

Targeted expression of *Vitreoscilla* hemoglobin improves the production of tropane alkaloids in *Hyoscyamus niger* hairy roots

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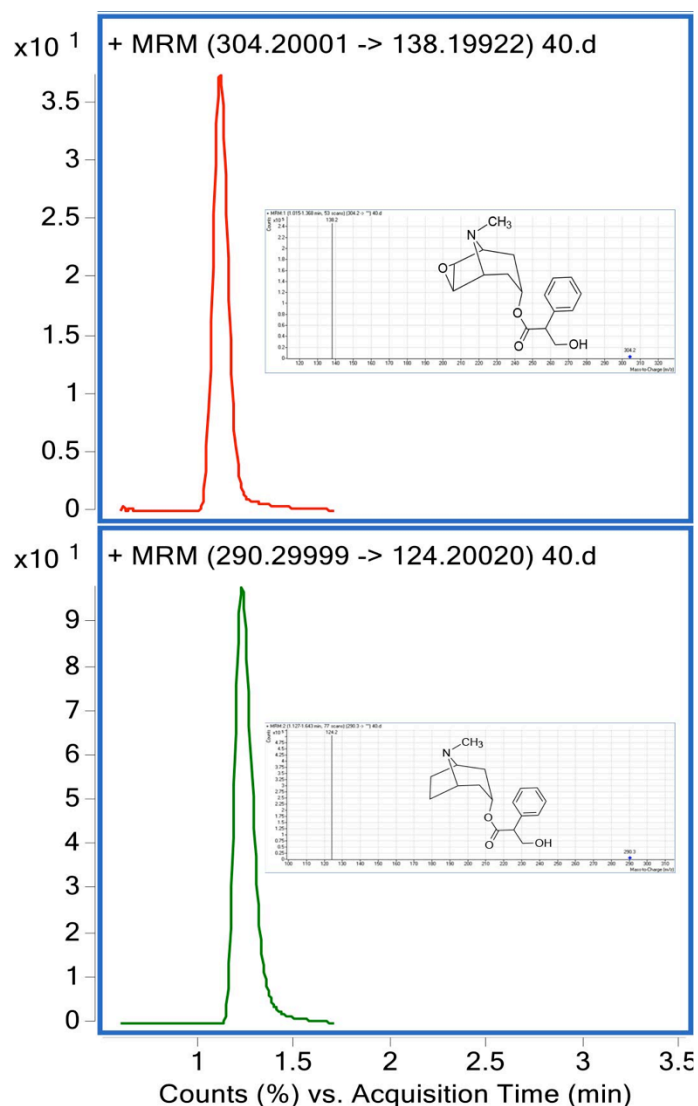
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Supplementary Table S1. PCR primers used in the text.

| Primers used for PCR analysis | | | |
|--------------------------------------|------------------------------|---------------------------------|-------------------|
| <i>Primer names</i> | <i>Purpose</i> | <i>Primer Sequences (5'-3')</i> | <i>Base Pairs</i> |
| ubVHb-F- <i>Bgl</i> III | For subcellular localization | AAAGATCTATGTTAGACCAGCAAACCAT | 28 |
| ubVHb-R- <i>Spe</i> I | For subcellular localization | AAACTAGTTTCAACCGCTTGAGCGTACA | 28 |
| ubCoxIV-F- <i>Nco</i> I | For subcellular localization | AGCACCATGGTTTTCACTACGTCAATCTA | 28 |
| ubCoxIV-R- <i>Bgl</i> III | For subcellular localization | AAAGATCTTTTTTGTCTGAAGCAG | 23 |
| ubRecA-F- <i>Nco</i> I | For subcellular localization | AGAACCATGGATTCACAGCTAGTCTT | 26 |
| ubRecA-R- <i>Bgl</i> III | For subcellular localization | AAAGATCTTCTGTTCATCGAATTCAG | 25 |
| ubAtHRS1-F- <i>Nco</i> I | For subcellular localization | CACTCCATGGTCGACCCACGCGTCC | 25 |
| ubAtHRS1-R- <i>Bgl</i> III | For subcellular localization | AAAGATCTGATTGACATCGATCTTCTT | 27 |
| 1b-F | For molecular analysis | TCGCCATGCCTCACCAACTCAC | 22 |
| 1b-R | For molecular analysis | CCTTGATCGAGCCGGGTGAGAA | 22 |
| 1c-F | For molecular analysis | CGAGGGGATCCGATTTGCTT | 20 |
| 1c-R | For molecular analysis | GACGCCCTCCTCGCCTTCCT | 20 |
| 2t-F | For molecular analysis | CGATTTGTGTACGCCCGACAGTC | 23 |
| 2t-R | For molecular analysis | CGATGTAGGAGGGCGTGGATATG | 23 |
| 5S-F | For molecular analysis | GAGGACCTAACAGAACTCGCC | 21 |
| VHb-F | For qRT-PCR | GCCAAACACCCTGAAGTACG | 20 |
| VHb-R | For qRT-PCR | ACGCCTGCTTGACAATGTTT | 20 |
| 18S-F | For qRT-PCR | AAACGGCTACCACATCCAAG | 20 |
| 18S-R | For qRT-PCR | CCTCCAATGGATCCTCGTTA | 20 |
| CYP80F1-F | For qRT-PCR | TGTGTGGAAAATGGCAAGGG | 20 |
| CYP80F1-R | For qRT-PCR | GCCAAAGATTGTCCAGCACA | 20 |
| PMT-F | For qRT-PCR | CTACCTAGCAGCAGGATTCG | 20 |
| PMT-R | For qRT-PCR | GGTCAGAAGAGTCCACAATAATG | 23 |
| H6H-F | For qRT-PCR | GCCAGACCCAAGTTCAAC | 19 |
| H6H-R | For qRT-PCR | CAGCAATCCAGGTAGCATCC | 20 |



Supplementary Figure S1. Chromatogram result of VHb-expression transgenic hairy roots by electrospray LC-MS/MS. The hyoscyamine and scopolamine compounds were detected using ESI in negative-ion mode, quantified by multiple-reaction monitoring (MRM) mode using following transition mass of m/z , 290.3 \rightarrow 124.2 for hyoscyamine, 304.2 \rightarrow 138.2 for scopolamine. The extracted peak identification: (A) hyoscyamine (290) and (B) scopolamine (304). This chromatogram is the result of V1 transgenic line. All standards were purchased from Sigma-Aldrich (St. Louis, MO). Data analysis was carried out using the Agilent Mass Hunter Workstation software.