**Table S1:** Phylogenetic analysis of *CYB5R* and *CYP9A306* in different insect species.

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| **Genes** | **Species Name** |
|  **Phylogenetic analysis of *CYB5R* gene** |
| *PgCYB5R|XM\_050016019.1*  | *Pectinophora gossypiella* |
| *VtCYB5R|XM\_026640170.2* | *Vanessa tameamea* |
| *PxCYB5R|XM\_048624147.1* | *Plutella xylostella* |
| *MjCYB5R|XM\_045918579.1*  | *Maniola jurtina* |
| *MsCYB5R|XM\_030184493.2*  | *Manduca sexta* |
| *OnCYB5R|XM\_063973438.1* | *Ostrinia nubilalis* |
| *OfCYB5R|XM\_028310911.1* | *Ostrinia furnacalis* |
| *CfCYB5R|XM\_063530311.1* | *Cydia fagiglandana* |
| *CsCYB5R|XM\_063681153.1* | *Cydia strobilella* |
| *CpCYB5R|XM\_061862610.1* | *Cydia pomonella* |
| *LgCYB5R|XM\_048136075.1* | *Leguminivora glycinivorella* |
| *CaCYB5R|XM\_063509500.1*  | *Cydia amplana* |
| *HkCYB5R|XM\_026465371.1*  | *Hyposmocoma kahamanoa*  |
| *MhCYB5R|XM\_034978463.2*  | *Maniola hyperantus* |
| *BmCYB5R|XM\_038021569.2* | *Bombyx mori* |
| *BmCYB5R|XM\_028186251.1*  | *Bombyx mandarina* |
| *AtCYB5R|XM\_013343954.2*  | *Amyelois transitella* |
| *GmCYB5R|XM\_026900671.3*  | *Galleria mellonella*  |
| *SfCYB5R|XM\_050693697.1*  | *Spodoptera frugiperda* |
| *BaCYB5R|XM\_052887264.1*  | *Bicyclus anynana* |
| *HaCYB5R|XM\_021339333.3*  | *Helicoverpa armigera* |
| *BaCYB5R|XM\_052887265.1*  | *Bicyclus anynana* |
| *AgCYB5R|XM\_059196773.1*  | *Achroia grisella* |
| *HzCYB5R|XM\_047175907.1*  | *Helicoverpa zea* |
| *SlCYB5R|XM\_022966891.1*  | *Spodoptera litura* |
| *PaCYB5R|XM\_039900520.1*  | *Pararge aegeria* |
| *AaCYB5R|XM\_042126459.1*  | *Aricia agestis* |
| *NoCYB5R|XM\_050491429.1*  | *Nymphalis io* |
| *VaCYB5R|XM\_047679188.1*  | *Vanessa atalanta* |
| *VcCYB5R|XM\_047113429.1*  | *Vanessa cardui* |
| **Phylogenetic analysis of *CYP9A306* gene** |
| *CYP9A306* | *Tuta absoluta* |
| *TaCYP9A307|OQ201153.1* | *Tuta absoluta* |
| *BmCYP9E2|XM\_028181163.1* | *Bombyx mandarina* |
| *BmCYP9A22|EF535805.1* | *Bombyx mori* |
| *HkCYP9E2|XM\_026471279.1* | *Hyposmocoma kahamanoa* |
| *BmCYPA22|NM\_001102464.2* | *Bombyx mori* |
| *CfCYP9E2|XM\_063524980.1* | *Cydia fagiglandana* |
| *EeCYPA198|MW417340.1* | *Ephestia elutella* |
| *OfCYP9E2|XM\_028304899.1* | *Ostrinia furnacalis* |
| *OfCYP9A185MT039805.1* | *Ostrinia furnacalis* |
| *AhCYPA21|LC388686.1* | *Adoxophyes honmai* |
| *OnCYP9E2|XM\_063969119.1* | *Ostrinia nubilalis* |
| *MsCYP9E2|XM\_030179456.2* | *Manduca sexta* |
| *CmCYP9A38|FN421128.1* | *Cnaphalocrocis medinalis* |
| *PgCYP9E2|XM\_050013568.1* | *Pectinophora gossypiella* |
| *HaCYP914|PP163253.1* | *Helicoverpa armigera* |
| *CaCYP9E2|XM\_063505800.1* | *Cydia amplana* |
| *HvCYPA38|MH236464.1* | *Heortia vitessoides* |
| *PoCYPA176|MK761084.1* | *Plecoptera oculata* |
| *AgCYP9E2|XM\_059201988.1* | *Achroia grisella* |
| *PiCYP9E2|XM\_053751744.1* | *Plodia interpunctella* |
| *SeCYP9A10|KX443437.1* | *Spodoptera exigua* |
| *CmCYPA80|KP001132.1* | *Cnaphalocrocis medinalis* |
| *MsCYPA101|MH346410.1* | *Mythimna separata* |
| *CpCYPA120|MF574685.1* | *Cydia pomonella* |
| *CsCYP9E2|XM\_063678275.1* | *Cydia strobilella* |
| *GmCYPA209|MW538482.1* | *Grapholita molesta* |