**Table S4. List of genes that were directly regulated by HapX in response to iron availability.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_01577 | H | 1.1238 | 0.7810 | 0.4589 | 0.0021 |
| CNAG\_02958 | H | 1.7488 | 0.0130 | 0.4538 | 0.0006 |
| CNAG\_02959 | H | 1.6344 | 0.0966 | 0.4450 | 0.0000 |
| CNAG\_03782 | H | 1.6181 | 0.2280 | 2.7476 | 0.0001 |
| CNAG\_04241 | H | 1.5520 | 0.0486 | 0.4678 | 0.0019 |
| CNAG\_04704 | H | 0.7079 | 0.2746 | 0.4347 | 0.0012 |
| CNAG\_04756 | H | 1.4622 | 0.1464 | 2.0444 | 0.0041 |
| CNAG\_04963 | H | 1.1412 | 0.6513 | 2.1710 | 0.0000 |
| CNAG\_05329 | H | 1.5943 | 0.1374 | 2.3100 | 0.0001 |
| CNAG\_06136 | H | 1.0365 | 0.8324 | 0.4574 | 0.0002 |
| CNAG\_06347 | H | 2.9288 | 0.0073 | 5.7963 | 0.0000 |
| CNAG\_07902 | H | 1.1967 | 0.4360 | 0.4175 | 0.0005 |
| CNAG\_00010 | L | 2.4964 | 0.0006 | 0.9341 | 0.7495 |
| CNAG\_00162 | L | 5.6639 | 0.0001 | 1.1330 | 0.6005 |
| CNAG\_00237 | L | 21.7879 | 0.0000 | 0.6331 | 0.0319 |
| CNAG\_00301 | L | 2.2152 | 0.0447 | 0.9933 | 0.9775 |
| CNAG\_00315 | L | 16.8243 | 0.0000 | 1.0232 | 0.8974 |
| CNAG\_00389 | L | 4.7481 | 0.0000 | 0.8861 | 0.4189 |
| CNAG\_00442 | L | 0.2469 | 0.0000 | 1.0902 | 0.6510 |
| CNAG\_00457 | L | 3.1718 | 0.0000 | 1.1288 | 0.5935 |
| CNAG\_00462 | L | 67.4743 | 0.0000 | 0.5577 | 0.0076 |
| CNAG\_00575 | L | 5.6955 | 0.0000 | 1.5267 | 0.0818 |
| CNAG\_00587 | L | 2.2347 | 0.0302 | 1.4160 | 0.1756 |
| CNAG\_00588 | L | 3.9838 | 0.0010 | 1.5426 | 0.0897 |
| CNAG\_00668 | L | 2.3768 | 0.0001 | 1.2967 | 0.2660 |
| CNAG\_00715 | L | 6.5515 | 0.0000 | 0.7538 | 0.0993 |
| CNAG\_00716 | L | 11.3979 | 0.0000 | 0.8499 | 0.4433 |
| CNAG\_00818 | L | 2.9289 | 0.0000 | 1.2591 | 0.3398 |
| CNAG\_00844 | L | 2.6439 | 0.0021 | 1.2877 | 0.3117 |
| CNAG\_00888 | L | 2.4301 | 0.0000 | 0.9239 | 0.6547 |
| CNAG\_00891 | L | 5.1934 | 0.0000 | 0.9894 | 0.9620 |
| CNAG\_00904 | L | 2.6971 | 0.0000 | 1.2967 | 0.2140 |
| CNAG\_01082 | L | 0.4269 | 0.0091 | 1.1687 | 0.5385 |
| CNAG\_01137 | L | 19.4317 | 0.0000 | 0.7966 | 0.3748 |
| CNAG\_01138 | L | 45.5272 | 0.0000 | 0.7437 | 0.2455 |
| CNAG\_01150 | L | 2.2321 | 0.0005 | 1.0334 | 0.8910 |
| CNAG\_01229 | L | 3.5599 | 0.0000 | 0.6412 | 0.0056 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_01237 | L | 20.0358 | 0.0000 | 1.1253 | 0.5960 |
| CNAG\_01287 | L | 29.0562 | 0.0000 | 0.8060 | 0.2773 |
| CNAG\_01354 | L | 10.3366 | 0.0000 | 1.1790 | 0.5124 |
| CNAG\_01400 | L | 9.8280 | 0.0000 | 0.9076 | 0.6805 |
| CNAG\_01443 | L | 9.6927 | 0.0000 | 0.6531 | 0.0172 |
| CNAG\_01464 | L | 2.5973 | 0.0209 | 1.1858 | 0.4559 |
| CNAG\_01471 | L | 4.7400 | 0.0000 | 0.9129 | 0.6309 |
| CNAG\_01526 | L | 2.1053 | 0.0119 | 0.9912 | 0.9720 |
| CNAG\_01539 | L | 0.3280 | 0.0004 | 0.5814 | 0.0146 |
| CNAG\_01603 | L | 2.6517 | 0.0010 | 0.8073 | 0.3193 |
| CNAG\_01704 | L | 2.1106 | 0.0055 | 1.2251 | 0.3434 |
| CNAG\_01721 | L | 11.0090 | 0.0000 | 0.7842 | 0.2932 |
| CNAG\_01772 | L | 3.8846 | 0.0000 | 1.0240 | 0.9077 |
| CNAG\_01802 | L | 6.1305 | 0.0000 | 1.3464 | 0.1626 |
| CNAG\_01846 | L | 32.2019 | 0.0000 | 0.8744 | 0.5824 |
| CNAG\_01847 | L | 0.4219 | 0.0217 | 1.0871 | 0.7388 |
| CNAG\_02028 | L | 7.1787 | 0.0000 | 0.6627 | 0.0443 |
| CNAG\_02093 | L | 7.4982 | 0.0000 | 1.5898 | 0.0171 |
| CNAG\_02131 | L | 7.3887 | 0.0000 | 0.5814 | 0.0199 |
| CNAG\_02132 | L | 4.9579 | 0.0000 | 0.9154 | 0.7301 |
| CNAG\_02190 | L | 2.6654 | 0.0008 | 1.0668 | 0.7724 |
| CNAG\_02221 | L | 4.4572 | 0.0000 | 0.7549 | 0.1339 |
| CNAG\_02222 | L | 3.0467 | 0.0000 | 0.7797 | 0.1606 |
| CNAG\_02266 | L | 15.8020 | 0.0000 | 0.8608 | 0.3388 |
| CNAG\_02315 | L | 10.4354 | 0.0000 | 0.9447 | 0.7516 |
| CNAG\_02351 | L | 3.4497 | 0.0001 | 1.0828 | 0.6882 |
| CNAG\_02361 | L | 0.4150 | 0.0035 | 0.7350 | 0.1896 |
| CNAG\_02387 | L | 4.8709 | 0.0000 | 0.9483 | 0.8144 |
| CNAG\_02405 | L | 3.2711 | 0.0000 | 0.8351 | 0.4586 |
| CNAG\_02540 | L | 3.9115 | 0.0002 | 0.8219 | 0.3731 |
| CNAG\_02564 | L | 4.3494 | 0.0000 | 0.8068 | 0.2461 |
| CNAG\_02565 | L | 13.7476 | 0.0000 | 0.6061 | 0.0160 |
| CNAG\_02570 | L | 4.3663 | 0.0000 | 1.7062 | 0.0380 |
| CNAG\_02580 | L | 2.3363 | 0.0001 | 0.9131 | 0.6016 |
| CNAG\_02581 | L | 8.4621 | 0.0000 | 0.7130 | 0.0343 |
| CNAG\_02600 | L | 3.0846 | 0.0025 | 1.0154 | 0.9521 |
| CNAG\_02850 | L | 0.4498 | 0.0176 | 1.0000 | 0.9999 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_02852 | L | 2.2315 | 0.0002 | 0.9770 | 0.9277 |
| CNAG\_02990 | L | 4.4186 | 0.0000 | 1.2922 | 0.3197 |
| CNAG\_03046 | L | 0.3268 | 0.0007 | 0.6781 | 0.0622 |
| CNAG\_03154 | L | 4.0846 | 0.0001 | 1.0289 | 0.9116 |
| CNAG\_03226 | L | 38.6824 | 0.0000 | 0.8388 | 0.4350 |
| CNAG\_03279 | L | 2.1920 | 0.0000 | 0.7146 | 0.0642 |
| CNAG\_03280 | L | 0.3703 | 0.0000 | 0.7331 | 0.0335 |
| CNAG\_03304 | L | 3.7632 | 0.0000 | 1.1798 | 0.4807 |
| CNAG\_03346 | L | 2.9907 | 0.0008 | 1.3496 | 0.1995 |
| CNAG\_03383 | L | 3.5834 | 0.0000 | 1.0269 | 0.8970 |
| CNAG\_03473 | L | 2.3414 | 0.0000 | 1.0408 | 0.8103 |
| CNAG\_03498 | L | 2.2555 | 0.0162 | 1.4869 | 0.1144 |
| CNAG\_03511 | L | 3.6262 | 0.0000 | 0.8714 | 0.5520 |
| CNAG\_03629 | L | 37.4290 | 0.0000 | 0.8350 | 0.3992 |
| CNAG\_03663 | L | 7.1142 | 0.0000 | 0.6298 | 0.0649 |
| CNAG\_03668 | L | 2.3899 | 0.0055 | 1.0219 | 0.9317 |
| CNAG\_03755 | L | 7.1490 | 0.0000 | 0.6621 | 0.0049 |
| CNAG\_03772 | L | 0.1400 | 0.0000 | 0.9388 | 0.8053 |
| CNAG\_03902 | L | 5.9493 | 0.0000 | 1.0962 | 0.6995 |
| CNAG\_03939 | L | 10.3861 | 0.0000 | 0.7285 | 0.1420 |
| CNAG\_03940 | L | 3.2347 | 0.0000 | 0.9595 | 0.7865 |
| CNAG\_03984 | L | 3.4756 | 0.0000 | 0.6149 | 0.0069 |
| CNAG\_03985 | L | 5.6540 | 0.0000 | 0.6213 | 0.0229 |
| CNAG\_04038 | L | 0.4845 | 0.0114 | 0.7944 | 0.2673 |
| CNAG\_04039 | L | 3.3091 | 0.0000 | 1.5903 | 0.0172 |
| CNAG\_04055 | L | 2.3919 | 0.0002 | 1.3055 | 0.0814 |
| CNAG\_04056 | L | 24.6548 | 0.0000 | 0.7256 | 0.0443 |
| CNAG\_04189 | L | 6.1874 | 0.0000 | 0.8012 | 0.3568 |
| CNAG\_04202 | L | 6.5733 | 0.0000 | 1.0730 | 0.7840 |
| CNAG\_04221 | L | 5.4042 | 0.0000 | 0.9359 | 0.7024 |
| CNAG\_04242 | L | 8.1694 | 0.0000 | 0.5859 | 0.0123 |
| CNAG\_04272 | L | 2.8439 | 0.0000 | 0.8608 | 0.3785 |
| CNAG\_04325 | L | 29.4816 | 0.0000 | 0.6024 | 0.0492 |
| CNAG\_04515 | L | 0.4529 | 0.0007 | 0.8786 | 0.5886 |
| CNAG\_04523 | L | 0.2098 | 0.0000 | 1.8025 | 0.0221 |
| CNAG\_04604 | L | 2.6329 | 0.0000 | 1.0405 | 0.8205 |
| CNAG\_04617 | L | 19.8686 | 0.0000 | 0.8152 | 0.4272 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_04656 | L | 2.3207 | 0.0050 | 1.0279 | 0.8905 |
| CNAG\_04689 | L | 2.3861 | 0.0003 | 0.7520 | 0.1830 |
| CNAG\_04690 | L | 2.0499 | 0.0213 | 0.7888 | 0.3355 |
| CNAG\_04730 | L | 2.2091 | 0.0193 | 1.1415 | 0.6052 |
| CNAG\_04768 | L | 2.9097 | 0.0007 | 1.0842 | 0.7147 |
| CNAG\_04784 | L | 2.0347 | 0.0182 | 0.8583 | 0.5346 |
| CNAG\_04836 | L | 0.3934 | 0.0025 | 0.8019 | 0.3900 |
| CNAG\_04837 | L | 0.4543 | 0.0253 | 0.6968 | 0.1518 |
| CNAG\_04846 | L | 3.3446 | 0.0000 | 0.8148 | 0.2267 |
| CNAG\_04869 | L | 0.4204 | 0.0152 | 0.9153 | 0.7302 |
| CNAG\_04877 | L | 0.0936 | 0.0000 | 0.5223 | 0.0051 |
| CNAG\_04945 | L | 2.4456 | 0.0000 | 0.8302 | 0.3738 |
| CNAG\_04951 | L | 10.5027 | 0.0000 | 0.7236 | 0.1526 |
| CNAG\_04981 | L | 2.3861 | 0.0362 | 1.3350 | 0.2283 |
| CNAG\_05032 | L | 2.1720 | 0.0031 | 0.7838 | 0.3282 |
| CNAG\_05041 | L | 58.3404 | 0.0000 | 0.7689 | 0.1333 |
| CNAG\_05090 | L | 6.1303 | 0.0000 | 1.1828 | 0.3773 |
| CNAG\_05132 | L | 2.0761 | 0.0002 | 0.9900 | 0.9582 |
| CNAG\_05139 | L | 2.1467 | 0.0006 | 1.1007 | 0.6591 |
| CNAG\_05144 | L | 3.7104 | 0.0000 | 0.6832 | 0.1282 |
| CNAG\_05154 | L | 2.8927 | 0.0000 | 0.5175 | 0.0037 |
| CNAG\_05264 | L | 2.0589 | 0.0292 | 1.9208 | 0.0076 |
| CNAG\_05316 | L | 2.9955 | 0.0000 | 0.9720 | 0.8819 |
| CNAG\_05341 | L | 3.4505 | 0.0002 | 1.2816 | 0.2971 |
| CNAG\_05381 | L | 0.4263 | 0.0140 | 0.8745 | 0.5684 |
| CNAG\_05387 | L | 0.3579 | 0.0152 | 1.1927 | 0.4864 |
| CNAG\_05434 | L | 9.1975 | 0.0000 | 0.6655 | 0.0164 |
| CNAG\_05497 | L | 25.1799 | 0.0000 | 0.6969 | 0.0773 |
| CNAG\_05554 | L | 4.0053 | 0.0000 | 0.9500 | 0.7934 |
| CNAG\_05595 | L | 2.4374 | 0.0014 | 1.2662 | 0.2840 |
| CNAG\_05631 | L | 21.8045 | 0.0000 | 0.8179 | 0.2439 |
| CNAG\_05632 | L | 2.8319 | 0.0080 | 1.4089 | 0.1810 |
| CNAG\_05662 | L | 0.4265 | 0.0422 | 0.7250 | 0.2057 |
| CNAG\_05725 | L | 2.3874 | 0.0020 | 0.8070 | 0.3473 |
| CNAG\_05726 | L | 2.5141 | 0.0006 | 0.9038 | 0.5814 |
| CNAG\_05763 | L | 18.0353 | 0.0000 | 0.7479 | 0.1560 |
| CNAG\_05842 | L | 4.4695 | 0.0000 | 0.6261 | 0.0686 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_05907 | L | 5.1677 | 0.0000 | 0.9051 | 0.5742 |
| CNAG\_05909 | L | 15.0628 | 0.0000 | 0.9698 | 0.8489 |
| CNAG\_06028 | L | 2.5330 | 0.0000 | 0.8405 | 0.2204 |
| CNAG\_06029 | L | 3.8447 | 0.0001 | 0.9106 | 0.6942 |
| CNAG\_06085 | L | 3.2972 | 0.0008 | 1.2785 | 0.3366 |
| CNAG\_06104 | L | 0.4763 | 0.0005 | 0.7605 | 0.2657 |
| CNAG\_06138 | L | 3.9423 | 0.0000 | 0.7062 | 0.0188 |
| CNAG\_06204 | L | 4.8859 | 0.0000 | 0.7689 | 0.2968 |
| CNAG\_06403 | L | 2.1957 | 0.0000 | 0.8699 | 0.3790 |
| CNAG\_06404 | L | 10.3804 | 0.0000 | 0.9606 | 0.8714 |
| CNAG\_06551 | L | 3.4068 | 0.0000 | 0.7688 | 0.2871 |
| CNAG\_06583 | L | 0.3844 | 0.0000 | 1.1461 | 0.5354 |
| CNAG\_06644 | L | 2.0090 | 0.0313 | 1.1540 | 0.5776 |
| CNAG\_06699 | L | 3.4330 | 0.0000 | 0.8461 | 0.4374 |
| CNAG\_06722 | L | 5.0854 | 0.0000 | 1.0924 | 0.7307 |
| CNAG\_06723 | L | 58.0090 | 0.0000 | 0.7922 | 0.2608 |
| CNAG\_06761 | L | 0.3665 | 0.0000 | 1.2529 | 0.3801 |
| CNAG\_06816 | L | 2.0476 | 0.0337 | 0.7671 | 0.1951 |
| CNAG\_06897 | L | 2.2168 | 0.0002 | 1.3221 | 0.2528 |
| CNAG\_06908 | L | 3.1313 | 0.0000 | 1.0581 | 0.7269 |
| CNAG\_06946 | L | 32.2188 | 0.0000 | 0.9490 | 0.7961 |
| CNAG\_07177 | L | 9.1870 | 0.0000 | 0.8765 | 0.4250 |
| CNAG\_07309 | L | 14.7293 | 0.0000 | 0.9363 | 0.7952 |
| CNAG\_07310 | L | 49.0836 | 0.0000 | 0.6925 | 0.1033 |
| CNAG\_07356 | L | 12.1428 | 0.0000 | 0.7983 | 0.2903 |
| CNAG\_07549 | L | 16.6792 | 0.0000 | 0.7714 | 0.3119 |
| CNAG\_07551 | L | 2.5060 | 0.0270 | 1.0859 | 0.7457 |
| CNAG\_07695 | L | 0.3898 | 0.0011 | 1.3832 | 0.1077 |
| CNAG\_07779 | L | 3.1485 | 0.0000 | 0.8832 | 0.5563 |
| CNAG\_07797 | L | 6.7132 | 0.0000 | 0.8262 | 0.2745 |
| CNAG\_07798 | L | 5.0200 | 0.0000 | 1.3587 | 0.1417 |
| CNAG\_07869 | L | 0.4396 | 0.0080 | 1.6151 | 0.0622 |
| CNAG\_07897 | L | 5.6443 | 0.0000 | 0.8146 | 0.3598 |
| CNAG\_07982 | L | 2.2146 | 0.0000 | 0.7656 | 0.1893 |
| CNAG\_08005 | L | 2.7881 | 0.0007 | 0.8735 | 0.4568 |
| CNAG\_00235 | L/Hd | 2.2733 | 0.0373 | 0.4263 | 0.0006 |
| CNAG\_00758 | L/H | 0.3909 | 0.0000 | 0.4569 | 0.0001 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Gene | Growth conditiona | Transcriptome (*hapXΔ* vs WT) | | | |
| Low-iron | | High-iron | |
| foldb | *p*-valuec | fold | *p*-value |
| CNAG\_00800 | L/H | 5.0626 | 0.0000 | 0.4787 | 0.0041 |
| CNAG\_00876 | L/H | 2.5550 | 0.0000 | 0.4724 | 0.0036 |
| CNAG\_01908 | L/H | 42.5090 | 0.0000 | 0.2955 | 0.0000 |
| CNAG\_03666 | L/H | 22.6077 | 0.0000 | 0.3963 | 0.0002 |
| CNAG\_04217 | L/H | 2.0748 | 0.0213 | 2.6142 | 0.0002 |
| CNAG\_04862 | L/H | 5.7761 | 0.0000 | 0.3884 | 0.0002 |
| CNAG\_05169 | L/H | 4.0490 | 0.0000 | 0.4299 | 0.0002 |
| CNAG\_05357 | L/H | 11.8295 | 0.0000 | 0.1675 | 0.0000 |
| CNAG\_06096 | L/H | 12.2467 | 0.0000 | 0.3579 | 0.0000 |
| CNAG\_07361 | L/H | 2.4188 | 0.0009 | 0.3483 | 0.0000 |
| CNAG\_07911 | L/H | 13.6314 | 0.0000 | 0.3925 | 0.0002 |

a Growth conditions: low-iron (L) or high-iron (H) medium.

b The values indicate the ratio of expression level as follow: *hapXΔ*/WT: the *hapX* mutant versus the wild-type strain.

c Values indicate statistical significance.

d L/H indicates the gene that was identified as a binding target of HapX in both low- and high-iron media.