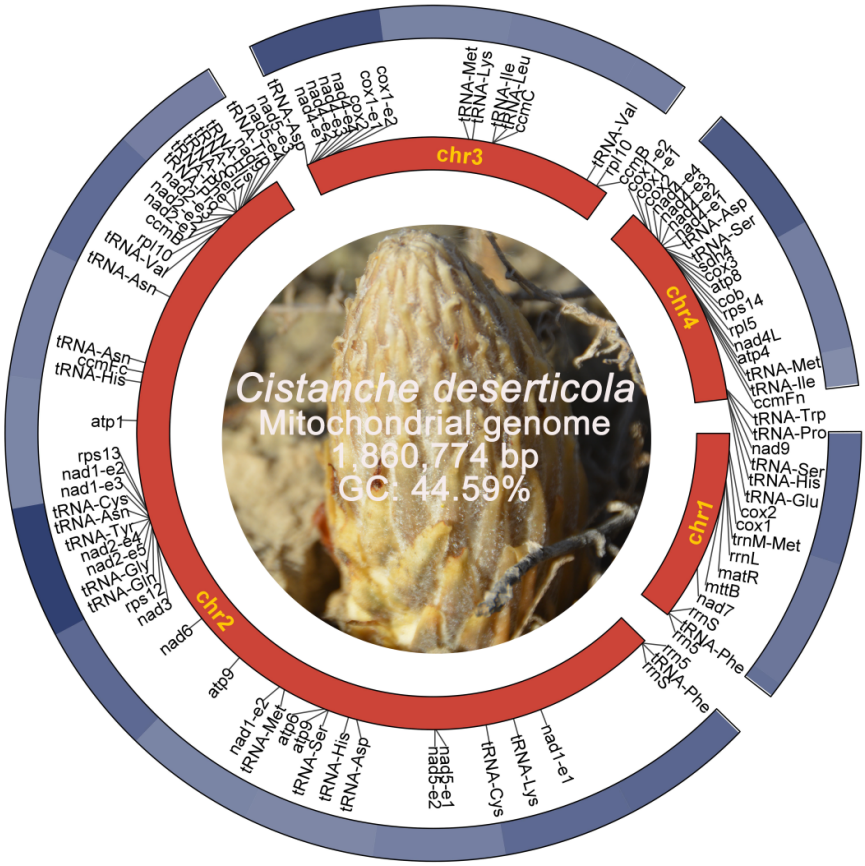


FIGURE S1 | Mitochondrial genome map of *Cistanche deserticola*. The outside circle shows the GC content. The inside circle represents the protein coding gene, tRNA and rRNA.

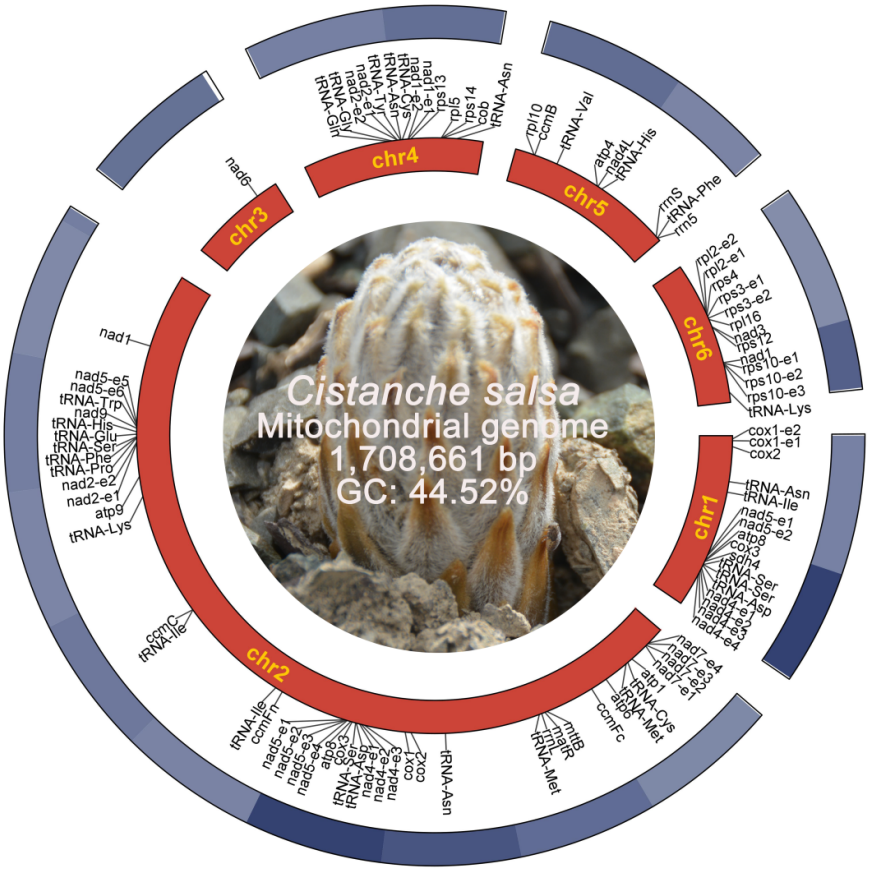


FIGURE S2 | Mitochondrial genome map of *Cistanche salsa*. The outside circle shows the GC content. The inside circle represents the protein coding gene, tRNA and rRNA.

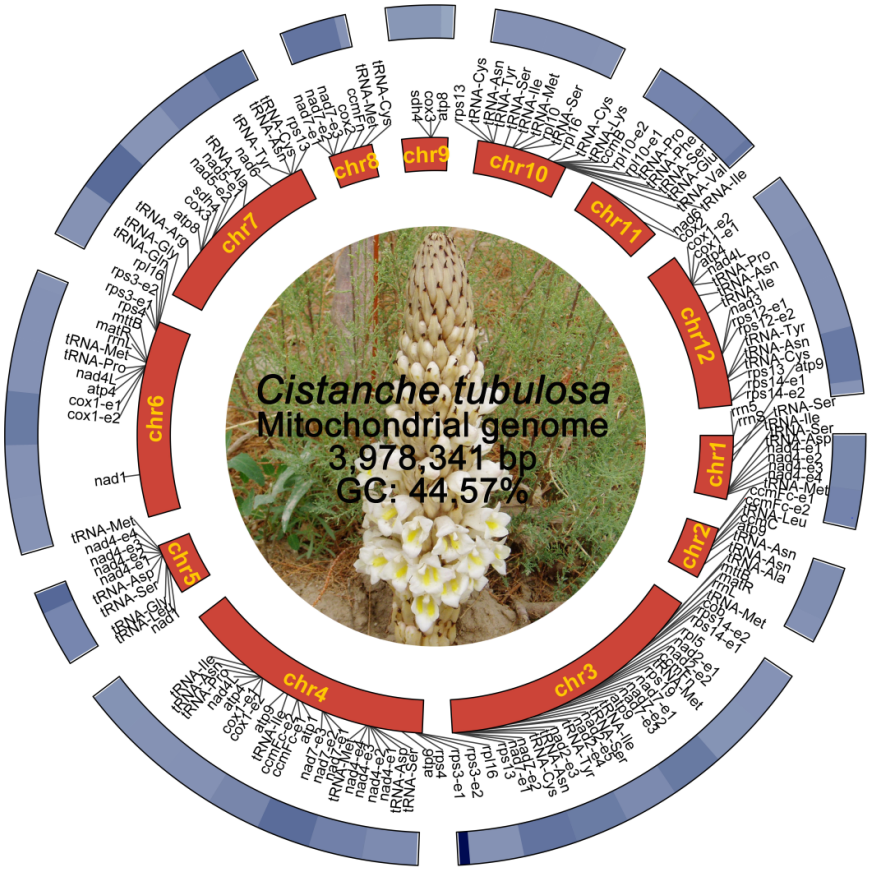


FIGURE S3 | Mitochondrial genome map of *Cistanche tubulosa*. The outside circle shows the GC content. The inside circle represents the protein coding gene, tRNA and rRNA.

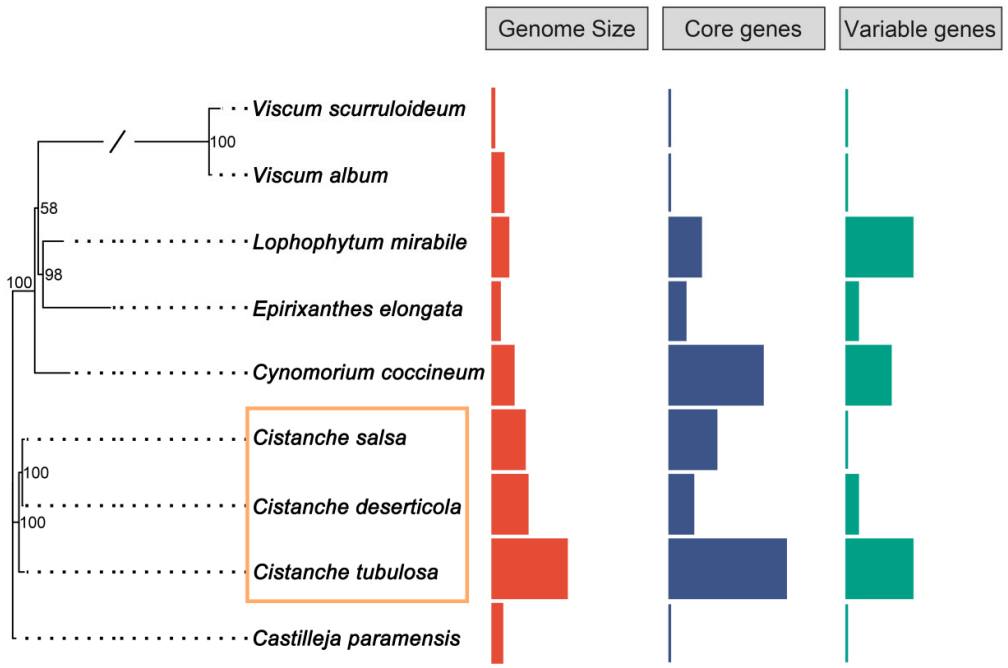


FIGURE S4 | Genome size and protein-coding gene content of 9 parasitic plants mitochondrial genomes.

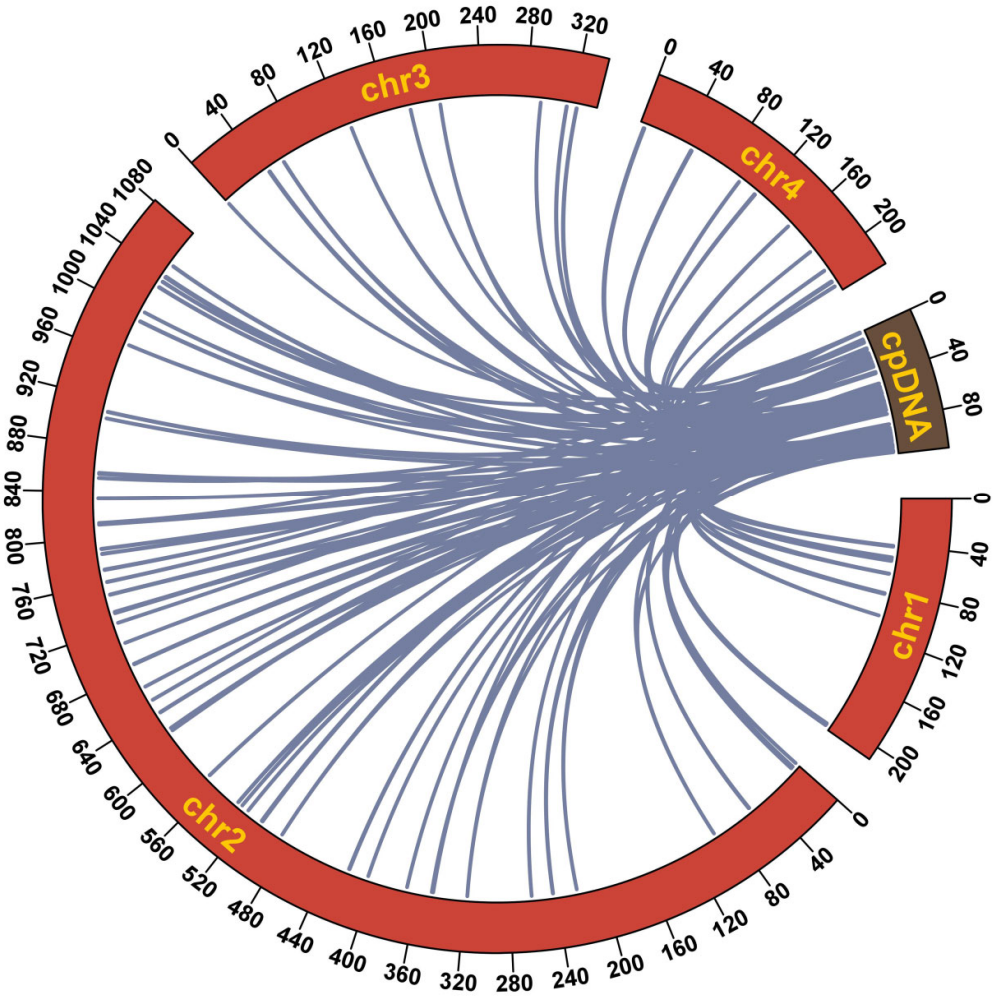


FIGURE S5 | The collinearity analysis among *C. deserticola* mitochondrial genome and plastid genome.

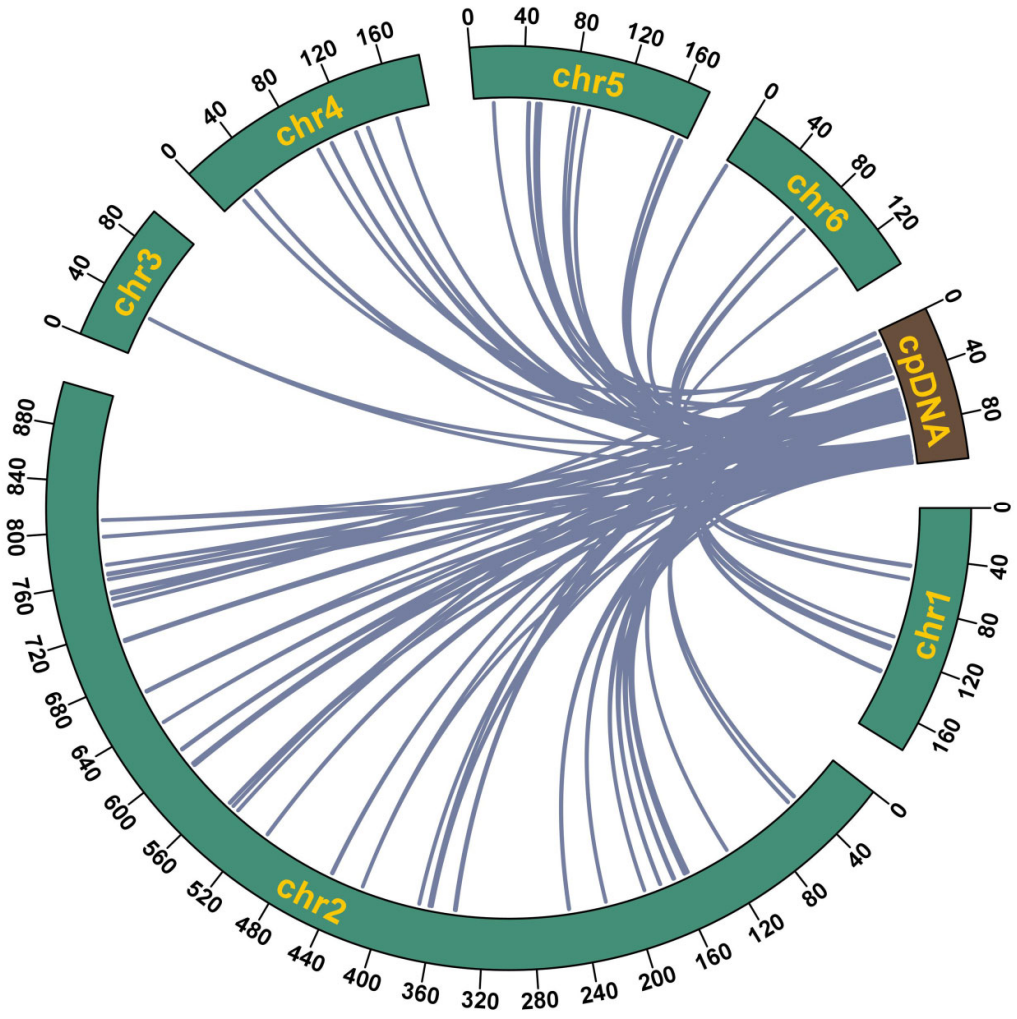


FIGURE S6 | The collinearity analysis among *C. salsa* mitochondrial genome and plastid genome.

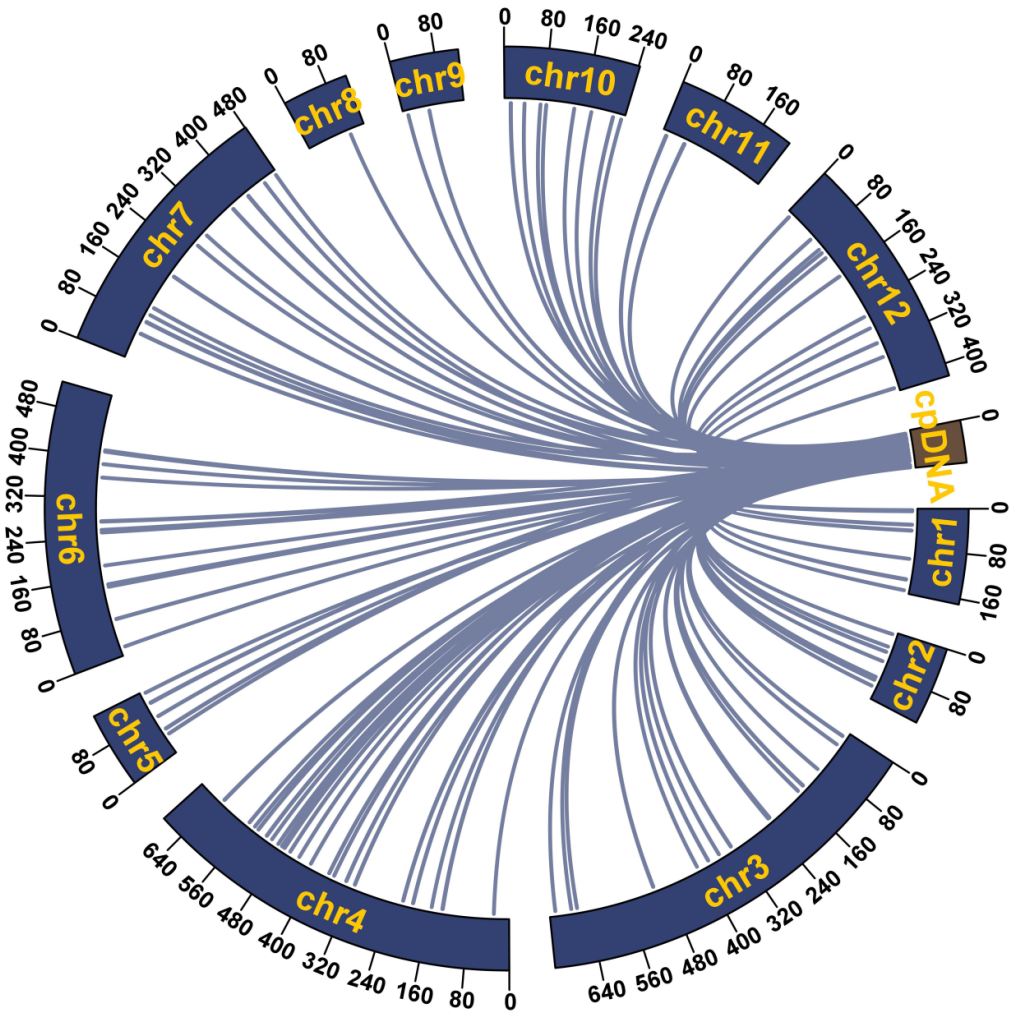


FIGURE S7 | The collinearity analysis among *C. tubulosa* mitochondrial genome and plastid genome.

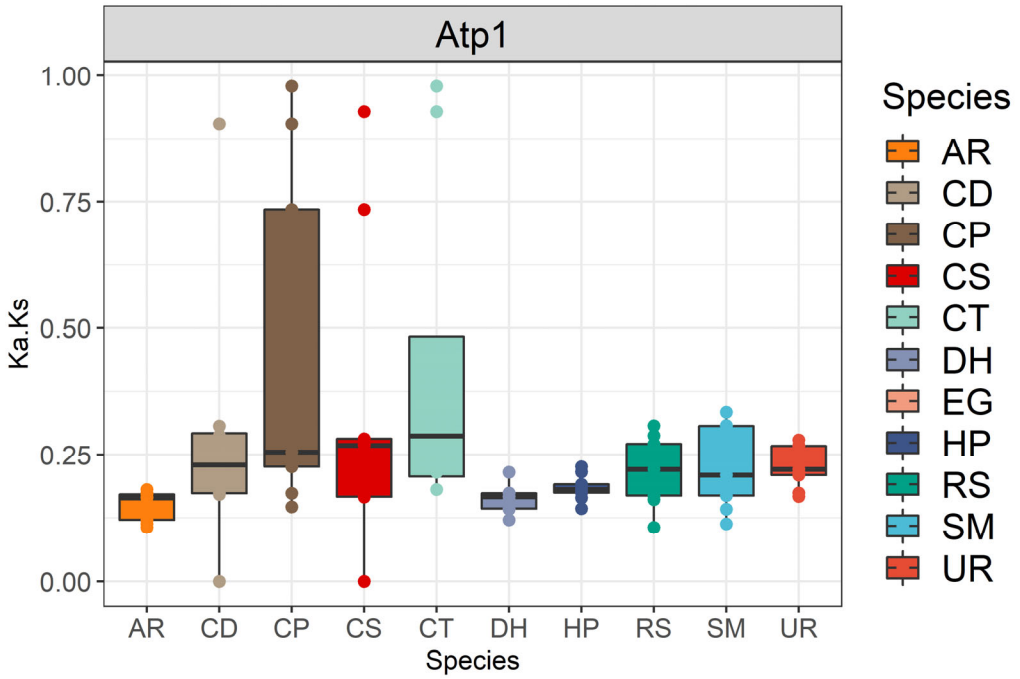


FIGURE S8 | Boxplots of pairwise Ka/Ks values in *Atp*1 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

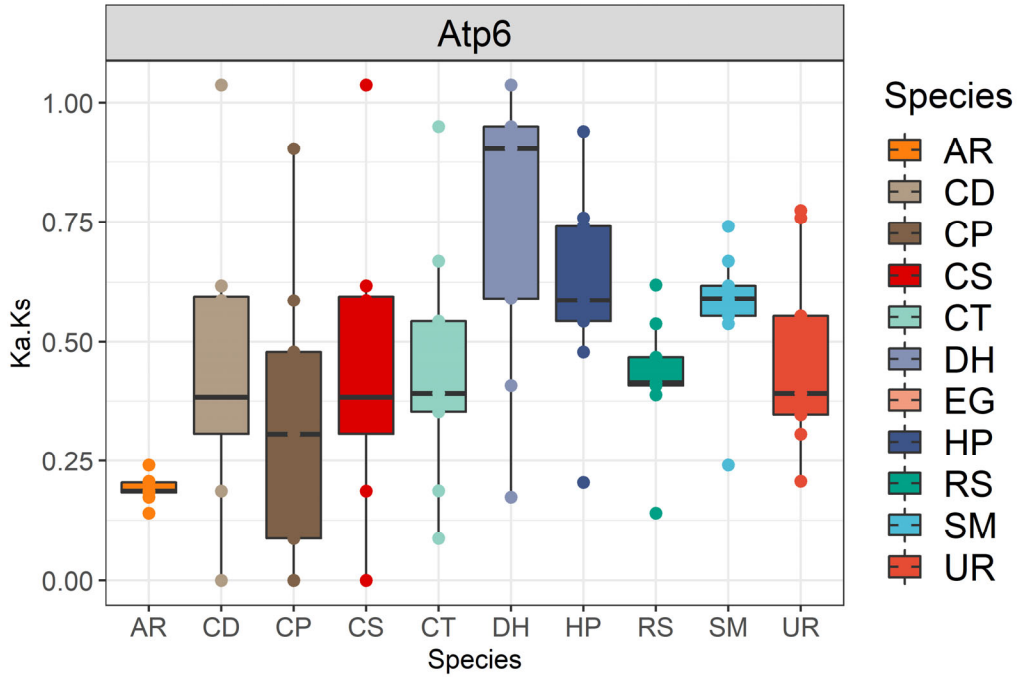


FIGURE S9 | Boxplots of pairwise Ka/Ks values in *Atp6* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

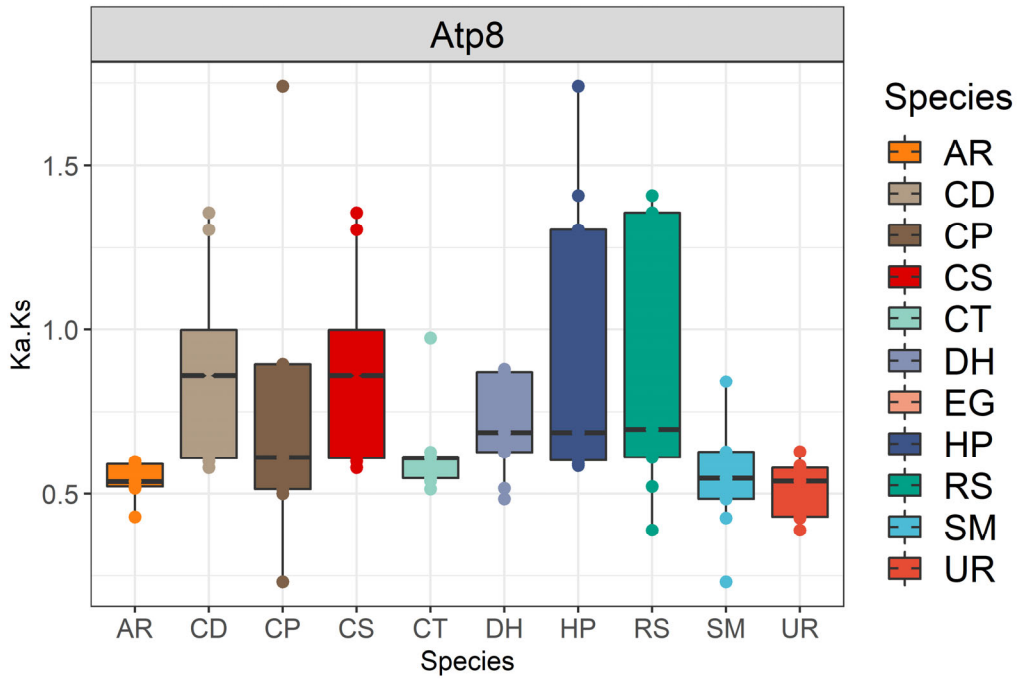


FIGURE S10 | Boxplots of pairwise Ka/Ks values in *Atp8* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

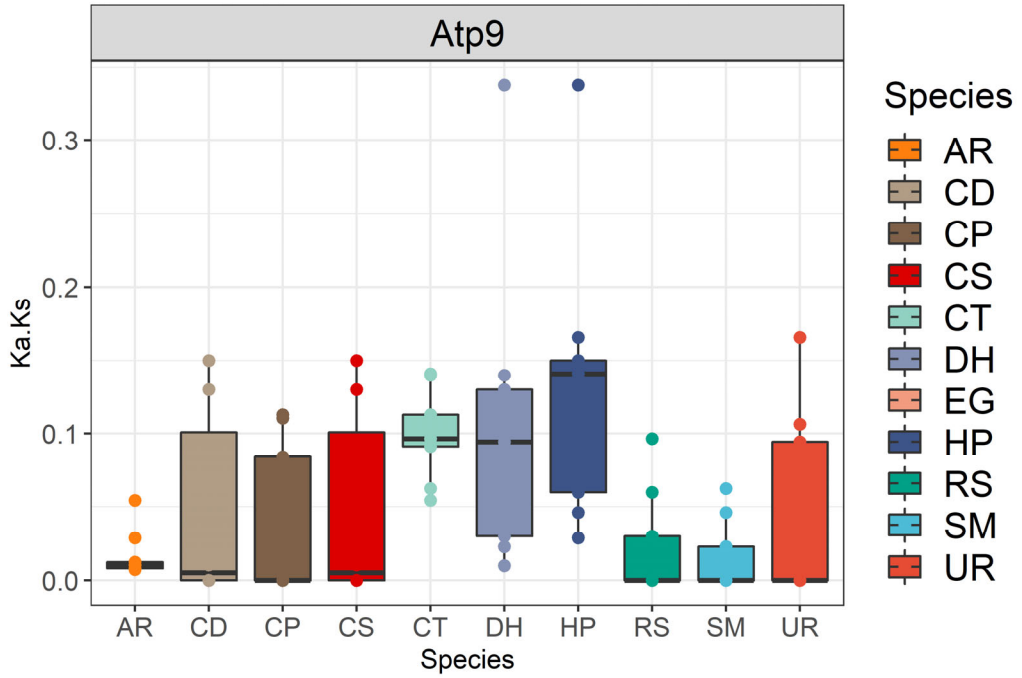


FIGURE S11 | Boxplots of pairwise Ka/Ks values in *Atp*9 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

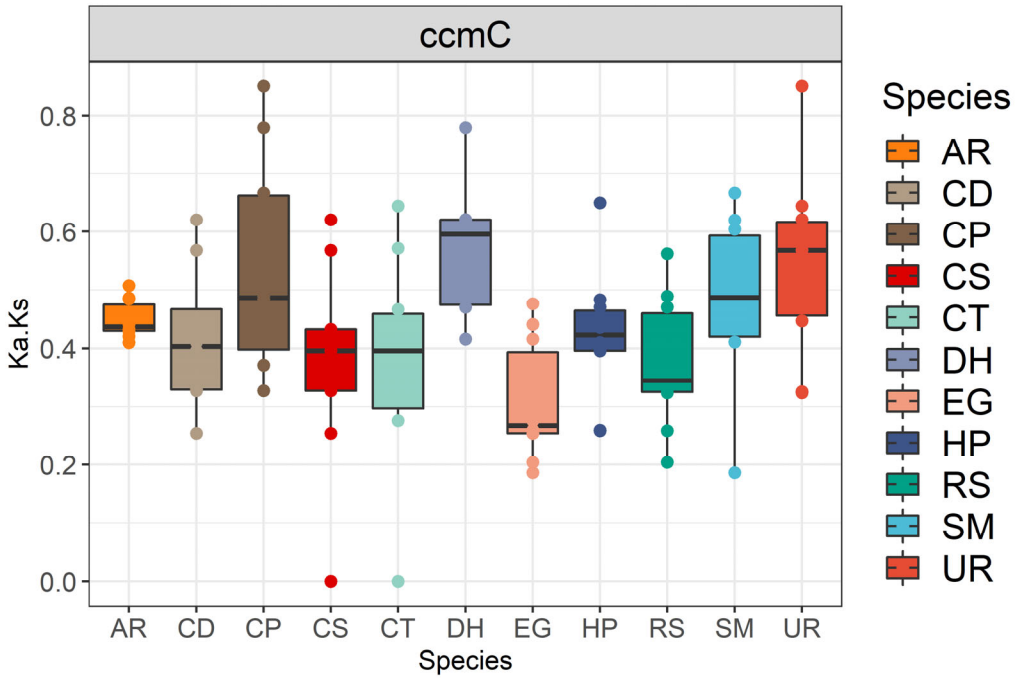


FIGURE S12 | Boxplots of pairwise Ka/Ks values in *ccmC* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

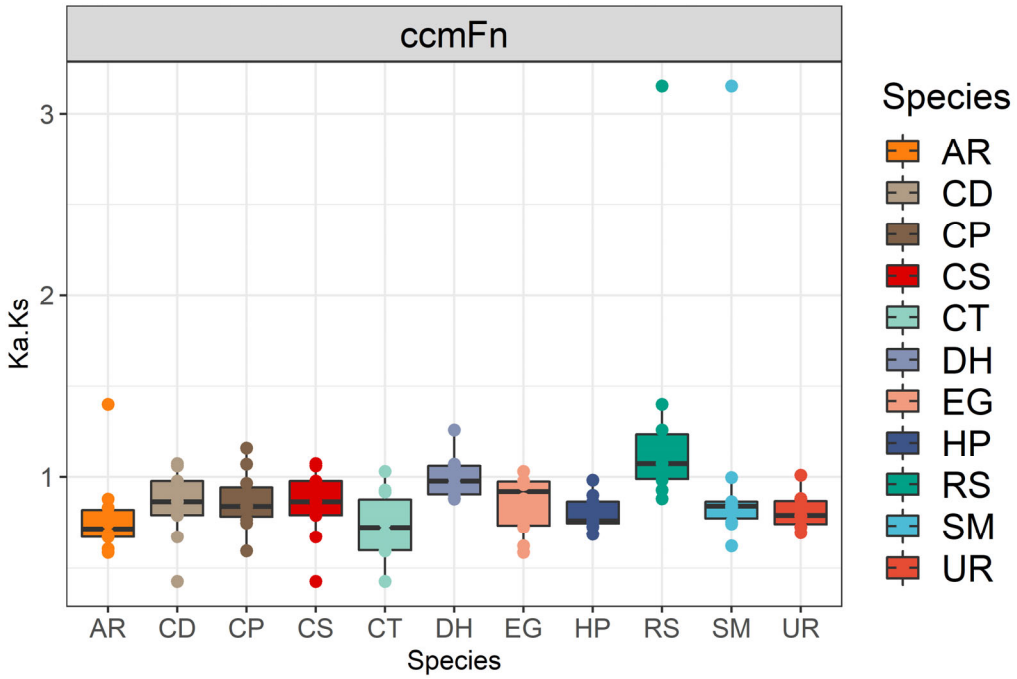


FIGURE S13 | Boxplots of pairwise Ka/Ks values in *ccmFn* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

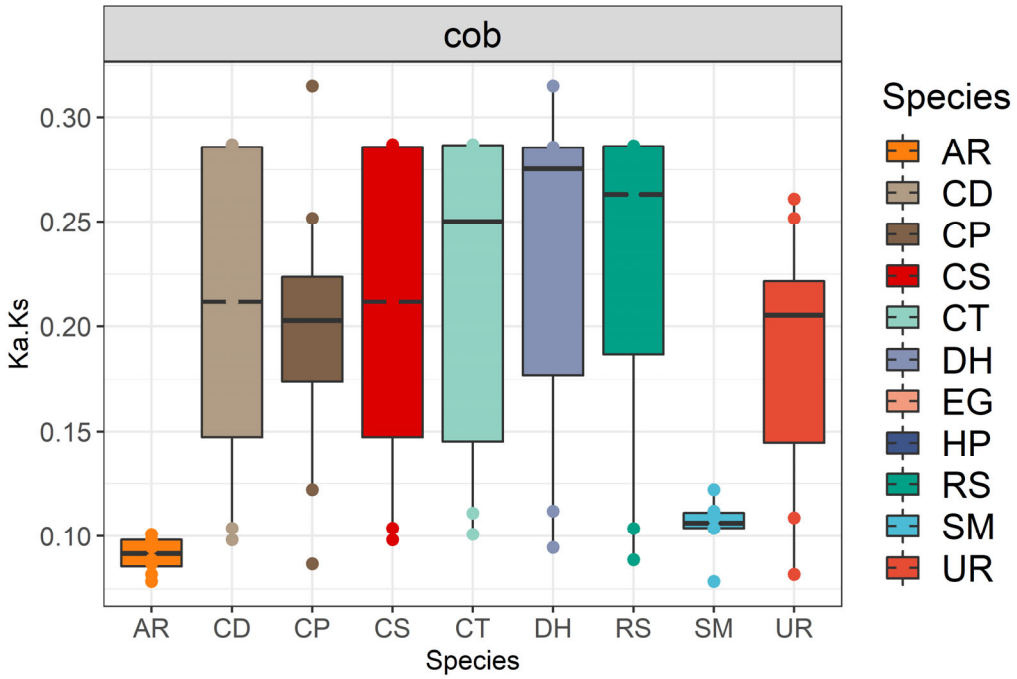


FIGURE S14 | Boxplots of pairwise Ka/Ks values in *cob* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

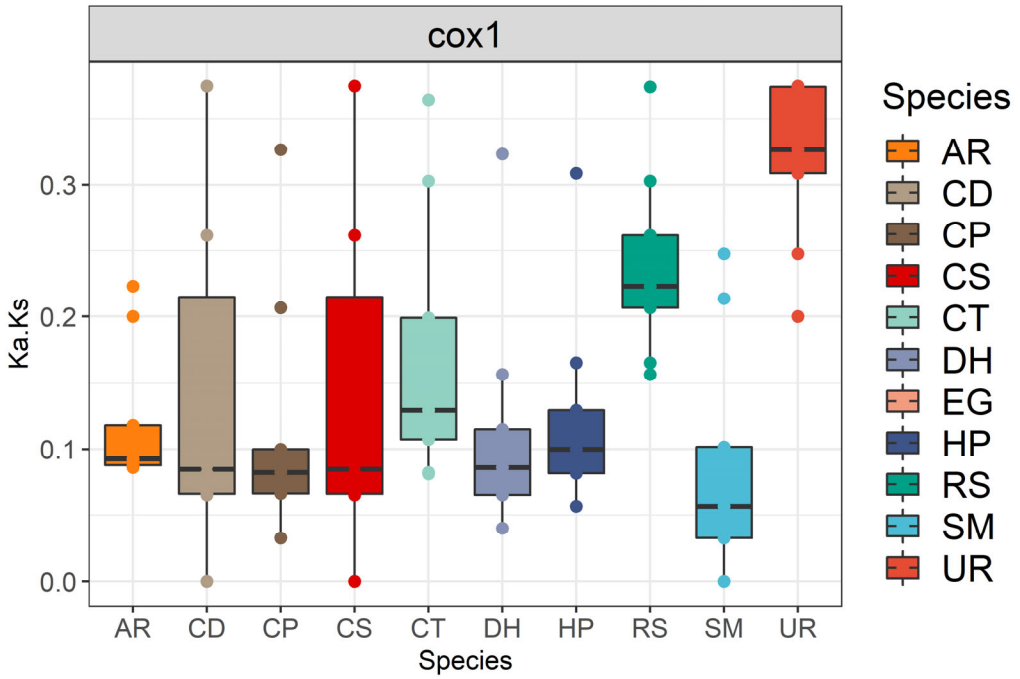


FIGURE S15 | Boxplots of pairwise Ka/Ks values in *cox*1 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

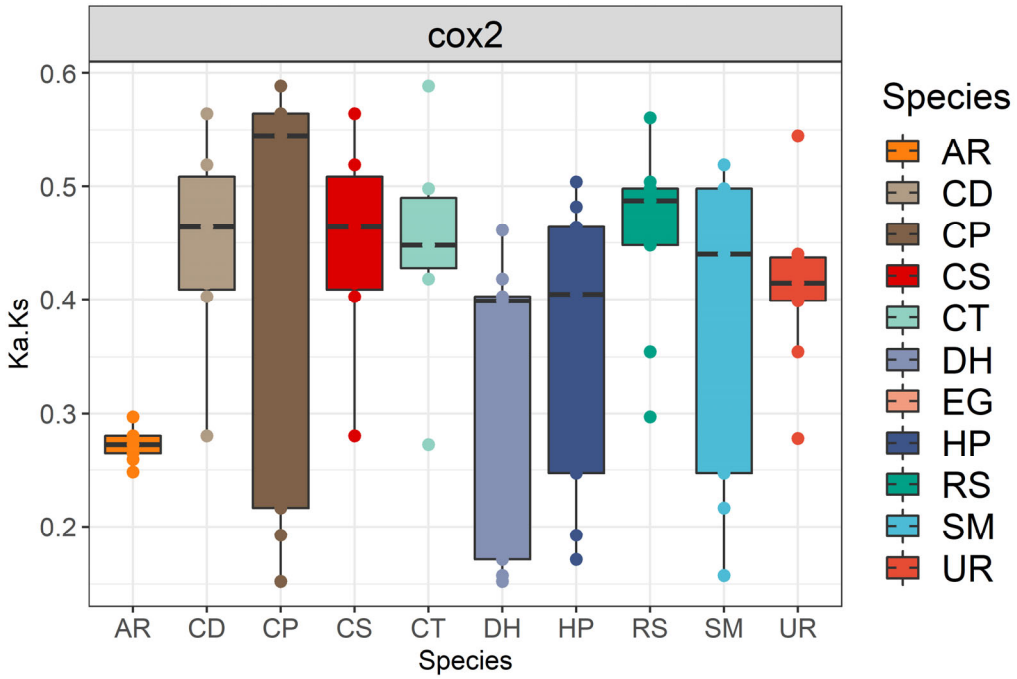


FIGURE S16 | Boxplots of pairwise Ka/Ks values in *cox*2 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

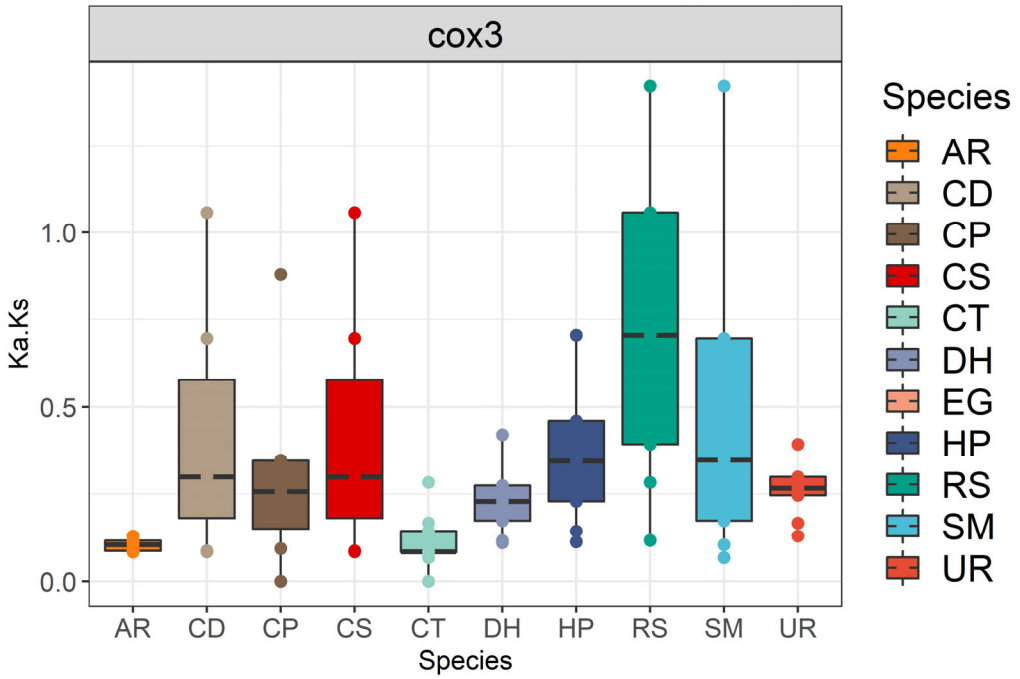


FIGURE S17 | Boxplots of pairwise Ka/Ks values in *cox*3 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

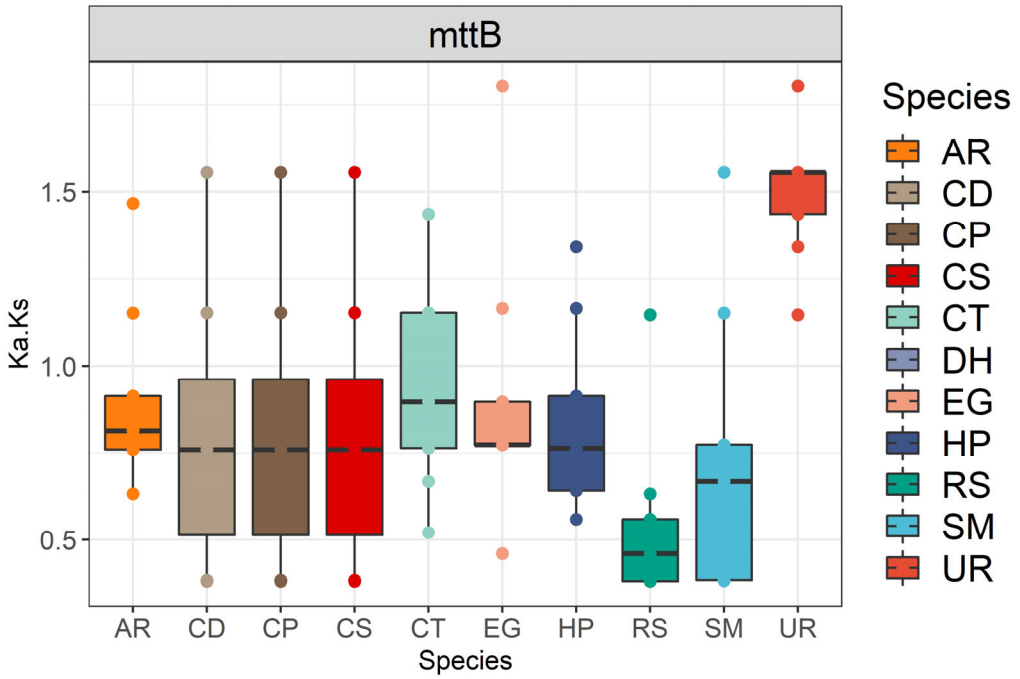


FIGURE S18 | Boxplots of pairwise Ka/Ks values in *mttB* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

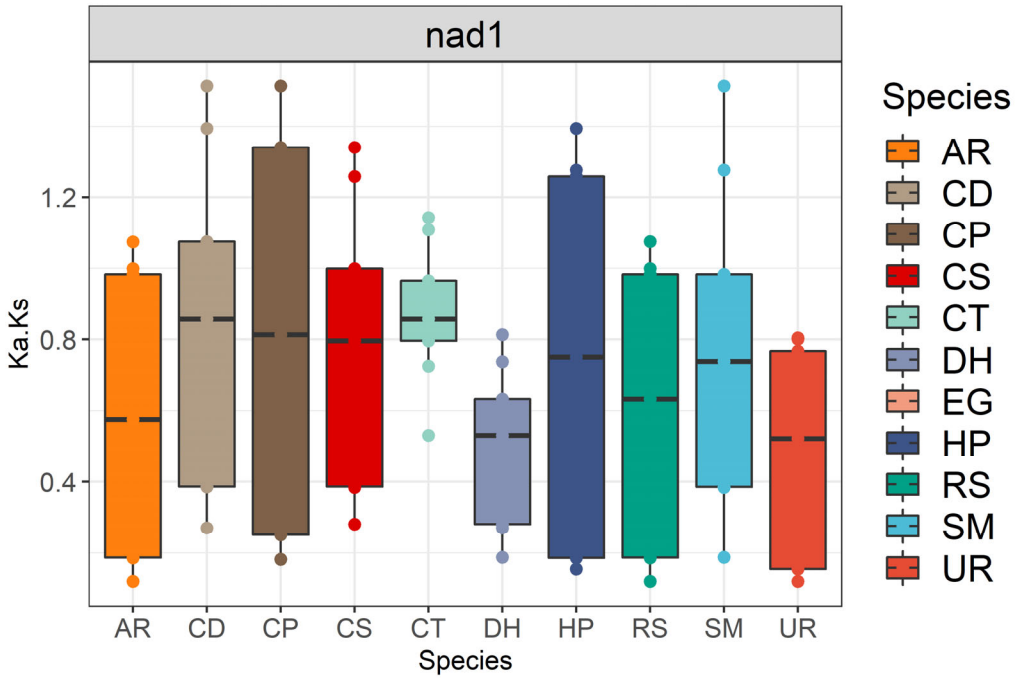


FIGURE S19 | Boxplots of pairwise Ka/Ks values in *nad*1 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

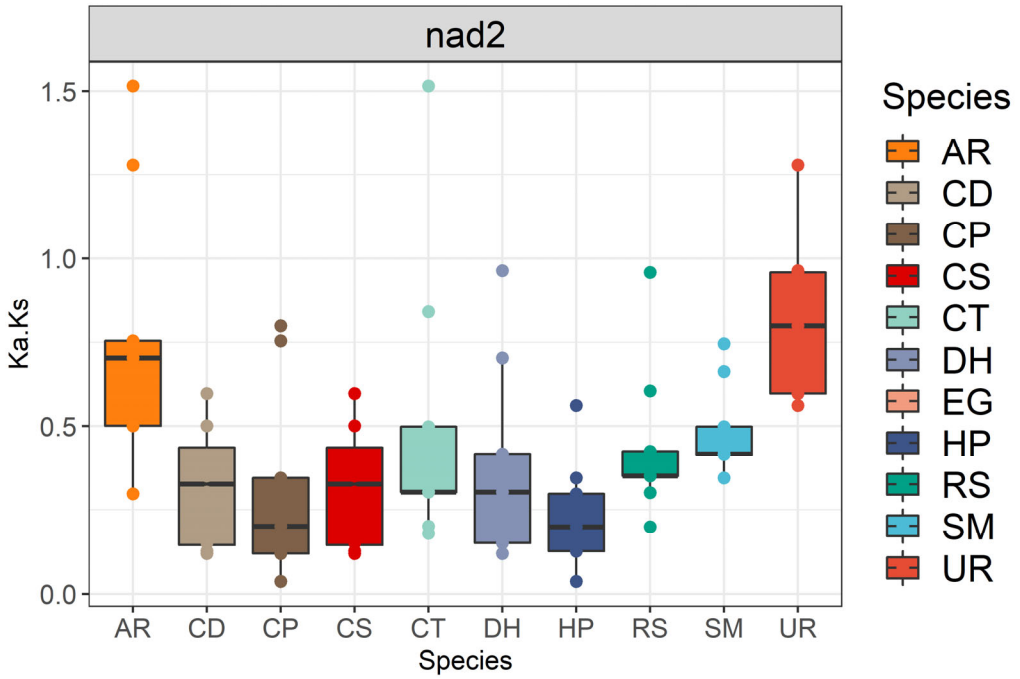


FIGURE S20 | Boxplots of pairwise Ka/Ks values in *nad*2 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

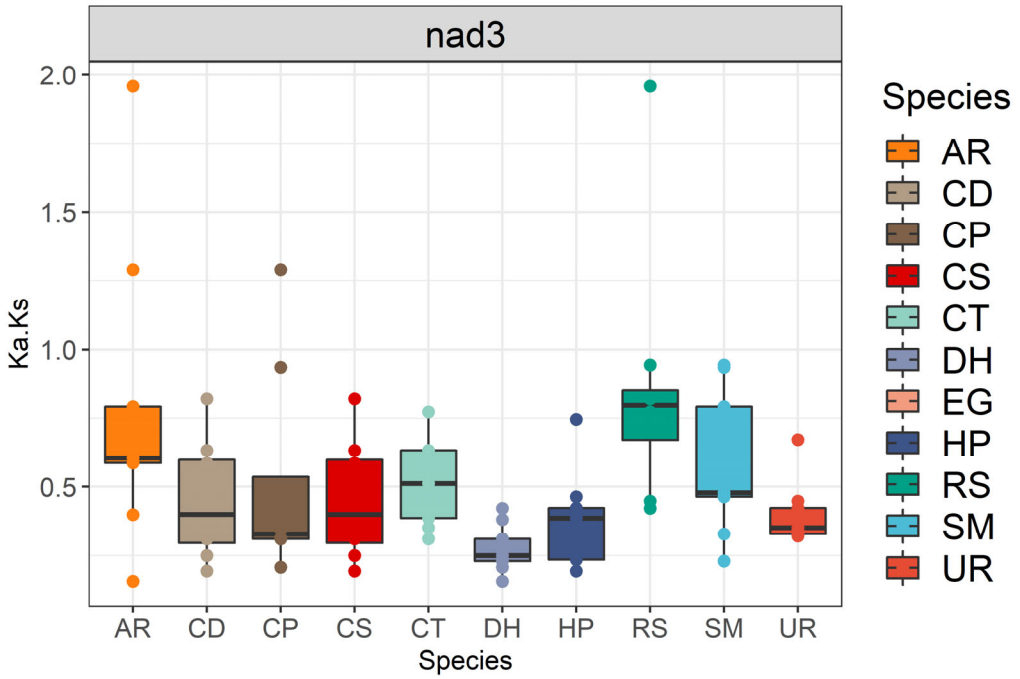


FIGURE S21 | Boxplots of pairwise Ka/Ks values in *nad*3 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

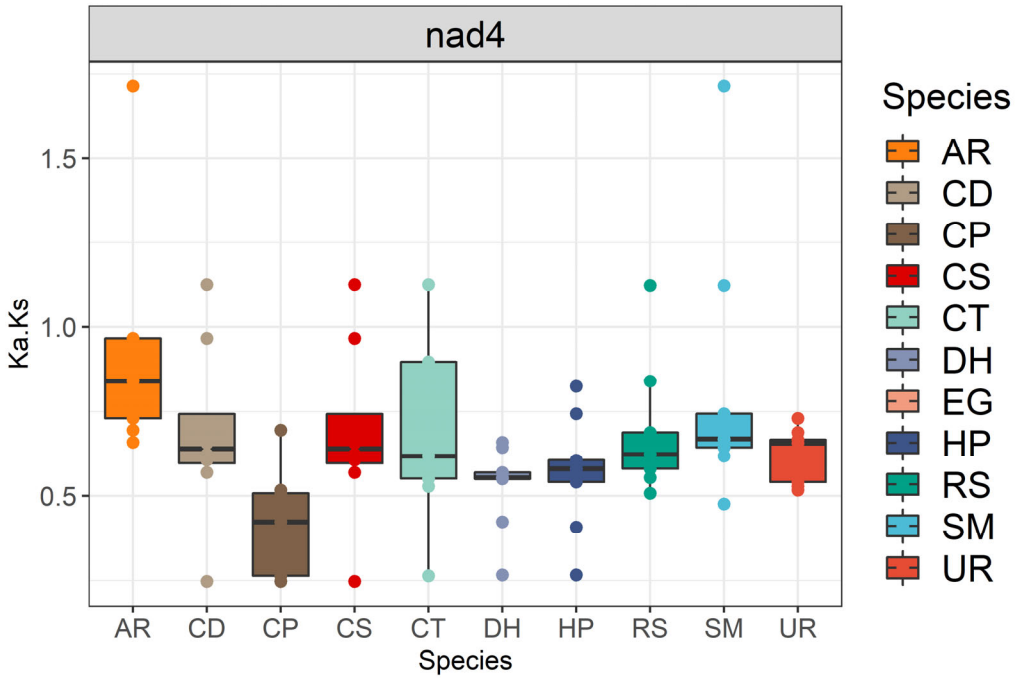


FIGURE S22 | Boxplots of pairwise Ka/Ks values in *nad*4 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

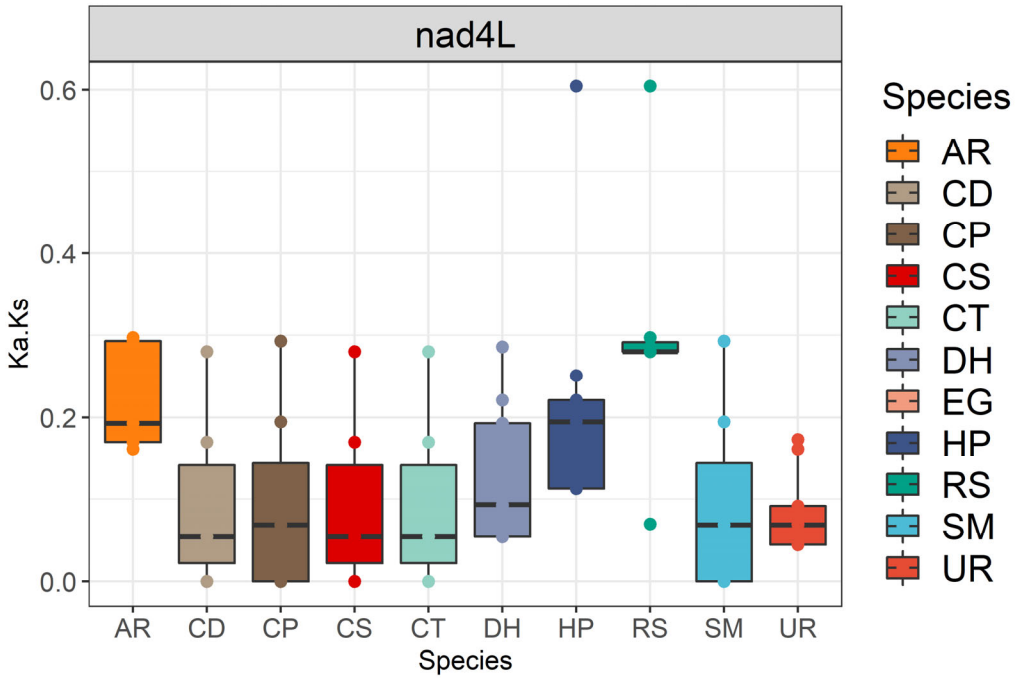


FIGURE S23 | Boxplots of pairwise Ka/Ks values in *nad*4L gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

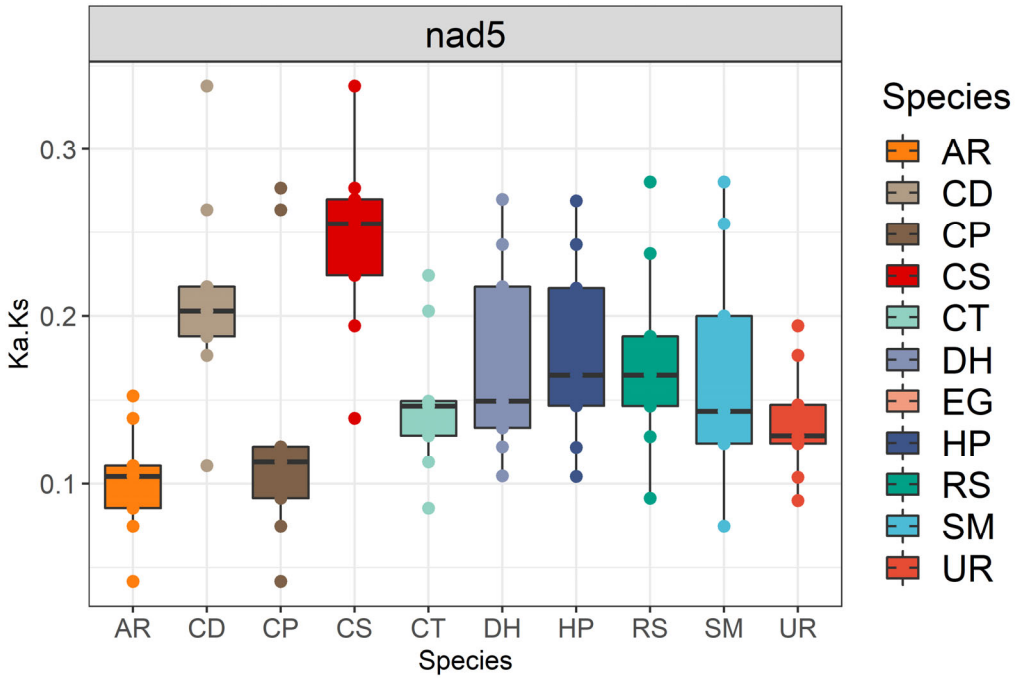


FIGURE S24 | Boxplots of pairwise Ka/Ks values in *nad*5 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

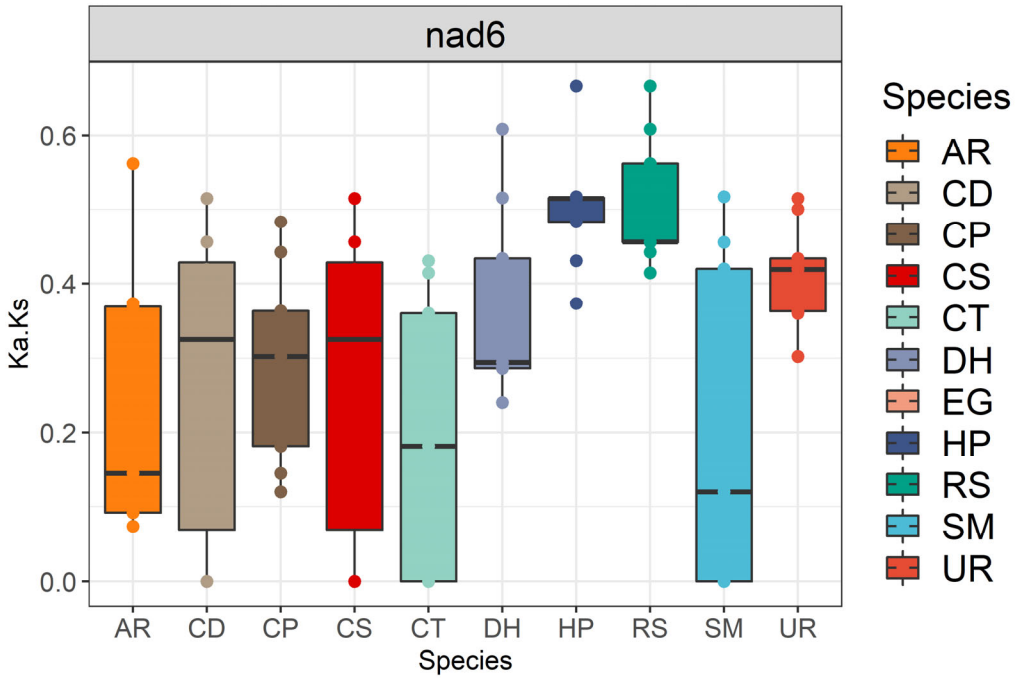


FIGURE S25 | Boxplots of pairwise Ka/Ks values in *nad*6 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

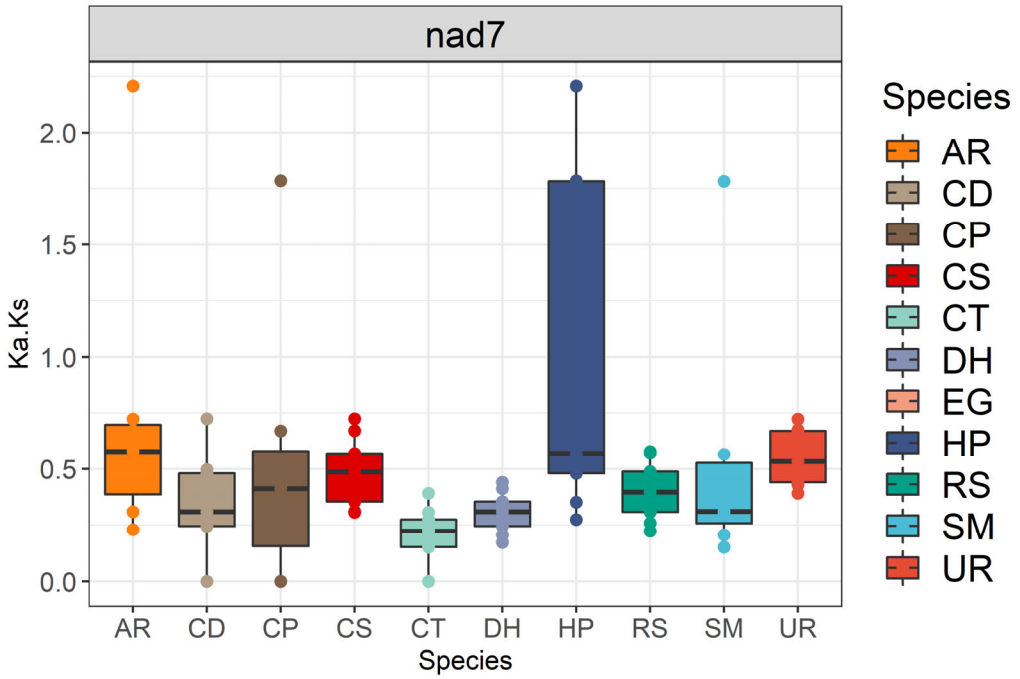


FIGURE S26 | Boxplots of pairwise Ka/Ks values in *nad7* gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

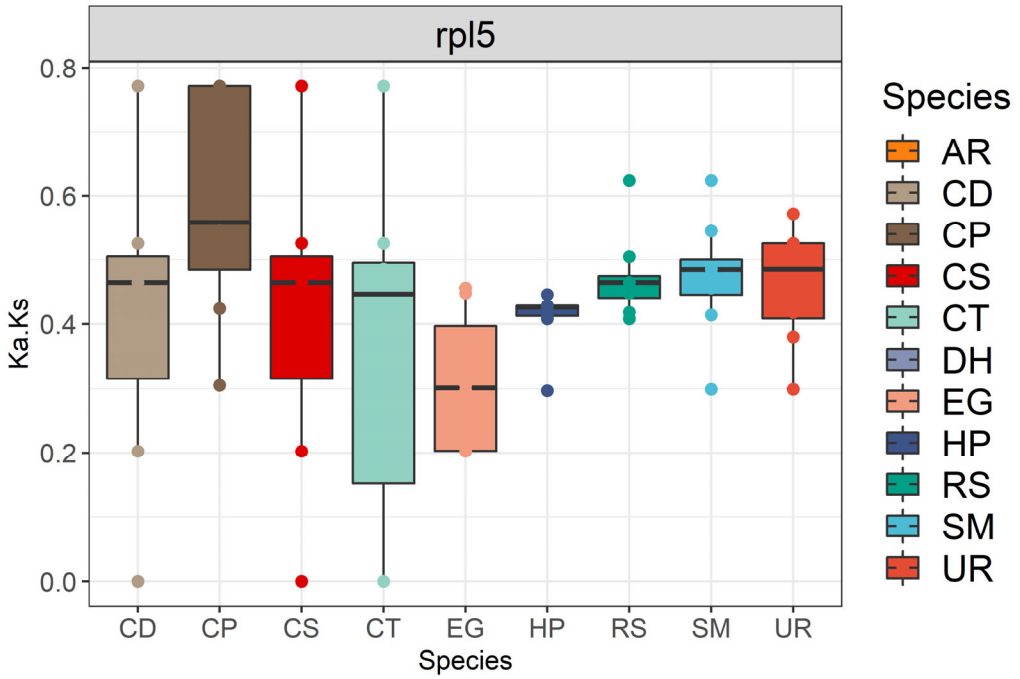


FIGURE S27 | Boxplots of pairwise Ka/Ks values in *rpl*5 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

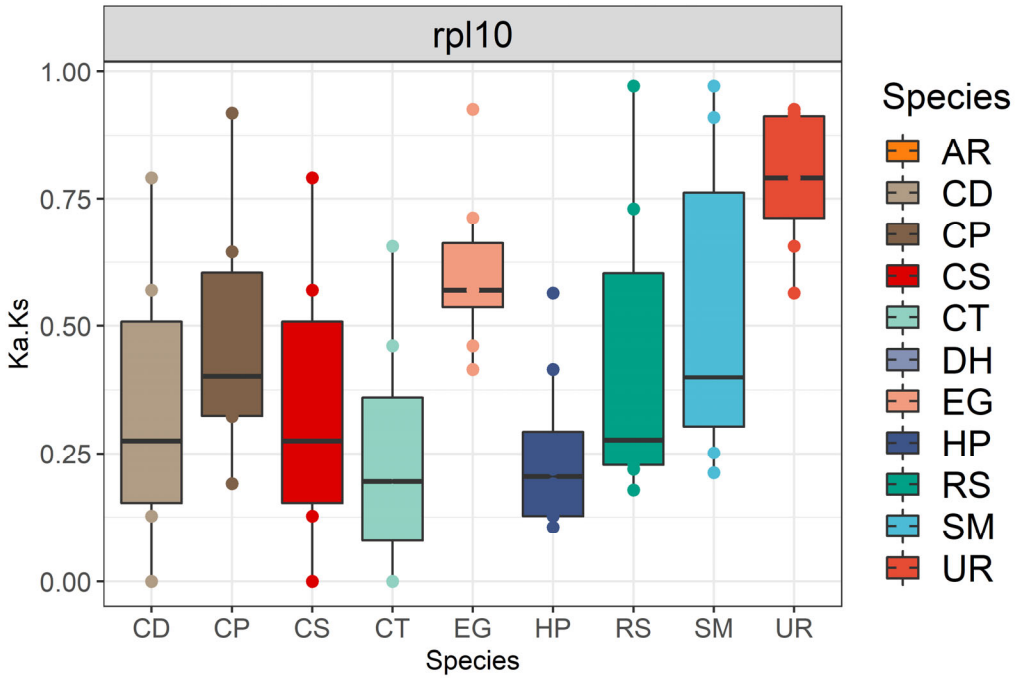


FIGURE S28 | Boxplots of pairwise Ka/Ks values in *rpl*10 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

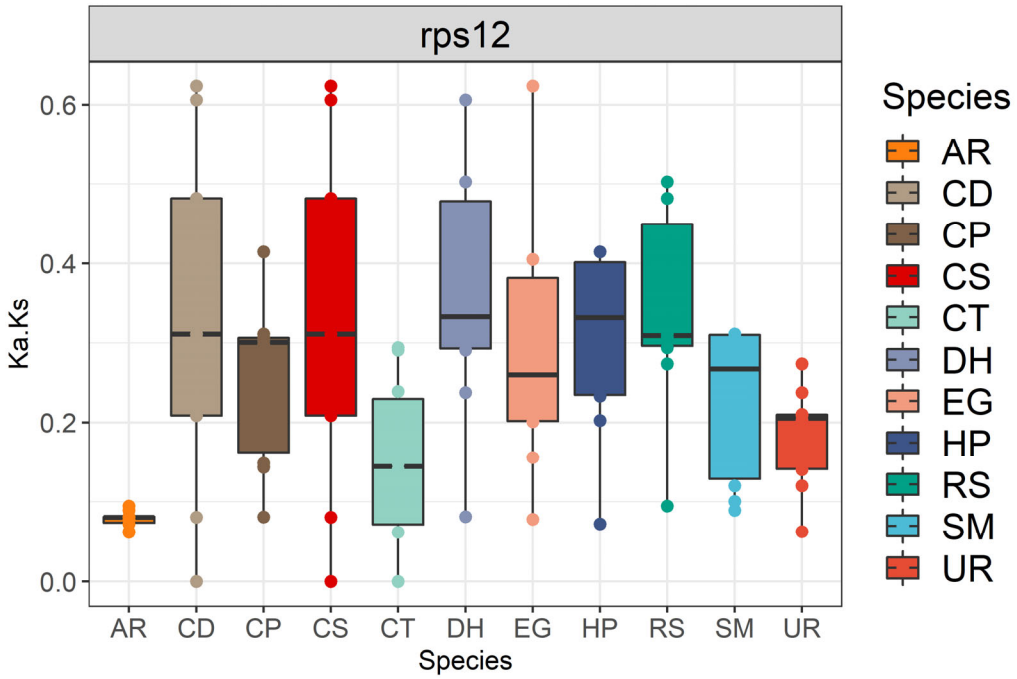


FIGURE S29 | Boxplots of pairwise Ka/Ks values in *rps*12 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

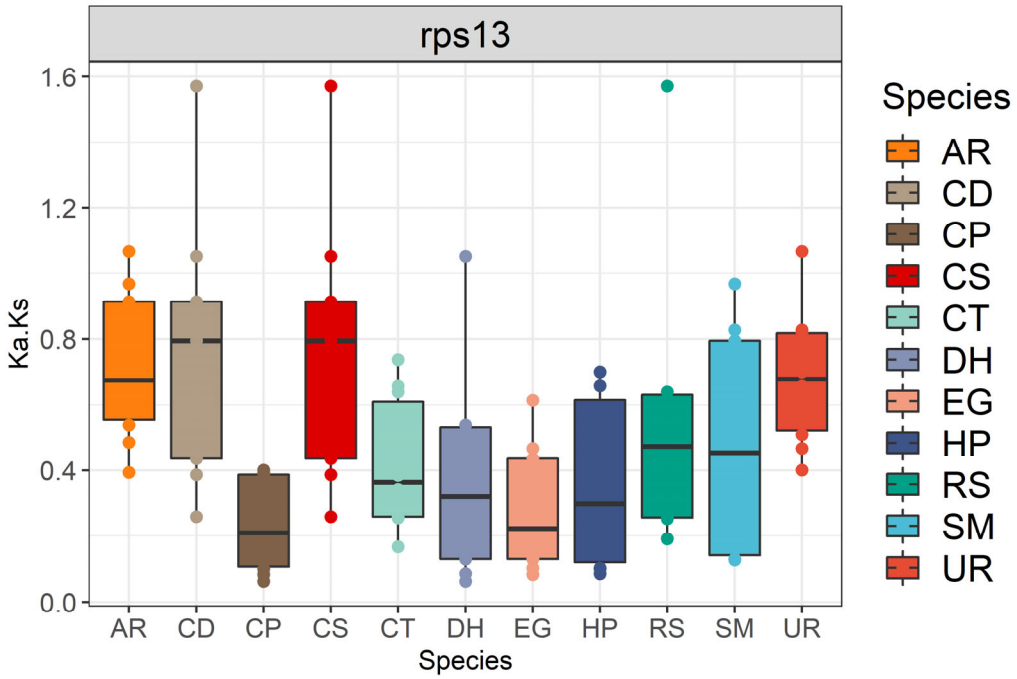


FIGURE S30 | Boxplots of pairwise Ka/Ks values in *rps*13 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.

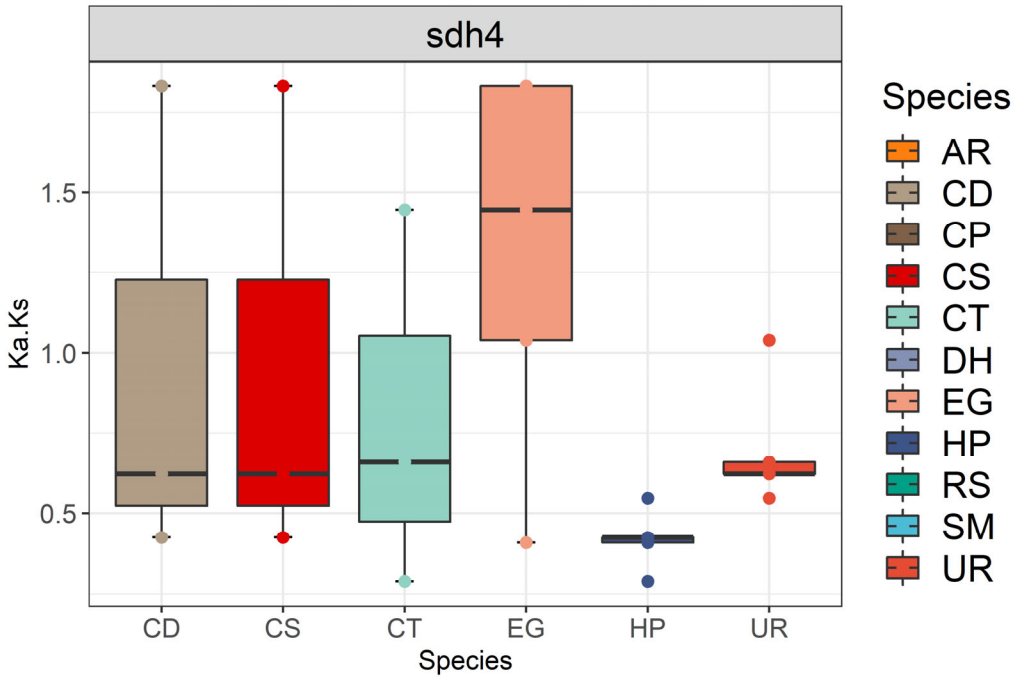


FIGURE S31 | Boxplots of pairwise Ka/Ks values in *sdh*4 gene within 11 Lamiales species. AR – *Ajuga reptans*; CD – *Cistanche deserticola*; CP – *Castilleja paramensis*; CS – *Cistanche salsa*; CT – *Cistanche tubulosa*; DH – *Doroceras hygrometricum*; EG – *Erythranthe guttata*; HP – *Hesperelaea palmeri*; RS – *Rotheca serrate*; SM – *Salvai miltiorrhiza*; UR – *Utricularia reniformis*.