### Table S1. Orthologous relationship of the clustered genes in different fungal species.

| M. robertsii Gene | Annotation                                      | U. virens | A. fumigatus |
|-------------------|------------------------------------------------|-----------|--------------|
| EXV01523          | MrGT1   UDP-glucosyltransferase                | UV8b_01806| /            |
| EXV01522          | MrMT1   FkbM family methyltransferase         | UV8b_01807| /            |
| EXU98528          | hypothetical protein                          | UV8b_03447| /            |
| EXU98527          | amino acid permease                           | UV8b_05995| AfuA_5g00710 |
| EXU98526          | oxidoreductase                                | UV8b_05851| /            |
| EXU98525          | hypothetical protein                          | UV8b_03468| AfuA_3g00850 |
| **EXU98524**      | **mUSTP** polyketide synthase                 | UV8b_01134| **UstP/ UvPKS1** |
| EXU98523          | mUSTZ   EthD domain-containing dehydratase     | UV8b_01135| UstZ/UsgD     |
| EXU98522          | mUSTT   Major facilitator superfamily transporter | UV8b_01136| UstT/UsgT     |
| EXU98521          | mUSTE   Phospholipid methyltransferase         | UV8b_01137| UstE/UsgR     |
| EXU98520          | mUSTM   Methyltransferase                     | UV8b_01138| UstM/UsgM     |
| EXU98519          | mUSTL   Laccase                               | UV8b_01139| UstL/UsgL     |
| EXU98518          | IDI-3 protein                                 | /          | /            |
| EXU98517          | hypothetical protein                          | /          | /            |
|                   | / / / polyketide synthase                     | /          | AfuA_8g00370, FmaB |
|                   | / / / DUF1100 domain protein                  | /          | AfuA_8g00380, FmaC |
| EXU98516          | mFmaD   O-methyltransferase B                 | /          | AfuA_8g00390, FmaD |
| EXU98515          | mPsoE   Glutathione S-transferase             | /          | AfuA_8g00580, PsoE |
| EXU98514          | hypothetical protein                          | /          | AfuA_8g00550 |
| EXU98513          | mPsoG   hypothetical protein                  | /          | AfuA_8g00450, PsoG |
| EXU98512          | mPsoF   steroid monoxygenase                  | /          | AfuA_8g00440, PsoF |
| EXU98511          | propionyl-CoA synthase                        | /          | AfuA_8g00500 |
| EXU98510          | methionine aminopeptidase 1                   | /          | AfuA_8g00460 |
| EXU98509          | methionine aminopeptidase 2                   | /          | AfuA_8g00410 |
| EXU98508          | F-box domain, cyclin-like protein             | /          | AfuA_8g00570 |
| EXU98507          | mPsoD   Cytochrome P450 CYP5058A4             | /          | AfuA_8g00560, PsoD |
| EXU98506          | mPsoC   methyltransferase                     | /          | AfuA_8g00550, PsoC |
| **EXU98505**      | **mPsoA** Hybrid PKS-NRPS                    | /          | **AfuA_8g00540, PsoA** |
| EXU98504          | mPsoB   alpha/beta hydrolase                  | /          | AfuA_8g00530, PsoB |
| EXU98503          | Dimeric alpha-beta barrel                     | /          | AfuA_8g00430 |
| **EXU98502**      | **UpmR** C6 finger transcription factor       | /          | **AfuA_8g00420, FapR** |
|                   | / / / DUF4188 domain protein                  | /          | AfuA_8g00470, FmaE |
| EXU98501          | 2OG-Fe(II) oxygenase                          | /          | AfuA_8g00480, FmaF |
| EXU98500          | mFmaF  2OG-Fe(II) oxygenase                   | /          | AfuA_8g00480, FmaF |
| EXU98499          | hypothetical protein                          | /          | AfuA_8g00499 |
| EXU98498          | mFmaG  Cytochrome P450 CYP620F3               | /          | AfuA_8g00510, FmaG |
| EXU98497          | mFmaA  Terpene cyclase                        | /          | AfuA_8g00520, FmaA |
| EXU98496          | FAD-binding protein                           | /          | AfuA_8g00520, FmaA |

Note: MrGT/mrMT gene pairs are shadowed that are located outside the supercluster; Core genes are highlighted in bold. / shows the absence of the homologous genes in respective fungal species.