**Supplementary Table 1** Real-time quantitative PCR primer sequence

|  |  |
| --- | --- |
| Primer name | Primer sequence(5'-3') |
| AsNPF6.2-F | CACCACCAGCATCATCACCT |
| AsNPF6.2-R | CGTGATGGCAGAATGAAGCG |
| AsNPF4.5-F | ATCATGCTCAACTGCTGCCT |
| AsNPF4.5-R | GATGATGAACGTGACGGGGA |
| AsNPF2.1-F | CATGCGCCGTCTTCTTCATG |
| AsNPF2.1-R | TAGTGGGTTTTCTCCGGTGC |
| AsNPF6.8-F | ATCCACCGCCATGTGTTGAT |
| AsNPF6.8-R | GCGGCTGAAAAGCAACTTCA |
| AsNPF4.18-F | GTTTGCGCCGTACCAATTGT |
| AsNPF4.18-R | CAGGTTCTCCAGCACCTCAG |
| AsNPF2.6-F | GACCAGTTTCCATGCCTCGA |
| AsNPF2.6-R | ACTGGGATGATTCGCGCTAG |
| AsNPF2.7-F | GTCGACGGGCATCATCTTCT |
| AsNPF2.7-R | GTAGATCGGGATCCACAGCG |
| AsNPF7.16-F | CCTTGCTCCTCTTCCTCAGC |
| AsNPF7.16-R | CGGACTTCCAGTTCCTGCAT |
| AsNPF7.19-F | GAGGCGCACTCTAAGGTCTC |
| AsNPF7.19-R | AATCCTAGCACCCAGTTGCC |
| AsNPF6.13-F | CATTATCAGCGCGTTCTGGC |
| AsNPF6.13-R | GAAGCCCATGGACAAGGTGA |
| AsActin-F | CATTGGTATGGAAGCTGCTG |
| AsActin-R | CACTGAGCACAATGTTACCG |

**Supplementary Table 2** Primer sequences

|  |  |
| --- | --- |
| **Primer name** | **Primer sequence** |
| AsNPF4.5-F | ATGGAGGACGGAGTGCGGGA |
| AsNPF4.5-R | GCCCTTGATCACCCCAGCGT |
| AsNPF2.1-F | ATGGACACCGTGAAGCCTGG |
| AsNPF2.1-R | AACCGGCGACGCACTCGTAG |
| AsNPF6.8-F | ATGGTAAACCGAAGTTTGAG |
| AsNPF6.8-R | GGTAACTGCAAGCGC |
| AsNPF2.6-F | ATGGACACCGTGAAGCCTGG |
| AsNPF2.6-R | AACCGGCGACGCACTCGTAG |
| AsNPF7.16-F | ATGTATGTTTTGCAGTCTGC |
| AsNPF7.16-R | TGCTGCGTGGCATGT |
| AsNPF7.19-F | ATGTCTGCGAACGAGGGAGA |
| AsNPF7.19-R | CGCTGCGTGGCATGT |
| AsNPF6.13-F | ATGGTTTCTGCCGGTGGC |
| AsNPF6.13-R | CACATCCATCCCTTCAACGT |
| GFP-AsNPF4.5-F | TATCTCTAGAGGATCCATGGAGGACGGAGTGCGGGA |
| GFP-AsNPF4.5-R | TGCTCACCATGGATCCGCCCTTGATCACCCCAGCGT |
| GFP-AsNPF2.1-F | TATCTCTAGAGGATCCATGGACACCGTGAAGCCTGG |
| GFP-AsNPF2.1-R | TGCTCACCATGGATCCAACCGGCGACGCACTCGTAG |
| GFP-AsNPF6.8-F | TATCTCTAGAGGATCCATGGTAAACCGAAGTTTGAG |
| GFP-AsNPF6.8-R | TGCTCACCATGGATCCGGTAACTGCAAGCGC |
| GFP-AsNPF2.6-F | TATCTCTAGAGGATCCATGGACACCGTGAAGCCTGG |
| GFP-AsNPF2.6-R | TGCTCACCATGGATCCAACCGGCGACGCACTCGTAG |
| GFP-AsNPF7.16-F | TATCTCTAGAGGATCCATGTATGTTTTGCAGTCTGC |
| GFP-AsNPF7.16-R | TGCTCACCATGGATCCTGCTGCGTGGCATGT |
| GFP-AsNPF7.19-F | TATCTCTAGAGGATCCATGTCTGCGAACGAGGGAGA |
| GFP-AsNPF7.19-R | TGCTCACCATGGATCCCGCTGCGTGGCATGT |
| GFP-AsNPF6.13-F | TATCTCTAGAGGATCCATGGTTTCTGCCGGTGGC |
| GFP-AsNPF6.13-R | TGCTCACCATGGATCCCACATCCATCCCTTCAACGT |

**Supplementary Table 3** Predicted physicochemical properties of 197 *AsNRT1* members

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Gene Name | Gene ID | Number of amino acids | Molecular weight/kDa | Theoretical pI | Instability index | Chromosome | Aliphatic index | GRAVY | Subcellular location |
|
|
|
| AVESA.00001b.r3.1Ag0000868.1 | AsNPF6.1 | 596 | 64 | 6.28 | 32.81 | 1A | 95.77 | 0.353 | Vacuole. |
| AVESA.00001b.r3.1Ag0000869.1 | AsNPF6.2 | 641 | 69 | 7.55 | 32.25 | 1A | 93.96 | 0.332 | Vacuole. |
| AVESA.00001b.r3.1Ag0001029.4 | AsNPF7.1 | 609 | 66 | 9.29 | 41.8 | 1A | 101.07 | 0.433 | Vacuole. |
| AVESA.00001b.r3.1Ag0001031.9 | AsNPF7.2 | 427 | 46 | 5.57 | 32.93 | 1A | 96.32 | 0.396 | Vacuole. |
| AVESA.00001b.r3.1Ag0001055.1 | AsNPF5.1 | 599 | 65 | 7.62 | 37.54 | 1A | 98.83 | 0.221 | Vacuole. |
| AVESA.00001b.r3.1Ag0001125.1 | AsNPF3.1 | 601 | 66 | 9.39 | 32.04 | 1A | 96.91 | 0.171 | Vacuole. |
| AVESA.00001b.r3.1Ag0001129.1 | AsNPF3.2 | 609 | 66 | 8.55 | 36.56 | 1A | 95.63 | 0.243 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.1Ag0001133.1 | AsNPF3.3 | 613 | 67 | 8.38 | 38.27 | 1A | 95.53 | 0.22 | Vacuole. |
| AVESA.00001b.r3.1Ag0001583.1 | AsNPF5.2 | 567 | 61 | 8.99 | 43.13 | 1A | 99.88 | 0.343 | Vacuole. |
| AVESA.00001b.r3.1Ag0001584.2 | AsNPF5.3 | 411 | 45 | 9.72 | 50.25 | 1A | 106.74 | 0.398 | Vacuole. |
| AVESA.00001b.r3.1Ag0001585.1 | AsNPF5.4 | 548 | 59 | 8.02 | 37.77 | 1A | 100.27 | 0.451 | Vacuole. |
| AVESA.00001b.r3.1Ag0003109.1 | AsNPF8.1 | 596 | 65 | 6.71 | 32.91 | 1A | 93.64 | 0.365 | Vacuole. |
| AVESA.00001b.r3.1Ag0003110.1 | AsNPF5.5 | 534 | 58 | 8.26 | 44.79 | 1A | 98.84 | 0.422 | Vacuole. |
| AVESA.00001b.r3.1Ag0003111.1 | AsNPF5.6 | 527 | 57 | 6.99 | 38.17 | 1A | 102.03 | 0.475 | Vacuole. |
| AVESA.00001b.r3.1Ag0003112.1 | AsNPF5.7 | 426 | 47 | 8.11 | 44.39 | 1A | 96.36 | 0.401 | Vacuole. |
| AVESA.00001b.r3.1Cg0000378.3 | AsNPF8.2 | 580 | 64 | 7.06 | 22.46 | 1C | 96.19 | 0.326 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.1Cg0001531.1 | AsNPF6.3 | 596 | 64 | 7.59 | 33.43 | 1C | 94.46 | 0.36 | Vacuole. |
| AVESA.00001b.r3.1Cg0001532.1 | AsNPF6.4 | 597 | 64 | 7.55 | 32.66 | 1C | 96.3 | 0.394 | Vacuole. |
| AVESA.00001b.r3.1Cg0001747.5 | AsNPF7.3 | 580 | 62 | 9.21 | 39.92 | 1C | 100.09 | 0.419 | Vacuole. |
| AVESA.00001b.r3.1Cg0001750.3 | AsNPF7.4 | 575 | 61 | 11.06 | 48.78 | 1C | 90.66 | 0.036 | Mitochondrion. Vacuole. |
| AVESA.00001b.r3.1Cg0001751.2 | AsNPF7.5 | 567 | 62 | 7.02 | 34.47 | 1C | 101.16 | 0.497 | Vacuole. |
| AVESA.00001b.r3.1Cg0001842.2 | AsNPF3.4 | 600 | 65 | 9.29 | 30.06 | 1C | 97.87 | 0.190 | Vacuole. |
| AVESA.00001b.r3.1Cg0001846.1 | AsNPF3.5 | 599 | 65 | 8.56 | 37.33 | 1D | 96.44 | 0.260 | Vacuole. |
| AVESA.00001b.r3.1Dg0000855.2 | AsNPF6.5 | 596 | 64 | 6.83 | 32.43 | 1D | 95.29 | 0.352 | Vacuole. |
| AVESA.00001b.r3.1Dg0000856.1 | AsNPF6.6 | 636 | 68 | 7.17 | 32.39 | 1D | 94.54 | 0.342 | Vacuole. |
| AVESA.00001b.r3.1Dg0001024.1 | AsNPF7.6 | 598 | 64 | 9.27 | 40.06 | 1D | 101.45 | 0.432 | Vacuole. |
| AVESA.00001b.r3.1Dg0001026.2 | AsNPF7.7 | 567 | 62 | 7.02 | 33.05 | 1D | 100.95 | 0.465 | Vacuole. |
| AVESA.00001b.r3.1Dg0001124.1 | AsNPF3.6 | 601 | 66 | 9.46 | 30.72 | 1D | 97.07 | 0.175 | Vacuole. |
| AVESA.00001b.r3.1Dg0001127.2 | AsNPF3.7 | 604 | 66 | 8.56 | 38.37 | 1D | 97.24 | 0.284 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.1Dg0001130.5 | AsNPF3.8 | 609 | 66 | 8.72 | 37.11 | 1D | 95.52 | 0.232 | Vacuole. |
| AVESA.00001b.r3.1Dg0001613.1 | AsNPF5.8 | 570 | 62 | 8.4 | 41.71 | 1D | 99.84 | 0.360 | Vacuole. |
| AVESA.00001b.r3.1Dg0001614.5 | AsNPF5.9 | 536 | 58 | 8.06 | 44.85 | 1D | 102.82 | 0.446 | Vacuole. |
| AVESA.00001b.r3.1Dg0001615.1 | AsNPF8.3 | 569 | 62 | 7.92 | 36.42 | 1D | 96.52 | 0.379 | Vacuole. |
| AVESA.00001b.r3.1Dg0002584.1 | AsNPF5.10 | 286 | 31 | 10.43 | 57.81 | 1D | 63.57 | -0.403 | Vacuole. |
| AVESA.00001b.r3.1Dg0002944.4 | AsNPF8.4 | 587 | 65 | 5.73 | 36.52 | 1D | 95.03 | 0.346 | Vacuole. |
| AVESA.00001b.r3.1Dg0002945.6 | AsNPF8.5 | 458 | 51 | 7.98 | 40.58 | 1D | 102.38 | 0.393 | Vacuole. |
| AVESA.00001b.r3.1Dg0002946.3 | AsNPF8.6 | 588 | 65 | 5.71 | 30.77 | 1D | 100.66 | 0.318 | Vacuole. |
| AVESA.00001b.r3.1Dg0002947.1 | AsNPF8.7 | 344 | 38 | 6.23 | 34.26 | 1D | 104.36 | 0.369 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.2Ag0001199.3 | AsNPF4.1 | 583 | 63 | 8.71 | 37.83 | 2A | 91.6 | 0.418 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.2Ag0001470.6 | AsNPF4.2 | 559 | 62 | 8.47 | 35.66 | 2A | 104.13 | 0.373 | Vacuole. |
| AVESA.00001b.r3.2Ag0001471.12 | AsNPF4.3 | 572 | 63 | 8.9 | 39.35 | 2A | 103.04 | 0.360 | Vacuole. |
| AVESA.00001b.r3.2Ag0001472.9 | AsNPF4.4 | 565 | 62 | 8.52 | 36.39 | 2A | 104.55 | 0.408 | Vacuole. |
| AVESA.00001b.r3.2Ag0001886.2 | AsNPF5.11 | 546 | 58 | 6.09 | 44.49 | 2A | 98.53 | 0.415 | Vacuole. |
| AVESA.00001b.r3.2Ag0001951.1 | AsNPF7.8 | 566 | 61 | 6.51 | 34.54 | 2A | 99.59 | 0.244 | Vacuole. |
| AVESA.00001b.r3.2Ag0001952.2 | AsNPF7.9 | 591 | 64 | 6.12 | 35.18 | 2A | 100.69 | 0.347 | Vacuole. |
| AVESA.00001b.r3.2Ag0002425.1 | AsNPF4.5 | 586 | 63 | 8.93 | 38.58 | 2A | 100.05 | 0.408 | Vacuole. |
| AVESA.00001b.r3.2Ag0002684.1 | AsNPF8.8 | 598 | 65 | 7.86 | 39.87 | 2A | 95.28 | 0.328 | Vacuole. |
| AVESA.00001b.r3.2Cg0000333.1 | AsNPF7.10 | 650 | 71 | 6.38 | 40.52 | 2C | 105.80 | 0.389 | Vacuole. |
| AVESA.00001b.r3.2Cg0001583.2 | AsNPF6.7 | 586 | 63 | 7.9 | 32.77 | 2C | 100.73 | 0.421 | Vacuole. |
| AVESA.00001b.r3.2Cg0001935.1 | AsNPF4.6 | 581 | 63 | 8.62 | 37.15 | 2C | 91.24 | 0.408 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.2Cg0002189.4 | AsNPF4.7 | 559 | 62 | 7.98 | 36.22 | 2C | 104.81 | 0.386 | Vacuole. |
| AVESA.00001b.r3.2Cg0002190.4 | AsNPF4.8 | 585 | 65 | 8.71 | 38.05 | 2C | 103.61 | 0.359 | Vacuole. |
| AVESA.00001b.r3.2Cg0002192.4 | AsNPF4.9 | 565 | 62 | 8.66 | 35.16 | 2C | 104.04 | 0.377 | Vacuole. |
| AVESA.00001b.r3.2Cg0002582.1 | AsNPF5.12 | 513 | 54 | 5.59 | 43.04 | 2C | 97.64 | 0.423 | Vacuole. |
| AVESA.00001b.r3.2Cg0002645.2 | AsNPF7.11 | 586 | 64 | 6.38 | 33.61 | 2C | 99.52 | 0.236 | Vacuole. |
| AVESA.00001b.r3.2Cg0002646.1 | AsNPF7.12 | 468 | 51 | 7.06 | 36.13 | 2C | 100.04 | 0.428 | Vacuole. |
| AVESA.00001b.r3.2Cg0002740.1 | AsNPF8.9 | 526 | 57 | 8.51 | 38.8 | 2C | 99.94 | 0.352 | Vacuole. |
| AVESA.00001b.r3.2Dg0000122.1 | AsNPF5.13 | 532 | 58 | 5.71 | 37.28 | 2D | 105.04 | 0.443 | Vacuole. |
| AVESA.00001b.r3.2Dg0000186.3 | AsNPF3.9 | 594 | 65 | 8.38 | 33.9 | 2D | 90.34 | 0.221 | Vacuole. |
| AVESA.00001b.r3.2Dg0001397.13 | AsNPF4.10 | 571 | 63 | 8.82 | 39.31 | 2D | 102.89 | 0.368 | Vacuole. |
| AVESA.00001b.r3.2Dg0001399.2 | AsNPF4.11 | 565 | 63 | 8.67 | 36.54 | 2D | 105.24 | 0.416 | Vacuole. |
| AVESA.00001b.r3.2Dg0001790.3 | AsNPF5.14 | 563 | 61 | 6.92 | 39.37 | 2D | 106.16 | 0.434 | Vacuole. |
| AVESA.00001b.r3.2Dg0001814.4 | AsNPF5.15 | 573 | 62 | 5.97 | 48.2 | 2D | 94.75 | 0.274 | Vacuole. |
| AVESA.00001b.r3.2Dg0001879.1 | AsNPF7.13 | 435 | 47 | 5.37 | 41.09 | 2D | 96.44 | 0.281 | Vacuole. |
| AVESA.00001b.r3.2Dg0001880.1 | AsNPF7.14 | 466 | 50 | 6.53 | 37.84 | 2D | 100.71 | 0.448 | Vacuole. |
| AVESA.00001b.r3.2Dg0003760.1 | AsNPF4.12 | 583 | 63 | 8.71 | 36.3 | 2D | 91.92 | 0.420 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.3Ag0000099.1 | AsNPF8.10 | 652 | 71 | 8.63 | 29.57 | 3A | 93.37 | 0.186 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.3Ag0000897.1 | AsNPF8.11 | 384 | 42 | 8.92 | 32.96 | 3A | 94.66 | 0.188 | Vacuole. |
| AVESA.00001b.r3.3Ag0002158.2 | AsNPF4.13 | 625 | 70 | 8.21 | 38.27 | 3A | 95.86 | 0.205 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.3Cg0000054.5 | AsNPF8.12 | 580 | 63 | 6.71 | 24.03 | 3C | 96.19 | 0.303 | Cell membrane. Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.3Cg0001879.2 | AsNPF8.13 | 573 | 63 | 7.6 | 36.15 | 3C | 102.43 | 0.353 | Vacuole. |
| AVESA.00001b.r3.3Cg0002334.2 | AsNPF1.1 | 585 | 64 | 8.53 | 44.87 | 3C | 107.37 | 0.357 | Vacuole. |
| AVESA.00001b.r3.3Cg0002401.1 | AsNPF4.14 | 625 | 70 | 8.51 | 38.73 | 3C | 97.26 | 0.216 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.3Cg0002996.2 | AsNPF5.16 | 311 | 35 | 9.4 | 45.22 | 3C | 105.72 | 0.501 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.3Cg0002997.1 | AsNPF5.17 | 519 | 56 | 6.19 | 42.19 | 3C | 100.42 | 0.466 | Vacuole. |
| AVESA.00001b.r3.3Cg0002998.1 | AsNPF5.18 | 519 | 56 | 7.55 | 41.54 | 3C | 101.37 | 0.383 | Vacuole. |
| AVESA.00001b.r3.3Cg0002999.2 | AsNPF5.19 | 570 | 62 | 8.91 | 39.34 | 3C | 100.93 | 0.353 | Vacuole. |
| AVESA.00001b.r3.3Cg0003005.1 | AsNPF5.20 | 561 | 60 | 6.63 | 41.79 | 3C | 99.41 | 0.399 | Vacuole. |
| AVESA.00001b.r3.3Dg0000347.1 | AsNPF8.14 | 576 | 63 | 7.06 | 34.83 | 3D | 98.7 | 0.326 | Vacuole. |
| AVESA.00001b.r3.3Dg0001704.2 | AsNPF4.15 | 626 | 70 | 8.2 | 38.59 | 3D | 96.47 | 0.213 | Vacuole. |
| AVESA.00001b.r3.4Ag0000493.1 | AsNPF2.1 | 611 | 67 | 8.52 | 42.74 | 4A | 86.69 | 0.127 | Vacuole. |
| AVESA.00001b.r3.4Ag0000827.1 | AsNPF4.16 | 619 | 66 | 7.9 | 42.15 | 4A | 90.76 | 0.368 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Ag0000901.1 | AsNPF4.17 | 667 | 74 | 8.36 | 44.05 | 4A | 101.71 | 0.252 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Ag0001156.4 | AsNPF8.15 | 601 | 65 | 6.15 | 40.99 | 4A | 93.83 | 0.343 | Vacuole. |
| AVESA.00001b.r3.4Ag0001336.1 | AsNPF8.16 | 589 | 65 | 5.08 | 32.5 | 4A | 99.68 | 0.330 | Vacuole. |
| AVESA.00001b.r3.4Ag0001963.1 | AsNPF5.21 | 619 | 67 | 9.36 | 35.47 | 4A | 102.1 | 0.318 | Vacuole. |
| AVESA.00001b.r3.4Ag0002422.1 | AsNPF5.22 | 599 | 66 | 8.73 | 29.12 | 4A | 100.85 | 0.289 | Vacuole. |
| AVESA.00001b.r3.4Ag0002606.11 | AsNPF6.8 | 551 | 60 | 8.49 | 36.09 | 4A | 114.85 | 0.547 | Vacuole. |
| AVESA.00001b.r3.4Ag0002712.1 | AsNPF6.9 | 623 | 67 | 8.83 | 37.9 | 4A | 100.08 | 0.299 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.4Ag0003144.1 | AsNPF5.23 | 562 | 61 | 9.06 | 45.86 | 4A | 96.03 | 0.445 | Vacuole. |
| AVESA.00001b.r3.4Ag0003145.1 | AsNPF5.24 | 549 | 60 | 9.19 | 33.37 | 4A | 98.43 | 0.385 | Vacuole. |
| AVESA.00001b.r3.4Ag0003146.1 | AsNPF5.25 | 559 | 60 | 9.4 | 41.77 | 4A | 97.25 | 0.371 | Vacuole. |
| AVESA.00001b.r3.4Ag0003147.1 | AsNPF5.26 | 549 | 59 | 9.25 | 39.92 | 4A | 100.44 | 0.430 | Vacuole. |
| AVESA.00001b.r3.4Ag0003149.1 | AsNPF5.27 | 517 | 55 | 7.64 | 40.74 | 4A | 101.95 | 0.510 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Ag0003151.1 | AsNPF5.28 | 536 | 58 | 8.33 | 43.9 | 4A | 100.54 | 0.366 | Vacuole. |
| AVESA.00001b.r3.4Ag0003152.1 | AsNPF5.29 | 562 | 61 | 7.81 | 38.17 | 4A | 102.56 | 0.382 | Vacuole. |
| AVESA.00001b.r3.4Ag0003154.1 | AsNPF5.30 | 572 | 61 | 7.73 | 41.82 | 4A | 99.44 | 0.409 | Vacuole. |
| AVESA.00001b.r3.4Ag0003156.2 | AsNPF5.31 | 331 | 36 | 9.49 | 49.63 | 4A | 107.04 | 0.265 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.4Ag0003309.2 | AsNPF8.17 | 567 | 61 | 6.82 | 34.75 | 4A | 93.9 | 0.358 | Vacuole. |
| AVESA.00001b.r3.4Ag0003368.17 | AsNPF2.2 | 673 | 75 | 8 | 39.72 | 4A | 101.17 | 0.292 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Ag0003369.3 | AsNPF2.3 | 621 | 68 | 8.69 | 42.05 | 4A | 102.72 | 0.296 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Ag0003636.1 | AsNPF5.32 | 356 | 39 | 8.57 | 47.42 | 4A | 96.54 | 0.417 | Vacuole. |
| AVESA.00001b.r3.4Ag0003637.1 | AsNPF5.33 | 548 | 60 | 6.01 | 39.78 | 4A | 107.21 | 0.401 | Vacuole. |
| AVESA.00001b.r3.4Cg0000931.1 | AsNPF2.4 | 582 | 64 | 8.62 | 45.18 | 4C | 93.99 | 0.254 | Vacuole. |
| AVESA.00001b.r3.4Cg0000932.1 | AsNPF2.5 | 604 | 67 | 8.28 | 45.41 | 4C | 92.5 | 0.183 | Vacuole. |
| AVESA.00001b.r3.4Cg0001089.2 | AsNPF5.34 | 607 | 67 | 8.78 | 29.33 | 4C | 99.06 | 0.251 | Vacuole. |
| AVESA.00001b.r3.4Cg0001090.1 | AsNPF5.35 | 606 | 67 | 8.65 | 29.19 | 4C | 97.77 | 0.248 | Vacuole. |
| AVESA.00001b.r3.4Cg0001585.2 | AsNPF4.18 | 621 | 68 | 9.36 | 43.56 | 4C | 97.71 | 0.303 | Vacuole. |
| AVESA.00001b.r3.4Cg0002221.1 | AsNPF8.18 | 459 | 51 | 7.09 | 40.25 | 4C | 96.45 | 0.409 | Vacuole. |
| AVESA.00001b.r3.4Cg0003592.2 | AsNPF8.19 | 647 | 71 | 8.16 | 38.94 | 4C | 94.78 | 0.291 | Vacuole. |
| AVESA.00001b.r3.4Cg0003594.1 | AsNPF8.20 | 588 | 65 | 5.84 | 33.54 | 4C | 94.01 | 0.334 | Vacuole. |
| AVESA.00001b.r3.4Cg0003595.3 | AsNPF8.21 | 458 | 51 | 7.49 | 40.48 | 4C | 101.53 | 0.385 | Vacuole. |
| AVESA.00001b.r3.4Cg0003596.1 | AsNPF8.22 | 594 | 65 | 5.48 | 37.55 | 4C | 103.38 | 0.470 | Vacuole. |
| AVESA.00001b.r3.4Cg0003597.3 | AsNPF8.23 | 589 | 65 | 6.03 | 31.05 | 4C | 99.81 | 0.312 | Vacuole. |
| AVESA.00001b.r3.4Cg0003598.1 | AsNPF8.24 | 606 | 67 | 5.92 | 35.7 | 4C | 97.24 | 0.292 | Vacuole. |
| AVESA.00001b.r3.4Cg0003599.1 | AsNPF8.25 | 576 | 64 | 6.07 | 28.52 | 4C | 99.57 | 0.317 | Vacuole. |
| AVESA.00001b.r3.4Dg0000840.2 | AsNPF2.6 | 611 | 67 | 8.61 | 43.19 | 4D | 87.33 | 0.152 | Vacuole. |
| AVESA.00001b.r3.4Dg0001186.1 | AsNPF4.19 | 614 | 66 | 7.48 | 42.65 | 4D | 91.82 | 0.353 | Vacuole. |
| AVESA.00001b.r3.4Dg0001256.1 | AsNPF4.20 | 607 | 67 | 6.84 | 43.09 | 4D | 103.9 | 0.323 | Vacuole. |
| AVESA.00001b.r3.4Dg0001519.1 | AsNPF8.26 | 557 | 60 | 5.45 | 38.79 | 4D | 93.54 | 0.345 | Vacuole. |
| AVESA.00001b.r3.4Dg0001520.1 | AsNPF8.27 | 600 | 65 | 7.22 | 35.22 | 4D | 98.03 | 0.392 | Vacuole. |
| AVESA.00001b.r3.4Dg0001521.1 | AsNPF8.28 | 574 | 62 | 4.89 | 44.71 | 4D | 92.82 | 0.280 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Dg0001537.4 | AsNPF2.7 | 631 | 69 | 9.03 | 36.92 | 4D | 89.84 | 0.158 | Vacuole. |
| AVESA.00001b.r3.4Dg0001681.1 | AsNPF8.29 | 589 | 65 | 5.01 | 32.63 | 4D | 99.35 | 0.328 | Vacuole. |
| AVESA.00001b.r3.4Dg0002323.1 | AsNPF5.36 | 590 | 64 | 9.25 | 35.2 | 4D | 103.15 | 0.377 | Vacuole. |
| AVESA.00001b.r3.4Dg0002699.1 | AsNPF5.37 | 545 | 59 | 8.51 | 43.01 | 4D | 98.31 | 0.517 | Vacuole. |
| AVESA.00001b.r3.4Dg0002700.1 | AsNPF5.38 | 541 | 58 | 9.49 | 40.58 | 4D | 102.29 | 0.489 | Vacuole. |
| AVESA.00001b.r3.4Dg0002702.1 | AsNPF5.39 | 563 | 62 | 8.1 | 38.65 | 4D | 100.99 | 0.373 | Vacuole. |
| AVESA.00001b.r3.4Dg0002708.1 | AsNPF5.40 | 580 | 63 | 6.28 | 40.46 | 4D | 103.19 | 0.368 | Vacuole. |
| AVESA.00001b.r3.4Dg0002863.1 | AsNPF8.30 | 555 | 60 | 5.94 | 36.87 | 4D | 93.48 | 0.316 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Dg0002921.15 | AsNPF2.8 | 607 | 67 | 8.92 | 41.92 | 4D | 101.1 | 0.278 | Vacuole. |
| AVESA.00001b.r3.4Dg0002922.1 | AsNPF2.9 | 637 | 70 | 8.93 | 40.66 | 4D | 101.52 | 0.318 | Vacuole. |
| AVESA.00001b.r3.4Dg0002923.4 | AsNPF2.10 | 621 | 69 | 8.69 | 43.76 | 4D | 102.25 | 0.287 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.4Dg0003166.1 | AsNPF5.41 | 544 | 59 | 5.8 | 40.66 | 4D | 103 | 0.515 | Vacuole. |
| AVESA.00001b.r3.4Dg0003167.2 | AsNPF5.42 | 548 | 60 | 6.09 | 40.02 | 4D | 107.37 | 0.416 | Vacuole. |
| AVESA.00001b.r3.4Dg0003431.1 | AsNPF8.31 | 552 | 60 | 6.32 | 38.35 | 4D | 94.89 | 0.367 | Vacuole. |
| AVESA.00001b.r3.4Dg0003487.6 | AsNPF2.11 | 637 | 70 | 9.07 | 38.31 | 4D | 103.83 | 0.307 | Vacuole. |
| AVESA.00001b.r3.4Dg0003490.4 | AsNPF2.12 | 624 | 69 | 8.87 | 39.04 | 4D | 103.16 | 0.302 | Vacuole. |
| AVESA.00001b.r3.5Ag0000219.1 | AsNPF8.32 | 589 | 65 | 5.63 | 33.23 | 5A | 101.21 | 0.334 | Vacuole. |
| AVESA.00001b.r3.5Ag0000220.1 | AsNPF8.33 | 598 | 65 | 5.96 | 39.56 | 5A | 99.45 | 0.423 | Vacuole. |
| AVESA.00001b.r3.5Ag0000221.6 | AsNPF8.34 | 587 | 65 | 6.67 | 35.93 | 5A | 98.99 | 0.291 | Vacuole. |
| AVESA.00001b.r3.5Ag0000222.7 | AsNPF8.35 | 587 | 65 | 5.74 | 38.32 | 5A | 93.03 | 0.317 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.5Ag0002011.2 | AsNPF6.10 | 650 | 70 | 8.75 | 41.26 | 5A | 99.88 | 0.376 | Vacuole. |
| AVESA.00001b.r3.5Cg0001570.1 | AsNPF6.11 | 651 | 71 | 8.98 | 40.42 | 5C | 100.02 | 0.354 | Vacuole. |
| AVESA.00001b.r3.5Dg0003320.3 | AsNPF5.43 | 549 | 59 | 6.4 | 46.85 | 5D | 99.2 | 0.374 | Vacuole. |
| AVESA.00001b.r3.5Dg0003468.1 | AsNPF5.44 | 539 | 58 | 5.95 | 39.67 | 5D | 98.87 | 0.405 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.5Dg0003472.2 | AsNPF5.45 | 411 | 44 | 6.24 | 42.24 | 5D | 99.05 | 0.458 | Vacuole. |
| AVESA.00001b.r3.6Ag0000932.1 | AsNPF2.13 | 569 | 61 | 9.1 | 43.31 | 6A | 103.25 | 0.459 | Vacuole. |
| AVESA.00001b.r3.6Ag0000934.1 | AsNPF2.14 | 584 | 63 | 9.48 | 41.57 | 6A | 98.39 | 0.393 | Vacuole. |
| AVESA.00001b.r3.6Ag0000935.1 | AsNPF2.15 | 575 | 62 | 8.49 | 31.7 | 6A | 100.96 | 0.431 | Vacuole. |
| AVESA.00001b.r3.6Ag0001024.2 | AsNPF7.15 | 589 | 64 | 6.04 | 31.26 | 6A | 99.44 | 0.305 | Vacuole. |
| AVESA.00001b.r3.6Ag0001155.2 | AsNPF7.16 | 624 | 68 | 5.91 | 37.28 | 6A | 89.47 | 0.238 | Vacuole. |
| AVESA.00001b.r3.6Ag0001567.2 | AsNPF6.12 | 595 | 64 | 8.11 | 29.1 | 6A | 98.97 | 0.326 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.6Ag0002426.1 | AsNPF7.17 | 632 | 69 | 7.6 | 39.42 | 6A | 106.02 | 0.412 | Vacuole. |
| AVESA.00001b.r3.6Ag0003250.2 | AsNPF5.46 | 550 | 59 | 6.67 | 44.47 | 6A | 100.44 | 0.357 | Vacuole. |
| AVESA.00001b.r3.6Cg0000496.1 | AsNPF8.36 | 516 | 56 | 6.25 | 38.12 | 6C | 96.24 | 0.378 | Vacuole. |
| AVESA.00001b.r3.6Cg0000500.2 | AsNPF8.37 | 567 | 61 | 6.4 | 38.77 | 6C | 95.87 | 0.392 | Vacuole. |
| AVESA.00001b.r3.6Cg0000501.3 | AsNPF8.38 | 574 | 62 | 7.01 | 37.65 | 6C | 95.35 | 0.385 | Vacuole. |
| AVESA.00001b.r3.6Cg0001798.2 | AsNPF5.47 | 614 | 68 | 9.18 | 35.08 | 6C | 100.47 | 0.335 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.6Cg0002872.2 | AsNPF2.16 | 605 | 65 | 8.19 | 33.52 | 6C | 102.23 | 0.508 | Vacuole. |
| AVESA.00001b.r3.6Cg0002989.1 | AsNPF7.18 | 590 | 65 | 5.52 | 32.8 | 6C | 99.61 | 0.313 | Vacuole. |
| AVESA.00001b.r3.6Cg0003144.2 | AsNPF7.19 | 621 | 67 | 6.17 | 35.84 | 6C | 88.97 | 0.248 | Vacuole. |
| AVESA.00001b.r3.6Cg0003582.2 | AsNPF6.13 | 591 | 64 | 8.61 | 28.01 | 6C | 99.97 | 0.334 | Vacuole. |
| AVESA.00001b.r3.6Dg0000624.1 | AsNPF2.17 | 569 | 61 | 9.1 | 43.14 | 6D | 102.72 | 0.448 | Vacuole. |
| AVESA.00001b.r3.6Dg0000625.1 | AsNPF2.18 | 530 | 57 | 9.01 | 41.44 | 6D | 100.49 | 0.454 | Vacuole. |
| AVESA.00001b.r3.6Dg0000626.1 | AsNPF2.19 | 575 | 62 | 8.81 | 31.12 | 6D | 104 | 0.466 | Vacuole. |
| AVESA.00001b.r3.6Dg0000715.5 | AsNPF7.20 | 366 | 40 | 6.96 | 33.68 | 6D | 104.92 | 0.304 | Vacuole. |
| AVESA.00001b.r3.6Dg0000835.4 | AsNPF7.21 | 619 | 67 | 5.58 | 38.01 | 6D | 89.71 | 0.236 | Vacuole. |
| AVESA.00001b.r3.6Dg0001257.4 | AsNPF6.14 | 616 | 66 | 7.62 | 29.72 | 6D | 98.3 | 0.317 | Vacuole. |
| AVESA.00001b.r3.7Ag0000774.1 | AsNPF5.48 | 533 | 58 | 7.66 | 38.4 | 7A | 101.37 | 0.444 | Vacuole. |
| AVESA.00001b.r3.7Ag0000942.5 | AsNPF5.49 | 649 | 71 | 9.2 | 37.8 | 7A | 95.05 | 0.187 | Vacuole. |
| AVESA.00001b.r3.7Ag0001206.1 | AsNPF5.50 | 534 | 58 | 6.02 | 37.12 | 7A | 104.46 | 0.445 | Vacuole. |
| AVESA.00001b.r3.7Ag0001277.1 | AsNPF3.10 | 621 | 68 | 8.36 | 34.88 | 7A | 87.84 | 0.139 | Vacuole. |
| AVESA.00001b.r3.7Ag0002373.2 | AsNPF6.15 | 608 | 65 | 9.23 | 32.07 | 7A | 97.42 | 0.315 | Vacuole. |
| AVESA.00001b.r3.7Ag0002499.2 | AsNPF8.39 | 561 | 62 | 6.09 | 37.55 | 7A | 100.32 | 0.396 | Vacuole. |
| AVESA.00001b.r3.7Ag0002919.2 | AsNPF8.40 | 235 | 26 | 7.72 | 44.24 | 7A | 103.32 | 0.563 | Vacuole. |
| AVESA.00001b.r3.7Cg0000296.1 | AsNPF5.51 | 584 | 63 | 9.19 | 37.92 | 7C | 105.09 | 0.396 | Vacuole. |
| AVESA.00001b.r3.7Cg0000955.1 | AsNPF8.41 | 587 | 64 | 5.14 | 32.45 | 7C | 99.35 | 0.338 | Vacuole. |
| AVESA.00001b.r3.7Cg0001125.6 | AsNPF2.20 | 629 | 69 | 8.97 | 37.59 | 7C | 90.14 | 0.168 | Vacuole. |
| AVESA.00001b.r3.7Cg0001145.2 | AsNPF8.42 | 317 | 35 | 6.5 | 29.13 | 7C | 101.8 | 0.347 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.7Cg0001146.1 | AsNPF8.43 | 597 | 64 | 5.57 | 38.13 | 7C | 92.5 | 0.331 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.7Cg0001395.2 | AsNPF2.21 | 596 | 66 | 8 | 45.93 | 7C | 87.58 | 0.131 | Vacuole. |
| AVESA.00001b.r3.7Cg0001431.1 | AsNPF4.21 | 416 | 45 | 9.57 | 61.26 | 7C | 83.73 | -0.15 | Vacuole. |
| AVESA.00001b.r3.7Cg0001519.1 | AsNPF4.22 | 617 | 66 | 7.08 | 41.47 | 7C | 91.67 | 0.361 | Vacuole. |
| AVESA.00001b.r3.7Cg0002464.2 | AsNPF6.16 | 612 | 66 | 9.68 | 35.53 | 7C | 92.79 | 0.199 | Vacuole. |
| AVESA.00001b.r3.7Cg0002581.1 | AsNPF8.44 | 573 | 63 | 6.43 | 36.03 | 7C | 101.61 | 0.403 | Cell membrane. Vacuole. |
| AVESA.00001b.r3.7Cg0003036.2 | AsNPF2.22 | 605 | 67 | 8.77 | 41.69 | 7C | 89.77 | 0.173 | Vacuole. |
| AVESA.00001b.r3.7Dg0000219.3 | AsNPF5.52 | 533 | 58 | 5.59 | 38.37 | 7D | 105.01 | 0.441 | Vacuole. |
| AVESA.00001b.r3.7Dg0000280.6 | AsNPF3.11 | 615 | 67 | 8.55 | 37.55 | 7D | 88.08 | 0.159 | Vacuole. |
| AVESA.00001b.r3.7Dg0001351.1 | AsNPF6.17 | 636 | 68 | 9.48 | 32.22 | 7D | 95.74 | 0.283 | Vacuole. |
| AVESA.00001b.r3.7Dg0001944.5 | AsNPF8.45 | 576 | 63 | 7.1 | 29.05 | 7D | 96.67 | 0.348 | Cell membrane. Vacuole |
| AVESA.00001b.r3.7Dg0002035.3 | AsNPF4.23 | 587 | 63 | 9.01 | 38.33 | 7D | 100.2 | 0.404 | Vacuole. |
| AVESA.00001b.r3.7Dg0002288.5 | AsNPF8.46 | 624 | 68 | 8.93 | 44.25 | 7D | 93.17 | 0.291 | Vacuole. |
| AVESA.00001b.r3.7Dg0002289.2 | AsNPF8.47 | 598 | 65 | 7.58 | 40.6 | 7D | 94.97 | 0.345 | Vacuole. |
| AVESA.00001b.r3.7Dg0003211.8 | AsNPF5.53 | 646 | 71 | 8.99 | 37.67 | 7D | 94.29 | 0.187 | Endoplasmic reticulum. Vacuole. |
| AVESA.00001b.r3.7Dg0003375.1 | AsNPF5.54 | 541 | 59 | 7.64 | 37.23 | 7D | 100.78 | 0.447 | Vacuole. |
| AVESA.00001b.r3.Ung0000332.1 | AsNPF5.55 | 544 | 59 | 5.35 | 37.07 | 7D | 101.76 | 0.424 | Vacuole. |

**Supplementary Table 4** Segmental duplication and tandem duplication gene pairs among *AsNRT1* family members

|  |  |  |
| --- | --- | --- |
| **NO.** | **Segmental duplication gene pairs** | **Tandem duplication gene pairs** |
| 1 | AsNPF2.1/2.22 | AsNPF2.4/2.5 |
| 2 | AsNPF2.10/2.12 | AsNPF2.9/2.10 |
| 3 | AsNPF2.13/2.16 | AsNPF2.14/2.15 |
| 4 | AsNPF2.13/2.17 | AsNPF5.5/5.6/5.7 |
| 5 | AsNPF2.16/2.19 | AsNPF5.17/5.18 |
| 6 | AsNPF2.7/2.2 | AsNPF5.23/5.24 |
| 7 | AsNPF3.1/3.4 | AsNPF5.25/5.26 |
| 8 | AsNPF3.1/3.6 | AsNPF5.34/5.35 |
| 9 | AsNPF3.10/3.11 | AsNPF5.41/5.42 |
| 10 | AsNPF3.4/3.6 | AsNPF6.3/6.4 |
| 11 | AsNPF4.1/4.6 | AsNPF7.4/7.5 |
| 12 | AsNPF4.1/4.12 | AsNPF7.8/7.9 |
| 13 | AsNPF4.13/4.14 | AsNPF7.13/7.14 |
| 14 | AsNPF4.13/4.15 | AsNPF8.5/8.6/8.7 |
| 15 | AsNPF4.14/4.15 | AsNPF8.22/8.23/8.24/8.25 |
| 16 | AsNPF4.16/4.19 | AsNPF8.33/8.34 |
| 17 | AsNPF4.16/4.22 |  |
| 18 | AsNPF4.17/4.2 |  |
| 19 | AsNPF4.17/4.21 |  |
| 20 | AsNPF4.19/4.22 |  |
| 21 | AsNPF4.20/4.21 |  |
| 22 | AsNPF4.5/4.23 |  |
| 23 | AsNPF4.6/4.12 |  |
| 24 | AsNPF4.9/4.11 |  |
| 25 | AsNPF5.12/5.15 |  |
| 26 | AsNPF5.13/5.5 |  |
| 27 | AsNPF5.17/5.25 |  |
| 28 | AsNPF5.19/5.29 |  |
| 29 | AsNPF5.19/5.39 |  |
| 30 | AsNPF5.2/5.8 |  |
| 31 | AsNPF5.2/5.23 |  |
| 32 | AsNPF5.2/5.37 |  |
| 33 | AsNPF5.20/5.3 |  |
| 34 | AsNPF5.21/5.51 |  |
| 35 | AsNPF5.22/5.34 |  |
| 36 | AsNPF5.23/5.37 |  |
| 37 | AsNPF5.25/5.38 |  |
| 38 | AsNPF5.29/5.39 |  |
| 39 | AsNPF5.31/5.4 |  |
| 40 | AsNPF5.32/5.41 |  |
| 41 | AsNPF5.43/5.46 |  |
| 42 | AsNPF5.48/5.54 |  |
| 43 | AsNPF5.49/5.53 |  |
| 44 | AsNPF5.5/5.8 |  |
| 45 | AsNPF5.6/5.9 |  |
| 46 | AsNPF5.8/5.23 |  |
| 47 | AsNPF5.8/5.37 |  |
| 48 | AsNPF6.1/6.3 |  |
| 49 | AsNPF6.10/6.11 |  |
| 50 | AsNPF6.13/6.14 |  |
| 51 | AsNPF6.15/6.17 |  |
| 52 | AsNPF6.2/6.9 |  |
| 53 | AsNPF6.3/6.9 |  |
| 54 | AsNPF6.6/6.9 |  |
| 55 | AsNPF7.1/7.3 |  |
| 56 | AsNPF7.1/7.6 |  |
| 57 | AsNPF7.10/7.17 |  |
| 58 | AsNPF7.11/7.13 |  |
| 59 | AsNPF7.16/7.21 |  |
| 60 | AsNPF7.3/7.6 |  |
| 61 | AsNPF7.8/7.11 |  |
| 62 | AsNPF7.8/7.14 |  |
| 63 | AsNPF8.11/8.13 |  |
| 64 | AsNPF8.11/8.14 |  |
| 65 | AsNPF8.13/8.14 |  |
| 66 | AsNPF8.16/8.29 |  |
| 67 | AsNPF8.16/8.41 |  |
| 68 | AsNPF8.17/8.3 |  |
| 69 | AsNPF8.17/8.31 |  |
| 70 | AsNPF8.22/8.33 |  |
| 71 | AsNPF8.26/8.43 |  |
| 72 | AsNPF8.27/8.42 |  |
| 73 | AsNPF8.29/8.41 |  |
| 74 | AsNPF8.30/8.31 |  |
| 75 | AsNPF8.36/8.46 |  |
| 76 | AsNPF8.39/8.44 |  |
| 77 | AsNPF8.5/8.21 |  |
| 78 | AsNPF8.5/8.32 |  |
| 79 | AsNPF8.7/8.23 |  |
| 80 | AsNPF8.8/8.36 |  |
| 81 | AsNPF8.8/8.46 |  |

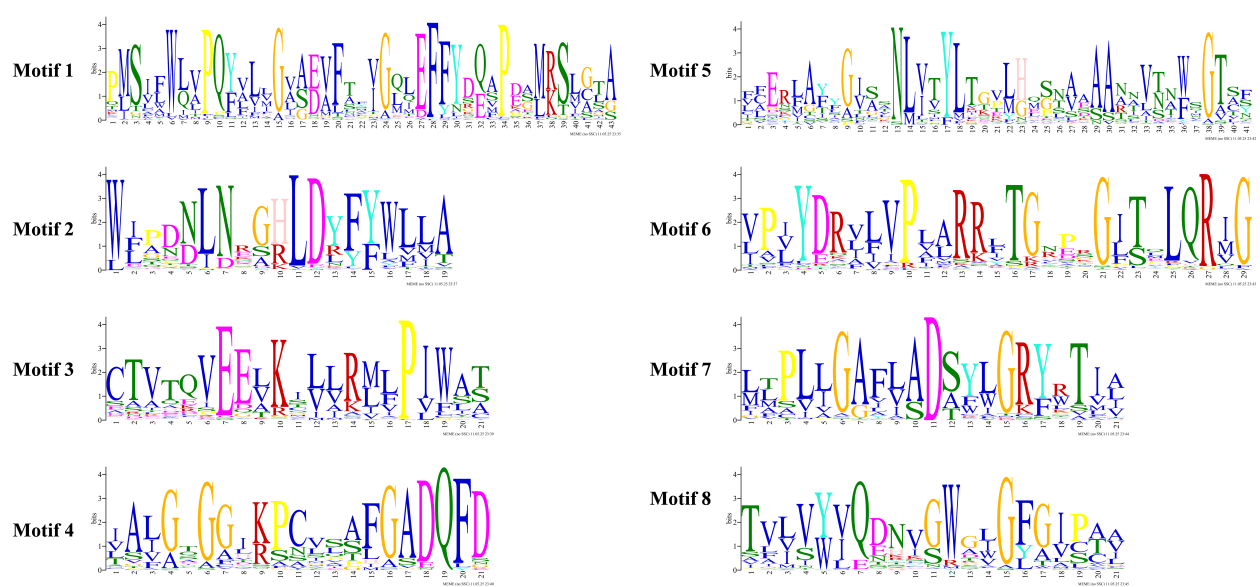
**Supplementary Table 5** The Ka and Ks values of homologous pairs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Gene 1** | **Gene 2** | **Ka** | **Ks** | **Ka/Ks** | **Note** |
| AsNPF2.1 | AsNPF2.22 | 0.04 | 0.22 | 0.2 | purify selection |
| AsNPF2.1 | AsNPF2.5 | 0.12 | 0.53 | 0.23 | purify selection |
| AsNPF2.10 | AsNPF2.12 | 0.04 | 0.08 | 0.5 | purify selection |
| AsNPF2.10 | AsNPF2.2 | 0.07 | 0.13 | 0.54 | purify selection |
| AsNPF2.12 | AsNPF2.10 | 0.04 | 0.08 | 0.5 | purify selection |
| AsNPF2.12 | AsNPF2.2 | 0.06 | 0.12 | 0.53 | purify selection |
| AsNPF2.2 | AsNPF2.12 | 0.06 | 0.12 | 0.53 | purify selection |
| AsNPF2.2 | AsNPF2.9 | 0.09 | 0.24 | 0.36 | purify selection |
| AsNPF2.4 | AsNPF2.5 | 0.03 | 0.15 | 0.21 | purify selection |
| AsNPF2.4 | AsNPF2.22 | 0.12 | 0.55 | 0.22 | purify selection |
| AsNPF2.4 | AsNPF2.1 | 0.13 | 0.49 | 0.27 | purify selection |
| AsNPF2.5 | AsNPF2.4 | 0.03 | 0.15 | 0.21 | purify selection |
| AsNPF2.5 | AsNPF2.22 | 0.13 | 0.54 | 0.24 | purify selection |
| AsNPF2.5 | AsNPF2.1 | 0.12 | 0.53 | 0.23 | purify selection |
| AsNPF2.7 | AsNPF2.20 | 0.03 | 0.2 | 0.16 | purify selection |
| AsNPF2.7 | AsNPF2.1 | 0.32 | 0.7 | 0.46 | purify selection |
| AsNPF2.7 | AsNPF2.22 | 0.33 | 0.67 | 0.49 | purify selection |
| AsNPF2.9 | AsNPF2.2 | 0.09 | 0.24 | 0.36 | purify selection |
| AsNPF2.9 | AsNPF2.10 | 0.12 | 0.26 | 0.45 | purify selection |
| AsNPF3.1 | AsNPF3.6 | 0 | 0.07 | 0.03 | purify selection |
| AsNPF3.1 | AsNPF3.4 | 0.01 | 0.07 | 0.13 | purify selection |
| AsNPF3.1 | AsNPF3.5 | 0.26 | 0.56 | 0.46 | purify selection |
| AsNPF3.1 | AsNPF3.3 | 0.27 | 0.6 | 0.45 | purify selection |
| AsNPF3.2 | AsNPF3.5 | 0.21 | 0.47 | 0.44 | purify selection |
| AsNPF3.2 | AsNPF3.3 | 0.2 | 0.46 | 0.44 | purify selection |
| AsNPF3.3 | AsNPF3.5 | 0.02 | 0.11 | 0.17 | purify selection |
| AsNPF3.3 | AsNPF3.2 | 0.2 | 0.46 | 0.44 | purify selection |
| AsNPF3.4 | AsNPF3.1 | 0.01 | 0.07 | 0.13 | purify selection |
| AsNPF3.4 | AsNPF3.6 | 0.01 | 0.11 | 0.1 | purify selection |
| AsNPF3.4 | AsNPF3.5 | 0.26 | 0.58 | 0.45 | purify selection |
| AsNPF3.5 | AsNPF3.3 | 0.02 | 0.11 | 0.17 | purify selection |
| AsNPF3.5 | AsNPF3.2 | 0.21 | 0.47 | 0.44 | purify selection |
| AsNPF3.6 | AsNPF3.1 | 0 | 0.07 | 0.03 | purify selection |
| AsNPF3.6 | AsNPF3.4 | 0.01 | 0.11 | 0.1 | purify selection |
| AsNPF3.6 | AsNPF3.5 | 0.26 | 0.58 | 0.45 | purify selection |
| AsNPF4.1 | AsNPF4.12 | 0.01 | 0.06 | 0.14 | purify selection |
| AsNPF4.1 | AsNPF4.6 | 0.01 | 0.11 | 0.09 | purify selection |
| AsNPF4.1 | AsNPF4.22 | 0.2 | 0.54 | 0.37 | purify selection |
| AsNPF4.1 | AsNPF4.19 | 0.21 | 0.58 | 0.36 | purify selection |
| AsNPF4.10 | AsNPF4.3 | 0.01 | 0.01 | 0.37 | purify selection |
| AsNPF4.10 | AsNPF4.8 | 0.02 | 0.06 | 0.35 | purify selection |
| AsNPF4.12 | AsNPF4.1 | 0.01 | 0.06 | 0.14 | purify selection |
| AsNPF4.12 | AsNPF4.6 | 0.01 | 0.11 | 0.13 | purify selection |
| AsNPF4.12 | AsNPF4.22 | 0.2 | 0.55 | 0.36 | purify selection |
| AsNPF4.12 | AsNPF4.19 | 0.2 | 0.58 | 0.34 | purify selection |
| AsNPF4.13 | AsNPF4.15 | 0 | 0.07 | 0.06 | purify selection |
| AsNPF4.13 | AsNPF4.14 | 0.01 | 0.11 | 0.12 | purify selection |
| AsNPF4.13 | AsNPF4.23 | 0.56 | 0.83 | 0.68 | purify selection |
| AsNPF4.14 | AsNPF4.15 | 0.01 | 0.1 | 0.11 | purify selection |
| AsNPF4.14 | AsNPF4.13 | 0.01 | 0.11 | 0.12 | purify selection |
| AsNPF4.14 | AsNPF4.23 | 0.56 | 0.83 | 0.68 | purify selection |
| AsNPF4.15 | AsNPF4.13 | 0 | 0.07 | 0.06 | purify selection |
| AsNPF4.15 | AsNPF4.14 | 0.01 | 0.1 | 0.11 | purify selection |
| AsNPF4.15 | AsNPF4.23 | 0.55 | 0.84 | 0.66 | purify selection |
| AsNPF4.16 | AsNPF4.19 | 0.01 | 0.04 | 0.25 | purify selection |
| AsNPF4.16 | AsNPF4.22 | 0.01 | 0.08 | 0.15 | purify selection |
| AsNPF4.16 | AsNPF4.1 | 0.2 | 0.55 | 0.36 | purify selection |
| AsNPF4.16 | AsNPF4.12 | 0.2 | 0.56 | 0.36 | purify selection |
| AsNPF4.17 | AsNPF4.20 | 0.02 | 0.1 | 0.21 | purify selection |
| AsNPF4.17 | AsNPF4.9 | 0.39 | 2.78 | 0.14 | purify selection |
| AsNPF4.17 | AsNPF4.11 | 0.38 | 2.24 | 0.17 | purify selection |
| AsNPF4.19 | AsNPF4.16 | 0.01 | 0.04 | 0.25 | purify selection |
| AsNPF4.19 | AsNPF4.22 | 0.01 | 0.11 | 0.14 | purify selection |
| AsNPF4.19 | AsNPF4.1 | 0.21 | 0.58 | 0.37 | purify selection |
| AsNPF4.19 | AsNPF4.6 | 0.2 | 0.57 | 0.36 | purify selection |
| AsNPF4.20 | AsNPF4.17 | 0.02 | 0.1 | 0.21 | purify selection |
| AsNPF4.20 | AsNPF4.9 | 0.39 | 3.53 | 0.11 | purify selection |
| AsNPF4.20 | AsNPF4.11 | 0.39 | 2.51 | 0.15 | purify selection |
| AsNPF4.3 | AsNPF4.10 | 0.01 | 0.01 | 0.37 | purify selection |
| AsNPF4.3 | AsNPF4.8 | 0.02 | 0.07 | 0.36 | purify selection |
| AsNPF4.5 | AsNPF4.23 | 0 | 0.06 | 0.08 | purify selection |
| AsNPF4.5 | AsNPF4.15 | 0.54 | 0.8 | 0.68 | purify selection |
| AsNPF4.5 | AsNPF4.14 | 0.55 | 0.81 | 0.69 | purify selection |
| AsNPF4.6 | AsNPF4.1 | 0.01 | 0.11 | 0.09 | purify selection |
| AsNPF4.6 | AsNPF4.12 | 0.01 | 0.11 | 0.13 | purify selection |
| AsNPF4.6 | AsNPF4.22 | 0.21 | 0.58 | 0.37 | purify selection |
| AsNPF4.6 | AsNPF4.19 | 0.2 | 0.57 | 0.36 | purify selection |
| AsNPF4.8 | AsNPF4.10 | 0.02 | 0.06 | 0.35 | purify selection |
| AsNPF4.8 | AsNPF4.3 | 0.02 | 0.07 | 0.36 | purify selection |
| AsNPF4.9 | AsNPF4.11 | 0.02 | 0.11 | 0.15 | purify selection |
| AsNPF5.1 | AsNPF5.35 | 0.18 | 0.54 | 0.34 | purify selection |
| AsNPF5.1 | AsNPF5.22 | 0.18 | 0.57 | 0.32 | purify selection |
| AsNPF5.1 | AsNPF5.34 | 0.18 | 0.6 | 0.31 | purify selection |
| AsNPF5.1 | AsNPF5.53 | 0.35 | 0.67 | 0.52 | purify selection |
| AsNPF5.10 | AsNPF5.28 | 0.17 | 0.27 | 0.65 | purify selection |
| AsNPF5.10 | AsNPF5.18 | 0.27 | 0.41 | 0.65 | purify selection |
| AsNPF5.10 | AsNPF5.17 | 0.3 | 0.52 | 0.58 | purify selection |
| AsNPF5.10 | AsNPF5.27 | 0.29 | 0.62 | 0.46 | purify selection |
| AsNPF5.12 | AsNPF5.15 | 0.01 | 0.13 | 0.1 | purify selection |
| AsNPF5.12 | AsNPF5.46 | 0.1 | 0.41 | 0.24 | purify selection |
| AsNPF5.12 | AsNPF5.43 | 0.1 | 0.52 | 0.2 | purify selection |
| AsNPF5.13 | AsNPF5.50 | 0.02 | 0.18 | 0.11 | purify selection |
| AsNPF5.13 | AsNPF5.2 | 0.52 | 0.84 | 0.62 | purify selection |
| AsNPF5.13 | AsNPF5.8 | 0.55 | 0.89 | 0.61 | purify selection |
| AsNPF5.14 | AsNPF5.29 | 0.02 | 0.09 | 0.23 | purify selection |
| AsNPF5.14 | AsNPF5.39 | 0.02 | 0.09 | 0.27 | purify selection |
| AsNPF5.14 | AsNPF5.19 | 0.04 | 0.15 | 0.23 | purify selection |
| AsNPF5.14 | AsNPF5.30 | 0.27 | 1.24 | 0.21 | purify selection |
| AsNPF5.15 | AsNPF5.12 | 0.01 | 0.13 | 0.1 | purify selection |
| AsNPF5.15 | AsNPF5.43 | 0.1 | 0.5 | 0.21 | purify selection |
| AsNPF5.15 | AsNPF5.46 | 0.1 | 0.4 | 0.25 | purify selection |
| AsNPF5.17 | AsNPF5.27 | 0.04 | 0.09 | 0.38 | purify selection |
| AsNPF5.17 | AsNPF5.28 | 0.08 | 0.19 | 0.45 | purify selection |
| AsNPF5.17 | AsNPF5.18 | 0.09 | 0.21 | 0.43 | purify selection |
| AsNPF5.17 | AsNPF5.25 | 0.25 | 0.49 | 0.51 | purify selection |
| AsNPF5.18 | AsNPF5.28 | 0.04 | 0.13 | 0.32 | purify selection |
| AsNPF5.18 | AsNPF5.27 | 0.09 | 0.23 | 0.4 | purify selection |
| AsNPF5.18 | AsNPF5.17 | 0.09 | 0.21 | 0.43 | purify selection |
| AsNPF5.18 | AsNPF5.25 | 0.26 | 0.54 | 0.47 | purify selection |
| AsNPF5.19 | AsNPF5.39 | 0.03 | 0.15 | 0.2 | purify selection |
| AsNPF5.19 | AsNPF5.14 | 0.04 | 0.15 | 0.23 | purify selection |
| AsNPF5.19 | AsNPF5.29 | 0.03 | 0.16 | 0.18 | purify selection |
| AsNPF5.19 | AsNPF5.30 | 0.27 | 1.29 | 0.21 | purify selection |
| AsNPF5.2 | AsNPF5.8 | 0.02 | 0.09 | 0.17 | purify selection |
| AsNPF5.2 | AsNPF5.24 | 0.27 | 0.52 | 0.53 | purify selection |
| AsNPF5.2 | AsNPF5.37 | 0.28 | 0.57 | 0.48 | purify selection |
| AsNPF5.2 | AsNPF5.23 | 0.27 | 0.56 | 0.48 | purify selection |
| AsNPF5.20 | AsNPF5.30 | 0.03 | 0.14 | 0.24 | purify selection |
| AsNPF5.20 | AsNPF5.40 | 0.13 | 0.46 | 0.28 | purify selection |
| AsNPF5.20 | AsNPF5.19 | 0.26 | 1.37 | 0.19 | purify selection |
| AsNPF5.20 | AsNPF5.39 | 0.27 | 1.41 | 0.19 | purify selection |
| AsNPF5.21 | AsNPF5.36 | 0 | 0.04 | 0.11 | purify selection |
| AsNPF5.21 | AsNPF5.51 | 0.02 | 0.12 | 0.17 | purify selection |
| AsNPF5.21 | AsNPF8.23 | 0.57 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF5.21 | AsNPF8.6 | 0.58 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF5.22 | AsNPF5.34 | 0.02 | 0.09 | 0.18 | purify selection |
| AsNPF5.22 | AsNPF5.35 | 0.03 | 0.17 | 0.19 | purify selection |
| AsNPF5.22 | AsNPF5.1 | 0.18 | 0.57 | 0.32 | purify selection |
| AsNPF5.22 | AsNPF5.49 | 0.32 | 0.59 | 0.55 | purify selection |
| AsNPF5.23 | AsNPF5.37 | 0.01 | 0.09 | 0.1 | purify selection |
| AsNPF5.23 | AsNPF5.24 | 0.2 | 0.42 | 0.47 | purify selection |
| AsNPF5.23 | AsNPF5.2 | 0.27 | 0.56 | 0.48 | purify selection |
| AsNPF5.23 | AsNPF5.8 | 0.26 | 0.58 | 0.46 | purify selection |
| AsNPF5.24 | AsNPF5.37 | 0.2 | 0.44 | 0.45 | purify selection |
| AsNPF5.24 | AsNPF5.23 | 0.2 | 0.42 | 0.47 | purify selection |
| AsNPF5.24 | AsNPF5.2 | 0.27 | 0.52 | 0.53 | purify selection |
| AsNPF5.24 | AsNPF5.8 | 0.28 | 0.55 | 0.51 | purify selection |
| AsNPF5.25 | AsNPF5.26 | 0.04 | 0.06 | 0.56 | purify selection |
| AsNPF5.25 | AsNPF5.38 | 0.05 | 0.11 | 0.44 | purify selection |
| AsNPF5.25 | AsNPF5.28 | 0.26 | 0.53 | 0.49 | purify selection |
| AsNPF5.25 | AsNPF5.18 | 0.26 | 0.54 | 0.47 | purify selection |
| AsNPF5.26 | AsNPF5.25 | 0.04 | 0.06 | 0.56 | purify selection |
| AsNPF5.26 | AsNPF5.38 | 0.03 | 0.07 | 0.46 | purify selection |
| AsNPF5.26 | AsNPF5.28 | 0.27 | 0.51 | 0.53 | purify selection |
| AsNPF5.26 | AsNPF5.18 | 0.26 | 0.5 | 0.53 | purify selection |
| AsNPF5.27 | AsNPF5.17 | 0.04 | 0.09 | 0.38 | purify selection |
| AsNPF5.27 | AsNPF5.28 | 0.09 | 0.21 | 0.44 | purify selection |
| AsNPF5.27 | AsNPF5.18 | 0.09 | 0.23 | 0.4 | purify selection |
| AsNPF5.27 | AsNPF5.25 | 0.24 | 0.52 | 0.46 | purify selection |
| AsNPF5.28 | AsNPF5.18 | 0.04 | 0.13 | 0.32 | purify selection |
| AsNPF5.28 | AsNPF5.17 | 0.08 | 0.19 | 0.45 | purify selection |
| AsNPF5.28 | AsNPF5.27 | 0.09 | 0.21 | 0.44 | purify selection |
| AsNPF5.28 | AsNPF5.25 | 0.26 | 0.53 | 0.49 | purify selection |
| AsNPF5.29 | AsNPF5.39 | 0.01 | 0.03 | 0.28 | purify selection |
| AsNPF5.29 | AsNPF5.14 | 0.02 | 0.09 | 0.23 | purify selection |
| AsNPF5.29 | AsNPF5.19 | 0.03 | 0.16 | 0.18 | purify selection |
| AsNPF5.29 | AsNPF5.30 | 0.26 | 1.28 | 0.2 | purify selection |
| AsNPF5.30 | AsNPF5.20 | 0.03 | 0.14 | 0.24 | purify selection |
| AsNPF5.30 | AsNPF5.40 | 0.12 | 0.48 | 0.25 | purify selection |
| AsNPF5.30 | AsNPF5.19 | 0.27 | 1.29 | 0.21 | purify selection |
| AsNPF5.30 | AsNPF5.39 | 0.26 | 1.26 | 0.2 | purify selection |
| AsNPF5.31 | AsNPF5.40 | 0.06 | 0.14 | 0.43 | purify selection |
| AsNPF5.31 | AsNPF5.20 | 0.19 | 0.68 | 0.28 | purify selection |
| AsNPF5.31 | AsNPF5.30 | 0.2 | 0.74 | 0.27 | purify selection |
| AsNPF5.31 | AsNPF5.19 | 0.27 | 2.19 | 0.13 | purify selection |
| AsNPF5.32 | AsNPF5.41 | 0.02 | 0.1 | 0.25 | purify selection |
| AsNPF5.32 | AsNPF5.15 | 0.17 | 0.61 | 0.27 | purify selection |
| AsNPF5.32 | AsNPF5.43 | 0.21 | 0.65 | 0.32 | purify selection |
| AsNPF5.33 | AsNPF5.42 | 0.02 | 0.13 | 0.17 | purify selection |
| AsNPF5.33 | AsNPF5.15 | 0.16 | 0.95 | 0.17 | purify selection |
| AsNPF5.33 | AsNPF5.46 | 0.19 | 1.07 | 0.18 | purify selection |
| AsNPF5.34 | AsNPF5.22 | 0.02 | 0.09 | 0.18 | purify selection |
| AsNPF5.34 | AsNPF5.35 | 0.03 | 0.16 | 0.17 | purify selection |
| AsNPF5.34 | AsNPF5.1 | 0.18 | 0.6 | 0.31 | purify selection |
| AsNPF5.34 | AsNPF5.53 | 0.33 | 0.58 | 0.56 | purify selection |
| AsNPF5.35 | AsNPF5.34 | 0.03 | 0.16 | 0.17 | purify selection |
| AsNPF5.35 | AsNPF5.22 | 0.03 | 0.17 | 0.19 | purify selection |
| AsNPF5.35 | AsNPF5.1 | 0.18 | 0.54 | 0.34 | purify selection |
| AsNPF5.35 | AsNPF5.53 | 0.33 | 0.55 | 0.6 | purify selection |
| AsNPF5.36 | AsNPF5.21 | 0 | 0.04 | 0.11 | purify selection |
| AsNPF5.36 | AsNPF5.51 | 0.02 | 0.12 | 0.2 | purify selection |
| AsNPF5.36 | AsNPF8.23 | 0.57 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF5.36 | AsNPF8.6 | 0.58 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF5.37 | AsNPF5.23 | 0.01 | 0.09 | 0.1 | purify selection |
| AsNPF5.37 | AsNPF5.24 | 0.2 | 0.44 | 0.45 | purify selection |
| AsNPF5.37 | AsNPF5.2 | 0.28 | 0.57 | 0.48 | purify selection |
| AsNPF5.37 | AsNPF5.8 | 0.27 | 0.59 | 0.46 | purify selection |
| AsNPF5.38 | AsNPF5.26 | 0.03 | 0.07 | 0.46 | purify selection |
| AsNPF5.38 | AsNPF5.25 | 0.05 | 0.11 | 0.44 | purify selection |
| AsNPF5.38 | AsNPF5.27 | 0.25 | 0.49 | 0.51 | purify selection |
| AsNPF5.38 | AsNPF5.28 | 0.25 | 0.52 | 0.49 | purify selection |
| AsNPF5.39 | AsNPF5.29 | 0.01 | 0.03 | 0.28 | purify selection |
| AsNPF5.39 | AsNPF5.14 | 0.02 | 0.09 | 0.27 | purify selection |
| AsNPF5.39 | AsNPF5.19 | 0.03 | 0.15 | 0.2 | purify selection |
| AsNPF5.39 | AsNPF5.30 | 0.26 | 1.26 | 0.2 | purify selection |
| AsNPF5.4 | AsNPF5.6 | 0.03 | 0.21 | 0.13 | purify selection |
| AsNPF5.4 | AsNPF5.5 | 0.13 | 0.55 | 0.23 | purify selection |
| AsNPF5.4 | AsNPF5.9 | 0.12 | 0.52 | 0.24 | purify selection |
| AsNPF5.4 | AsNPF5.7 | 0.08 | 0.4 | 0.21 | purify selection |
| AsNPF5.40 | AsNPF5.30 | 0.12 | 0.48 | 0.25 | purify selection |
| AsNPF5.40 | AsNPF5.20 | 0.13 | 0.46 | 0.28 | purify selection |
| AsNPF5.40 | AsNPF5.19 | 0.25 | 1.38 | 0.18 | purify selection |
| AsNPF5.40 | AsNPF5.14 | 0.25 | 1.14 | 0.22 | purify selection |
| AsNPF5.41 | AsNPF5.15 | 0.15 | 0.56 | 0.27 | purify selection |
| AsNPF5.41 | AsNPF5.33 | 0.18 | 0.85 | 0.22 | purify selection |
| AsNPF5.41 | AsNPF5.42 | 0.2 | 0.87 | 0.23 | purify selection |
| AsNPF5.42 | AsNPF5.33 | 0.02 | 0.13 | 0.17 | purify selection |
| AsNPF5.42 | AsNPF5.15 | 0.16 | 1.02 | 0.16 | purify selection |
| AsNPF5.42 | AsNPF5.46 | 0.19 | 1.07 | 0.18 | purify selection |
| AsNPF5.5 | AsNPF5.9 | 0.03 | 0.22 | 0.13 | purify selection |
| AsNPF5.5 | AsNPF5.6 | 0.13 | 0.61 | 0.22 | purify selection |
| AsNPF5.5 | AsNPF5.4 | 0.13 | 0.55 | 0.23 | purify selection |
| AsNPF5.5 | AsNPF5.7 | 0.15 | 0.68 | 0.23 | purify selection |
| AsNPF5.6 | AsNPF5.4 | 0.03 | 0.21 | 0.13 | purify selection |
| AsNPF5.6 | AsNPF5.5 | 0.13 | 0.61 | 0.22 | purify selection |
| AsNPF5.6 | AsNPF5.9 | 0.12 | 0.59 | 0.21 | purify selection |
| AsNPF5.6 | AsNPF5.7 | 0.09 | 0.43 | 0.21 | purify selection |
| AsNPF5.7 | AsNPF5.6 | 0.09 | 0.43 | 0.21 | purify selection |
| AsNPF5.7 | AsNPF5.4 | 0.08 | 0.4 | 0.21 | purify selection |
| AsNPF5.7 | AsNPF5.5 | 0.15 | 0.68 | 0.23 | purify selection |
| AsNPF5.7 | AsNPF5.9 | 0.14 | 0.54 | 0.27 | purify selection |
| AsNPF5.8 | AsNPF5.2 | 0.02 | 0.09 | 0.17 | purify selection |
| AsNPF5.8 | AsNPF5.24 | 0.28 | 0.55 | 0.51 | purify selection |
| AsNPF5.8 | AsNPF5.37 | 0.28 | 0.59 | 0.47 | purify selection |
| AsNPF5.8 | AsNPF5.5 | 0.3 | 0.76 | 0.39 | purify selection |
| AsNPF5.9 | AsNPF5.5 | 0.03 | 0.22 | 0.13 | purify selection |
| AsNPF5.9 | AsNPF5.6 | 0.12 | 0.59 | 0.21 | purify selection |
| AsNPF5.9 | AsNPF5.4 | 0.12 | 0.52 | 0.24 | purify selection |
| AsNPF5.9 | AsNPF5.7 | 0.14 | 0.54 | 0.27 | purify selection |
| AsNPF6.1 | AsNPF6.3 | 0.01 | 0.12 | 0.12 | purify selection |
| AsNPF6.1 | AsNPF6.6 | 0.05 | 0.36 | 0.15 | purify selection |
| AsNPF6.1 | AsNPF6.4 | 0.06 | 0.38 | 0.15 | purify selection |
| AsNPF6.10 | AsNPF6.11 | 0.01 | 0.11 | 0.11 | purify selection |
| AsNPF6.10 | AsNPF8.10 | 0.54 | 0.59 | 0.92 | purify selection |
| AsNPF6.11 | AsNPF6.10 | 0.01 | 0.11 | 0.11 | purify selection |
| AsNPF6.11 | AsNPF8.10 | 0.54 | 0.59 | 0.93 | purify selection |
| AsNPF6.2 | AsNPF6.6 | 0 | 0.09 | 0.03 | purify selection |
| AsNPF6.2 | AsNPF6.4 | 0.01 | 0.16 | 0.09 | purify selection |
| AsNPF6.2 | AsNPF6.3 | 0.06 | 0.36 | 0.16 | purify selection |
| AsNPF6.3 | AsNPF6.1 | 0.01 | 0.12 | 0.12 | purify selection |
| AsNPF6.3 | AsNPF6.4 | 0.06 | 0.38 | 0.15 | purify selection |
| AsNPF6.3 | AsNPF6.6 | 0.06 | 0.36 | 0.16 | purify selection |
| AsNPF6.4 | AsNPF6.6 | 0.01 | 0.15 | 0.09 | purify selection |
| AsNPF6.4 | AsNPF6.2 | 0.01 | 0.16 | 0.09 | purify selection |
| AsNPF6.4 | AsNPF6.3 | 0.06 | 0.38 | 0.15 | purify selection |
| AsNPF6.6 | AsNPF6.2 | 0 | 0.09 | 0.03 | purify selection |
| AsNPF6.6 | AsNPF6.4 | 0.01 | 0.15 | 0.09 | purify selection |
| AsNPF6.6 | AsNPF6.3 | 0.06 | 0.36 | 0.16 | purify selection |
| AsNPF6.9 | AsNPF6.4 | 0.2 | 0.48 | 0.41 | purify selection |
| AsNPF6.9 | AsNPF6.6 | 0.21 | 0.49 | 0.43 | purify selection |
| AsNPF6.9 | AsNPF6.2 | 0.2 | 0.51 | 0.39 | purify selection |
| AsNPF6.9 | AsNPF6.3 | 0.2 | 0.57 | 0.34 | purify selection |
| AsNPF7.1 | AsNPF7.6 | 0.03 | 0.1 | 0.35 | purify selection |
| AsNPF7.1 | AsNPF7.3 | 0.03 | 0.11 | 0.31 | purify selection |
| AsNPF7.1 | AsNPF7.5 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.1 | AsNPF7.7 | 0.32 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.10 | AsNPF7.17 | 0.03 | 0.08 | 0.41 | purify selection |
| AsNPF7.10 | AsNPF7.5 | 0.41 | 2.79 | 0.15 | purify selection |
| AsNPF7.10 | AsNPF7.7 | 0.42 | 4.17 | 0.1 | purify selection |
| AsNPF7.10 | AsNPF8.6 | 0.51 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.11 | AsNPF7.8 | 0.02 | 0.11 | 0.17 | purify selection |
| AsNPF7.11 | AsNPF7.9 | 0.15 | 0.36 | 0.4 | purify selection |
| AsNPF7.11 | AsNPF7.12 | 0.13 | 0.31 | 0.43 | purify selection |
| AsNPF7.11 | AsNPF7.14 | 0.13 | 0.3 | 0.44 | purify selection |
| AsNPF7.12 | AsNPF7.14 | 0.03 | 0.11 | 0.26 | purify selection |
| AsNPF7.12 | AsNPF7.9 | 0.04 | 0.11 | 0.33 | purify selection |
| AsNPF7.12 | AsNPF7.8 | 0.13 | 0.31 | 0.41 | purify selection |
| AsNPF7.12 | AsNPF7.11 | 0.13 | 0.31 | 0.43 | purify selection |
| AsNPF7.13 | AsNPF7.12 | 0.12 | 0.27 | 0.44 | purify selection |
| AsNPF7.13 | AsNPF7.14 | 0.12 | 0.27 | 0.46 | purify selection |
| AsNPF7.13 | AsNPF7.11 | 0.15 | 0.34 | 0.43 | purify selection |
| AsNPF7.13 | AsNPF7.9 | 0.13 | 0.3 | 0.44 | purify selection |
| AsNPF7.14 | AsNPF7.12 | 0.03 | 0.11 | 0.26 | purify selection |
| AsNPF7.14 | AsNPF7.9 | 0.02 | 0.07 | 0.33 | purify selection |
| AsNPF7.14 | AsNPF7.8 | 0.13 | 0.33 | 0.38 | purify selection |
| AsNPF7.14 | AsNPF7.11 | 0.13 | 0.3 | 0.44 | purify selection |
| AsNPF7.2 | AsNPF7.7 | 0.01 | 0.02 | 0.44 | purify selection |
| AsNPF7.2 | AsNPF7.5 | 0.02 | 0.09 | 0.2 | purify selection |
| AsNPF7.2 | AsNPF7.3 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.2 | AsNPF7.6 | 0.34 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.3 | AsNPF7.1 | 0.03 | 0.11 | 0.31 | purify selection |
| AsNPF7.3 | AsNPF7.6 | 0.04 | 0.13 | 0.32 | purify selection |
| AsNPF7.3 | AsNPF7.5 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.3 | AsNPF7.7 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.4 | AsNPF7.6 | 0.34 | 0.72 | 0.47 | purify selection |
| AsNPF7.4 | AsNPF7.1 | 0.33 | 0.69 | 0.48 | purify selection |
| AsNPF7.4 | AsNPF7.3 | 0.33 | 0.69 | 0.47 | purify selection |
| AsNPF7.4 | AsNPF7.5 | 0.52 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.5 | AsNPF7.7 | 0.02 | 0.1 | 0.18 | purify selection |
| AsNPF7.5 | AsNPF7.2 | 0.02 | 0.09 | 0.2 | purify selection |
| AsNPF7.5 | AsNPF7.3 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.5 | AsNPF7.1 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.6 | AsNPF7.1 | 0.03 | 0.1 | 0.35 | purify selection |
| AsNPF7.6 | AsNPF7.3 | 0.04 | 0.13 | 0.32 | purify selection |
| AsNPF7.6 | AsNPF7.5 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.6 | AsNPF7.7 | 0.3 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.7 | AsNPF7.5 | 0.02 | 0.1 | 0.18 | purify selection |
| AsNPF7.7 | AsNPF7.2 | 0.01 | 0.02 | 0.44 | purify selection |
| AsNPF7.7 | AsNPF7.3 | 0.31 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.7 | AsNPF7.1 | 0.32 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF7.8 | AsNPF7.11 | 0.02 | 0.11 | 0.17 | purify selection |
| AsNPF7.8 | AsNPF7.9 | 0.13 | 0.35 | 0.37 | purify selection |
| AsNPF7.8 | AsNPF7.12 | 0.13 | 0.31 | 0.41 | purify selection |
| AsNPF7.8 | AsNPF7.14 | 0.13 | 0.33 | 0.38 | purify selection |
| AsNPF7.9 | AsNPF7.12 | 0.04 | 0.11 | 0.33 | purify selection |
| AsNPF7.9 | AsNPF7.14 | 0.02 | 0.07 | 0.33 | purify selection |
| AsNPF7.9 | AsNPF7.8 | 0.13 | 0.35 | 0.37 | purify selection |
| AsNPF7.9 | AsNPF7.11 | 0.15 | 0.36 | 0.4 | purify selection |
| AsNPF8.1 | AsNPF8.3 | 0.03 | 0.26 | 0.12 | purify selection |
| AsNPF8.1 | AsNPF8.23 | 0.36 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.1 | AsNPF8.6 | 0.36 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.1 | AsNPF8.32 | 0.38 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.10 | AsNPF8.16 | 0.32 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.10 | AsNPF8.29 | 0.32 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.11 | AsNPF8.14 | 0.02 | 0.09 | 0.27 | purify selection |
| AsNPF8.11 | AsNPF8.13 | 0.08 | 0.24 | 0.31 | purify selection |
| AsNPF8.11 | AsNPF8.26 | 0.23 | 0.81 | 0.28 | purify selection |
| AsNPF8.13 | AsNPF8.14 | 0.03 | 0.13 | 0.19 | purify selection |
| AsNPF8.13 | AsNPF8.43 | 0.17 | 0.57 | 0.3 | purify selection |
| AsNPF8.13 | AsNPF8.26 | 0.17 | 0.55 | 0.3 | purify selection |
| AsNPF8.14 | AsNPF8.13 | 0.03 | 0.13 | 0.19 | purify selection |
| AsNPF8.14 | AsNPF8.43 | 0.18 | 0.52 | 0.34 | purify selection |
| AsNPF8.14 | AsNPF8.26 | 0.18 | 0.5 | 0.35 | purify selection |
| AsNPF8.16 | AsNPF8.29 | 0 | 0.11 | 0.03 | purify selection |
| AsNPF8.16 | AsNPF8.41 | 0 | 0.11 | 0.03 | purify selection |
| AsNPF8.16 | AsNPF8.6 | 0.23 | 2.62 | 0.09 | purify selection |
| AsNPF8.16 | AsNPF8.23 | 0.24 | 3.74 | 0.06 | purify selection |
| AsNPF8.17 | AsNPF8.30 | 0.01 | 0.05 | 0.23 | purify selection |
| AsNPF8.17 | AsNPF8.31 | 0.02 | 0.15 | 0.14 | purify selection |
| AsNPF8.17 | AsNPF8.10 | 0.35 | 0.59 | 0.6 | purify selection |
| AsNPF8.18 | AsNPF8.19 | 0.15 | 0.69 | 0.22 | purify selection |
| AsNPF8.18 | AsNPF8.20 | 0.15 | 0.68 | 0.23 | purify selection |
| AsNPF8.19 | AsNPF8.20 | 0.02 | 0.09 | 0.23 | purify selection |
| AsNPF8.19 | AsNPF8.45 | 0.08 | 0.3 | 0.27 | purify selection |
| AsNPF8.20 | AsNPF8.19 | 0.02 | 0.09 | 0.23 | purify selection |
| AsNPF8.20 | AsNPF8.45 | 0.07 | 0.3 | 0.24 | purify selection |
| AsNPF8.21 | AsNPF8.34 | 0.01 | 0.09 | 0.1 | purify selection |
| AsNPF8.21 | AsNPF8.5 | 0.01 | 0.09 | 0.14 | purify selection |
| AsNPF8.21 | AsNPF8.6 | 0.21 | 1.77 | 0.12 | purify selection |
| AsNPF8.21 | AsNPF8.32 | 0.21 | 1.8 | 0.12 | purify selection |
| AsNPF8.22 | AsNPF8.33 | 0.02 | 0.12 | 0.19 | purify selection |
| AsNPF8.22 | AsNPF8.6 | 0.29 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.22 | AsNPF8.23 | 0.29 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.22 | AsNPF8.34 | 0.28 | 2.02 | 0.14 | purify selection |
| AsNPF8.23 | AsNPF8.6 | 0.01 | 0.1 | 0.14 | purify selection |
| AsNPF8.23 | AsNPF8.32 | 0.07 | 0.29 | 0.24 | purify selection |
| AsNPF8.23 | AsNPF8.24 | 0.08 | 0.33 | 0.24 | purify selection |
| AsNPF8.23 | AsNPF8.25 | 0.07 | 0.37 | 0.2 | purify selection |
| AsNPF8.24 | AsNPF8.32 | 0.02 | 0.08 | 0.26 | purify selection |
| AsNPF8.24 | AsNPF8.6 | 0.08 | 0.35 | 0.21 | purify selection |
| AsNPF8.24 | AsNPF8.23 | 0.08 | 0.33 | 0.24 | purify selection |
| AsNPF8.24 | AsNPF8.25 | 0.11 | 0.39 | 0.27 | purify selection |
| AsNPF8.25 | AsNPF8.6 | 0.07 | 0.37 | 0.18 | purify selection |
| AsNPF8.25 | AsNPF8.23 | 0.07 | 0.37 | 0.2 | purify selection |
| AsNPF8.25 | AsNPF8.32 | 0.08 | 0.37 | 0.22 | purify selection |
| AsNPF8.25 | AsNPF8.24 | 0.11 | 0.39 | 0.27 | purify selection |
| AsNPF8.26 | AsNPF8.28 | 0.02 | 0.07 | 0.29 | purify selection |
| AsNPF8.26 | AsNPF8.43 | 0.03 | 0.15 | 0.17 | purify selection |
| AsNPF8.26 | AsNPF8.13 | 0.17 | 0.55 | 0.3 | purify selection |
| AsNPF8.27 | AsNPF8.44 | 0.14 | 0.51 | 0.27 | purify selection |
| AsNPF8.27 | AsNPF8.39 | 0.14 | 0.49 | 0.28 | purify selection |
| AsNPF8.27 | AsNPF8.13 | 0.29 | 1.04 | 0.28 | purify selection |
| AsNPF8.27 | AsNPF8.14 | 0.29 | 1.05 | 0.27 | purify selection |
| AsNPF8.28 | AsNPF8.26 | 0.02 | 0.07 | 0.29 | purify selection |
| AsNPF8.28 | AsNPF8.43 | 0.03 | 0.13 | 0.26 | purify selection |
| AsNPF8.28 | AsNPF8.13 | 0.18 | 0.61 | 0.29 | purify selection |
| AsNPF8.29 | AsNPF8.16 | 0 | 0.11 | 0.03 | purify selection |
| AsNPF8.29 | AsNPF8.41 | 0 | 0.15 | 0.03 | purify selection |
| AsNPF8.29 | AsNPF8.6 | 0.23 | 3.06 | 0.08 | purify selection |
| AsNPF8.29 | AsNPF8.23 | 0.23 | NaN | NaN | purify selection |
| AsNPF8.3 | AsNPF8.1 | 0.03 | 0.26 | 0.12 | purify selection |
| AsNPF8.3 | AsNPF8.6 | 0.36 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.3 | AsNPF8.23 | 0.36 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.3 | AsNPF8.32 | 0.38 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.30 | AsNPF8.17 | 0.01 | 0.05 | 0.23 | purify selection |
| AsNPF8.30 | AsNPF8.31 | 0.02 | 0.17 | 0.14 | purify selection |
| AsNPF8.30 | AsNPF8.10 | 0.35 | 0.56 | 0.62 | purify selection |
| AsNPF8.31 | AsNPF8.30 | 0.02 | 0.17 | 0.14 | purify selection |
| AsNPF8.31 | AsNPF8.17 | 0.02 | 0.15 | 0.14 | purify selection |
| AsNPF8.31 | AsNPF8.10 | 0.33 | 0.53 | 0.62 | purify selection |
| AsNPF8.32 | AsNPF8.24 | 0.02 | 0.08 | 0.26 | purify selection |
| AsNPF8.32 | AsNPF8.6 | 0.07 | 0.33 | 0.2 | purify selection |
| AsNPF8.32 | AsNPF8.23 | 0.07 | 0.29 | 0.24 | purify selection |
| AsNPF8.32 | AsNPF8.25 | 0.08 | 0.37 | 0.22 | purify selection |
| AsNPF8.33 | AsNPF8.22 | 0.02 | 0.12 | 0.19 | purify selection |
| AsNPF8.33 | AsNPF8.6 | 0.29 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.33 | AsNPF8.23 | 0.29 | NaN | NaN | High Sequence Divergence Value (pS>=0.75) |
| AsNPF8.33 | AsNPF8.34 | 0.3 | 1.74 | 0.17 | purify selection |
| AsNPF8.34 | AsNPF8.21 | 0.01 | 0.09 | 0.1 | purify selection |
| AsNPF8.34 | AsNPF8.5 | 0.01 | 0.02 | 0.51 | purify selection |
| AsNPF8.34 | AsNPF8.6 | 0.21 | 1.47 | 0.14 | purify selection |
| AsNPF8.34 | AsNPF8.32 | 0.22 | 1.44 | 0.15 | purify selection |
| AsNPF8.5 | AsNPF8.34 | 0.01 | 0.02 | 0.51 | purify selection |
| AsNPF8.5 | AsNPF8.21 | 0.01 | 0.09 | 0.14 | purify selection |
| AsNPF8.5 | AsNPF8.6 | 0.21 | 1.74 | 0.12 | purify selection |
| AsNPF8.5 | AsNPF8.32 | 0.21 | 1.68 | 0.13 | purify selection |
| AsNPF8.6 | AsNPF8.23 | 0.01 | 0.1 | 0.14 | purify selection |
| AsNPF8.6 | AsNPF8.32 | 0.07 | 0.33 | 0.2 | purify selection |
| AsNPF8.6 | AsNPF8.24 | 0.08 | 0.35 | 0.21 | purify selection |
| AsNPF8.6 | AsNPF8.25 | 0.07 | 0.37 | 0.18 | purify selection |
| AsNPF8.7 | AsNPF8.32 | 0 | 0.03 | 0.13 | purify selection |
| AsNPF8.7 | AsNPF8.24 | 0.02 | 0.07 | 0.33 | purify selection |
| AsNPF8.7 | AsNPF8.6 | 0.08 | 0.36 | 0.22 | purify selection |
| AsNPF8.7 | AsNPF8.23 | 0.09 | 0.34 | 0.25 | purify selection |
| AsNPF8.8 | AsNPF8.46 | 0.05 | 0.11 | 0.48 | purify selection |
| AsNPF8.8 | AsNPF8.47 | 0.07 | 0.2 | 0.34 | purify selection |
| AsNPF8.8 | AsNPF8.37 | 0.06 | 0.2 | 0.33 | purify selection |
| AsNPF8.9 | AsNPF8.28 | 0.18 | 0.47 | 0.37 | purify selection |
| AsNPF8.9 | AsNPF8.43 | 0.21 | 0.49 | 0.42 | purify selection |
| AsNPF8.9 | AsNPF8.26 | 0.17 | 0.44 | 0.38 | purify selection |

Note: PS represented the proportion of synonymous mutation sites. NaN indicated that the results of synonymous mutations between the sequences could not be calculated, likely due to substantial differences between the sequences.

Fig.S1

**Supplementary Fig. 1. Chromosomal location of the oat *AsNRT1s***. Orange letters indicate the chromosome and red letters indicate the gene name. The different colors on the chromosome represent the density of the gene on the chromosome, with dark blue representing a higher density.



**Supplementary Fig. 2. Nucleic acid frequency plot of the AsNRT1s.** Larger letters indicating that the protein occurs more frequently and the position is more conserved.

Fig.S2

**Supplementary Fig. 3.** **Sequence cis-acting element prediction analysis of the 2000 bp promoter region upstream of the oat *AsNRT1s*.** Different colored squares representing different elements.