**Supplementary Materials**

Biological activity of *Beauveria bassiana* and chemical profile of its volatile secondary metabolites using SPME-GC/MS analysis

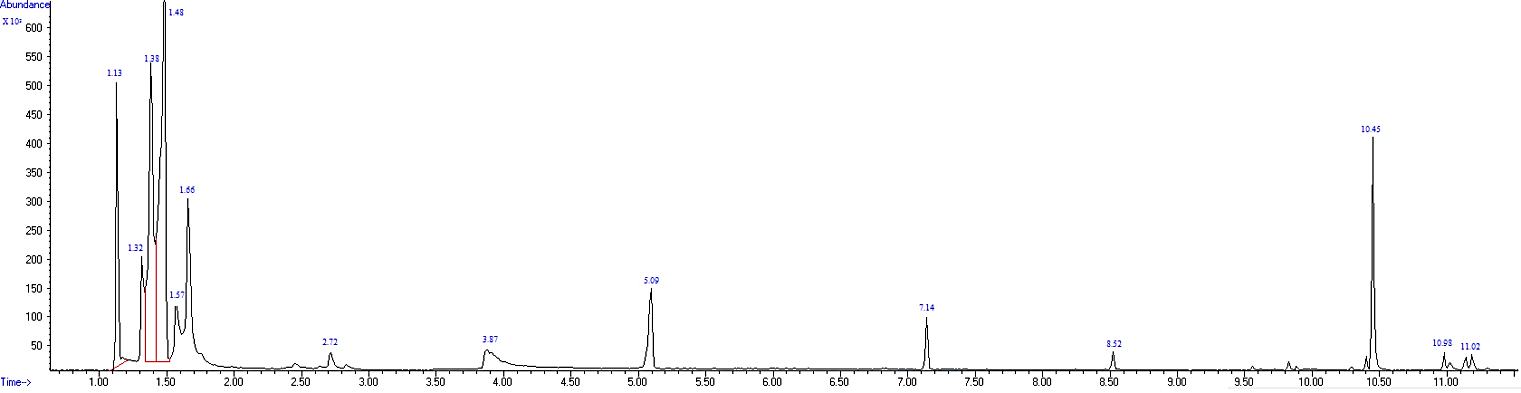
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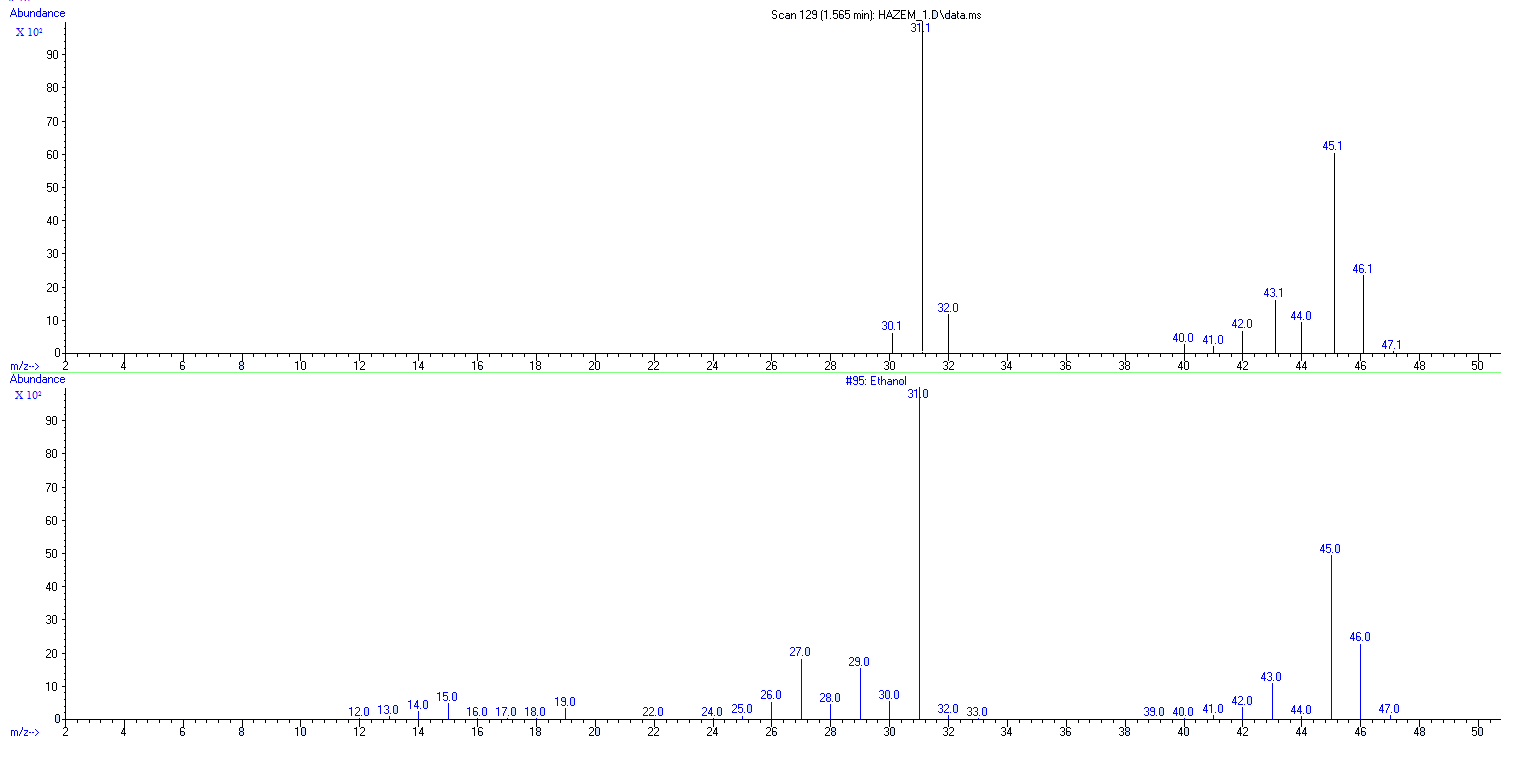
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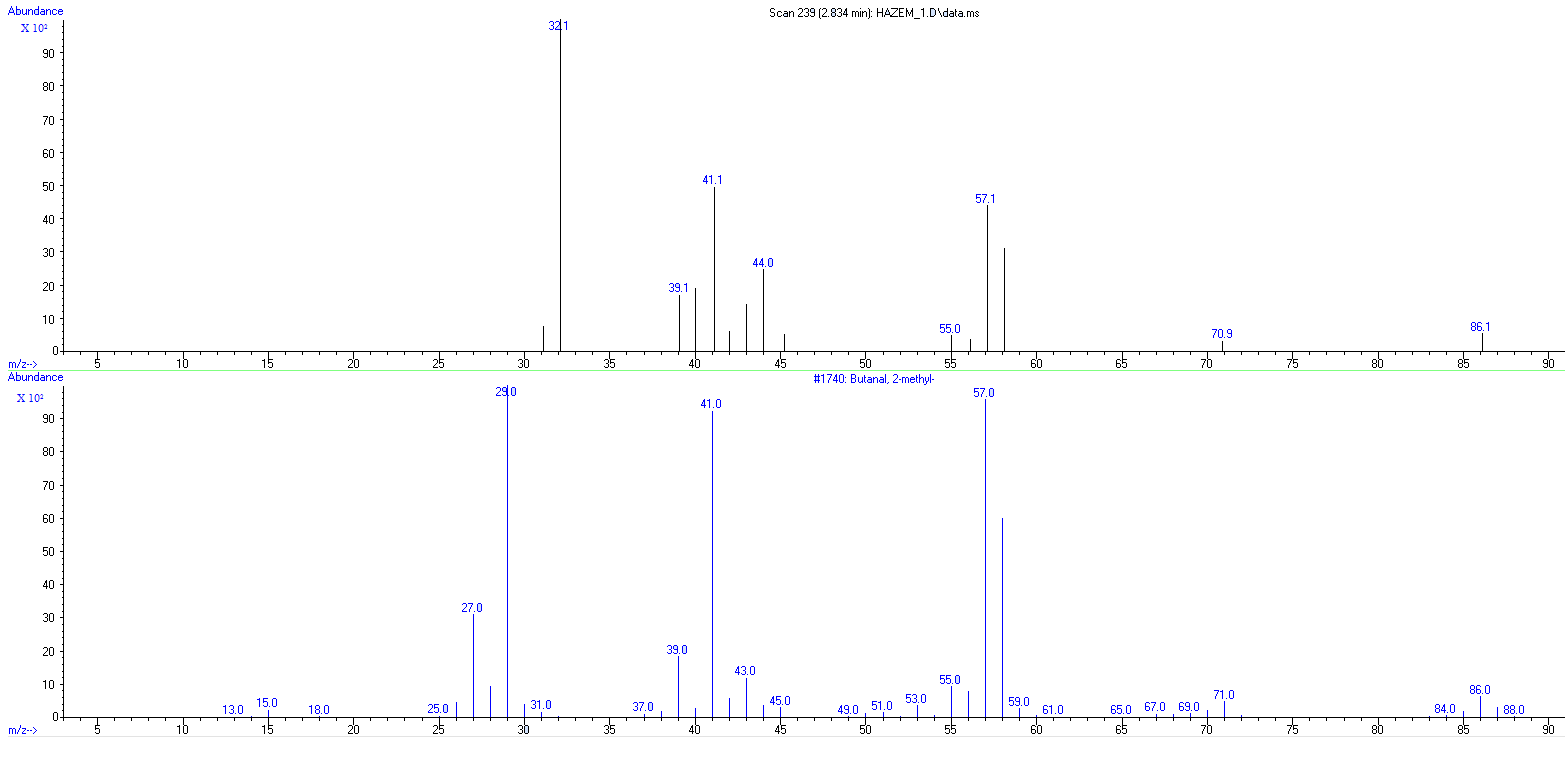
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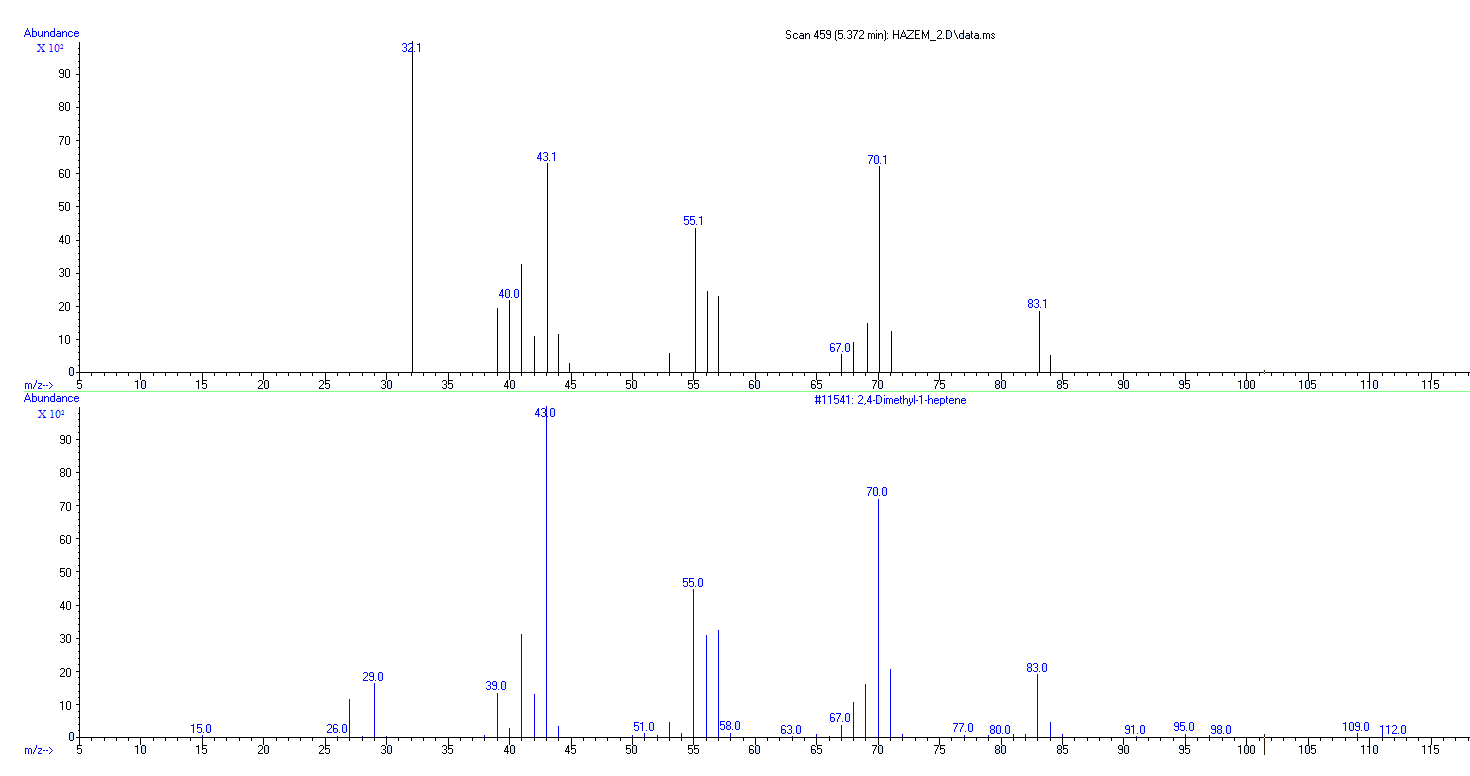
**Fig. S1.** Chromatogram of VOCs extracted from *B. bassiana* UniB2439-3



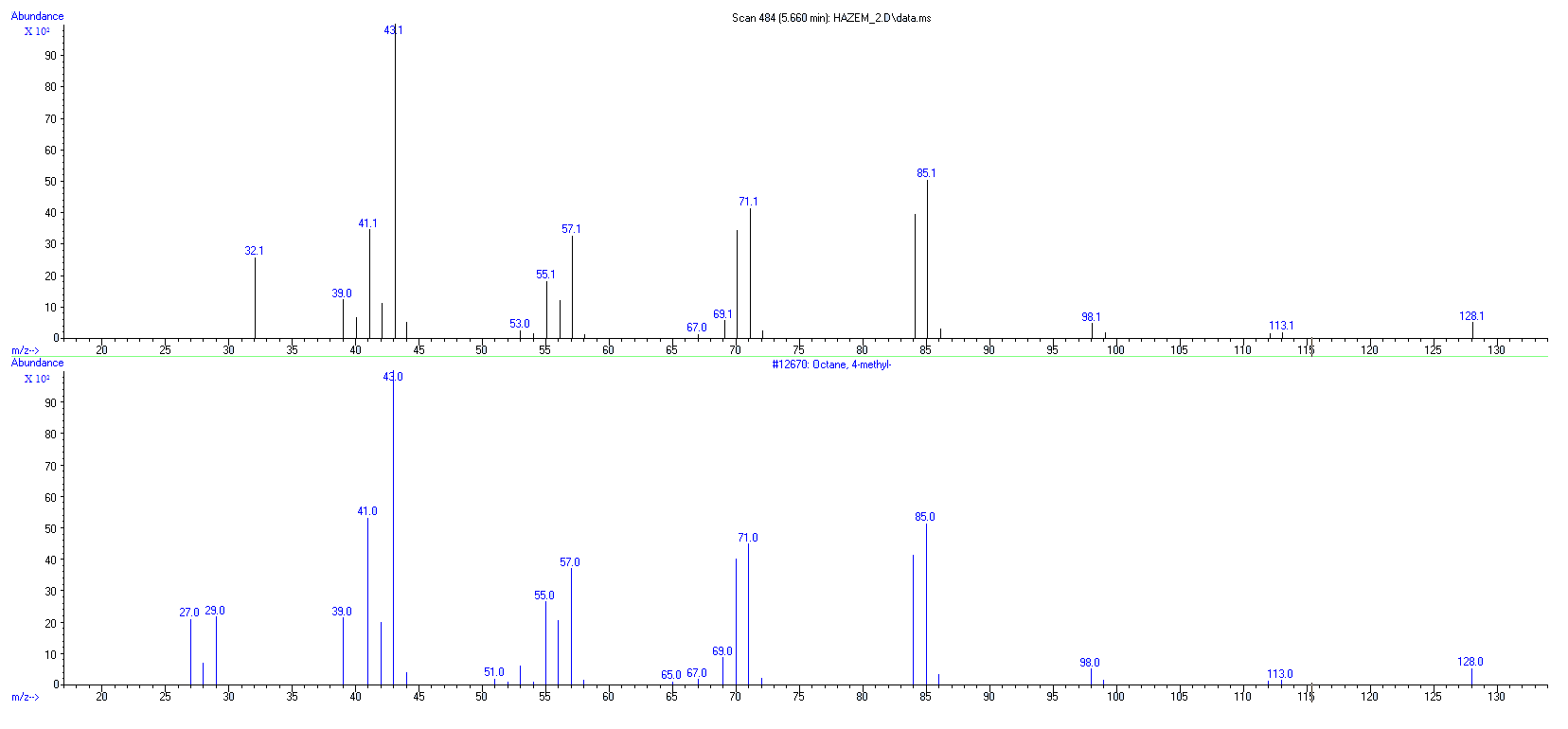
**Fig. S2.** Mass spectra of ethanol



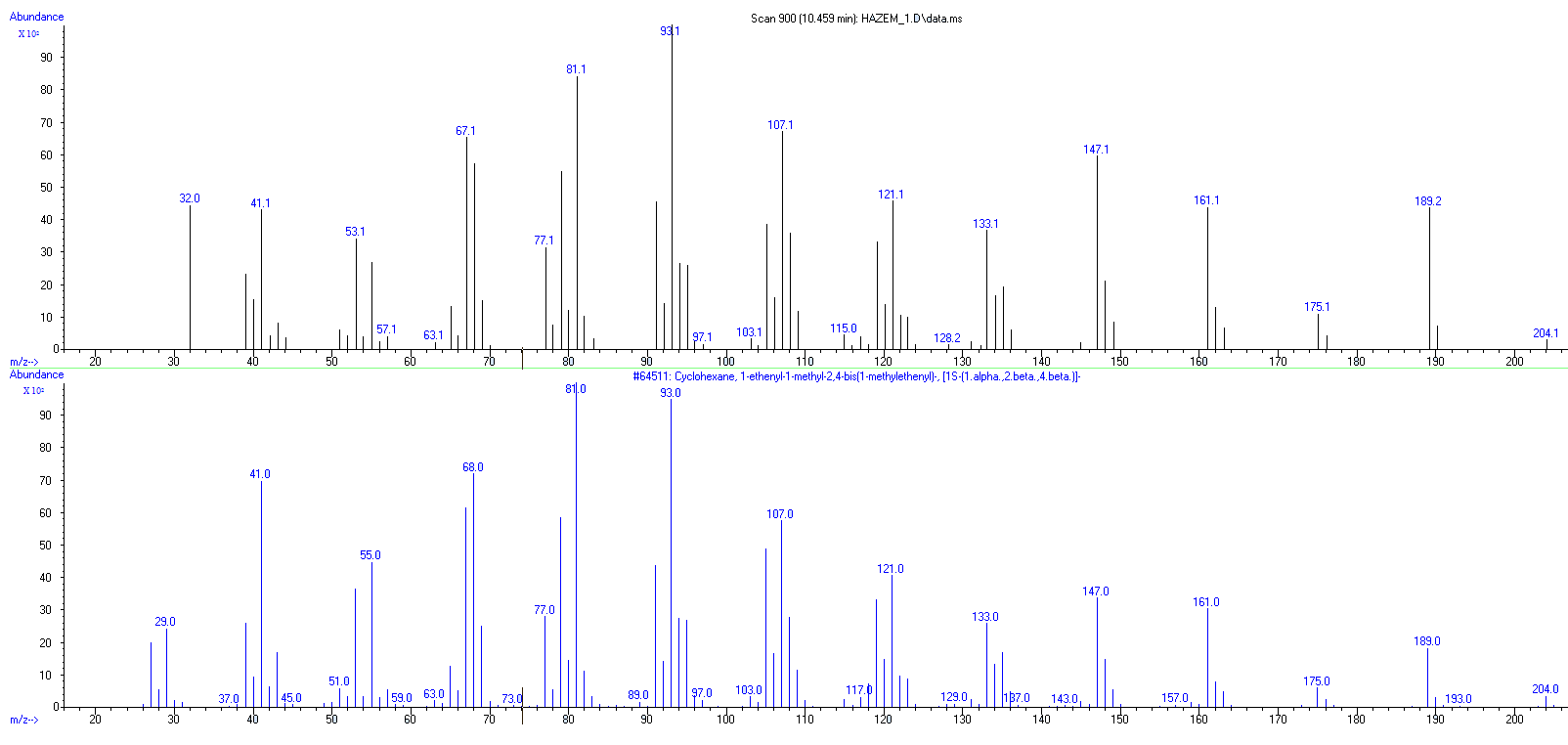
**Fig. S3.** Mass spectra of Butanal, 2-methyl

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**Fig. S4.** Mass spectra of 2,4-Dimethyl-1-heptene



**Fig. S5.** Mass spectra of Octane, 4-methyl



**Fig. S6.** Mass spectra of β-elemene

**Table S1.** Antagonistic antibacterial activity of the five studied isolates of Beauveria sp.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Diameter of inhibition zone (mm)** | | | | | |
|  |  | **UniB2439-1** | **UniB2439-2** | **UniB2439-3** | **UniB2439-4** | **UniB2439-5** |
| G+ve | *B. cereus* | 10±1.2bc | 12±0.8b | 20±1.4a | 15±1.5b | 8±0.8c |
| *B. megaterium* | 8±1.4c | 7±0.9c | 15±3.2a | 11±1.2b | 10±2.4b |
| *B. mojavensis* | 12±0.2b | 15±0.8b | 22±2.4a | 12±2.4bc | 10±2.1bc |
| *C. michiganensis* | 10±3.2b | 10±0.7b | 19±1.4a | 8±1.2c | 7±1.2c |
| G-ve | *X. campestris* | 7±1.2b | 5±0.7b | 10±2.2a | 0±02c | 5±0.7b |
| *X. vesicatoria* | 5±2.3c | 10±2.2ab | 12±3.2a | 8±0.7ab | 6±0.8b |
| *P. aeruginosa* | 0±0c | 3±1.2ab | 0±0c | 5±1.2a | 0±0c |
| *P. fluorescens* | 2±1.2b | 8±0.8a | 6±0.8ab | 0±0c | 0±0c |

Values followed by different letters in each horizontal row for each tested bacteria are significantly different at *P* < 0.05 according to one-way ANOVA combined with *Tukey* B post hoc test by using SPPS program. Data are expressed as the mean of inhibition zone diameter (mm) for three

**Table S2.** The whole list of SPME-GC/MS analysis of VOCs extracted from *B. bassiana* UniB2439-3.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| RT1  (min) | Area  (%) | Name | M.Wt2  (g/mol) | Formula | CAS3 | Probability of identification  (%) |
| 1,11 | 2,75 | Carbon dioxide | 44,01 | CO2 | 000124-38-9 | 80 |
| 1,21 | 1,24 | Benzaldehyde, 2-nitro-, diaminomethylidenhydrazone | 207.19 | [C8H9N5O2](https://pubchem.ncbi.nlm.nih.gov/#query=C8H9N5O2) | 102632-31-5 | 43 |
| 1.4840 | 27.5713 | Nitrous oxide | 44.013 | [N2O](https://pubchem.ncbi.nlm.nih.gov/#query=N2O) | 010024-97-2 | 65 |
| 1,68 | 0,66 | Silanol, trimethyl- | 90.2 | [C3H10OSi](https://pubchem.ncbi.nlm.nih.gov/#query=C3H10OSi) | 001066-40-6 | 74 |
| 1,77 | 0,72 | Acetone | 58.08 | [C3H6O](https://pubchem.ncbi.nlm.nih.gov/#query=C3H6O) | 000067-64-1 | 79 |
| 2,03 | 0,61 | Formamide, N-methylthio | 75.14 | [C2H5NS](https://pubchem.ncbi.nlm.nih.gov/#query=C2H5NS) | 018952-41-5 | 63 |
| 2.7184 | 1.3273 | Butanal, 3-methyl- | 86.13 | [C5H10O](https://pubchem.ncbi.nlm.nih.gov/#query=C5H10O) | 000590-86-3 | 81 |
| 2.8337 | 0.4432 | Butanal, 2-methyl- | 86.13 | [C5H10O](https://pubchem.ncbi.nlm.nih.gov/#query=C5H10O) | 000096-17-3 | 90 |
| 3.8835 | 3.7267 | 1-Butanol, 3-methyl- | 88.15 | [C5H12O](https://pubchem.ncbi.nlm.nih.gov/#query=C5H12O) | 000123-51-3 | 83 |
| 4,98 | 1,68 | Arsenous acid, tris(trimethylsilyl) ester | 342.49 | [C9H27AsO3Si3](https://pubchem.ncbi.nlm.nih.gov/#query=C9H27AsO3Si3) | 055429-29-3 | 70 |
| 5,37 | 0,63 | 2,4-Dimethyl-1-heptene | 126.24 | [C9H18](https://pubchem.ncbi.nlm.nih.gov/#query=C9H18) | 019549-87-2 | 90 |
| 5,56 | 0,76 | Heptane, 2,3-dimethyl- | 128.25 | [C9H20](https://pubchem.ncbi.nlm.nih.gov/#query=C9H20) | 003074-71-3 | 87 |
| 5,66 | 1,99 | Octane, 4-methyl- | 128.25 | [C9H20](https://pubchem.ncbi.nlm.nih.gov/#query=C9H20) | 002216-34-4 | 93 |
| 7,30 | 0,19 | Octane, 2,3,6,7-tetramethyl- | 170.33 | [C12H26](https://pubchem.ncbi.nlm.nih.gov/#query=C12H26) | 052670-34-5 | 63 |
| 7,33 | 0,21 | Oxalic acid, 2-ethylhexyl nonyl ester | 328.5 | [C19H36O4](https://pubchem.ncbi.nlm.nih.gov/#query=C19H36O4) | 1000309-39-2 | 74 |
| 7,70 | 0,49 | Dodecane, 2,6,11-trimethyl- | 212.41 | [C15H32](https://pubchem.ncbi.nlm.nih.gov/#query=C15H32) | 031295-56-4 | 69 |
| 7,76 | 5,47 | Decane, 3,6-dimethyl- | 170.33 | [C12H26](https://pubchem.ncbi.nlm.nih.gov/#query=C12H26) | 017312-53-7 | 72 |
| 7,81 | 2,37 | Heptane, 2,4-dimethyl- | 128.25 | [C9H20](https://pubchem.ncbi.nlm.nih.gov/#query=C9H20) | 002213-23-2 | 79 |
| 7,97 | 1,02 | 2-Undecene, 4-methyl- | 168.32 | [C12H24](https://pubchem.ncbi.nlm.nih.gov/#query=C12H24) | 091695-32-8 | 63 |
| 8,09 | 0,54 | Oxalic acid, isohexyl neopentyl ester | 244.33 | [C13H24O4](https://pubchem.ncbi.nlm.nih.gov/#query=C13H24O4) | 1000309-73-0 | 64 |
| 8,15 | 2,37 | Decane, 3,7-dimethyl- | 170.33 | [C12H26](https://pubchem.ncbi.nlm.nih.gov/#query=C12H26) | 017312-54-8 | 87 |
| 8,27 | 0,65 | Sulfurous acid, hexyl 2-pentyl ester | 236.37 | [C11H24O3S](https://pubchem.ncbi.nlm.nih.gov/#query=C11H24O3S) | 1000309-15-6 | 69 |
| 9,56 | 0,68 | Decane, 2,3,5-trimethyl- | 184.36 | [C13H28](https://pubchem.ncbi.nlm.nih.gov/#query=C13H28) | 062238-11-3 | 80 |
| 9,62 | 0,14 | Dodecane, 2,6,10-trimethyl- | 212.41 | [C15H32](https://pubchem.ncbi.nlm.nih.gov/#query=C15H32) | 003891-98-3 | 72 |
| 9,66 | 0,18 | Hexadecane | 226.44 | [C16H34](https://pubchem.ncbi.nlm.nih.gov/#query=C16H34) | 000544-76-3 | 78 |
| 9,72 | 0,30 | Dodecane, 2,6,10-trimethyl- | 212.41 | [C15H32](https://pubchem.ncbi.nlm.nih.gov/#query=C15H32) | 003891-98-3 | 64 |
| 9,89 | 0,40 | Heptadecane | 240.5 | [C17H36](https://pubchem.ncbi.nlm.nih.gov/#query=C17H36) | 000629-78-7 | 72 |
| 10,30 | 0,37 | 7-Chloro-2,3-dihydro-3-(4-N,N-dimethylaminobenzylidene)-5-phenyl-1H-1,4-benzodiazepin-2-one | 401.9 | [C24H20ClN3O](https://pubchem.ncbi.nlm.nih.gov/#query=C24H20ClN3O) | 055056-35-4 | 46 |
| 10,39 | 0,20 | 3,6-Dioxa-2,4,5,7-tetrasilaoctane, 2,2,4,4,5,5,7,7-octamethyl- | 294.68 | [C10H30O2Si4](https://pubchem.ncbi.nlm.nih.gov/#query=C10H30O2Si4) | 004342-25-0 | 65 |
| 10,46 | 0,93 | Cyclohexane, 1-ethenyl-1-methyl-2,4-bis(1-methylethenyl)-, [1S-(1.alpha.,2.beta.,4.beta.)]- | 204.35 | [C15H24](https://pubchem.ncbi.nlm.nih.gov/#query=C15H24) | 000515-13-9 | 91 |
| 11,19 | 0,40 | 3-Hydroxybromoazepam, bis(trimethylsilyl)- deriv. | 476.5 | [C20H26BrN3O2Si2](https://pubchem.ncbi.nlm.nih.gov/#query=C20H26BrN3O2Si2) | 1000079-50-7 | 72 |
| 11,42 | 0,22 | 2-Amino-2-oxo-acetic acid, N-[3,4-dimethylphenyl]-, ethyl ester | 221.25 | [C12H15NO3](https://pubchem.ncbi.nlm.nih.gov/#query=C12H15NO3) | 024451-17-0 | 77 |

1. RT: retention time is the amount of time a compound spends on the column after it has been injected.
2. M.Wt: molecular weight, also called molecular mass, is a measure of the sum of the [atomic weight](https://www.thoughtco.com/definition-of-atomic-weight-604378) values of the [atoms](https://www.thoughtco.com/definition-of-atom-and-examples-604373) in a [molecule](https://www.thoughtco.com/what-is-a-molecule-definition-examples-608506).
3. CAS: is a registry number, is a unique numerical [identifier](https://en.wikipedia.org/wiki/Identifier) assigned by the [Chemical Abstracts Service](https://en.wikipedia.org/wiki/Chemical_Abstracts_Service) (CAS), US to every [chemical substance](https://en.wikipedia.org/wiki/Chemical_substance) described in the open scientific literature.

The eventual fragmentation of the acquired volatile metabolites, as described here, is also shown in Table (S2). Beauvericin was fragmented into carbon dioxide and nitrous oxide. Whereas, bassianolide was converted to butanal, 3-methyl with 81% or butanol, 3-methyl with 83%. Regarding bassianin, GC-MS analysis showed that this compound was converted into 2,4-Dimethyl-1-heptene with 90%. Whereas, beauveriolide was fragmented into butanal, 3-methyl with 81%, carbon dioxide and nitrous oxide. Regarding cyclosporine, results demonstrated that this compound was fragmented into butanal, 2-methyl- (90%), butanal, 3-methyl- (81%), 1-butanol, 3-methyl- (83%), carbon dioxide and nitrous oxide.