

**Fig. S1.** Chromosome structure in Pt15. **A** Whole-genome pairwise alignment showing homologous chromosome pairs. **B** Chromosome comparison of both haplotypes. Horizontal rectangle indicates telomeric sequence of each chromosome.

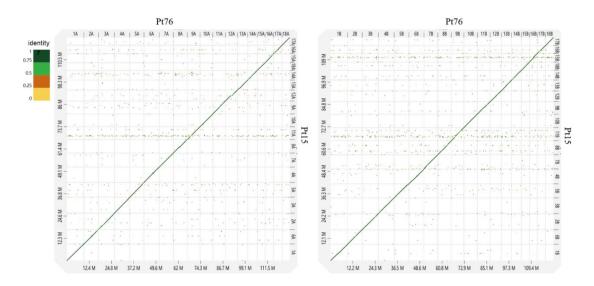


Fig. S2. Whole-genome pairwise alignment of genome assemblies for Pt76 and Pt15.

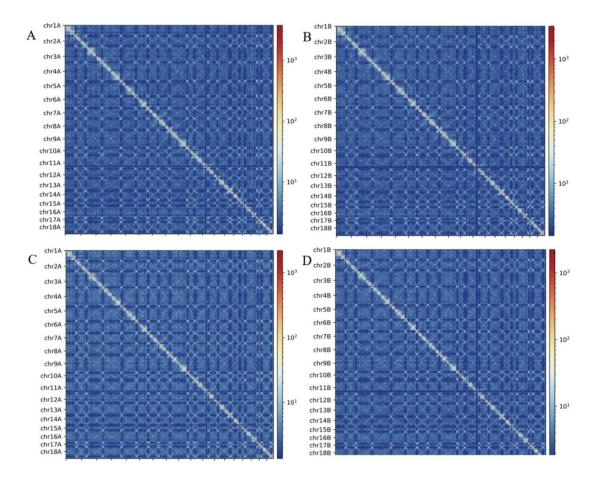


Fig. S3. Hi-C contact maps of genome assembly in Pt15. Hi-C sequencing reads of (A) (B) and (C)(D) were from the Pt76 and Pt64 genomes, respectively.

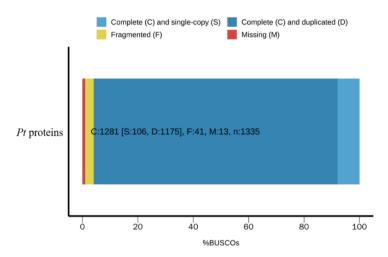


Fig. S4. BUSCO assessment of predicted proteins in Pt15.

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chr6A	den de ausse en en entre en
chr7A	alada ana dina ata dalama ata andara dan adara ata ata ang ang ang ang ang ang ang ang ang an
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**Fig. S5.** Repeat and gene densities for the Pt15 chromosomes. From top to bottom, repetitive sequences, all the genes and secreted protein genes are shown for each chromosome, respectively.

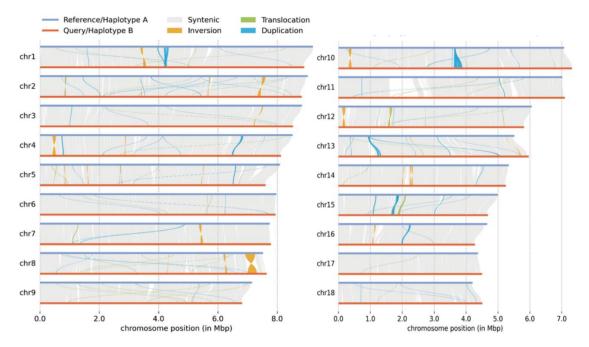


Fig. S6. Structural variation between homologous chromosomes. The blocks greater than 5 kb are shown.

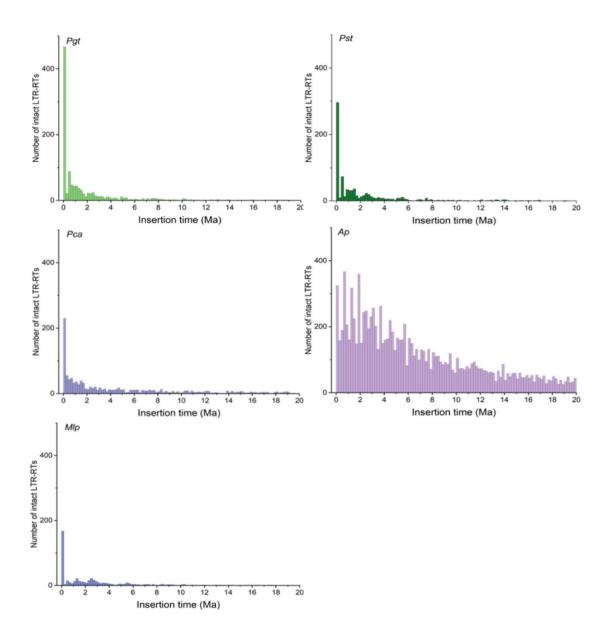
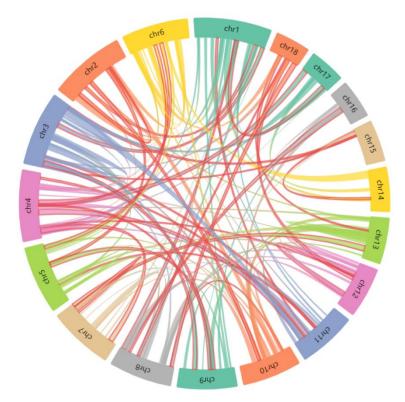


Fig. S7. Insertion time of LTR-RTs in Pgt, Pst, Pca, Ap and Mlp. MA: one million years.



**Fig. S8.** Gene collinearity showing gene duplicates in *Pt*. MCScanX result is visualized using AccuSyn (https://accusyn.usask.ca/).

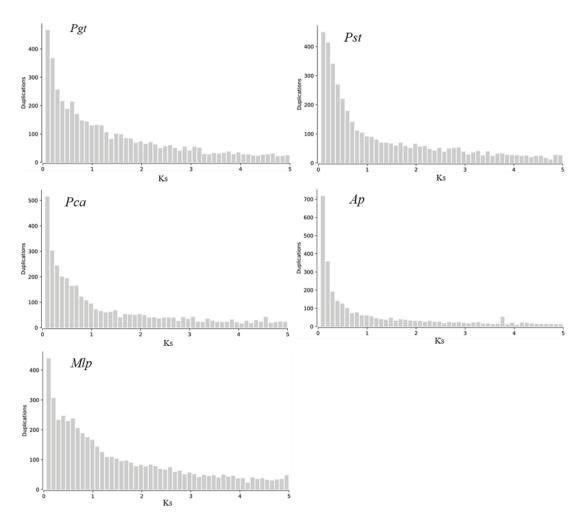


Fig. S9. Ks distribution of paralogues in *Pgt*, *Pst*, *Pca*, *Ap* and *Mlp*.

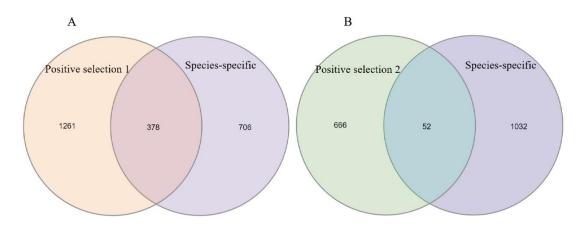
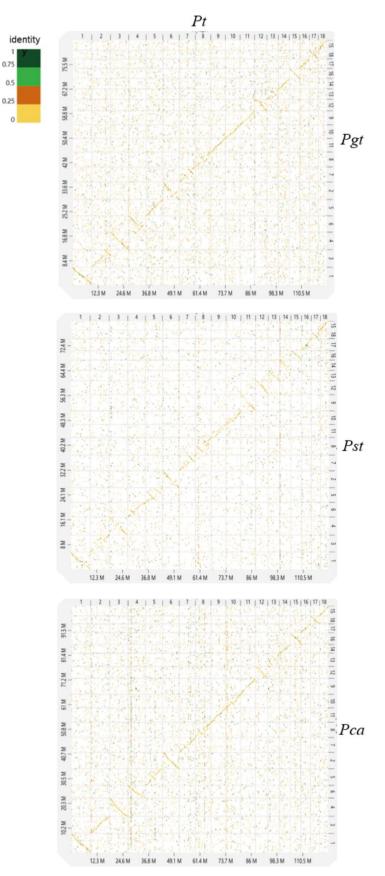
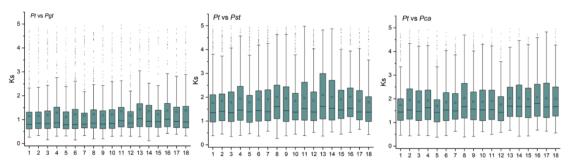


Fig. S10. Venn diagram showing the relation of species-specific genes and genes that underwent positive selection in Pt. A After Pt-Pgt divergence. B Before Pt-Pgt divergence.



**Fig. S11.** Whole-genome pairwise alignments between chromosome-level assemblies of *Pt*, *Pgt*, *Pst* and *Pca*. X-axis represents *Pt*. Y-axis represents *Pgt*, *Pst* and *Pca*, respectively.



**Fig. S12.** Ks distribution of gene pairs between syntenic blocks on each chromosome of *Pgt*, *Pst* and *Pca* compared to *Pt*. Chromosome numbers are shown on x-axis.

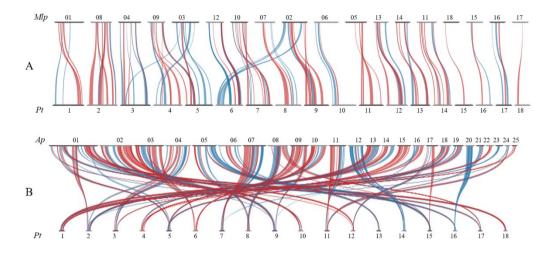


Fig. S13. Gene synteny in Pt-Mlp (A) and Pt-Ap (B). Syntenic blocks containing at least five genes are shown. Chromosome numbers are shown for Pt and Mlp. Sequence numbers are shown for Ap.