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# Integrated proteo-metabolomics reveal molecular mechanisms of wheat growth promotion and yield enhancement by PGPB–AMF microbial consortia under field conditions

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## SUPPLEMENTRY MATERIAL

**Table S1. Upregulated proteins in grain tissue of CP4-treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4) | *p*-value |
|---|---|---|---|---|
| **1.** | **A0A3B6ST91** | **Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1** | **5.19** | **1.0E-17** |
| 2. | A0A3B6TZF9 | Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 5.19 | 1.0E-17 |
| 3. | Q00445 | Small heat shock protein, chloroplastic OS=*Triticum* | 2.95 | 7.3E-11 |
| 4. | Q8H0B8 | Cold regulated protein OS=*Triticum aestivum*OX=4565 | 2.35 | 2.1E-07 |
| **5.** | **A0A3B5Y3D7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **2.35** | **2.1E-07** |
| 6. | A0A3B6PQU5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 2.16 | 3.6E-06 |
| **7.** | **A0A3B6NTF1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **2.16** | **3.6E-06** |
| **8.** | **A0A3B6TK25** | **Superoxide dismutase [Cu-Zn] OS=*Triticum*** | **2.1** | **3.4E-06** |
| 9. | Q96123 | Superoxide dismutase [Cu-Zn] OS=*Triticum aestivum*OX=4565 | 2.1 | 3.4E-06 |
| 10. | A0A3B6RFK1 | Superoxide dismutase [Cu-Zn] OS=*Triticum aestivum*OX=4565 | 2.1 | 3.4E-06 |
| 11. | O24400 | Superoxide dismutase [Cu-Zn] OS=*Triticum aestivum*OX=4565 | 2.1 | 3.4E-06 |
| 12. | A0A3B6PTJ6 | Rab protein OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 2.03 | 7.0E-06 |
| **13.** | **Q41579** | **Rab protein OS=*Triticum aestivum*OX=4565 GN=rab 15B** | **2.03** | **7.0E-06** |
| 14. | A0A3B6SLX4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.97 | 1.4E-05 |
| 15. | A0A3B6BY95 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.97 | 1.4E-05 |
| **16.** | **A0A077RWR2** | **SHSP domain-containing protein OS=*Triticum*** | **1.9** | **2.7E-05** |
| **17.** | **M9TLK0** | **Gamma gliadin-B2 OS=*Triticum aestivum*OX=4565 GN=Gli-1** | **1.75** | **1.1E-04** |
| 18. | A0A3B6QDI1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.73 | 1.3E-04 |
| **19.** | **A0A3B6PKG6** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.73** | **1.3E-04** |
| 20. | A0A3B5ZW34 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.62 | 3.5E-04 |
| 21. | A0A3B5YZ25 | Cold shock domain protein 2 OS=*Triticum aestivum*OX=4565 | 1.62 | 3.5E-04 |
| 22. | Q75QN9 | Cold shock domain protein 2 OS=*Triticum aestivum*OX=4565 | 1.62 | 3.5E-04 |
| **23.** | **A0A3B5Y1S1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.62** | **3.5E-04** |
| 24. | W5EAP3 | Ribosomal protein OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 1.6 | 4.2E-04 |
| **25.** | **A0A3B6HZM8** | **Ribosomal protein OS=*Triticum aestivum*OX=4565 PE=3** | **1.6** | **4.2E-04** |
| **26.** | **A0A3B6H417** | **Cytochrome b5 heme-binding domain-containing protein** | **1.59** | **4.4E-04** |
| 27. | A0A3B6LJH8 | Cytochrome b5 heme-binding domain-containing protein | 1.59 | 4.4E-04 |
| 28. | A0A3B6KGM8 | Cytochrome b5 heme-binding domain-containing protein | 1.59 | 4.4E-04 |
| 29. | H9AXB3 | Serpin-N3.2 OS=*Triticum aestivum*OX=4565 PE=2 SV=1 | 1.57 | 5.1E-04 |
| 30. | P93692 | Serpin-Z2B OS=*Triticum aestivum*OX=4565 PE=1 SV=1 | 1.57 | 5.1E-04 |
| **31.** | **A0A3B6KQL2** | **SERPIN domain-containing protein OS=*Triticum*** | **1.57** | **5.1E-04** |
| 32. | Q9ZSR6 | Heat shock protein HSP26 OS=*Triticum aestivum*OX=4565 | 1.51 | 8.2E-04 |
| **33.** | **Q9SBB7** | **Chloroplast small heat shock protein OS=*Triticum*** | **1.51** | **8.2E-04** |

| | | | | |
|---|---|---|---|---|
| 34. | A0A3B6HQY4 | SHSP domain-containing protein OS=*Triticum* | 1.51 | 8.2E-04 |
| 35. | A0A3B6GMS8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.51 | 8.2E-04 |
| 36. | A0A3B6FKP0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.51 | 8.6E-04 |
| 37. | A0A3B6HNY3 | SHSP domain-containing protein OS=*Triticum* | 1.51 | 8.6E-04 |
| 38. | A0A3B6FJS9 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.51 | 8.6E-04 |
| **39.** | **A0A3B6ECS7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.51** | **8.6E-04** |
| 40. | A0A3B6FQD3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.5 | 9.2E-04 |
| **41.** | **A0A3B6EJA1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.5** | **9.2E-04** |
| 42. | A0A3B6GVY3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.5 | 9.2E-04 |
| 43. | A0A3B6PJM1 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| 44. | A0A3B6RLX3 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| 45. | A0A3B6RQQ5 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| 46. | W5I2D4 | Glyceraldehyde-3-phosphate dehydrogenase (Fragment) | 1.49 | 9.5E-04 |
| 47. | A0A3B6QCR3 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| 48. | A0A3B6TKU1 | Gp_dh_N domain-containing protein OS=*Triticum* | 1.49 | 9.5E-04 |
| 49. | A0A3B6TXP4 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| **50.** | **A0A3B6NLY0** | **Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum*** | **1.49** | **9.5E-04** |
| 51. | A0A3B6SSQ7 | Glyceraldehyde-3-phosphate dehydrogenase OS=*Triticum* | 1.49 | 9.5E-04 |
| **52.** | **A0A3B6IQ78** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.39** | **2.1E-03** |
| **53.** | **W5D003** | **AAI domain-containing protein OS=*Triticum*** | **1.36** | **2.6E-03** |
| 54. | A0A3B6LV14 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.33 | 3.2E-03 |
| 55. | A0A3B6KHG3 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 1.33 | 3.2E-03 |
| **56.** | **A0A3B6MZC2** | **H15 domain-containing protein OS=*Triticum*** | **1.33** | **3.2E-03** |
| 57. | A0A3B6MR97 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 1.33 | 3.2E-03 |
| 58. | A0A3B6LIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.33 | 3.2E-03 |
| 59. | A0A3B6KGU0 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 1.33 | 3.2E-03 |
| 60. | A0A3B6LVB5 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.33 | 3.2E-03 |
| **61.** | **A0A3B6KGS8** | **Helicase ATP-binding domain-containing protein** | **1.33** | **3.2E-03** |
| 62. | A0A3B6LKH3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.33 | 3.2E-03 |
| 63. | A0A3B6LTT9 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.33 | 3.2E-03 |
| **64.** | **A0A3B6JIQ3** | **VOC domain-containing protein OS=*Triticum*** | **1.32** | **3.4E-03** |
| 65. | A0A3B6C9V8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.31 | 3.6E-03 |
| **66.** | **A0A3B6G229** | **Barwin domain-containing protein OS=*Triticum*** | **1.27** | **4.8E-03** |
| **67.** | **A0A3B6U5I1** | **AAI domain-containing protein OS=*Triticum*** | **1.27** | **4.9E-03** |
| 68. | A0A3B6MX78 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.26 | 5.2E-03 |
| **69.** | **A0A3B6RMT9** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.26** | **5.2E-03** |
| 70. | A0A3B6RQX2 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.26 | 5.2E-03 |
| 71. | A0A3B6KQQ2 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.26 | 5.2E-03 |
| 72. | A0A3B6LTV3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.26 | 5.2E-03 |
| **73.** | **A0A3B6TQ10** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.19** | **8.3E-03** |
| 74. | A0A3B6N0S7 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.14 | 1.1E-02 |
| **75.** | **P16347** | **Endogenous alpha-amylase/subtilisin inhibitor OS=*Triticum*** | **1.13** | **1.2E-02** |
| **76.** | **W5C2S2** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.12** | **1.3E-02** |
| 77. | A0A3B6C486 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.12 | 1.3E-02 |
| 78. | A0A3B6DAF6 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.12 | 1.3E-02 |
| 79. | A0A3B6AXA1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.12 | 1.3E-02 |
| **80.** | **Q06I75** | **Fasciclin-like protein FLA31 OS=*Triticum aestivum*OX=4565** | **1.1** | **1.5E-02** |
| 81. | A0A3B6TNI7 | FAS1 domain-containing protein OS=*Triticum* | 1.1 | 1.5E-02 |
| 82. | A0A3B6SHE9 | FAS1 domain-containing protein OS=*Triticum* | 1.1 | 1.5E-02 |
| 83. | A0A3B6ATQ1 | Ribosomal_L18e/L15P domain-containing protein OS=*Triticum* | 1.09 | 1.5E-02 |
| 84. | A0A3B6JI52 | Ribosomal_L18e/L15P domain-containing protein OS=*Triticum* | 1.09 | 1.5E-02 |
| 85. | W5BPV2 | Ribosomal_L18e/L15P domain-containing protein OS=*Triticum* | 1.09 | 1.5E-02 |
| 86. | A0A3B5Z0N6 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.08 | 1.6E-02 |

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|---|---|---|---|---|
| 87. | A0A3B6AWA1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.08 | 1.6E-02 |
| **88.** | **A0A3B5ZZB3** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.08** | **1.6E-02** |
| 89. | A0A3B6FV54 | ADP-ribosylation factor OS=*Triticum aestivum*OX=4565 PE=3 | 1.08 | 1.6E-02 |
| 90. | Q76ME3 | ADP-ribosylation factor OS=*Triticum aestivum*OX=4565 GN=arf | 1.08 | 1.6E-02 |
| 91. | A0A3B6KSP3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.08 | 1.6E-02 |
| 92. | A0A3B6N1W7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.08 | 1.6E-02 |
| 93. | A0A3B6LWK6 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.05 | 2.0E-02 |
| 94. | A0A3B6HTX5 | Alcohol dehydrogenase ADH1A OS=*Triticum aestivum*OX=4565 | 1.01 | 2.5E-02 |
| 95. | A9U8G5 | Alcohol dehydrogenase ADH1D OS=*Triticum aestivum*OX=4565 | 1.01 | 2.5E-02 |
| **96.** | **A9U8G4** | **Alcohol dehydrogenase ADH1A OS=*Triticum*** | **1.01** | **2.5E-02** |
| 97. | A0A3B6ING4 | Alcohol dehydrogenase ADH1D OS=*Triticum aestivum*OX=4565 | 1.01 | 2.5E-02 |
| 98. | D0EWS4 | Avenin-like b7 OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 1.01 | 2.5E-02 |

**Table S2. Upregulated proteins in AMF-treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (AMF) | *p*-value |
|---|---|---|---|---|
| **1.** | **A0A3B6ETW5** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **4.92** | **1.0E-10** |
| 2. | A0A3B6ER02 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 4.92 | 1.0E-10 |
| 3. | A0A3B6EPH7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 4.92 | 1.0E-10 |
| 4. | A0A3B6ER07 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 3.42 | 4.6E-06 |
| 5. | A0A3B6SQ43 | Chitin-binding type-1 domain-containing protein OS=*Triticum* | 3.28 | 1.1E-05 |
| **6.** | **A0A3B6RP58** | **Chitin-binding type-1 domain-containing protein** | **3.28** | **1.1E-05** |
| 7. | Q00445 | Small heat shock protein, chloroplastic OS=*Triticum* | 3.17 | 2.0E-05 |
| 8. | Q8H0B8 | Cold regulated protein OS=*Triticum aestivum*OX=4565 | 3.01 | 5.0E-05 |
| **9.** | **A0A3B5Y3D7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **3.01** | **5.0E-05** |
| **10.** | **A0A3B6LV22** | **H15 domain-containing protein OS=*Triticum*** | **2.91** | **8.2E-05** |
| 11. | A0A3B6FHE6 | AAI domain-containing protein OS=*Triticum aestivum*OX=4565 | 2.61 | 3.8E-04 |
| **12.** | **A0A3B5ZXF4** | **WRKY domain-containing protein OS=*Triticum*** | **2.33** | **1.4E-03** |
| **13.** | **A0A3B6ST91** | **Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1** | **2.25** | **1.9E-03** |
| 14. | A0A3B6TZF9 | Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 2.25 | 1.9E-03 |
| 15. | A0A3B6PQU5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 2.24 | 2.0E-03 |
| **16.** | **A0A3B6NTF1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **2.24** | **2.0E-03** |
| 17. | A0A3B6NTT5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 2.24 | 2.0E-03 |
| 18. | A0A3B6LW98 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 2.07 | 4.0E-03 |
| **19.** | **A0A077RWR2** | **SHSP domain-containing protein OS=*Triticum*** | **1.94** | **6.7E-03** |
| 20. | A0A3B6GMS8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.86 | 9.1E-03 |
| 21. | A0A3B6FKP0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.86 | 9.1E-03 |
| **22.** | **A0A3B6ECS7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.86** | **9.1E-03** |
| 23. | A0A3B6SLX4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.7 | 1.6E-02 |
| 24. | A0A3B6BY95 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.7 | 1.6E-02 |
| **25.** | **A0A3B6U5Z4** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.69** | **1.7E-02** |
| 26. | A0A077S7C3 | Peroxidase OS=*Triticum aestivum*OX=4565 | 1.66 | 1.8E-02 |
| 27. | Q9ZSR6 | Heat shock protein HSP26 OS=*Triticum aestivum*OX=4565 | 1.64 | 2.0E-02 |
| **28.** | **Q9SBB7** | **Chloroplast small heat shock protein OS=*Triticum*** | **1.64** | **2.0E-02** |
| 29. | A0A3B6HQY4 | SHSP domain-containing protein OS=*Triticum* | 1.64 | 2.0E-02 |
| 30. | A0A3B6HNY3 | SHSP domain-containing protein OS=*Triticum* | 1.64 | 2.0E-02 |
| 31. | A0A3B6KHG3 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 1.59 | 2.3E-02 |
| 32. | A0A3B6LIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.59 | 2.3E-02 |

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| **33.** | **A0A3B6KGS8** | **Helicase ATP-binding domain-containing protein** | **1.59** | **2.3E-02** |
| 34. | A0A3B6LKH3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.59 | 2.3E-02 |
| 35. | M9TE79 | Gamma gliadin-B1 OS=*Triticum aestivum*OX=4565 GN=Gli-1 | 1.52 | 2.9E-02 |
| **36.** | **Q4U1A4** | **Dimeric alpha-amylase inhibitor OS=*Triticum*** | **1.51** | **3.1E-02** |
| 37. | D0EWS4 | Avenin-like b7 OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 1.49 | 3.2E-02 |
| 38. | A0A3B6LV14 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.48 | 3.3E-02 |
| **39.** | **A0A3B6MZC2** | **H15 domain-containing protein OS=*Triticum*** | **1.48** | **3.3E-02** |
| 40. | A0A3B6LVB5 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.48 | 3.3E-02 |
| 41. | A0A3B6LTT9 | H15 domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.48 | 3.3E-02 |
| **42.** | **Q2PCC3** | **Type 2 non specific lipid transfer protein OS=*Triticum*** | **1.46** | **3.6E-02** |
| 43. | A0A3B6KVB9 | AAI domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.43 | 3.9E-02 |
| **44.** | **A0A3B5XUE9** | **Knot1 domain-containing protein OS=*Triticum*** | **1.43** | **3.9E-02** |
| 45. | A0A3B6N0S7 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.42 | 4.0E-02 |
| **46.** | **A0A3B6TQ10** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.39** | **4.4E-02** |
| 47. | A0A3B6J0F1 | Inositol-pentakisphosphate 2-kinase OS=*Triticum* | 1.37 | 4.7E-02 |
| 48. | A0A3B5XTA4 | AAI domain-containing protein OS=*Triticum aestivum*OX=4565 | 1.36 | 4.7E-02 |
| **49.** | **D2KFG9** | **Gliadin/avenin-like seed protein OS=*Triticum*** | **1.36** | **4.7E-02** |

**Table S3. Upregulated proteins in CP4+AMF -treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4+AMF) | *p*-value |
|---|---|---|---|---|
| 1. | A0A3B6KHG3 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 5.19 | 6.9E-11 |
| 2. | A0A3B6MR97 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 5.19 | 6.9E-11 |
| 3. | A0A3B6LIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 5.19 | 6.9E-11 |
| 4. | A0A3B6KGU0 | Helicase ATP-binding domain-containing protein OS=*Triticum* | 5.19 | 6.9E-11 |
| **5.** | **A0A3B6KGS8** | **Helicase ATP-binding domain-containing protein** | **5.19** | **6.9E-11** |
| 6. | A0A3B6LKH3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 5.19 | 6.9E-11 |
| 7. | A0A3B6ER07 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 5.13 | 1.1E-10 |
| 8. | A0A3B6PQU5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 3.37 | 1.7E-05 |
| **9.** | **A0A3B6NTF1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **3.37** | **1.7E-05** |
| 10. | A0A3B6NTT5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 3.37 | 1.7E-05 |
| **11.** | **M9TLK0** | **Gamma gliadin-B2 OS=*Triticum aestivum*OX=4565** | **3.35** | **1.8E-05** |
| 12. | H9AXB3 | Serpin-N3.2 OS=*Triticum aestivum*OX=4565 PE=2 SV=1 | 2.95 | 1.5E-04 |
| 13. | P93692 | Serpin-Z2B OS=*Triticum aestivum*OX=4565 PE=1 SV=1 | 2.95 | 1.5E-04 |
| **14.** | **A0A3B6KQL2** | **SERPIN domain-containing protein OS=*Triticum*** | **2.95** | **1.5E-04** |
| 15. | Q00445 | Small heat shock protein, chloroplastic OS=*Triticum* | 2.77 | 3.5E-04 |
| 16. | D0EWS4 | Avenin-like b7 OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 2.32 | 2.5E-03 |
| **17.** | **A0A3B6LV22** | **H15 domain-containing protein OS=*Triticum*** | **2.29** | **2.8E-03** |
| **18.** | **W5D003** | **AAI domain-containing protein OS=*Triticum*** | **2.25** | **3.2E-03** |
| **19.** | **A0A3B5XUE9** | **Knot1 domain-containing protein OS=*Triticum*** | **2.24** | **3.4E-03** |
| 20. | P29546 | Elongation factor 1-beta OS=*Triticum aestivum*OX=4565 PE=1 | 2.16 | 4.6E-03 |
| 21. | A0A3B6C101 | EF1_GNE domain-containing protein OS=*Triticum* | 2.16 | 4.6E-03 |
| **22.** | **A0A3B6JJG2** | **SHSP domain-containing protein OS=*Triticum*** | **2.15** | **4.8E-03** |
| 23. | A0A3B6FHE6 | AAI domain-containing protein OS=*Triticum* | 2.12 | 5.4E-03 |
| 24. | Q8H0B8 | Cold regulated protein OS=*Triticum aestivum*OX=4565 | 2.1 | 5.9E-03 |
| **25.** | **A0A3B5Y3D7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **2.1** | **5.9E-03** |
| **26.** | **A0A077RWR2** | **SHSP domain-containing protein OS=*Triticum*** | **2.01** | **8.0E-03** |
| 27. | A0A3B6LW98 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.97 | 9.3E-03 |

| | | | | |
|---|---|---|---|---|
| 28. | A0A3B6FQD3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.96 | 9.6E-03 |
| **29.** | **A0A3B6EJA1** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.96** | **9.6E-03** |
| 30. | A0A3B6GVY3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.96 | 9.6E-03 |
| 31. | A0A3B6GMS8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.92 | 1.1E-02 |
| 32. | A0A3B6FKP0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.92 | 1.1E-02 |
| 33. | A0A3B6FJS9 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.92 | 1.1E-02 |
| **34.** | **A0A3B6ECS7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.92** | **1.1E-02** |
| **35.** | **A0A3B6ETW5** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.87** | **1.3E-02** |
| 36. | A0A3B6ER02 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.87 | 1.3E-02 |
| 37. | A0A3B6EPH7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.87 | 1.3E-02 |
| **38.** | **A0A3B6ST91** | **Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1** | **1.86** | **1.4E-02** |
| 39. | A0A3B6TZF9 | Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 1.86 | 1.4E-02 |
| 40. | A0A3B5Z4G2 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.8 | 1.7E-02 |
| **41.** | **A0A3B6A2J7** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.8** | **1.7E-02** |
| 42. | A0A3B5Y6V0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.8 | 1.7E-02 |
| 43. | A0A077S7C3 | Peroxidase OS=*Triticum aestivum*OX=4565 | 1.8 | 1.7E-02 |
| 44. | A0A3B6KVB9 | AAI domain-containing protein OS=*Triticum* | 1.79 | 1.7E-02 |
| 45. | A0A3B6SLX4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.79 | 1.7E-02 |
| 46. | A0A3B6BY95 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.79 | 1.7E-02 |
| **47.** | **A0A060AQ78** | **Defensin OS=*Triticum aestivum*OX=4565 GN=PDF16 PE=2** | **1.76** | **1.9E-02** |
| 48. | A0A3B6DB70 | EF1_GNE domain-containing protein OS=*Triticum* | 1.76 | 1.9E-02 |
| **49.** | **A0A3B6ATD7** | **EF1_GNE domain-containing protein OS=*Triticum*** | **1.76** | **1.9E-02** |
| 50. | A0A3B6C9V8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.7 | 2.3E-02 |
| **51.** | **A0A3B6TQ10** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.68** | **2.4E-02** |
| **52.** | **A0A3B6IQ78** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.67** | **2.6E-02** |
| 53. | A0A3B5YS67 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.65 | 2.7E-02 |
| **54.** | **A0A341XD25** | **Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 SV=1** | **1.59** | **3.3E-02** |
| 55. | A0A3B6MUH5 | Knot1 domain-containing protein OS=*Triticum* | 1.57 | 3.5E-02 |
| 56. | A0A3B6KIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.56 | 3.6E-02 |
| **57.** | **A0A3B6U6Y8** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.56** | **3.6E-02** |
| 58. | A0A3B6MTS5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=4 | 1.56 | 3.6E-02 |
| **59.** | **P81713** | **Bowman-Birk type trypsin inhibitor OS=*Triticum*** | **1.53** | **3.9E-02** |
| 60. | A0A3B6KSH6 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.52 | 4.0E-02 |
| 61. | Q9ZSR6 | Heat shock protein HSP26 OS=*Triticum aestivum*OX=4565 | 1.51 | 4.2E-02 |
| **62.** | **Q9SBB7** | **Chloroplast small heat shock protein OS=*Triticum*** | **1.51** | **4.2E-02** |
| 63. | A0A3B6HQY4 | SHSP domain-containing protein OS=*Triticum* | 1.51 | 4.2E-02 |
| 64. | A0A3B6HNY3 | SHSP domain-containing protein OS=*Triticum* | 1.51 | 4.2E-02 |
| 65. | A0A3B5Y2Z7 | BOWMAN_BIRK domain-containing protein OS=*Triticum* | 1.5 | 4.3E-02 |
| 66. | A0A3B5YZB9 | BOWMAN_BIRK domain-containing protein OS=*Triticum* | 1.5 | 4.3E-02 |
| 67. | A0A3B6KSI1 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 PE=3 | 1.5 | 4.3E-02 |
| **68.** | **W5FHQ6** | **Defensin OS=*Triticum aestivum*OX=4565 GN=PDF31 PE=2** | **1.48** | **4.5E-02** |
| 69. | P20158 | Defensin-like protein 1 OS=*Triticum aestivum*OX=4565 PE=1 | 1.48 | 4.5E-02 |
| 70. | A0A3B6QDI1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 PE=3 | 1.47 | 4.7E-02 |
| **71.** | **A0A3B6PKG6** | **Uncharacterized protein OS=*Triticum aestivum*OX=4565** | **1.47** | **4.7E-02** |
| **72.** | **Q4U1A4** | **Dimeric alpha-amylase inhibitor OS=*Triticum*** | **1.46** | **4.8E-02** |
| 73. | A0A3B6HTX5 | Alcohol dehydrogenase ADH1A OS=*Triticum* | 1.45 | 4.9E-02 |
| 74. | A9U8G5 | Alcohol dehydrogenase ADH1D OS=*Triticum* | 1.45 | 4.9E-02 |
| **75.** | **A9U8G4** | **Alcohol dehydrogenase ADH1A OS=*Triticum*** | **1.45** | **4.9E-02** |
| 76. | A0A3B6ING4 | Alcohol dehydrogenase ADH1D OS=*Triticum* | 1.45 | 4.9E-02 |

**Table S4. Upregulated proteins in CP4+AHP3+AMF -treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4+AHP3+AMF) | *p*-value |
|---|---|---|---|---|
| **1.** | **A0A3B6ST91** | **Histone H2A OS=*Triticum aestivum*OX=4565 PE=3** | **4.19** | **1.9E-10** |
| 2. | A0A3B6TZF9 | Histone H2A OS=*Triticum aestivum*OX=4565 PE=3 | 4.19 | 1.9E-10 |
| 3. | A0A3B6KHG3 | Helicase ATP-binding domain-containing protein | 3.98 | 1.3E-09 |
| 4. | A0A3B6MR97 | Helicase ATP-binding domain-containing protein | 3.98 | 1.3E-09 |
| 5. | A0A3B6LIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 3.98 | 1.3E-09 |
| 6. | A0A3B6KGU0 | Helicase ATP-binding domain-containing protein | 3.98 | 1.3E-09 |
| **7.** | **A0A3B6KGS8** | **Helicase ATP-binding domain-containing protein** | **3.98** | **1.3E-09** |
| 8. | A0A3B6LKH3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 3.98 | 1.3E-09 |
| **9.** | **A0A3B6JMY4** | **Plasma membrane ATPase OS=*Triticum*** | **3.23** | **6.8E-07** |
| 10. | A0A3B6JQ63 | Plasma membrane ATPase OS=*Triticum* | 3.23 | 6.8E-07 |
| 11. | A0A3B6JNH3 | Plasma membrane ATPase OS=*Triticum* | 3.23 | 6.8E-07 |
| 12. | A0A3B6JPR5 | Plasma membrane ATPase OS=*Triticum* | 3.23 | 6.8E-07 |
| **13.** | **A0A3B6ETW5** | **Uncharacterized protein OS=*Triticum*** | **2.94** | **5.6E-06** |
| 14. | A0A3B6ER02 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 2.94 | 5.6E-06 |
| 15. | A0A3B6EPH7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 2.94 | 5.6E-06 |
| 16. | A0A3B6ER07 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 2.65 | 3.8E-05 |
| 17. | Q8H0B8 | Cold regulated protein OS=*Triticum aestivum*OX=4565 | 2.6 | 5.1E-05 |
| **18.** | **A0A3B5Y3D7** | **Uncharacterized protein OS=*Triticum*** | **2.6** | **5.1E-05** |
| **19.** | **A0A3B6TQ10** | **Uncharacterized protein OS=*Triticum*** | **2.12** | **8.2E-04** |
| 20. | A0A3B6FHE6 | AAI domain-containing protein OS=*Triticum* | 2.1 | 9.1E-04 |
| 21. | A0A3B6GMS8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.96 | 1.9E-03 |
| 22. | A0A3B6FKP0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.96 | 1.9E-03 |
| 23. | A0A3B6FJS9 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.96 | 1.9E-03 |
| **24.** | **A0A3B6ECS7** | **Uncharacterized protein OS=*Triticum*** | **1.96** | **1.9E-03** |
| 25. | Q00445 | Small heat shock protein, chloroplastic OS=*Triticum* | 1.91 | 2.4E-03 |
| 26. | A0A3B6SLX4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.89 | 2.6E-03 |
| 27. | A0A3B6BY95 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.89 | 2.6E-03 |
| 28. | W5CQ97 | Cysteine proteinase inhibitor OS=*Triticum* | 1.86 | 3.1E-03 |
| **29.** | **A0A3B6GQ71** | **Cysteine proteinase inhibitor OS=*Triticum*** | **1.86** | **3.1E-03** |
| 30. | Q1XHC6 | Cysteine proteinase inhibitor OS=*Triticum* | 1.86 | 3.1E-03 |
| 31. | A0A3B5Y6C7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.7 | 6.3E-03 |
| **32.** | **A0A3B6A2J7** | **Uncharacterized protein OS=*Triticum*** | **1.7** | **6.3E-03** |
| 33. | A0A3B5Y6V0 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.7 | 6.3E-03 |
| **34.** | **A0A077RWR2** | **SHSP domain-containing protein OS=*Triticum*** | **1.69** | **6.8E-03** |
| **35.** | **A0A3B6TK25** | **Superoxide dismutase [Cu-Zn] OS=*Triticum*** | **1.63** | **8.7E-03** |
| 36. | Q96123 | Superoxide dismutase [Cu-Zn] OS=*Triticum* | 1.63 | 8.7E-03 |
| 37. | A0A3B6RFK1 | Superoxide dismutase [Cu-Zn] OS=*Triticum* | 1.63 | 8.7E-03 |
| 38. | O24400 | Superoxide dismutase [Cu-Zn] OS=*Triticum* | 1.63 | 8.7E-03 |
| 39. | A0A3B5YS67 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.61 | 9.7E-03 |
| 40. | A0A3B5Y2Z7 | BOWMAN_BIRK domain-containing protein | 1.6 | 9.9E-03 |
| 41. | A0A3B5YZB9 | BOWMAN_BIRK domain-containing protein | 1.6 | 9.9E-03 |
| **42.** | **A0A3B6U5Z4** | **Uncharacterized protein OS=*Triticum*** | **1.55** | **1.2E-02** |
| 43. | A0A077S7C3 | Peroxidase OS=*Triticum aestivum*OX=4565 | 1.55 | 1.2E-02 |
| 44. | A0A3B6PQU5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.54 | 1.3E-02 |
| **45.** | **A0A3B6NTF1** | **Uncharacterized protein OS=*Triticum*** | **1.54** | **1.2E-02** |
| 46. | A0A3B6NTT5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.54 | 1.2E-02 |
| 47. | D0EWS4 | Avenin-like b7 OS=*Triticum aestivum*OX=4565 PE=3 | 1.54 | 1.3E-02 |
| **48.** | **A0A3B5XUE9** | **Knot1 domain-containing protein OS=*Triticum*** | **1.54** | **1.3E-02** |
| 49. | A0A3B6KVB9 | AAI domain-containing protein OS=*Triticum* | 1.53 | 1.3E-02 |
| 50. | Q6QAX7 | BOWMAN_BIRK domain-containing protein | 1.53 | 1.3E-02 |

| | | | | |
|---|---|---|---|---|
| 51. | W5ACP2 | BOWMAN_BIRK domain-containing protein | 1.53 | 1.3E-02 |
| **52.** | **A0A341P3U8** | **BOWMAN_BIRK domain-containing protein** | **1.53** | **1.3E-02** |
| 53. | A0A3B6LV14 | H15 domain-containing protein OS=*Triticum* | 1.52 | 1.4E-02 |
| **54.** | **A0A3B6MZC2** | **H15 domain-containing protein OS=*Triticum*** | **1.52** | **1.4E-02** |
| 55. | A0A3B6LVB5 | H15 domain-containing protein OS=*Triticum* | 1.52 | 1.4E-02 |
| 56. | A0A3B6LTT9 | H15 domain-containing protein OS=*Triticum* | 1.52 | 1.4E-02 |
| 57. | A0A3B6LW98 | rRNA N-glycosidase OS=*Triticum aestivum*OX=4565 | 1.51 | 1.4E-02 |
| 58. | A0A3B5ZU79 | Histone domain-containing protein OS=*Triticum* | 1.51 | 1.4E-02 |
| **59.** | **A0A3B6H417** | **Cytochrome b5 heme-binding domain-containing** | **1.5** | **1.5E-02** |
| 60. | A0A3B6LJH8 | Cytochrome b5 heme-binding domain-containing protein | 1.5 | 1.5E-02 |
| 61. | A0A3B6KGM8 | Cytochrome b5 heme-binding domain-containing protein | 1.5 | 1.5E-02 |
| 62. | H9AXB3 | Serpin-N3.2 OS=*Triticum aestivum*OX=4565 PE=2 | 1.49 | 1.5E-02 |
| 63. | P93692 | Serpin-Z2B OS=*Triticum aestivum*OX=4565 PE=1 SV=1 | 1.49 | 1.5E-02 |
| **64.** | **A0A3B6KQL2** | **SERPIN domain-containing protein OS=*Triticum*** | **1.49** | **1.5E-02** |
| 65. | A0A3B5XVX5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.46 | 1.6E-02 |
| 66. | A0A3B5ZNZ7 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.46 | 1.8E-02 |
| 67. | A0A3B5XUN1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.46 | 1.8E-02 |
| **68.** | **P30569** | **EC protein I/II OS=*Triticum aestivum*OX=4565 PE=1** | **1.46** | **1.8E-02** |
| 69. | A0A3B5XUY8 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.46 | 1.8E-02 |
| **70.** | **M9TLK0** | **Gamma gliadin-B2 OS=*Triticum aestivum*OX=4565** | **1.44** | **1.9E-02** |
| **71.** | **A0A3B6MXN3** | **Uncharacterized protein OS=*Triticum*** | **1.43** | **1.9E-02** |
| **72.** | **W5D003** | **AAI domain-containing protein OS=*Triticum*** | **1.41** | **2.1E-02** |
| **73.** | **P81713** | **Bowman-Birk type trypsin inhibitor OS=*Triticum*** | **1.34** | **2.8E-02** |
| 74. | A0A3B6KIU4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.33 | 2.9E-02 |
| **75.** | **A0A3B6U6Y8** | **Uncharacterized protein OS=*Triticum*** | **1.33** | **2.9E-02** |
| **76.** | **W5HK94** | **Uncharacterized protein OS=*Triticum*** | **1.32** | **3.0E-02** |
| **77.** | **A0A3B6RQ71** | **Uncharacterized protein OS=*Triticum*** | **1.31** | **3.1E-02** |
| **78.** | **A0A3B6PHC0** | **AAI domain-containing protein OS=*Triticum*** | **1.31** | **3.1E-02** |
| **79.** | **Q4U1A4** | **Dimeric alpha-amylase inhibitor OS=*Triticum*** | **1.3** | **3.3E-02** |
| 80. | A0A3B6PTJ6 | Rab protein OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | 1.29 | 3.3E-02 |
| **81.** | **Q41579** | **Rab protein OS=*Triticum aestivum*OX=4565 GN=rab** | **1.29** | **3.3E-02** |
| 82. | A0A3B6JLE2 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | 1.23 | 4.2E-02 |
| **83.** | **A0A3B6LV22** | **H15 domain-containing protein OS=*Triticum*** | **1.22** | **4.3E-02** |
| 84. | A0A3B5XTA4 | AAI domain-containing protein OS=*Triticum* | 1.21 | 4.5E-02 |
| **85.** | **D2KFG9** | **Gliadin/avenin-like seed protein OS=*Triticum*** | **1.21** | **4.5E-02** |
| **86.** | **A0A3B6IQ78** | **Uncharacterized protein OS=*Triticum*** | **1.21** | **4.5E-02** |
| **87.** | **A0A3B6KQR9** | **AAI domain-containing protein OS=*Triticum*** | **1.19** | **4.8E-02** |
| **88.** | **A0A060AQ78** | **Defensin OS=*Triticum aestivum*OX=4565 GN=PDF16** | **1.18** | **4.9E-02** |

**Table S5. Downregulated proteins in CP4-treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4) | *p*-value |
|---|---|---|---|---|
| 1. | A0A3B6MXG8 | Histone H2B OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | -3.38 | 1.3E-13 |
| 2. | P42755 | Em protein H5 OS=*Triticum aestivum*OX=4565 | -3.17 | 3.9E-12 |
| 3. | A0A3B6JLW0 | Histone H2B OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | -3.13 | 7.2E-12 |
| 4. | A0A3B6IS67 | Histone H2B OS=*Triticum aestivum*OX=4565 PE=3 SV=1 | -3.13 | 7.2E-12 |
| **5.** | **A0A3B6HS27** | **Histone H2B OS=*Triticum aestivum*OX=4565 PE=3** | **-3.13** | **7.2E-12** |
| 6. | A0A3B5ZU79 | Histone domain-containing protein OS=*Triticum* | -3.13 | 7.2E-12 |
| **7.** | **W5EH10** | **Ribonucloprotein OS=*Triticum aestivum*OX=4565** | **-2.72** | **2.5E-09** |

| | | | | |
|---|---|---|---|---|
| 8. | A0A3B6N0M6 | Histone domain-containing protein OS=*Triticum* | -2.09 | 4.6E-06 |
| 9. | A0A3B6FKN7 | Histone domain-containing protein OS=*Triticum* | -2.09 | 4.6E-06 |
| 10. | A0A3B6MZX9 | Histone domain-containing protein OS=*Triticum* | -2.09 | 4.6E-06 |
| 11. | A0A3B6KB74 | Histone domain-containing protein OS=*Triticum* | -2.09 | 4.6E-06 |
| 12. | A0A3B6GU21 | WHy domain-containing protein OS=*Triticum* | -2.08 | 5.3E-06 |
| **13.** | **A0A3B6ED63** | **WHy domain-containing protein OS=*Triticum*** | **-2.08** | **5.3E-06** |
| 14. | A0A3B6GVH3 | Peroxiredoxin OS=*Triticum aestivum*OX=4565 PE=3 | -2.05 | 7.0E-06 |
| **15.** | **A0A341P0J7** | **Ribosomal_L18e/L15P domain-containing protein** | **-2.02** | **9.5E-06** |
| 16. | A0A3B5XW22 | Ribosomal_L18e/L15P domain-containing protein | -2.02 | 9.5E-06 |
| **17.** | **W5HK94** | **Uncharacterized protein OS=*Triticum*** | **-1.93** | **2.4E-05** |
| 18. | A0A3B6I0Z4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.88 | 3.8E-05 |
| **19.** | **A0A3B6PEX3** | **Histone H2B OS=*Triticum aestivum*OX=4565 PE=3** | **-1.79** | **9.3E-05** |
| **20.** | **Q5I7K5** | **Ribosomal protein P1 OS=*Triticum aestivum*OX=4565** | **-1.74** | **1.4E-04** |
| **21.** | **P21292** | **Gamma-gliadin OS=*Triticum aestivum*OX=4565 PE=3** | **-1.59** | **5.1E-04** |
| **22.** | **A0A3B6RIV9** | **ADK_lid domain-containing protein OS=*Triticum*** | **-1.57** | **6.2E-04** |
| 23. | A0A3B6KDQ4 | ADK_lid domain-containing protein OS=*Triticum* | -1.57 | 6.2E-04 |
| 24. | A0A3B6TUN6 | ADK_lid domain-containing protein OS=*Triticum* | -1.57 | 6.2E-04 |
| 25. | A0A3B6MN40 | ADK_lid domain-containing protein OS=*Triticum* | -1.57 | 6.2E-04 |
| 26. | A0A3B6LID7 | ADK_lid domain-containing protein OS=*Triticum* | -1.57 | 6.2E-04 |
| **27.** | **A0A2X0TY93** | **Glutaredoxin domain-containing protein OS=*Triticum*** | **-1.56** | **6.7E-04** |
| **28.** | **B6UKM9** | **Gamma gliadin-A3 OS=*Triticum aestivum*OX=4565** | **-1.52** | **9.0E-04** |
| 29. | A0A3B6PJ20 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.47 | 1.3E-03 |
| **30.** | **A0A3B6QES1** | **Uncharacterized protein OS=*Triticum*** | **-1.47** | **1.3E-03** |
| 31. | A0A3B6NNK3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.47 | 1.3E-03 |
| **32.** | **A0A3B6ELY8** | **Peroxiredoxin OS=*Triticum aestivum*OX=4565 PE=3** | **-1.44** | **1.7E-03** |
| 33. | W5CY88 | Peroxiredoxin OS=*Triticum aestivum*OX=4565 | -1.44 | 1.7E-03 |
| **34.** | **A0A3B6JQP1** | **AAI domain-containing protein OS=*Triticum*** | **-1.41** | **2.1E-03** |
| **35.** | **A0A3B6IYR0** | **Knot1 domain-containing protein OS=*Triticum*** | **-1.37** | **2.9E-03** |
| **36.** | **A0A3B6JDF8** | **Uncharacterized protein OS=*Triticum*** | **-1.35** | **3.2E-03** |
| 37. | A0A3B6I162 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.34 | 3.4E-03 |
| 38. | W5EPT9 | Mitochondrial ATPase inhibitor OS=*Triticum* | -1.34 | 3.4E-03 |
| 39. | A0A3B6IMJ1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.34 | 3.4E-03 |
| **40.** | **A0A3B6ILL4** | **Uncharacterized protein OS=*Triticum*** | **-1.34** | **3.4E-03** |
| 41. | A0A3B6HXK5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.34 | 3.4E-03 |
| **42.** | **Q2PCD1** | **Non-specific lipid-transfer protein OS=*Triticum*** | **-1.21** | **8.3E-03** |
| 43. | Q2PCB7 | Non-specific lipid-transfer protein OS=*Triticum* | -1.21 | 8.3E-03 |
| 44. | A0A3B6SJ26 | ADK_lid domain-containing protein OS=*Triticum* | -1.18 | 1.0E-02 |
| 45. | Q9ST57 | Serpin-Z2A OS=*Triticum aestivum*OX=4565 PE=1 SV=1 | -1.17 | 1.1E-02 |
| **46.** | **A0A3B6JER2** | **Uncharacterized protein OS=*Triticum*** | **-1.16** | **1.1E-02** |
| 47. | A0A3B6HZC6 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.16 | 1.1E-02 |
| 48. | A0A341UET3 | 40S ribosomal protein S27 OS=*Triticum* | -1.14 | 1.3E-02 |
| 49. | A0A3B6HMI3 | 40S ribosomal protein S27 OS=*Triticum* | -1.14 | 1.3E-02 |
| 50. | A0A3B5ZR06 | Usp domain-containing protein OS=*Triticum* | -1.12 | 1.5E-02 |
| **51.** | **A0A3B5YTN4** | **Usp domain-containing protein OS=*Triticum*** | **-1.12** | **1.5E-02** |
| 52. | Q2TN84 | USP family protein OS=*Triticum aestivum*OX=4565 PE=2 | -1.12 | 1.5E-02 |
| **53.** | **P16315** | **Glutenin, low molecular weight subunit PTDUCD1** | **-1.1** | **1.6E-02** |
| **54.** | **A0A3B5Y2C5** | **BOWMAN_BIRK domain-containing protein** | **-1.07** | **2.0E-02** |
| **55.** | **Q9LEE2** | **Starch synthase, chloroplastic/amyloplastic** | **-1.07** | **2.0E-02** |
| 56. | A0A3B6SB88 | Starch synthase, chloroplastic/amyloplastic OS=*Triticum* | -1.07 | 2.0E-02 |
| 57. | A0A3B6JKP4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.06 | 2.0E-02 |
| 58. | A0A3B6IPJ3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.06 | 2.0E-02 |
| 59. | A0A3B6PK86 | 40S ribosomal protein S24 OS=*Triticum* | -1.05 | 2.2E-02 |
| **60.** | **A0A3B6QDU9** | **40S ribosomal protein S24 OS=*Triticum*** | **-1.05** | **2.2E-02** |

| | | | | |
|---|---|---|---|---|
| 61. | W5CQ97 | Cysteine proteinase inhibitor OS=*Triticum* | -1.05 | 2.2E-02 |
| 62. | A0A3B6QGT1 | 40S ribosomal protein S24 OS=*Triticum* | -1.05 | 2.3E-02 |
| **63.** | **A0A3B6GQ71** | **Cysteine proteinase inhibitor OS=*Triticum*** | **-1.05** | **2.3E-02** |
| 64. | Q1XHC6 | Cysteine proteinase inhibitor OS=*Triticum* | -1.05 | 2.3E-02 |
| 65. | A0A3B6LWE1 | 40S ribosomal protein S26 OS=*Triticum* | -1.04 | 2.4E-02 |
| **66.** | **A0A060APV2** | **Defensin OS=*Triticum aestivum*OX=4565 GN=PDF20** | **-1.03** | **2.5E-02** |
| **67.** | **W5I1R7** | **KH type-2 domain-containing protein OS=*Triticum*** | **-1.02** | **2.6E-02** |
| **68.** | **A0A3B5XX39** | **Uncharacterized protein OS=*Triticum*** | **-1.02** | **2.6E-02** |
| 69. | A0A3B6ER07 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.02 | 2.7E-02 |
| 70. | Q5I7L2 | Ribosomal protein L11 OS=*Triticum aestivum*OX=4565 | -1.02 | 2.7E-02 |

**Table S6. Downregulated proteins in AMF-treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (AMF) | *p*-value |
|---|---|---|---|---|
| 1. | W5G3Y7 | Uncharacterized protein OS=*Triticum* | -3.22 | 1.4E-04 |
| **2.** | **A0A3B6LI36** | **Uncharacterized protein OS=*Triticum*** | **-3.22** | **1.4E-04** |
| 3. | A0A3B6N0M6 | Histone domain-containing protein OS=*Triticum* | -3.21 | 1.5E-04 |
| 4. | A0A3B6FKN7 | Histone domain-containing protein OS=*Triticum* | -3.21 | 1.5E-04 |
| 5. | A0A3B6MZX9 | Histone domain-containing protein OS=*Triticum* | -3.21 | 1.5E-04 |
| 6. | A0A3B6KB74 | Histone domain-containing protein OS=*Triticum* | -3.21 | 1.5E-04 |
| 7. | A0A3B5YUR9 | O-acyltransferase OS=*Triticum aestivum*OX=4565 | -2.81 | 1.0E-03 |
| 8. | A0A3B5ZR87 | O-acyltransferase OS=*Triticum aestivum*OX=4565 | -2.81 | 1.0E-03 |
| **9.** | **A0A3B5XY29** | **O-acyltransferase OS=*Triticum aestivum*OX=4565** | **-2.81** | **1.0E-03** |
| **10.** | **A0A3B6RIV9** | **ADK_lid domain-containing protein OS=*Triticum*** | **-2.61** | **2.4E-03** |
| 11. | A0A3B6KDQ4 | ADK_lid domain-containing protein OS=*Triticum* | -2.61 | 2.4E-03 |
| 12. | A0A3B6TUN6 | ADK_lid domain-containing protein OS=*Triticum* | -2.61 | 2.4E-03 |
| 13. | A0A3B6MN40 | ADK_lid domain-containing protein OS=*Triticum* | -2.61 | 2.4E-03 |
| 14. | A0A3B6LID7 | ADK_lid domain-containing protein OS=*Triticum* | -2.61 | 2.4E-03 |
| **15.** | **Q5I7L3** | **Ribosomal protein OS=*Triticum aestivum*OX=4565** | **-2.44** | **4.8E-03** |
| 16. | A0A3B6ARY9 | Elongation factor 1-alpha OS=*Triticum* | -2.39 | 5.9E-03 |
| **17.** | **A0A1D5UZW7** | **Elongation factor 1-alpha OS=*Triticum*** | **-2.39** | **5.9E-03** |
| 18. | A0A3B6QK96 | Aldedh domain-containing protein OS=*Triticum* | -2.35 | 6.8E-03 |
| 19. | A0A3B6NW66 | Aldedh domain-containing protein OS=*Triticum* | -2.35 | 6.8E-03 |
| 20. | A0A3B6QMI9 | Aldedh domain-containing protein OS=*Triticum* | -2.35 | 6.8E-03 |
| **21.** | **A0A3B6PRJ5** | **Aldedh domain-containing protein OS=*Triticum*** | **-2.35** | **6.8E-03** |
| 22. | A0A3B6PQ55 | DHO_dh domain-containing protein OS=*Triticum* | -2.33 | 7.5E-03 |
| 23. | A0A3B6GU21 | WHy domain-containing protein OS=*Triticum* | -2.23 | 1.1E-02 |
| **24.** | **A0A3B6ED63** | **WHy domain-containing protein OS=*Triticum*** | **-2.23** | **1.1E-02** |
| **25.** | **W5EH10** | **Ribonucloprotein OS=*Triticum aestivum*OX=4565** | **-2.21** | **1.1E-02** |
| 26. | A0A3B5ZU79 | Histone domain-containing protein OS=*Triticum* | -2.18 | 1.3E-02 |
| **27.** | **A0A3B6EII2** | **Uncharacterized protein OS=*Triticum*** | **-2.08** | **1.8E-02** |
| 28. | A0A3B6GZ31 | Uncharacterized protein OS=*Triticum* | -2.08 | 1.8E-02 |
| 29. | A0A077RQJ1 | Uncharacterized protein OS=*Triticum* | -2.08 | 1.8E-02 |
| 30. | A0A3B5ZR06 | Usp domain-containing protein OS=*Triticum* | -2.06 | 1.9E-02 |
| **31.** | **A0A3B5YTN4** | **Usp domain-containing protein OS=*Triticum*** | **-2.06** | **1.9E-02** |
| 32. | Q2TN84 | USP family protein OS=*Triticum aestivum*OX=4565 | -2.06 | 1.9E-02 |
| **33.** | **A0A3B6DA12** | **Ribosomal protein L19 OS=*Triticum*** | **-2.05** | **2.0E-02** |
| **34.** | **A0A3B6QIX8** | **Uncharacterized protein OS=*Triticum*** | **-2** | **2.4E-02** |
| 35. | A0A3B6MXG8 | Histone H2B OS=*Triticum aestivum*OX=4565 PE=3 | -1.97 | 2.6E-02 |

| | | | | |
|---|---|---|---|---|
| 36. | W5E6W1 | Uncharacterized protein OS=*Triticum* | -1.92 | 3.0E-02 |
| 37. | A0A3B6D6J5 | PEROXIDASE_4 domain-containing protein | -1.89 | 3.4E-02 |
| **38.** | **A0A3B6AR02** | **PEROXIDASE_4 domain-containing protein** | **-1.89** | **3.4E-02** |
| 39. | A0A3B6BZD8 | PEROXIDASE_4 domain-containing protein | -1.89 | 3.4E-02 |
| **40.** | **A0A1D5VD11** | **Fructose-bisphosphate aldolase OS=*Triticum*** | **-1.82** | **4.2E-02** |
| 41. | A0A3B6IMV7 | Uncharacterized protein OS=*Triticum* | -1.81 | 4.3E-02 |
| **42.** | **A0A3B6HYA0** | **Uncharacterized protein OS=*Triticum*** | **-1.81** | **4.3E-02** |
| 43. | A0A3B6JFJ4 | Uncharacterized protein OS=*Triticum* | -1.81 | 4.3E-02 |

**Table S7. Downregulated proteins in CP4+AMF -treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4+AMF) | *p*-value |
|---|---|---|---|---|
| 1. | A0A3B5YUR9 | O-acyltransferase OS=*Triticum aestivum*OX=4565 PE=3 | -4.72 | 2.7E-08 |
| 2. | A0A3B5ZR87 | O-acyltransferase OS=*Triticum aestivum*OX=4565 PE=3 | -4.72 | 2.7E-08 |
| **3.** | **A0A3B5XY29** | **O-acyltransferase OS=*Triticum aestivum*OX=4565** | **-4.72** | **2.7E-08** |
| 4. | A0A3B6N0M6 | Histone domain-containing protein OS=*Triticum* | -3.24 | 1.7E-04 |
| 5. | A0A3B6FKN7 | Histone domain-containing protein OS=*Triticum* | -3.24 | 1.7E-04 |
| 6. | A0A3B6MZX9 | Histone domain-containing protein OS=*Triticum* | -3.24 | 1.7E-04 |
| **7.** | **A0A3B6QIX8** | **Uncharacterized protein OS=*Triticum*** | **-2.85** | **1.1E-03** |
| **8.** | **A0A3B6EKM3** | **Uncharacterized protein OS=*Triticum*** | **-2.65** | **2.5E-03** |
| 9. | A0A3B6GXD3 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -2.65 | 2.5E-03 |
| 10. | W5D637 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -2.65 | 2.5E-03 |
| 11. | A0A3B6EQZ2 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.62 | 2.7E-03 |
| 12. | A0A077S457 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.62 | 2.7E-03 |
| 13. | A0A3B6DPQ2 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.62 | 2.7E-03 |
| **14.** | **A0A1D5VD11** | **Fructose-bisphosphate aldolase OS=*Triticum*** | **-2.51** | **4.2E-03** |
| 15. | A0A341UET3 | 40S ribosomal protein S27 OS=*Triticum* | -2.39 | 6.7E-03 |
| 16. | A0A3B6HMI3 | 40S ribosomal protein S27 OS=*Triticum* | -2.39 | 6.7E-03 |
| **17.** | **Q9LEE2** | **Starch synthase, chloroplastic/amyloplastic** | **-2.38** | **6.9E-03** |
| 18. | A0A3B6SB88 | Starch synthase, chloroplastic/amyloplastic OS=*Triticum* | -2.38 | 6.9E-03 |
| 19. | P42755 | Em protein H5 OS=*Triticum aestivum*OX=4565 | -2.35 | 7.7E-03 |
| **20.** | **A0A3B6LFE7** | **Uncharacterized protein OS=*Triticum*** | **-2.3** | **9.0E-03** |
| 21. | A0A3B6MIQ1 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -2.3 | 9.0E-03 |
| **22.** | **Q2PCD1** | **Non-specific lipid-transfer protein OS=*Triticum*** | **-2.28** | **9.9E-03** |
| 23. | Q2PCB7 | Non-specific lipid-transfer protein OS=*Triticum* | -2.28 | 9.9E-03 |
| **24.** | **P04568** | **Em protein OS=*Triticum aestivum*OX=4565 GN=EM** | **-2.27** | **1.0E-02** |
| **25.** | **Q9ZR70** | **Em protein OS=*Triticum aestivum*OX=4565 GN=Em-** | **-2.19** | **1.3E-02** |
| 26. | A0A3B6EPJ4 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -2.11 | 1.7E-02 |
| 27. | D7NXU0 | Zinc finger protein OS=*Triticum aestivum*OX=4565 | -2.11 | 1.7E-02 |
| **28.** | **A0A3B6ESH1** | **Uncharacterized protein OS=*Triticum*** | **-2.11** | **1.7E-02** |
| 29. | A0A3B6FUY9 | Zinc finger protein OS=*Triticum aestivum*OX=4565 PE=4 | -2.11 | 1.7E-02 |
| 30. | A0A3B6GTZ6 | Aldo_ket_red domain-containing protein OS=*Triticum* | -2.1 | 1.8E-02 |
| 31. | A0A3B6N3B2 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.1 | 1.8E-02 |
| **32.** | **A0A3B6EGX5** | **Aldo_ket_red domain-containing protein OS=*Triticum*** | **-2.1** | **1.8E-02** |
| 33. | A0A3B6KD63 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.1 | 1.8E-02 |
| 34. | W5CWR9 | Aldo_ket_red domain-containing protein OS=*Triticum* | -2.1 | 1.8E-02 |
| 35. | A0A3B6TL27 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -2.08 | 1.9E-02 |
| **36.** | **A0A3B6RKV2** | **Uncharacterized protein OS=*Triticum*** | **-2.08** | **1.9E-02** |
| **37.** | **W4ZP51** | **Uncharacterized protein OS=*Triticum*** | **-1.98** | **2.7E-02** |

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|---|---|---|---|---|
| **38.** | **W5EH10** | **Ribonucloprotein OS=*Triticum aestivum*OX=4565** | **-1.98** | **2.7E-02** |
| 39. | A0A3B6KI09 | UBIQUITIN_CONJUGAT_2 domain-containing protein | -1.96 | 2.9E-02 |
| 40. | W5G1U9 | UBIQUITIN_CONJUGAT_2 domain-containing protein | -1.96 | 2.9E-02 |
| 41. | A0A0K2QJC7 | Alpha/beta-gliadin OS=*Triticum aestivum*OX=4565 | -1.94 | 3.0E-02 |
| 42. | P04727 | Alpha/beta-gliadin clone PW8142 OS=*Triticum* | -1.94 | 3.0E-02 |
| **43.** | **A0A341P0J7** | **Ribosomal_L18e/L15P domain-containing protein** | **-1.88** | **3.6E-02** |
| 44. | A0A3B5XW22 | Ribosomal_L18e/L15P domain-containing protein | -1.88 | 3.6E-02 |
| 45. | A0A3B6GU21 | WHy domain-containing protein OS=*Triticum* | -1.81 | 4.4E-02 |
| **46.** | **A0A3B6ED63** | **WHy domain-containing protein OS=*Triticum*** | **-1.81** | **4.4E-02** |
| **47.** | **A0A3B6RIV9** | **ADK_lid domain-containing protein OS=*Triticum*** | **-1.77** | **4.9E-02** |
| 48. | A0A3B6MN40 | ADK_lid domain-containing protein OS=*Triticum* | -1.77 | 4.9E-02 |

**Table S8. Downregulated proteins in CP4+AHP3+AMF -treated wheat HD3086**

| Sr. No. | UniProt Accession | Description | log2FC (CP4+AHP3+AMF) | *p*-value |
|---|---|---|---|---|
| **1** | **A0A341P0J7** | **Ribosomal_L18e/L15P domain-containing protein** | **-4.04** | **1.3E-08** |
| 2 | A0A3B5XW22 | Ribosomal_L18e/L15P domain-containing protein | -4.04 | 1.3E-08 |
| 3 | A0A3B5YUR9 | O-acyltransferase OS=*Triticum aestivum*OX=4565 PE=3 | -3.36 | 2.6E-06 |
| 4 | A0A3B5ZR87 | O-acyltransferase OS=*Triticum aestivum*OX=4565 PE=3 | -3.36 | 2.6E-06 |
| **5** | **A0A3B5XY29** | **O-acyltransferase OS=*Triticum aestivum*OX=4565 PE=3** | **-3.36** | **2.6E-06** |
| 6 | P42755 | Em protein H5 OS=*Triticum aestivum*OX=4565 | -2.68 | 2.2E-04 |
| **7** | **A0A3B6QIX8** | **Uncharacterized protein OS=*Triticum*** | **-2.42** | **8.8E-04** |
| **8** | **Q2PCD1** | **Non-specific lipid-transfer protein OS=*Triticum*** | **-2.42** | **9.2E-04** |
| 9 | Q2PCB7 | Non-specific lipid-transfer protein OS=*Triticum* | -2.42 | 9.2E-04 |
| **10** | **P21292** | **Gamma-gliadin OS=*Triticum aestivum*OX=4565 PE=3** | **-2.33** | **1.4E-03** |
| 11 | A0A3B5ZR06 | Usp domain-containing protein OS=*Triticum* | -2.25 | 2.2E-03 |
| **12** | **A0A3B5YTN4** | **Usp domain-containing protein OS=*Triticum*** | **-2.25** | **2.2E-03** |
| 13 | Q2TN84 | USP family protein OS=*Triticum aestivum*OX=4565 PE=2 | -2.25 | 2.2E-03 |
| 14 | A0A3B6EQZ2 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.11 | 4.2E-03 |
| 15 | A0A077S457 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.11 | 4.2E-03 |
| 16 | A0A3B6DPQ2 | Ribosomal_L28e domain-containing protein OS=*Triticum* | -2.11 | 4.2E-03 |
| **17** | **W5EH10** | **Ribonucloprotein OS=*Triticum aestivum*OX=4565 PE=3** | **-1.8** | **1.6E-02** |
| **18** | **A0A077RFQ1** | **Uncharacterized protein OS=*Triticum*** | **-1.8** | **1.6E-02** |
| 19 | W5D700 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.8 | 1.6E-02 |
| 20 | A0A3B6PPD5 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.76 | 2.1E-02 |
| 21 | A0A3B6QHH9 | Uncharacterized protein OS=*Triticum aestivum*OX=4565 | -1.76 | 2.1E-02 |
| **22** | **A0A3B6NU51** | **Uncharacterized protein OS=*Triticum*** | **-1.76** | **2.1E-02** |
| 23 | A0A3B6N0M6 | Histone domain-containing protein OS=*Triticum* | -1.72 | 2.2E-02 |
| 24 | A0A3B6FKN7 | Histone domain-containing protein OS=*Triticum* | -1.72 | 2.2E-02 |
| 25 | A0A3B6MZX9 | Histone domain-containing protein OS=*Triticum* | -1.72 | 2.2E-02 |
| 26 | A0A3B6KB74 | Histone domain-containing protein OS=*Triticum* | -1.72 | 2.2E-02 |
| 27 | A0A3B5YUS5 | Usp domain-containing protein OS=*Triticum* | -1.71 | 2.3E-02 |
| **28** | **A0A3B6B9R9** | **Clathrin light chain OS=*Triticum aestivum*OX=4565** | **-1.69** | **2.4E-02** |
| 29 | A0A3B6CGJ7 | Clathrin light chain OS=*Triticum aestivum*OX=4565 PE=3 | -1.69 | 2.4E-02 |
| 30 | A0A3B6DN22 | Clathrin light chain OS=*Triticum aestivum*OX=4565 PE=3 | -1.69 | 2.4E-02 |
| 31 | A0A3B6B9J0 | Clathrin light chain OS=*Triticum aestivum*OX=4565 PE=4 | -1.69 | 2.4E-02 |
| **32** | **W5G990** | **Uncharacterized protein OS=*Triticum*** | **-1.63** | **3.0E-02** |
| **33** | **W5ASA4** | **Uncharacterized protein OS=*Triticum*** | **-1.62** | **3.2E-02** |

| | | | | |
|---|---|---|---|---|
| **34** | **A0A3B5Y2C5** | **BOWMAN_BIRK domain-containing protein** | **-1.55** | **4.6E-02** |

**Table S9. List of differentially expressed proteins selected for protein-metabolite molecular docking analysis**

| Sr. No. | UniProt Accession | Description *(remarks)* |
|---|---|---|
| 1. | A0A3B6ST91 | Histone H2A |
| 2. | A0A3B6TZF9 | Histone H2A |
| 3. | A0A3B6KHG3 | Helicase ATP-binding domain-containing protein |
| 4. | A0A3B6MR97 | Helicase ATP-binding domain-containing protein |
| 5. | A0A3B6LIU4 | Uncharacterized protein (Helicase ATP-binding domain-containing protein) |
| 6. | A0A3B6KGU0 | Helicase ATP-binding domain-containing protein |
| 7. | A0A3B6KGS8 | Helicase ATP-binding domain-containing protein |
| 8. | A0A3B6LKH3 | Uncharacterized protein (Helicase ATP-binding domain-containing protein) |
| 9. | A0A3B6JMY4 | Plasma membrane ATPase *(Proton transport; intracellular pH regulation; ATP hydrolysis)* |
| 10. | A0A3B6JQ63 | Plasma membrane ATPase *(Proton transport across plasma membrane; ATP hydrolysis)* |
| 11. | A0A3B6ETW5 | Uncharacterized *(Methyltransferase activity)* |
| 12. | A0A3B6ER07 | Peptidase A1 domain-containing protein *(Protein metabolic process)* |
| 13. | Q8H0B8 | Cold regulated protein |
| 14. | A0A3B6TQ10 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 15. | A0A3B6FHE6 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 16. | A0A3B6ECS7 | PH domain-containing protein |
| 17. | Q00445 | Small heat shock protein, chloroplastic |
| 18. | A0A3B6SLX4 | 40S ribosomal protein S21 |
| 19. | Q1XHC6 | Cysteine proteinase inhibitor |
| 20. | A0A3B6A2J7 | Aspartic proteinase *(Lipid/protein metabolic process)* |
| 21. | A0A077RWR2 | SHSP domain-containing protein |
| 22. | O24400 | Superoxide dismutase [Cu-Zn] |
| 23. | A0A3B5YS67 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 24. | A0A3B5Y2Z7 | Bowman-Birk serine protease inhibitors family domain-containing protein |
| 25. | A0A077S7C3 | Peroxidase |
| 26. | A0A3B6PQU5 | ATP synthase subunit O, mitochondrial *(Biosyntheis, inner mitochondrial membrane transport)* |
| 27. | A0A3B6NTF1 | ATP synthase subunit O, mitochondrial *(Biosyntheis, inner mitochondrial membrane; proton-transport)* |
| 28. | A0A3B6NTT5 | Uncharacterized *(Inner mitochondrial membrane protein; proton transport)* |
| 29. | D0EWS4 | Avenin-like b7 *(Nutrient reservoir acitivity; seed storage; glutenin-linked)* |
| 30. | A0A3B5XUE9 | Knottin scorpion toxin-like domain-containing protein |
| 31. | A0A3B6KVB9 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 32. | Q6QAX7 | Bowman-Birk serine protease inhibitors family domain-containing protein |
| 33. | A0A3B6LTT9 | H15 domain-containing protein |
| 34. | A0A3B6LW98 | rRNA N-glycosidase *(Plant defense; translation; response to stress)* |
| 35. | A0A3B5ZU79 | Histone H2A/H2B/H3 domain-containing protein |

| | | |
|---|---|---|
| 36. | A0A3B6H417 | Cytochrome b5 heme-binding domain-containing protein |
| 37. | P93692 | Serpin-Z2B *(Protease inhibitor; extracellular)* |
| 38. | A0A3B5XUN1 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 39. | P30569 | EC protein I/II *(Zn binding (storage); Experimental str PDB)* |
| 40. | M9TLK0 | Gamma gliadin-B2 |
| 41. | A0A3B6MXN3 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 42. | W5D003 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein *(Alpha-amylase inhibitor; AAI domain-containing)* |
| 43. | P81713 | Bowman-Birk type trypsin inhibitor *(Enzyme regulator; extracellular)* |
| 44. | A0A3B6KIU4 | Bet v I/Major latex protein domain-containing protein *(Predicted; uncharacterised - unknown function; homologs - A0A3B6MUY3, A0A3B6U2D8)* |
| 45. | W5HK94 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 46. | A0A3B6PHC0 | Prolamin *(AAI domain-containing; related to gliadin; seed storage protein)* |
| 47. | Q4U1A4 | Dimeric alpha-amylase inhibitor *(Enzyme regulator; extracellular)* |
| 48. | Q41579 | Rab protein |
| 49. | A0A3B6JLE2 | Gamma-interferon-inducible lysosomal thiol reductase |
| 50. | A0A3B6LV22 | H15 domain-containing protein |
| 51. | D2KFG9 | Prolamin *(Gliadin/avenin-like seed protein; nutrient reservoir activity)* |
| 52. | A0A3B6IQ78 | Uncharacterized *(oxidoreductase activity, acting on sulfur group of donors, disulfide as acceptor)* |
| 53. | A0A3B6KQR9 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein *(AAI domain-containing)* |
| 54. | W5EAP3 | Ribosomal protein *(Translation; biosynthesis; large ribosomal subunit constituent)* |
| 55. | A0A060AQ78 | Defensin |
| 56. | D6QZM4 | Avenin-like b9 *(Nutrient reservoir acitivity; seed storage)* |
| 57. | A0A3B6PKG6 | Uncharacterized *(Membrane transport: organophosphate ester, organic anion)* |
| 58. | A0A3B6LF34 | Thaumatin-like protein *(Defense; response to stress)* |
| 59. | A0A3B5ZQG9 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 60. | A0A3B6MUH5 | Knottin scorpion toxin-like domain-containing protein *(Defense; response to stress)* |
| 61. | A0A3B6JL06 | Gamma-interferon-inducible lysosomal thiol reductase *(Oxidoreductase acitivity)* |
| 62. | A0A3B6U5I1 | Prolamin *(AAI domain-containing; related to gliadin; seed storage protein; nutrient reservoir activity)* |
| 63. | A0A3B6TKB5 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein |
| 64. | A0A3B6GR96 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein *(AAI domain-containing)* |
| 65. | A0A3B5YPZ7 | Prolamin *(AAI domain-containing protein; related to gliadin; seed storage protein)* |
| 66. | A0A3B6JQP1 | Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein *(AAI domain-containing)* |
| 67. | A0A3B6ATQ1 | Large ribosomal subunit protein uL15/eL18 domain-containing protein *(Experimental str PDB)* |
| 68. | A0A0K2QJB4 | Prolamin (Alpa/beta-gliadin) *(Related to gliadin; seed storage protein)* |
| 69. | P01085 | Alpha-amylase inhibitor 0.19 *(X-ray Exp Str RCSB; extracellular)* |
| 70. | I0IT56 | Prolamin (Alpa/beta-gliadin) *(Related to gliadin; seed storage protein)* |

**Table S10. PubChem compound ID of differentially expressed metabolites used in molecular docking analysis**

| Sr. No. | Metabolite | PubChem compound ID |
|---|---|---|
| 1. | Allantoin | 204 |
| 2. | CaprylicAcid | 379 |
| 3. | Glycine | 750 |
| 4. | Glyceric acid | 752 |
| 5. | Glycerol | 753 |
| 6. | Inositol | 892 |
| 7. | Oxalic acid | 971 |
| 8. | Palmitic acid | 985 |
| 9. | Pyruvic acid | 1060 |
| 10. | Succinic acid | 1110 |
| 11. | Strearic acid | 5281 |
| 12. | Glucose | 5793 |
| 13. | Alanine | 5950 |
| 14. | Serine | 5951 |
| 15. | Aspartic acid | 5960 |
| 16. | Sucrose | 5988 |
| 17. | Galactose | 6036 |
| 18. | L-methionine | 6137 |
| 19. | D-mannitol | 6251 |
| 20. | Maltose | 6255 |
| 21. | Valine | 6287 |
| 22. | Xylitol | 6912 |
| 23. | Pyroglutamic acid | 7405 |
| 24. | Trehalose | 7427 |
| 25. | Glutamic acid | 33032 |
| 26. | Arabinonic acid | 122045 |
| 27. | Oleic acid | 445639 |
| 28. | D-fructose | 2723872 |
| 29. | Jasmonic acid | 5281166 |
| 30. | L-threonic acid | 5460407 |

**Table S11. Binding affinities of upregulated proteins with metabolites estimated in molecular docking analysis**

| Protein description | Protein accession | Metabolite | Binding affinity ΔG (Kcal/mol) |
|---|---|---|---|
| Peroxidase | a0a077s7c3 | Stearic acid | -6.8 |
| | | Allantoin | -6.4 |
| | | Trehalose | -6.1 |
| Prolamin/Gliadin | a0a0k2qjb4 | Trehalose | -6.6 |
| | | Sucrose | -6.4 |
| | | Maltose | -6.1 |
| Prolamin/Gliadin | a0a3b5ypz7 | Trehalose | -7 |
| | | Maltose | -6.7 |
| | | Sucrose | -6.1 |
| Prolamin/Gliadin | a0a3b6phc0 | Trehalose | -6.1 |
| | | **Maltose** | **-5.9** |
| | | **Sucrose** | **-5.8** |
| Prolamin (Gliadin/avenin-like seed protein) | d2kfg9 | Sucrose | -6 |
| | | Trehalose | -6 |
| | | **Maltose** | **-5.9** |
| Avenin-like b7 | d0ews4 | Trehalose | -6.5 |
| | | Maltose | -6.3 |
| | | Sucrose | -6 |
| Avenin-like b9 | d6qzm4 | Trehalose | -6.6 |
| | | **Sucrose** | **-5.9** |
| | | **Maltose** | **-5.9** |
| | | **D-Fructose** | **-5.9** |
| Plasma membrane ATPase | a0a3b6jmy4 | JasmonicAcid | -6.2 |
| | | Sucrose | -6.1 |
| | | Maltose | -6.3 |
| | | Trehalose | -6.5 |
| Plasma membrane ATPase | a0a3b6jq63 | Allantoin | -6.3 |
| | | Sucrose | -6.5 |
| | | Maltose | -6.1 |
| | | Trehalose | -6.1 |
| Helicase ATP-binding domain-containing protein | a0a3b6kgs8 | Allantoin | -6.3 |
| | | Glucose | -6.5 |
| | | Sucrose | -7.6 |
| | | Galactose | -6.6 |
| | | Maltose | -7.6 |
| | | Trehalose | -6.3 |
| | | **GlutamicAcid** | **-5.9** |
| | | **Xylitol** | **-5.8** |
| Helicase ATP-binding domain-containing protein | a0a3b6kgu0 | Sucrose | -6.4 |
| | | Maltose | -6.2 |
| | | Trehalose | -6 |
| Helicase ATP-binding domain-containing protein | a0a3b6khg3 | D-Fructose | -6.2 |
| | | Glucose | -6.4 |
| | | Sucrose | -6 |
| | | Galactose | -6.7 |
| | | D-Mannitol | -6 |
| | | Maltose | -7.2 |

| | | | |
|---|---|---|---|
| | | Trehalose | -6 |
| | | Inositol | -6.7 |
| Helicase ATP-binding domain-containing protein | a0a3b6liu4 | D-Fructose | -6.6 |
| | | Glucose | -6.6 |
| | | Sucrose | -7.8 |
| | | Galactose | -6.6 |
| | | D-Mannitol | -6 |
| | | Maltose | -7.7 |
| | | Trehalose | -6.5 |
| | | Inositol | -6.3 |
| Helicase ATP-binding domain-containing protein | a0a3b6lkh3 | ArabinonicAcid | -6 |
| | | D-Fructose | -6.3 |
| | | Glucose | -6.4 |
| | | Sucrose | -6.7 |
| | | Galactose | -6.6 |
| | | Maltose | -7.7 |
| | | Trehalose | -6.1 |
| | | Inositol | -6.3 |
| Helicase ATP-binding domain-containing protein | a0a3b6mr97 | ArabinonicAcid | -6 |
| | | D-Fructose | -6.4 |
| | | Glucose | -6.4 |
| | | Galactose | -6.4 |
| | | Trehalose | -6.7 |
| Knottin scorpion toxin-like domain-containing protein | a0a3b6muh5 | Trehalose | -6.3 |
| Uncharacterized (ATP synthase subunit O, mitochondrial) | a0a3b6ntf1 | Maltose | -6 |
| Uncharacterized | a0a3b6pkg6 | Maltose | -6.1 |
| | | Sucrose | -6 |
| Ribosomal protein (ribonucleoprotein) | w5eap3 | Trehalose | -6.2 |
| | | Maltose | -6.1 |
| | | **Sucrose** | **-5.7** |
| Uncharacterized protein | a0a3b6kiu4 | CaprylicAcid | -6.3 |
| Thaumatin-like protein | a0a3b6lf34 | Sucrose | -6.2 |
| | | **Trehalose** | **-5.9** |
| rRNA N-glycosidase | a0a3b6lw98 | Sucrose | -6.9 |
| | | Maltose | -6.8 |
| | | Trehalose | -6 |
| | | **JasmonicAcid** | **-5.9** |
| Uncharacterized (Gamma-interferon-inducible lysosomal thiol reductase) | a0a3b6iq78 | Trehalose | -6.1 |
| | | **Sucrose** | **-5.9** |
| Defensin | a0a060aq78 | **Trehalose** | **-5.7** |
| PH domain-containing protein | a0a3b6ecs7 | Maltose | -6.1 |
| Aspartic proteinase (lipid/protein metabolic process) | a0a3b6a2j7 | Maltose | -7.2 |
| | | Trehalose | -6.8 |
| | | Sucrose | -6.2 |
| Peptidase A1 domain-containing protein (proteolysis) | a0a3b6er07 | Sucrose | -6.2 |
| | | Trehalose | -6.2 |
| | | **Maltose** | **-5.9** |
| Uncharacterised (SAM-dependent methyltransferase) | a0a3b6etw5 | Maltose | -6.4 |

| | | | |
|---|---|---|---|
| | | Sucrose | -6.3 |
| | | Trehalose | -6.1 |
| | | JasmonicAcid | -6 |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | a0a3b6fhe6 | Trehalose | -6.4 |
| | | Maltose | -6.3 |
| | | **Sucrose** | **-5.9** |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | a0a3b6gr96 | Trehalose | -6.4 |
| | | Maltose | -6 |
| | | **Sucrose** | **-5.9** |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | a0a3b6mxn3 | JasmonicAcid | -7.2 |
| | | Sucrose | -6.3 |
| | | **Allantoin** | **-5.8** |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | a0a3b5ys67 | **Allantoin** | **-5.7** |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | w5d003 | Trehalose | -6.1 |
| | | **Maltose** | **-5.8** |
| | | **Allantoin** | **-5.7** |
| Bifunctional inhibitor/plant lipid transfer protein/seed storage helical domain-containing protein | a0a3b6kqr9 | **OleicAcid** | **-5.8** |
| | | **JasmonicAcid** | **-5.8** |
| | | **Trehalose** | **-5.7** |
| Alpha-amylase inhibitor 0.19 (X-ray Str) | p01085 | Trehalose | -6.1 |
| | | **JasmonicAcid** | **-5.9** |
| Dimeric alpha-amylase inhibitor | q4u1a4 | Maltose | -6.8 |
| | | Trehalose | -6.5 |
| | | Allantoin | -6.3 |
| | | Sucrose | -6.2 |
| | | Inositol | -6.1 |
| | | **JasmonicAcid** | **-5.8** |
| Bowman-Birk type trypsin inhibitor | p81713 | Maltose | -6.3 |
| | | Trehalose | -6.3 |
| | | Sucrose | -6.2 |
| Serpin-Z2B (trypsin inhibitor) | p93692 | Maltose | -6.1 |
| | | Trehalose | -6.1 |
| | | **Sucrose** | **-5.8** |
| Cold regulated protein | q8h0b8 | **Sucrose** | **-5.9** |
| | | **JasmonicAcid** | **-5.8** |

Absolute binding affinities lower than 6.0 Kcal/mol are marked in bold. Binding affinity values corresponds to the best binding mode generated by AutoDock Vina

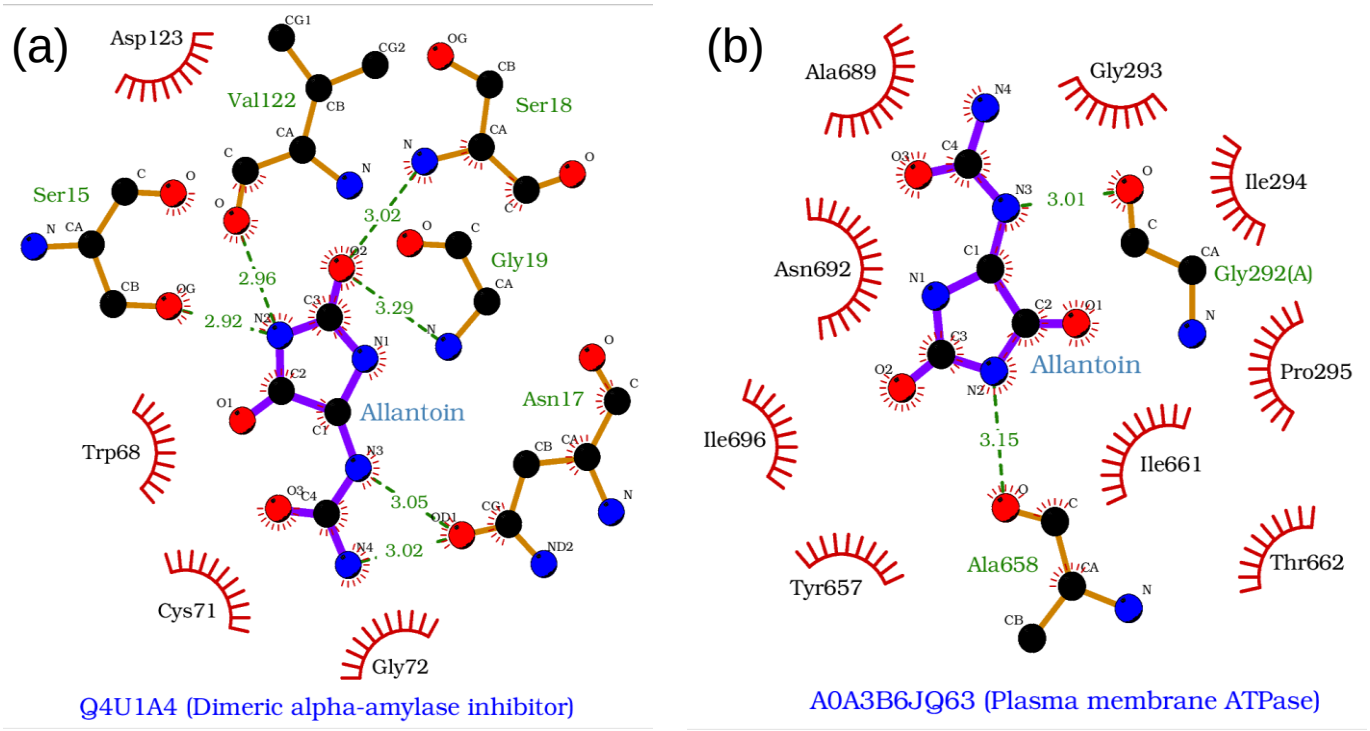
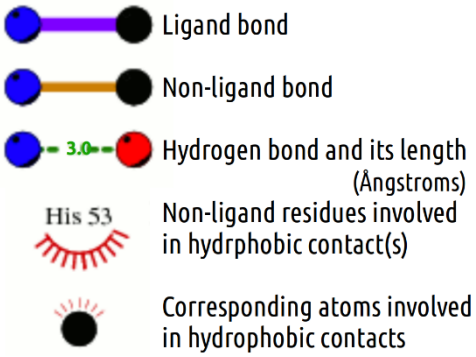



**Fig. S1.** LigPlot representation of molecular docking analysis of **(a)** Alpha-amylase inhibitor and allantoin **(b)** Plasma membrane ATPase and allantoin



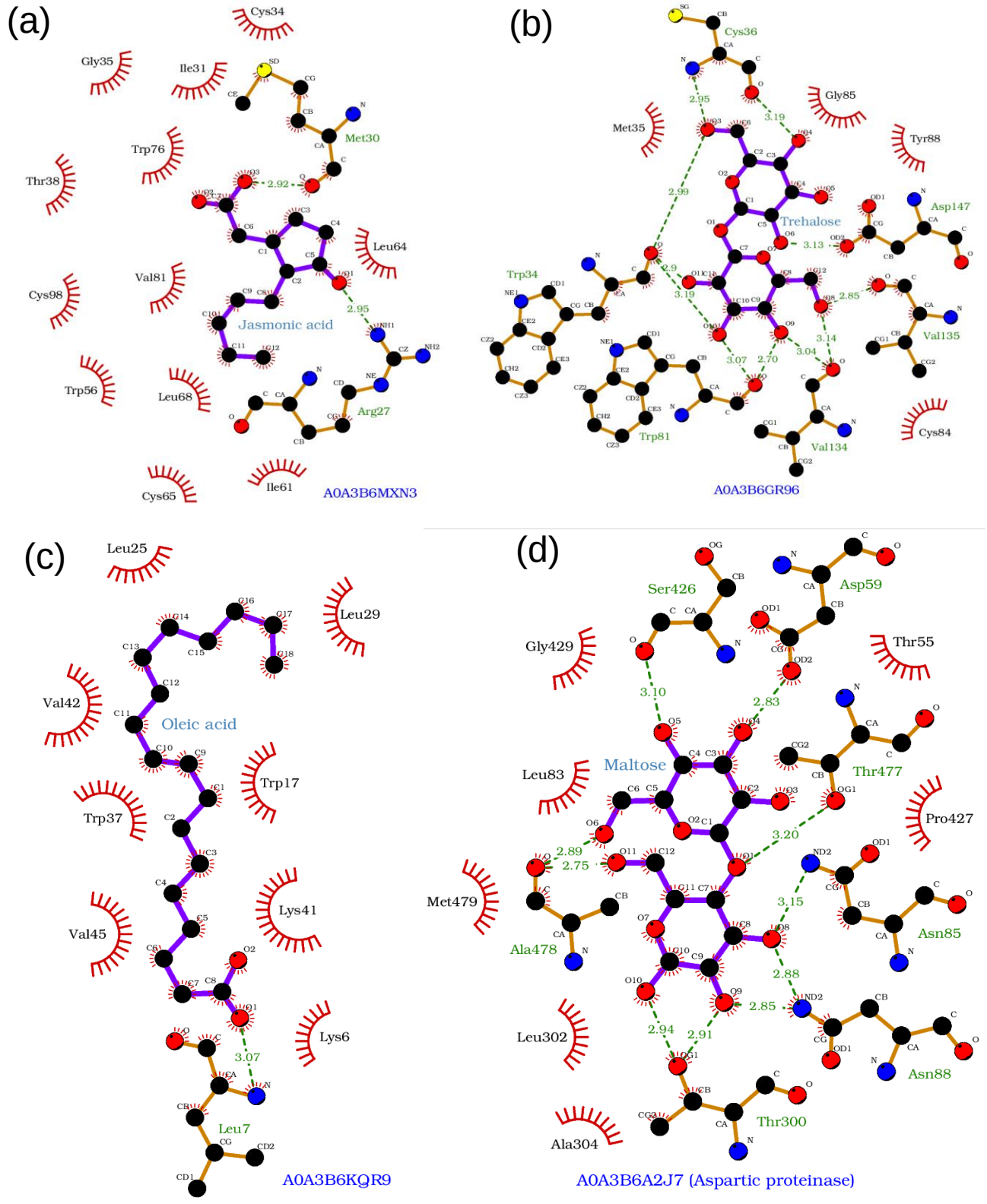



**Fig. S2.** LigPlot representation of molecular docking analysis of bifunctional inhibitor/ plant lipid transfer/ seed storage helical domain-containing proteins with **(a)** Jasmonic acid **(b)** Trehalose and **(c)** Oleic acid **(d)** LigPlot representation of docked aspartic proteinase – maltose complex

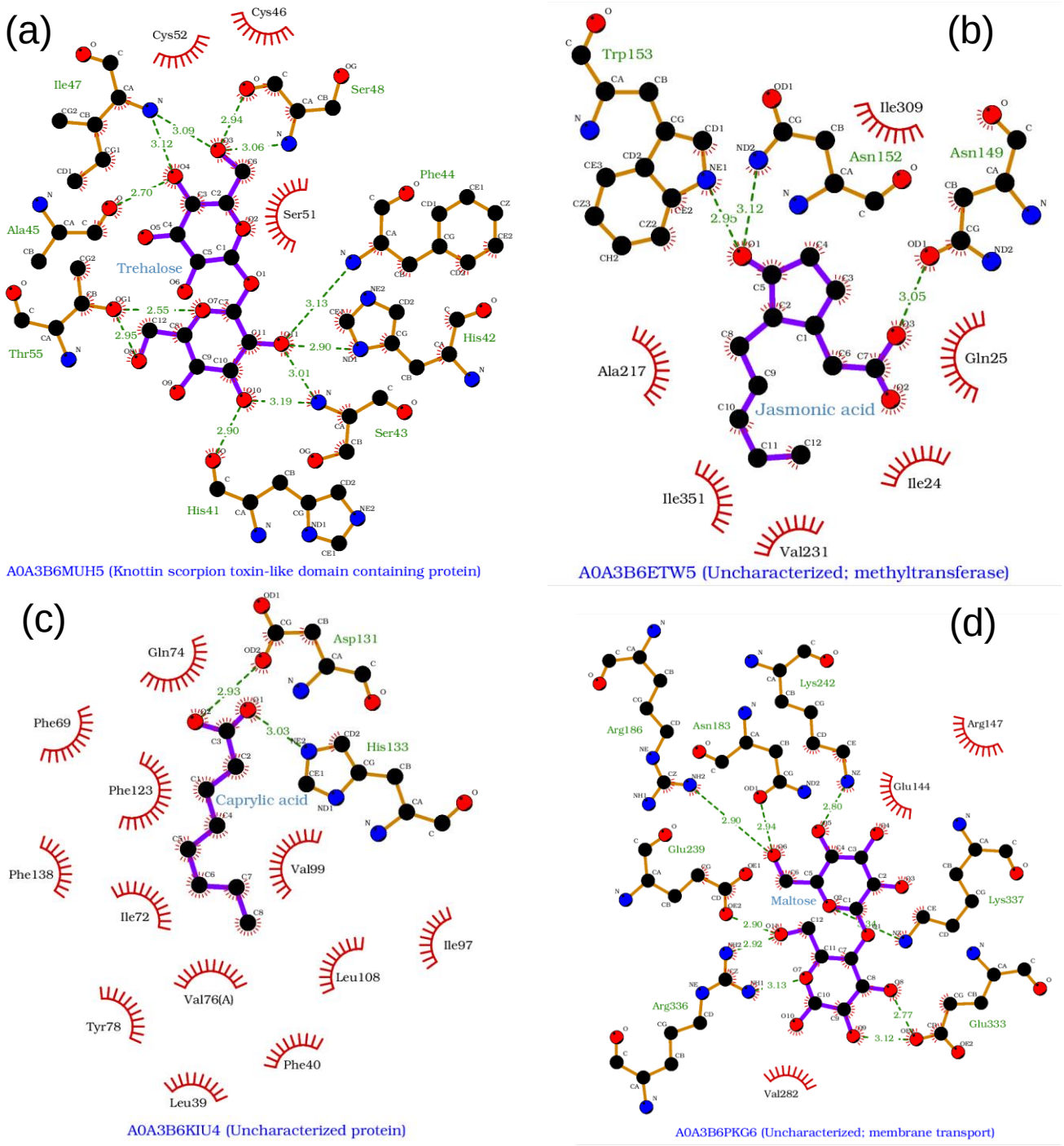



**Fig. S3.** LigPlot representation of molecular docking analysis of **(a)** Knottin and trehalose **(b)** Methyltransferase and jasmonic acid **(c)** Uncharacterised protein A0A3B6KIU4 and caprylic acid, and **(d)** Uncharacterised multi-pass membrane transport protein with maltose

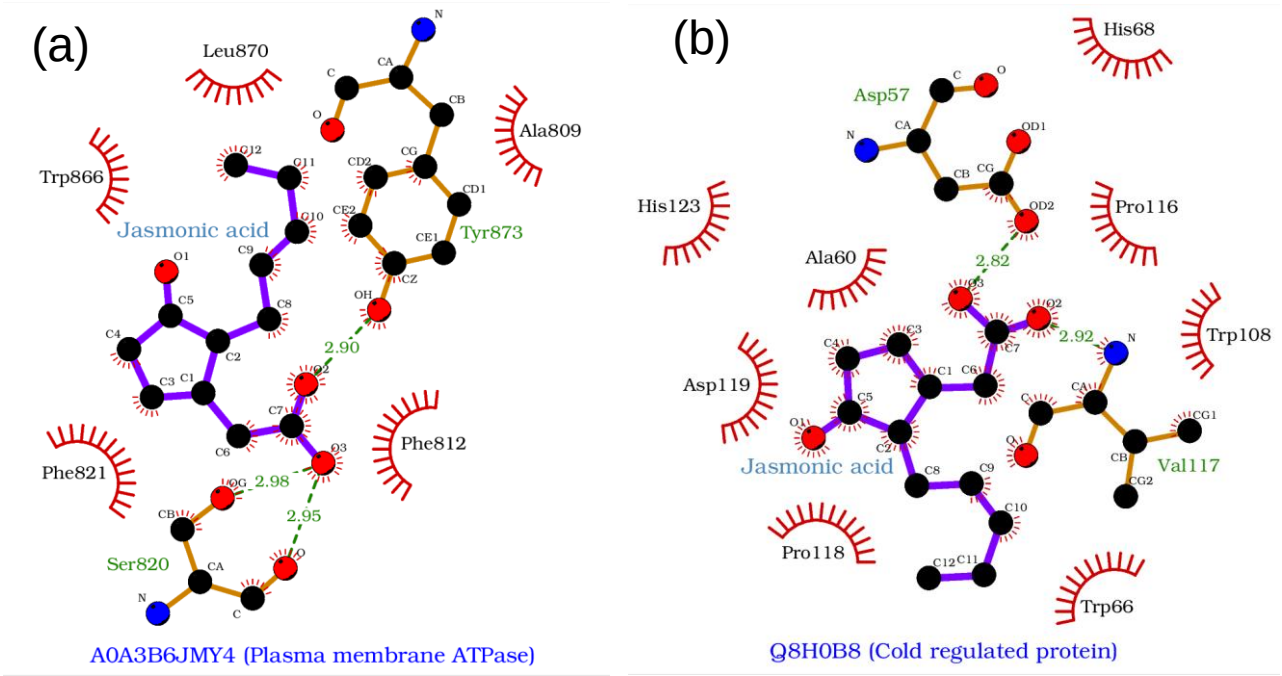



**Fig. S4.** LigPlot representation of molecular docking analysis of **(a)** Plasma membrane ATPase and jasmonic acid **(b)** Cold regulated protein and jasmonic acid

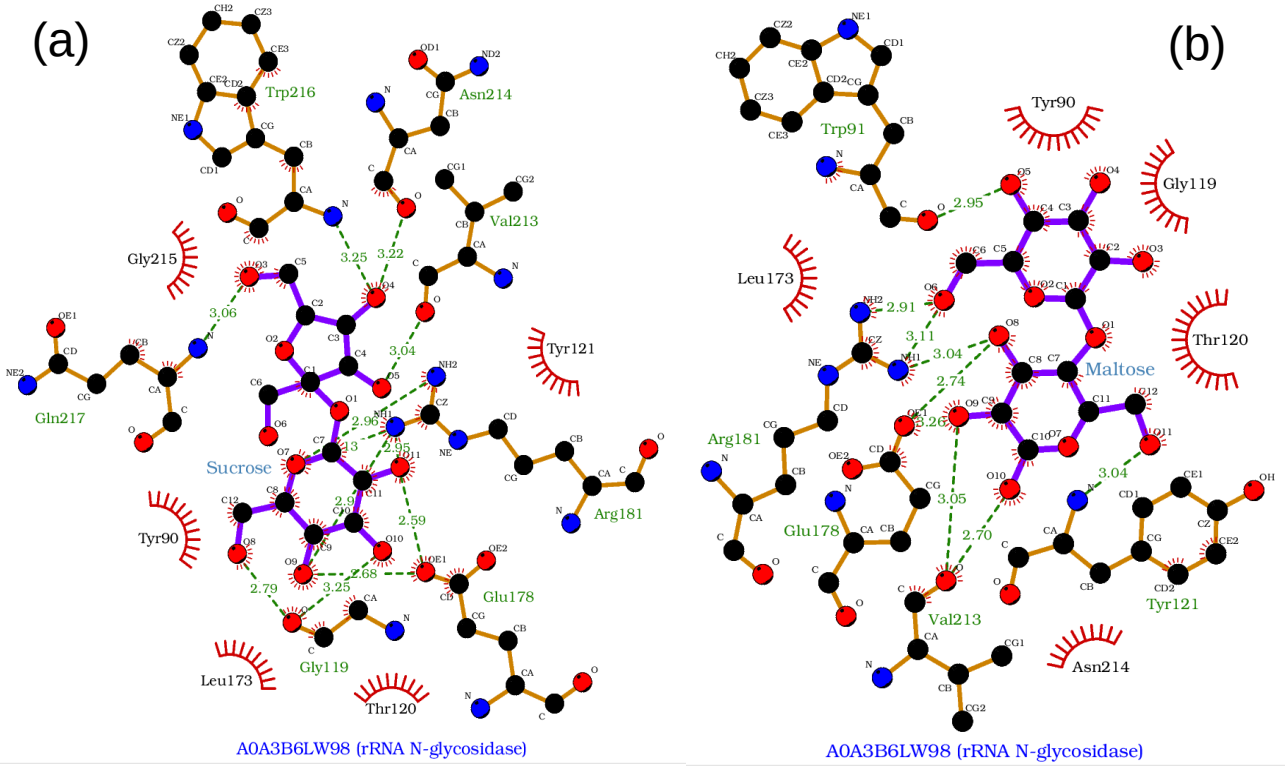



**Fig. S5.** LigPlot representation of molecular docking analysis of ribosomal RNA N-glycosidase with **(a)** Sucrose and **(b)** Maltose

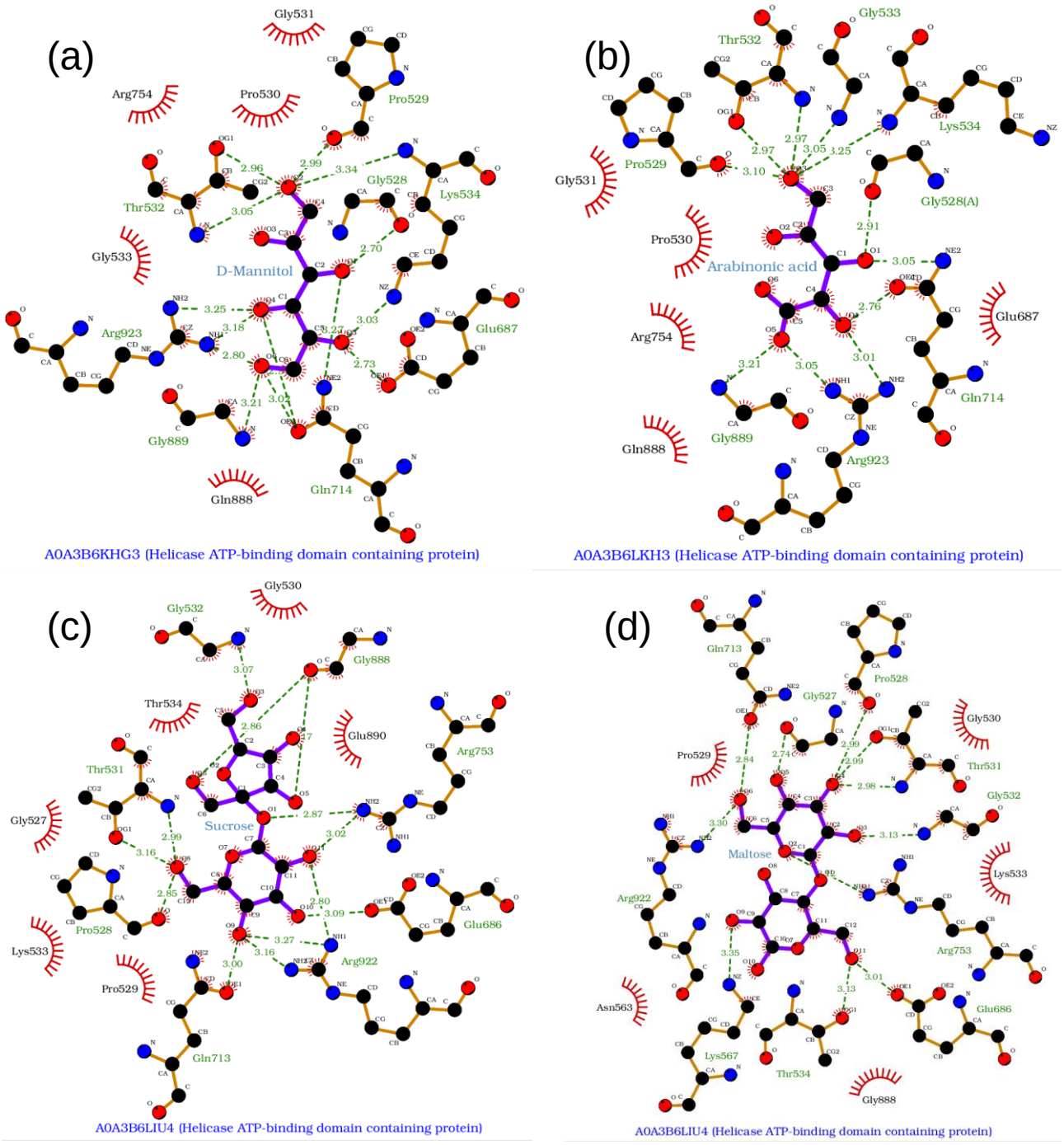



**Fig. S6.** LigPlot representation of molecular docking analysis of helicase ATP-binding domain-containing proteins with **(a)** D-mannitol **(b)** Arabinonic acid **(c)** Sucrose and **(d)** Maltose

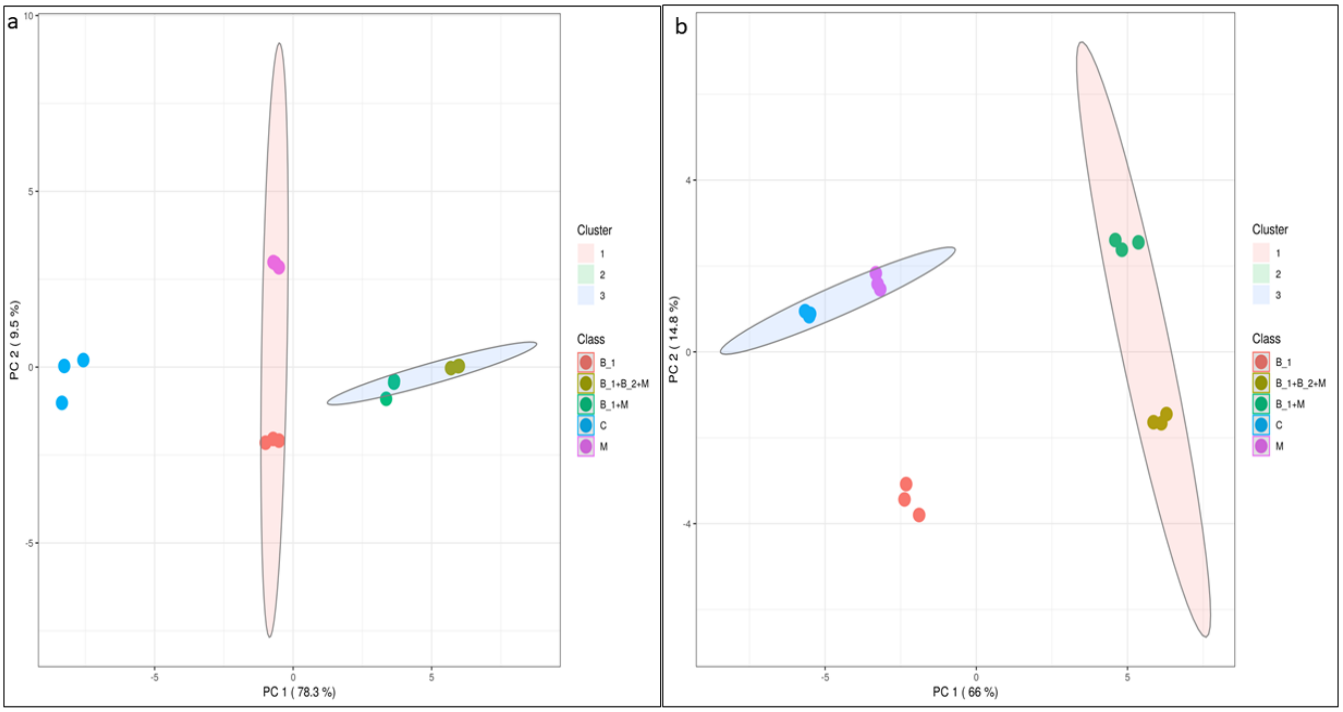



**Fig. S7.** Overview of the metabolomic reprogramming in wheat subjected to PGPB and/or AMF treatment. Unsupervised PCA score plots for **(a)** grain and **(b)** root show sample projections onto PC1 and PC2, with axis labels indicating the percentage of variance explained by each component. PCA was used for exploratory assessment of overall variance structure, replicate clustering, and potential outliers. Group labels: B1 = CP4, B1+B2+M = CP4+AHP3+AMF, B1+M = CP4+AMF, M = AMF, C = control.

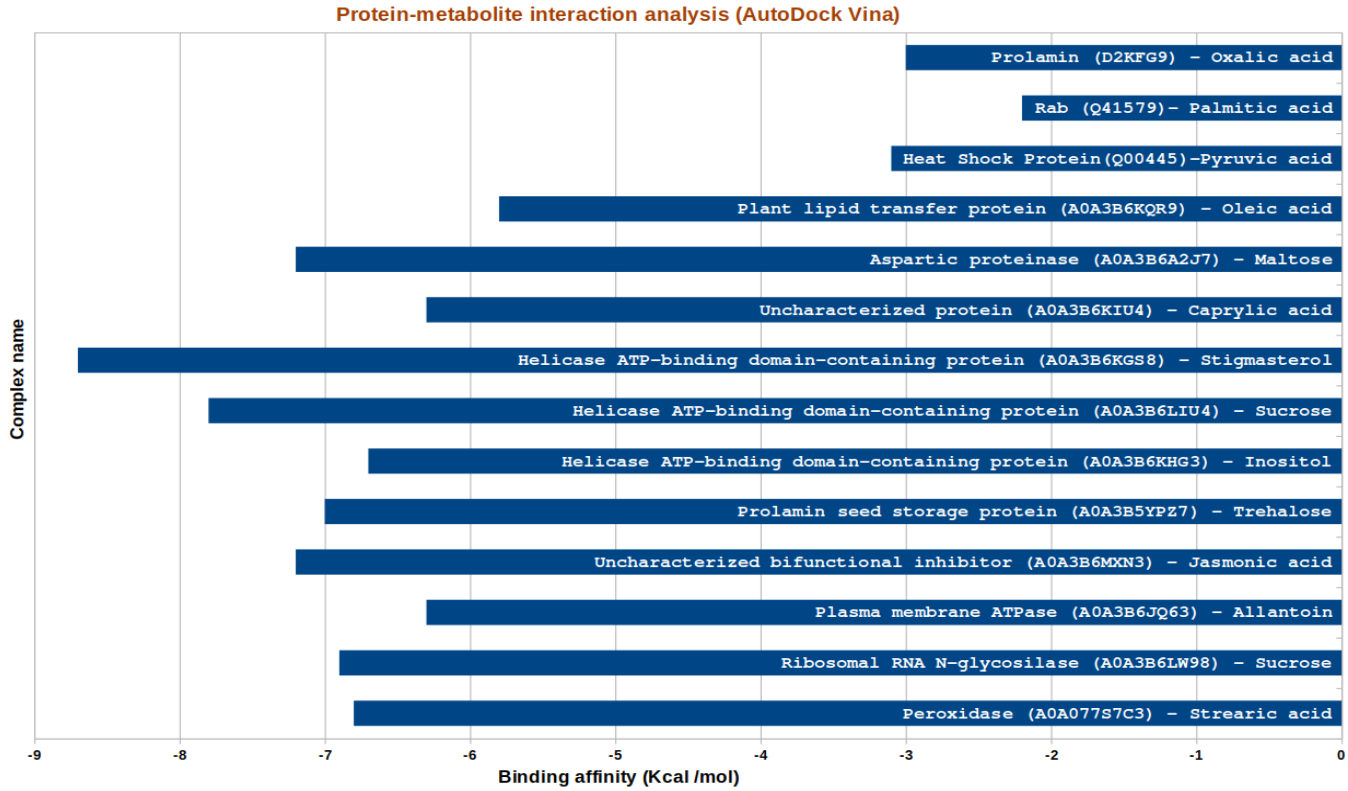



**Fig. S8.** Binding affinities of selected protein-metabolite complexes predicted using AutoDock *Vina* scoring function