTTCACGAGCAACTTGCTAATTTTGGAAAAGAGAAAGAAAAGACA |
| GTS40-3-2 | GCATTTCATTCAAAATAAGATCATACATACAGGTTAAAATAAACATAGGGAACCCAAATGGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCTATCGTTCAA |
| AAAAAGAATAAAAATAGCATCTACATATAGCTTCTCGTTGTTAGAAAAACAAAACTATTTGGGATCGGAGAAGAACTGTTTGAGGCGAATGGCCTGGTCGTCGCGGCCATCGTCGAGAAG |
| MON89788 | CTTCCTTTTGGGCTTTTTTGTTTCCCGCTCTAGCGCTTCAATCGTGGTTATCAAGCTCCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTCTAGC |
| ATACGACGGATCGTAATTTGTCGTTTTATCAAAATGTACTTTCATTTTATAATAACGCTCAGACTCTAGTGACTACCACCTTCACTCTCCTCAAGCATTTCAGCCTCTTCCCCGCTCAGA |
| MON87705 | AATTGGTAATTACTCTTTCTTTTTCTCCATATTGACCATCATACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGCCATTTACAATTGAAGAGACTCAGGGTGTTGTTATCACTG |
| DP-356043 | CTTTTGCCCGAGGTCGTTAGGTCGAATAGGCTAGGTTTACGAAAAAGAGACTAAGGCCGCTCTAGAGATCCGTCAACATGGTGGAGCACGACACTCTCGTCTACTCCAAGAATATCAAAG |
| DP-305423 | GTAGAATTTAAAGGTACTCTTTTTATATATACCCGTGTTCTCTTTTTGGCTAGCTAGTGTTTTTTTCTCGACTTTTGTATGAAAATCATTTGTGTCAATAGTTTGTGTTATGTATTCATT |
| CV127 | TAATAAAGGGGCAAACTAGTCTCGTAATATATTAGAGGTTAATTAAATTTATATTGCTCAAATAAAACCCAATTTTCATCCTTAAACGAACCTGCT |
| MON87708 | CCATCATACTCATTGCTGATCCATGTAGATTTCCCGGACTTTAGCTCAAAATGCATGTATTTATTAGCGTTCTGTCTTTTCGTTAATTTGTTCTCATCATAATATTGTGACAAAAATATA |
| MON87701 | GCACGCTTAGTGTGTGTGTCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTTGATATCGAATTCCTGCAGCCCGGGGGATCCACTAGTTCTAGAG |
| FG72 | TCGGGCTGCAGGAATTAATGTGGTTCATCCGTCTTTTTGTTAATGCGGTCATCAATACGTGCCTCAAAGATTGCCAAATAGATTAATGTGGTTCATCTCCCTATATGTTTTGCTTGTTGG |
| A2704-12 | AGGGGGTCAAAGACCAAGAAGTGAGTTATTTATCAGCCAAGCATTCTATTCTTCTTATGTCGGTGCGGGCCTCTTCGCTATTACGCCAGCTGGCGAAAGGGGGATGTGCTGCAAGGCGAT |
| A5547-127 | CCGCAATGCCATCGCTATTTGGTGGCATTTTTCCAAAAACCCGCAATGTCATACCGTCATCGTTGTCAGAAGTAAGTTGGCCGCAGTGTTATCACTCATGGTTATGGCAGCAATGCATAA |
| DAS-68416-4 | TAAAAACGTCCGCAATGTGTTATTAAGTTGTCTAAGCGTCAATATTTTAATTCTTAACAATCAATATTTTAATTCTTAAACTTTATTAAATCTAACAATAAACTGTAAGAACTAATTCTT |
| DAS-81419-2 | TCTAGCTATATTTAGCACTTGATATTCATGAATCAAACTTCTCTATGAAATAACCGCGGTGCGCATCGGTGCCTGTTGATCCCGCGCAAGTTGGGATCTTGAAGC |
| DAS-44406-6 | TTATTGTTCTTGTTGTTTCCTCTTTAGGAACTTACATGTAAACGGTAAGGTCATCATGGAGGTCCGAATAGTTTGAAATTAGAAAGCTCGCAATTGAGG |
| MON87751 | CTAAATTGCTCTTTGGAGTTTATTTTGTAGATATTTCCCCTCACTTTGGAGATCTCCAGTCAGCATCATCACACCAAAAGTTAGGCC |
| SYHT0H2 | GGGAATTGGGTACCATGCCCGGGCGGCCAGCATGGCCGTATCCGCAATGTGTTATTAAGTTGTCTAAACCCTAAACCAATGGCACACA |
| 油菜 | OXY-235 | CAAACTATTCGGGCCTAACTTTTGGTGTGATGATGCTGACTGGCAAGTTAATCTAGTTTCCGGTTATGAAGCACGGCGTGTCAGCTGATGGCAAGTTAATCTCCCCGAAGTCGACAAGAC |
| T45 | ACGGCGAGTTCTGTTAGGTCCTCTATTTGAATCTTTGACTCCATGGGAATTCATTTACAACTGTATTCCATATGCATAATTCATGTGTCCATTGATTTTACCCCTTATTTTATCATTCAA |
| MS1(B91-4) | AATTGCGAGCTTTCTAATTTCAAACTATTCGGGCCTAACTTTTGGTGTGATGATGCTGAAGAACCTATCCATGAAACTCACAAAAACATCATCACCTGAGAATTCTCTGGAATCTAAGTC |
| RT73(GT73)a | TTTCTCCATATTGACCATCATACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGATCATCCTCCTTCCTTTCCTTGCCTTTCCTTCCTTTTCTTGCCTTCGTATAAGCTTGTGTC |
| RT73(GT73)b | TCTGAATACACTCTATATTTAGACCCCTTAACTATTAATATACGGGGATTCGGGGTTGGATCCGGGGCGGGTTGTTACATAAAAAGTCGAACACTGATAGTTTAAACTGAAGGCGGGAAA |
| MON88302 | GTTCCTTGAACCTTATTTTATAGTGCACAAAACCTTTTAGTCATCATGTTGTACCACTTCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTCTAG |
| Ms8-derived | TATTTCTTTCAAGATGGGAATTAACATCTACAAATTGCCTTTTCTTATCGACCATGTACTCGACGGCCGAGTTCGACGGCCGAGTACTGAAGAGAAAATTGCAAAGGTCGAATCATATTC |
| Rf1 | AATTGCGAGCTTTCTAATTTCAAACTATTCGGGCCTAACTTTTGGTGTGATGATGCTGACTGGGTGAGGATGATGAGTCGCGTGTAGTCACCGGAAAAGATGGAAAAGGGTTCTTCGCCT |
| Rf2 | CGATGGGGGGCATCGCACCGGTGAGTAATATTGTACGGCTAAGAGCGAATTTGGCCGGTGAGTAATATTGTACTGGCACAGCTATATATACGTCGATATATTGTCTCACCCTATTAGATG |
| Topas19 | AGTTCCAAACGTAAAACGGCTTGTCCCGCGTCATCGGCGGGGGTCGTAACGTGACTCCCGGTCATATATCAGCGCCGGTCGGCCCCGGGCCTGGGGTGGGATTAAGGCCGAAGGCCCGAA |
| MON00073-7 | ATTGGTAATTACTCTTTCTTTTTCTCCATATTGACCATCATACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGATCATCCTCCTTCCTTTCCTTGCCTTTCCTTCCTTTTCTTG |
| MS8 | AAAAGTAAACAATTAATATAGCCGGCTATTTGTGTAAAAATCCCTAATATAATCGACGGATCCCCGGGAATTCCGGGGGAAGCTTAGATCCATGGATTTGTTATGATAACCAAAAACACC |
| Rf3 | GATGGAGACTTGAGAAGTTTTTTTTGGACTTTGTTTAGCTTTGTTGGGCGTTTTTTTTTTTTGATCAATAACTTTGTTGGGCTTATGGTCGATAAGCGTGCGCATGTCTGATGGTACATG |
| DP-073496-4 | GTTCTTCTCTTCATAGCTCATTACAGTTTTCATTAGTTAGATCAGGATATTCTTGTTTAAGATGTTGAACTCTATGGAGGTTTG |
| 番茄 | huafan1 | CTGGTGAAAAGAAAAACCACCCCAGTACATTAAAAACGTCCGCAATGTGTTATTAAGTTAAATATATAATGCTATTTTATATATTGTTTTAAGTTAAATATATAATAATATTCTCCAAAT |
| 棉花 | MON15985a | AGTGCATGCCTAACTAATACTTATCAGAAACAAATAATGCAATGAGTCATATCTCTATAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCCAGCTATCTGTCACTTTATTGTG |
| MON15985b | GTTACTAGATCGGGGATATCCCCGGGGCGGCCGCTCTAGAACTAGTGGATCTGCACTGAAATCCCATCCATTTAGCAACCTT |
| MON1445 | AATAAATATAATTATCTTGATTGGAGTAAGACGATTCAGATCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCAGCTTGGGCTGCAGGTCGATTGATGCATGTT |
| GGATTTTCTGCCTGTGGACAGCCCCTCAAATGTCAATAGGTGCGCCCTATTCAAATTTCAATCGGTTCCCTGAGAAATGATGCATGACTTTTGGAGATCTAAAGCTTTATTGGCAGTAAG |
| MON88913 | TACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGCCATTTACAATTGAATATATATTACAAAGCTATTTGCTTATAACATATGCGAAAAATTTTGTACTATAATCAGGGGTAAAT |
| GHB614 | CAAATACACTTGGAACGACTTCGTTTTAGGCTCCATGGCGATCGCTACGTATCTAGAATTCCTGCAGGTCGAGTCGCGACGTACGTTCGAACAATTGGTTTTAAAAGCTTGCATGCCTGC |
| LLcotton25 | CAAGGAACTATTCAACTGAGCTTAACAGTACTCGGCCGTCGACCGCGGTACCCCGGAATTCCAATCCCACAAAAATCTGAGCTTAACAGCACAGTTGCTCCTCTCAGAGCAGAATCGGGT |
| DAS-24236-5 | CTCATTGCTGATCCATGTAGATTTCCCTTACTTGTCTCCCTCTAATCTGACTTTATTAACCCAAAGCAATTGCTTATTTGTTCCCCACGCCCACAAAGCCCAGCATTGTCC |
| DAS-21023-5 | AAATATTAACAATGCATTGAGTATGATGTCCGGGAAATCTACATGGATNAGCAATGAGTATGATGGTCAATATGGAGAAAAAGAAAGAGT |
| MON531 | AACCAATGCCACCCCACTGACCCACTTAGCAGAGAAGAAGTGGAGGGACAAACGTGAGAAACTCGAATGGGA |
| GHB119 | CCAGTACTAAAATCCAGATCATGCATGGACCTGCAGGTCGACGGCCGAGTACTGTTTTATTTTTAACAGGAATTTGAGTCACGCAATTTC |
| T304-40 | AGCGCGCAAACTAGGATAAATTATCGCGCGCGGTGTCATCTATCTCCTTTTTCTTTTCAAGTTATCCCAAGATCTAGG |
| MON88701 | CATACTCATTGCTGATCCATGTAGATTTCCCGGACATGAAGCCTTAATTCAATATTGGCTCTAGAACATAACTTGTTTAACACT |
| 苜蓿 | J163 | TAAATACGACGGATCGTAATTTGTCGTTTTATCAAAATGTACTTTCATTTTATAATAACTTCCATTTTTTTTTTCTTTTTCTTTTATAATAACAGAAAAAGAAAAAGAAAGATGATGAAA |
| J101 | TATTTTATGTTATATCGTATTCATGTCATGTGTTTTGTACTGATCTTGTGTCATAGTTTCAAACACTGATAGTTTAAACTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTTCTG |
| 甜菜 | H7-1 | CGGTTTTATTGGGATCTGGGTGGCTCTAACTATTTACATGAGCCTCCGCGCGTTTGCTGAAGGCGGGAAACGACAATCTGATCCCCATCAAGCTTGAGCTCAGGATTTAGCAGCATTCCA |

## 内标准基因探针序列

### 核酮糖-二磷酸羧化酶（RBCL）

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | CCTGTCGTTGTGAGAATTCTTAATTCATGAGTTGTAGGGAGGGACGTATGTCACCACAAACAGAAACTAAAGCAAGTGTTGGATTTAAAGCTGGTGTTAAGGATTATAAATTGACTTACT |
| 2 | TTGACTTACTACACCCCGGAGTACGAAACCAAGGACACTGATATCTTGGCAGCATTCCGAGTAACTCCTCAGCCGGGGGTTCCGCCCGAAGAAGCAGGGGCTGCAGTAGCTGCCGAATCT |
| 3 | TGCCGAATCTTCTACTGGTACATGGACAACTGTTTGGACTGATGGACTTACCAGTCTTGATCGTTACAAAGGCCGATGCTATCACATCGAGCCCGTTGTTGGGGAGGATAATCAATATAT |
| 4 | ATCAATATATCGCTTATGTAGCTTATCCATTAGACCTATTTGAAGAGGGTTCTGTTACTAACATGTTTACTTCCATTGTGGGTAACGTATTTGGTTTCAAAGCCCTACGCGCTCTACTTC |
| 5 | GCTCTACTTCTGGAGGATCTGCGAATTCCCCCTACTTATTCAAAAACTTTCCAAGGTCCGCCTCATGGTATCCAAGTTGAAAGGGATAAGTTGAACAAATACGGTCGTCCTTTATTGGGA |
| 6 | TTTATTGGGATGTACTATTAAACCAAAATTGGGATTATCTGCAAAAAATTATGGTAGAGCATGTTATGAGTGTCTACGCGGTGGACTTGATTTTACCAAAGATGATGAAAACGTAAACTC |
| 7 | ACGTAAACTCACAACCATTTATGCGTTGGAGGGACCGTTTTGTCTTTTGTGCCAAAGCTATTTATAAATCACAGGCCGAAACCGGTGAAATTAAGGGGCATTACTTGAATGCGACTGCAG |
| 8 | GCGACTGCAGGTACATGCGAAGAAATGATTAAAAGAGCTGTATTTGCGAGGGAATTAGGGGTTCCTATTGTAATGCATGACTACTTAACCGGGGGATTCACCGCAAATACTAGTTTGGCT |
| 9 | TAGTTTGGCTCATTATTGCCGCGACAACGGCCTACTTCTTCACATTCACCGAGCAATGCATGCAGTTATTGATAGACAGAAAAATCATGGTATGCATTTCCGTGTATTAGCTAAAGCATT |
| 10 | CTAAAGCATTGCGTATGTCTGGGGGAGATCATATCCACGCTGGTACAGTAGTAGGTAAGTTAGAAGGGGAACGCGAAATGACTTTAGGTTTTGTTGATTTATTGCGCGATGATTTTATTG |
| 11 | GATTTTATTGAAAAAGATCGTGCTCGCGGTATCTTTTTCACTCAGGACTGGGTATCCATGCCAGGTGTTATACCGGTGGCTTCAGGGGGTATTCATGTTTGGCATATGCCAGCTCTGACC |
| 12 | AGCTCTGACCGAAATCTTTGGAGATGATTCTGTATTGCAATTTGGTGGAGGAACTTTAGGACATCCTTGGGGTAATGCACCTGGTGCAGCAGCTAATCGGGTGGCTTTAGAAGCCTGTGT |
| 13 | AAGCCTGTGTACAAGCTCGTAACGAAGGGCGCGATCTTGCTCGTGAAGGTAATGAAATTATCCGATCAGCTTGCAAATGGAGTCGTGAACTAGCCGCAGCTTGTGAAATATGGAAAGCGA |

### 质体醌脱氢酶复合体亚单位（PDCS）

|  |  |
| --- | --- |
| 编号 | 探针序列 |
| 1 | TGGGCAGTGAAGAAGGGTCAGATTGTGAGGGTGGAGAAAGACAAATATCTTAATAGTGTTAATTATCTTTCGGTTGGACATCCACCGTATTACAAAGGATTGGACTATATTTATGAAGAC |
| 2 | TCTTAATAGTGTTAATTATCTTTCGGTTGGACATCCACCGTATTACAAAGGATTGGACTATATTTATGAAGACCGCGGTGAGATATTGGATTTGCGTATTTTTGAGACAGGAGAGTATGC |
| 3 | AAGGATTGGACTATATTTATGAAGACCGCGGTGAGATATTGGATTTGCGTATTTTTGAGACAGGAGAGTATGCACTTGTAGCATGGGTTGGGGTCCCAACTGCGCCAGCATGGCTTCCAA |
| 4 | CAGAAACTCACATTTTCATTGGCTGAATCCGTGTCTAGTGCCACTCTCGTTGCTTTCCTCTCTGCTTCTTTCATCTTTGTTCATCCCGCACTTGCATTCAAGGGTGGAGGACCATACGGG |

## 人工DNA探针序列

### 人工DNA探针序列

|  |  |
| --- | --- |
| 编号 | 序列 |
| 1 | GCCATGCTGCGCCGCATCCTGCAGCGTACTCCGGGTCGTGTGGGCTCCCAGGGCTCTGACCTGGATAGTAGCGCCACCCCGATCAACACCGTTGATGTGAACAACGAGAGCTCCTCTGAA |
| 2 | GGCTTCATCTGCCCGCAGTGTATGAAATCTCTGGGTAGCGCTGACGAACTGTTCAAACACTATGAAGCAGTTCACGACGCTGGTAACGATTCCGGCCATGGCGGTGAGTCTAACCTGGCC |
| 3 | CTGAAACGTGATGACGTGACCCTGCTGCGTCAGGAAGTGCAGGACCTCCAGGCTAGCTTGAAAGAAGAAAAATGGTACTCTGAAGAACTGAAAAAGGAACTGGAAAAATACCAGGGCCTG |
| 4 | CAGCAGCAAGAGGCAAAACCGGACGGCCTGGTTACCGACTCTTCCGCTGAACTGCAGTCCCTGGAGCAGCAGCTGGAAGAAGCGCAGACTGAAAACTTCAACATTAAACAAATGAAGGAC |
| 5 | CTGTTCGAGCAGAAGGCCGCACAGCTGGCGACAGAAATTGCAGACATTAAATCCAAATATGACGAAGAACGTAGCCTGCGTGAGGCGGCTGAGCAGAAAGTCACTCGTCTGACTGAGGAG |
| 6 | CTGAACAAAGAAGCAACCGTTATCCAGGATCTCAAAACTGAGCTGCTGCAGCGTCCGGGTATCGAAGACGTGGCTGTTCTCAAAAAAGAGCTCGTGCAGGTGCAGACCTTGATGGACAAC |
| 7 | ATGACCCTGGAACGTGAACGTGAATCAGAGAAGCTGAAAGATGAGTGTAAAAAACTGCAGTCACAGTACGCTAGCTCTGAAGCGACGATCTCCCAGCTGCGTTCCGAGCTTGCCAAAGGC |
| 8 | CCGCAGGAAGTTGCGGTGTATGTTCAGGAATTGCAGAAACTGAAGTCTAGCGTAAACGAACTGACTCAAAAGAATCAGACCCTCACCGAAAACCTGTTGAAAAAAGAACAAGACTACACA |
| 9 | AAACTGGAAGAGAAACACAACGAAGAGTCCGTTTCTAAAAAGAACATTCAGGCGACCCTACACCAGAAAGATCTCGACTGCCAGCAGCTCCAAAGTCGCCTGTCTGCATCTGAAACGTCT |
| 10 | CTCCACCGTATTCACGTAGAGCTGTCCGAAAAAGGGGAAGCCACCCAGAAACTCAAAGAAGAACTGTCCGAAGTTGAAACTAAGTACCAGCACTTGAAAGCTGAGTTTAAACAACTGCAG |
| 11 | CAACAGCGTGAAGAAAAAGAGCAGCATGGTCTACAGCTCCAGTCCGAAATCAACCAGCTTCACTCCAAATTGCTGGAGACTGAACGCCAGCTGGGCGAAGCGCACGGCCGCCTGAAGGAA |
| 12 | CAGCGCCAGCTGTCCTCCGAAAAACTGATGGATAAAGAGCAGCAAGTGGCTGATCTGCAGCTTAAACTGTCTCGCCTAGAAGAACAACTGAAGGAAAAAGTTACGAACTCCACGGAGCTC |
| 13 | CAGCACCAGCTGGATAAAACTAAACAGCAGCACCAGGAACAGCAGGCTCTGCAACAGTCCACGACCGCGAAACTGCGTGAAGCCCAGAACGATCTTGAACAAGTGCTCCGTCAGATCGGT |
| 14 | GACAAAGACCAGAAAATTCAGAACCTTGAAGCGCTTCTGCAGAAATCTAAAGAGAATATCTCGCTGCTGGAAAAAGAACGTGAAGATCTATACGCTAAAATCCAGGCTGGCGAGGGGGAA |
| 15 | ACCGCAGTACTCAACCAACTGCAGGAGAAAAACCACACCCTGCAAGAACAGGTCACCCAACTGACGGAAAAGCTCAAGAACCAAAGCGAGTCTCACAAACAGGCACAAGAGAACCTGCAT |
| 16 | GACCAAGTGCAGGAGCAGAAAGCGCACCTGCGTGCGGCTCAGGACCGTGTTCTGTCTCTGGAAACTTCCGTTAACGAGCTGAATTCCCAGCTGAACGAGTCCAAAGAGAAAGTGTCCCAG |
| 17 | CTCGACATCCAGATTAAGGCTAAAACTGAACTGCTGCTGTCCGCGGAGGCAGCTAAAACCGCCCAGCGCGCTGATCTCCAGAACCACTTGGATACAGCGCAGAACGCGCTCCAGGATAAA |

附录B

（规范性附录）

人工DNA

B.1 人工DNA的序列

ACTCCGGGTCGTGTGGGCTCCCAGGGCTCTGACCTGGATAGTAGCGCCACCCCGATCAACACCGTTGATGTGAACAACGAGAGCTCCTCTGAAGGCTTCATCTGCCCGCAGTGTATGAAATCTCTGGGTAGCGCTGACGAACTGTTCAAACACTATGAAGCAGTTCACGACGCTGGTAACGATTCCGGCCATGGCGGTGAGTCTAACCTGGCCCTGAAACGTGATGACGTGACCCTGCTGCGTCAGGAAGTGCAGGACCTCCAGGCTAGCTTGAAAGAAGAAAAATGGTACTCTGAAGAACTGAAAAAGGAACTGGAAAAATACCAGGGCCTGCAGCAGCAAGAGGCAAAACCGGACGGCCTGGTTACCGACTCTTCCGCTGAACTGCAGTCCCTGGAGCAGCAGCTGGAAGAAGCGCAGACTGAAAACTTCAACATTAAACAAATGAAGGACCTGTTCGAGCAGAAGGCCGCACAGCTGGCGACAGAAATTGCAGACATTAAATCCAAATATGACGAAGAACGTAGCCTGCGTGAGGCGGCTGAGCAGAAAGTCACTCGTCTGACTGAGGAGCTGAACAAAGAAGCAACCGTTATCCAGGATCTCAAAACTGAGCTGCTGCAGCGTCCGGGTATCGAAGACGTGGCTGTTCTCAAAAAAGAGCTCGTGCAGGTGCAGACCTTGATGGACAACATGACCCTGGAACGTGAACGTGAATCAGAGAAGCTGAAAGATGAGTGTAAAAAACTGCAGTCACAGTACGCTAGCTCTGAAGCGACGATCTCCCAGCTGCGTTCCGAGCTTGCCAAAGGCCCGCAGGAAGTTGCGGTGTATGTTCAGGAATTGCAGAAACTGAAGTCTAGCGTAAACGAACTGACTCAAAAGAATCAGACCCTCACCGAAAACCTGTTGAAAAAAGAACAAGACTACACAAAACTGGAAGAGAAACACAACGAAGAGTCCGTTTCTAAAAAGAACATTCAGGCGACCCTACACCAGAAAGATCTCGACTGCCAGCAGCTCCAAAGTCGCCTGTCTGCATCTGAAACGTCTCTCCACCGTATTCACGTAGAGCTGTCCGAAAAAGGGGAAGCCACCCAGAAACTCAAAGAAGAACTGTCCGAAGTTGAAACTAAGTACCAGCACTTGAAAGCTGAGTTTAAACAACTGCAGCAACAGCGTGAAGAAAAAGAGCAGCATGGTCTACAGCTCCAGTCCGAAATCAACCAGCTTCACTCCAAATTGCTGGAGACTGAACGCCAGCTGGGCGAAGCGCACGGCCGCCTGAAGGAACAGCGCCAGCTGTCCTCCGAAAAACTGATGGATAAAGAGCAGCAAGTGGCTGATCTGCAGCTTAAACTGTCTCGCCTAGAAGAACAACTGAAGGAAAAAGTTACGAACTCCACGGAGCTCCAGCACCAGCTGGATAAAACTAAACAGCAGCACCAGGAACAGCAGGCTCTGCAACAGTCCACGACCGCGAAACTGCGTGAAGCCCAGAACGATCTTGAACAAGTGCTCCGTCAGATCGGTGACAAAGACCAGAAAATTCAGAACCTTGAAGCGCTTCTGCAGAAATCTAAAGAGAATATCTCGCTGCTGGAAAAAGAACGTGAAGATCTATACGCTAAAATCCAGGCTGGCGAGGGGGAAACCGCAGTACTCAACCAACTGCAGGAGAAAAACCACACCCTGCAAGAACAGGTCACCCAACTGACGGAAAAGCTCAAGAACCAAAGCGAGTCTCACAAACAGGCACAAGAGAACCTGCATGACCAAGTGCAGGAGCAGAAAGCGCACCTGCGTGCGGCTCAGGACCGTGTTCTGTCTCTGGAAACTTCCGTTAACGAGCTGAATTCCCAGCTGAACGAGTCCAAAGAGAAAGTGTCCCAGCTCGACATCCAGATTAAGGCTAAAACTGAACTGCTGCTGTCCGCGGAGGCAGCTAAAACCGCCCAGCGCGCTGATCTCCAGAACCACTTGGATACAGCGCAGAACGCGCTCCAGGATAAACAG