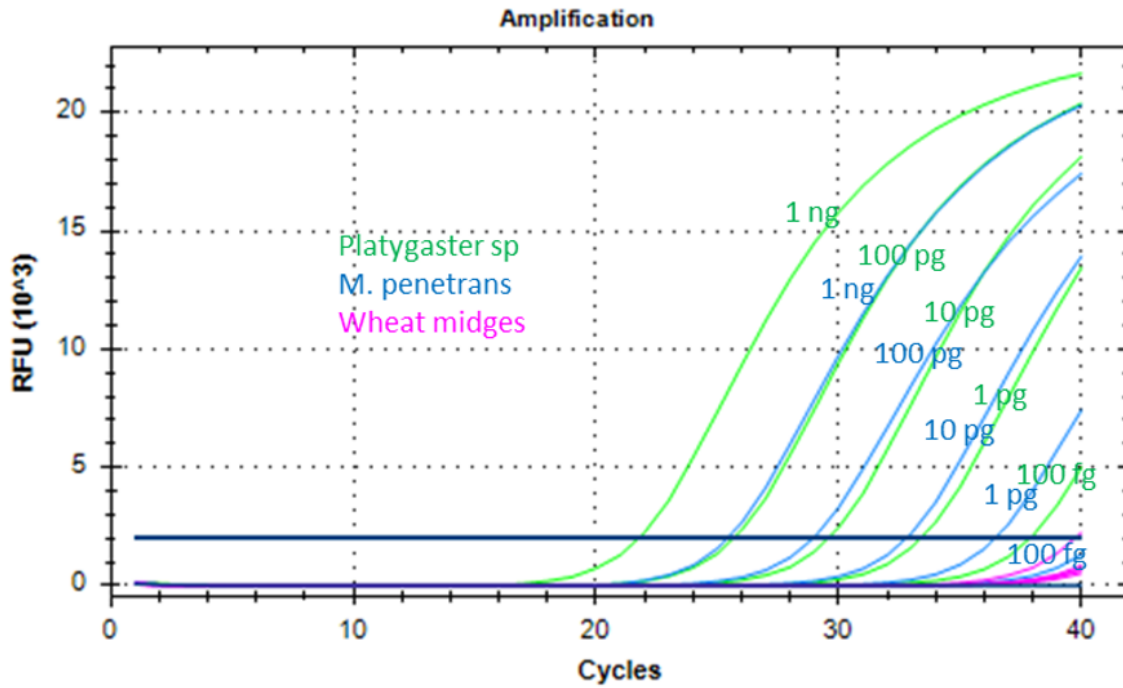
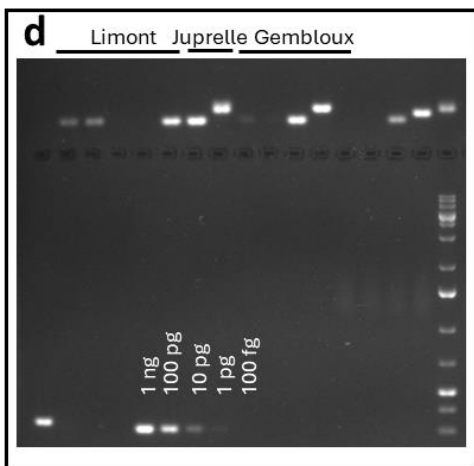
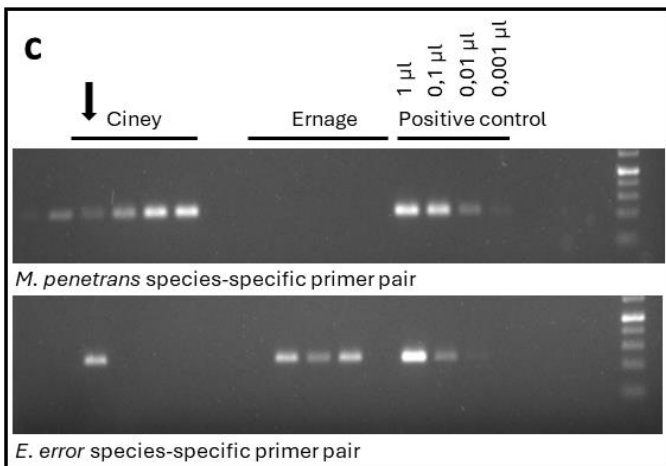
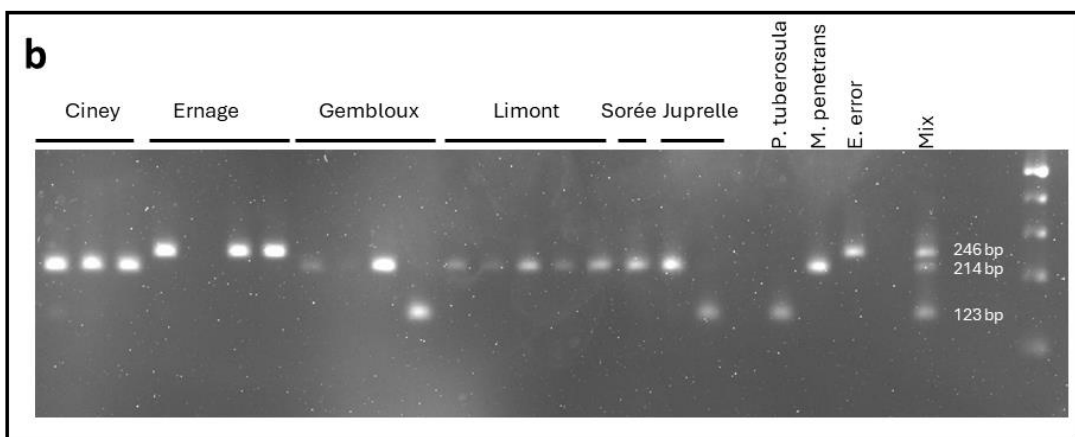
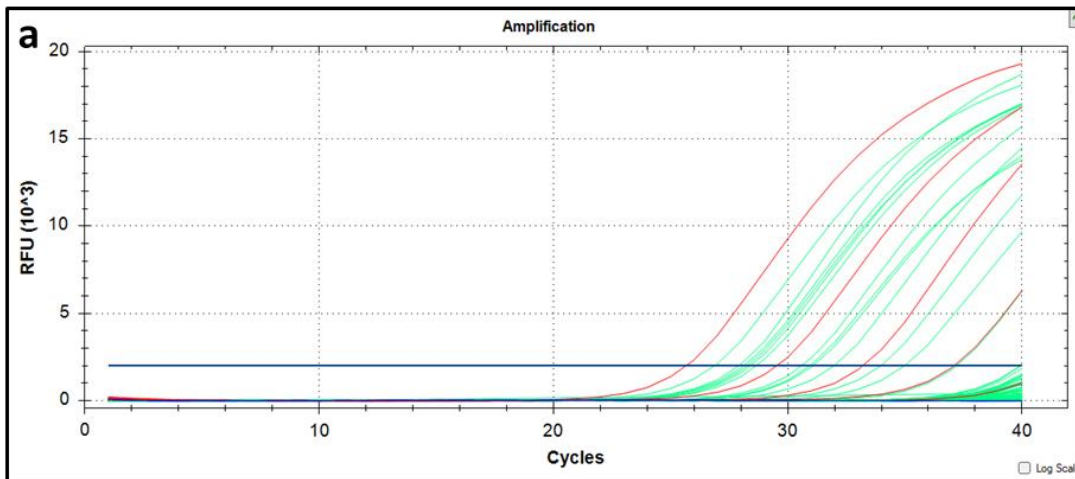


**Supplementary Figure S1. Neighbour-Joining trees of the parasitoid and midge species based on sequences of the mt COI and 18S rRNA genes.** All sequences obtained in this study and available in GenBank were used. Distances were computed using the Kimura 2-parameter method. Each tip of the trees represents one haplotype sequenced in one or more individuals (numbers in parentheses). Labels in green exclusively include GenBank data, those in black include either data obtained in this study only or a mix of data from this study and from GenBank. Bootstrap values  $\geq 70$  are given at the nodes.



**Supplementary Figure S2. Detection of *Platygaster* spp. and *M. penetrans* genomic DNA by TaqMan assay.** Five serial dilutions of genomic DNA were used (1 ng to 100 fg). Wheat midges genomic DNAs (10 ng) were used as control (*S. mosellana*, *C. tritici*, *H. marginata*).



**Supplementary Figure S3. Field parasitism monitoring using the tools developed in this study (examples).** (a) TaqMan assay on wheat midge larvae (in green). Serial dilutions (1 ng, 100 pg, 10 pg, 1 pg and 100 fg) of *M. penetrans* DNA were used as positive control (in red). Water was used as negative control (in blue) (b) Multiplex assay. One  $\mu$ l DNA from adult parasitoids was used as control. Mix: a mixture of DNA from the 3 species (c) Species specific detection of *M. penetrans* (above) and *E. error* (below). Serial dilutions of DNA from one reference parasitoid individual were used as positive controls (DNA not quantified). The arrow indicates a wheat midge larvae with double parasitism (d) Parasitoid group-specific detection (primer pair Par164+Par473). Serial dilutions of *M. penetrans* DNA were used as positive control. 1kb DNA ladder was used. Original uncropped gels are presented in Figure S4.

**Supplementary Figure S4. Original uncropped gels.** The cropped areas are delineated by a red box.

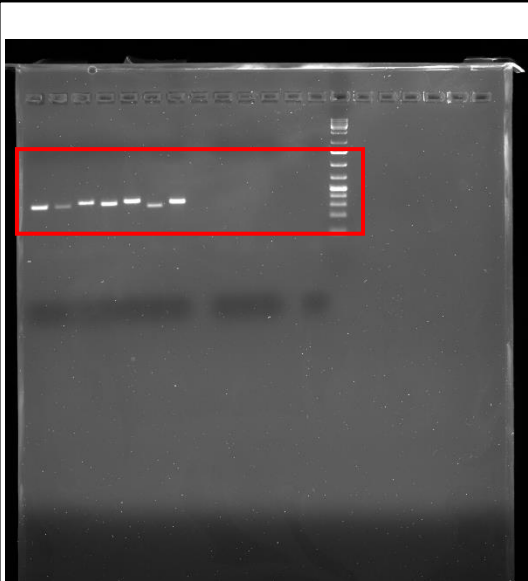


Figure 3a/left part



Figure 3a/right part

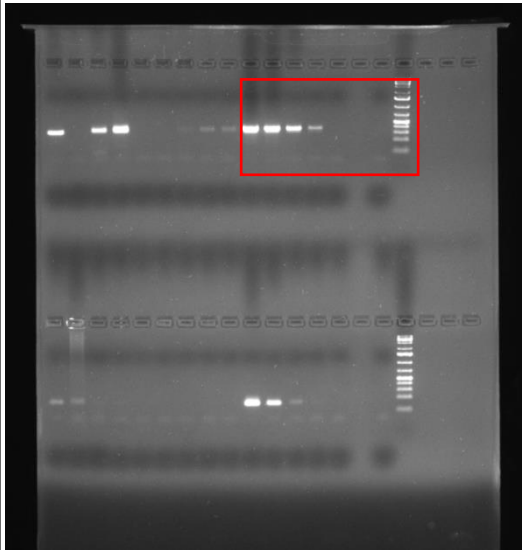


Figure 3b/left part

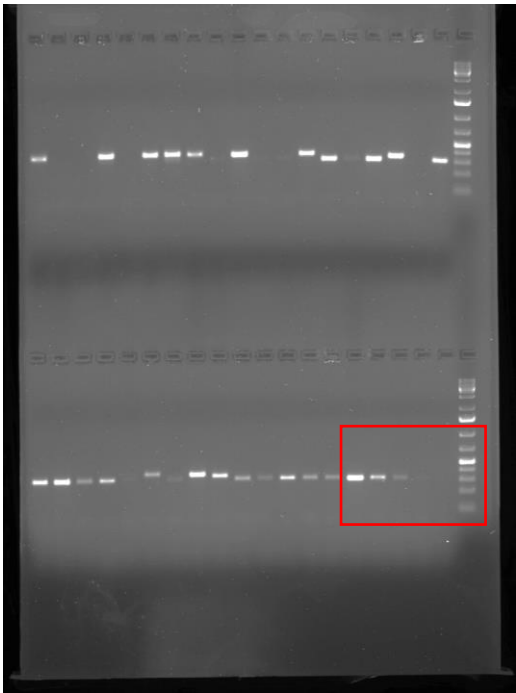


Figure 3b/right part

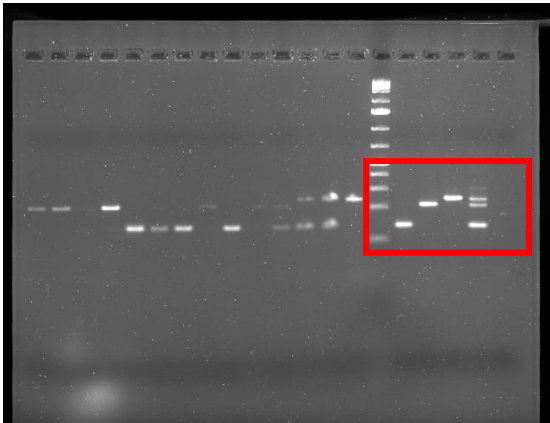


Figure 4

Supplementary Figure S4. Continued

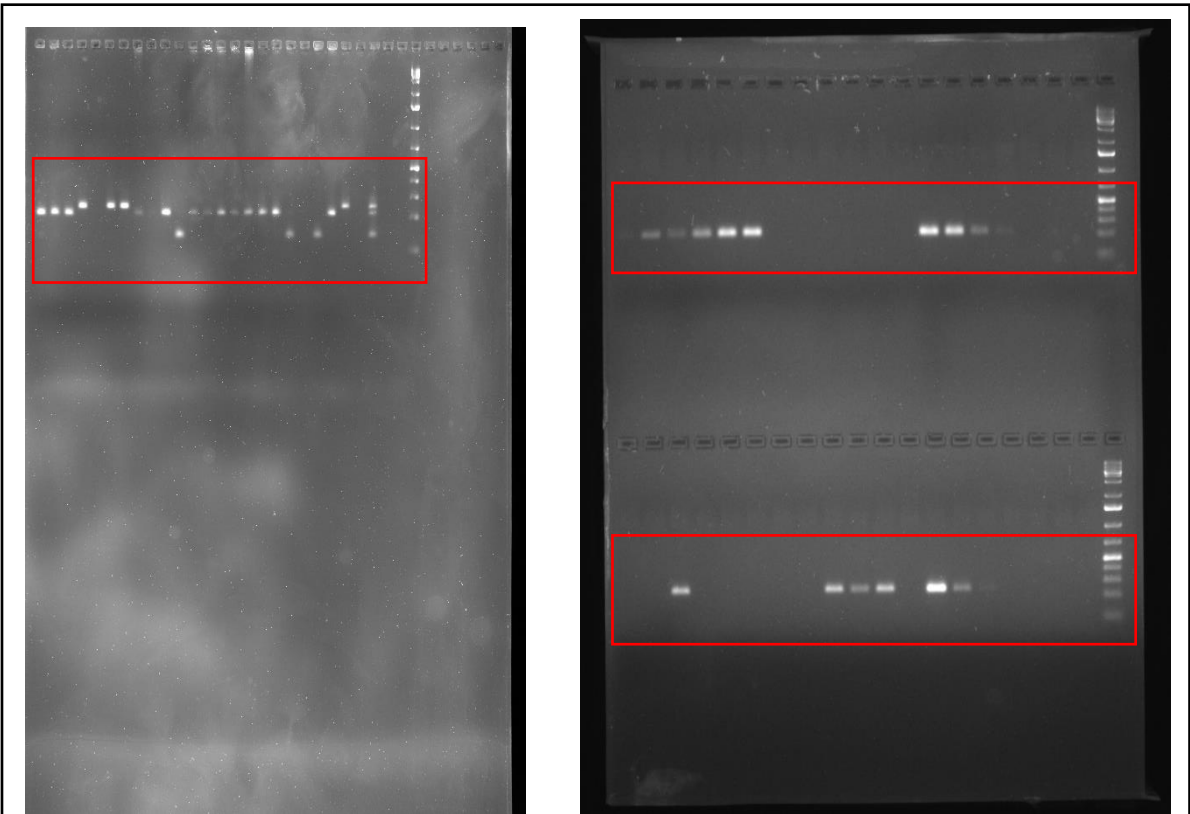


Figure S3b

Figure S3c

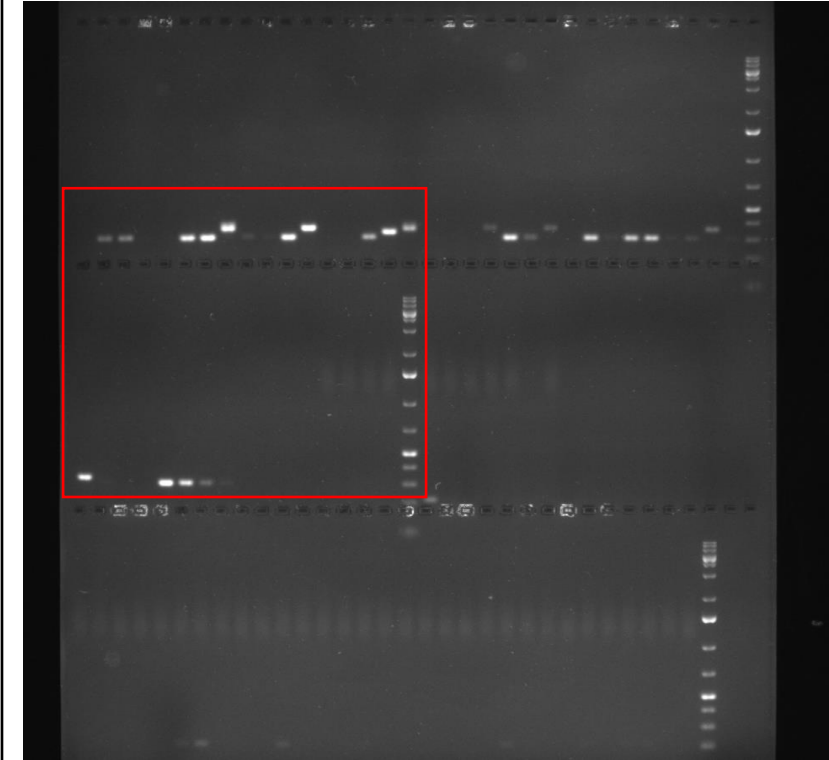


Figure S3d