**SUPPLEMENTARY TABLES**

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| **Table S1** Environmental conditions: Temperature (Max and Min °C) and weather (Romandie Meteo) in the afternoon and morning (S = sun, R = rain, C = cloudy, SN = snow) on the dates when the different reps were put outside for a period of 6 to 8 days. Also are given the dates on which the bioassays were conducted for a period of 48h and when the leaf material for the chemical analysis was sampled.  |
| Date | T°C day (Max/Min) | Morning Weather | Afternoon Weather | Reps put Outside | Bioassays | Chemical Sampling |
| 31.03 | 9 / 4 | R / S | R / S | A |   |   |
| 1.04 | 13 / 3 | C | C / S | A |  |  |
| 2.04 | 10 / 5 | R | C | A |  |  |
| 3.04 | 7 / 3 | C | R | A |  |  |
| 4.04 | 9 / 3 | C / S | C | A / B |  |  |
| 5.04 | 12 / 2 | C / S | R / S | A / B |  |  |
| 6.04 | 6 / 0 | C / S | C | B |  |  |
| 7.04 | 4 / -4 | S / SN | C / S | B | A |  |
| 8.04 | 4 / -3 | C | C | B | A | A |
| 9.04 | 12 / 3 | C / S | R | B | A |  |
| 10.04 | 12 / 7 | R | R / S | B |  | A |
| 11.04 | 10 / 3 | R / S | R | B |  |  |
| 12.04 | 10 / 1 | C / S | S |  | B |  |
| 13.04 | 14 / 3 | C / S | R / S | C | B |  |
| 14.04 | 10 / 2 | R | R | C | B |  |
| 15.04 | N/A | R | N/A | C |  | B |
| 16.04 | 7 / 0 | S / SN / R | S / SN / R | C |  |  |
| 17.04 | 7 / 0 | C | R | C |  |  |
| 18.04 | 14 / 3 | S | S | C |  |  |
| 19.04 | 14 / 6 | C | S | C |   |   |

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| **Table S1 Continued** |
| Date | T°C day (Max/Min) | Morning Weather | Afternoon Weather | Reps put Outside | Bioassays | Chemical Sampling |
| 20.04 | 14 / 6 | C | S | C |  |  |
| 21.04 | 11 / 7 | R | R | D |  |  |
| 22.04 | 9 / 7 | R | N/A | D | C | C |
| 23.04 | 11 / 9 | R | R | D | C | C |
| 24.04 | 15 / 7 | C | C | D | C | C |
| 25.04 | 14 / 8 | C | R / S | D |  |  |
| 26.04 | 17 / 5 | S | S | D |  |  |
| 27.04 | 20 / 6 | S | S | D |  |  |
| 28.04 | 15 / 8 | S | R / S | E1 | D |  |
| 29.04 | 14 / 6 | C | N/A | E1 | D | D |
| 30.04 | 12 / 6 | R / S | R | E1 | D |  |
| 1.05 | 14 / 6 | R / S | R / S | E1 |  | D |
| 2.05 | 18 / 4 | N/A | N/A | E1 |  |  |
| 3.05 | 19 / 7 | S | S | E1 |  |  |
| 4.05 | 20 / 8 | S | S | E1 |  |  |
| 5.05 | 18 / 9 | S | S |  | E1 |  |
| 6.05 | 20 / 8 | S | S |  | E1 | E |
| 7.05 | 21 / 9 | S | S | E2 | E1 |  |
| 8.05 | 18 / 9 | S | S | E2 |  |  |
| 9.05 | 21 / 7 | N/A | N/A | E2 |  |  |
| 10.05 | 23 / 12 | N/A | N/A | E2 |  |  |
| 11.05 | 21 / 9 | N/A | N/A | E2 |  |  |
| 12.05 | 20 / 8 | N/A | N/A | E2 |  |  |
| 13.05 | N/A | S | S |  | E2 |  |
| 14.05 | N/A | N/A | N/A |  | E2 |  |
| 15.05 | N/A | N/A | N/A |   | E2 |   |

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| **Table S2.** Compounds detected during GS analysis. Of these, 45 are glucosinolates based on fragmentation, and 29 (in bold) were selected as a basis for analysis to generate phylograms. Compounds underlined and nearly co-eluting were collapsed for analysis because they could not be differentiated based on spectra, yielding a final list for analysis (n=26). Compounds after retention time 30min were not included in analysis because based on their long retention times these may include GS with further substitutions on the glucose moiety – i.e. R group dimers. RT = Retention Time |
| RT (min) | Identification prefix; all are GS unless otherwise noted |
| 4.6 | collapse with elution time 7.8 |
| **7.6** | **3-(methylsulfinyl) propyl** |
| **7.8** | **3-hydroxypropyl** |
| **8.0** | **2-(S)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl** |
| **9.6** | **2-(S)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl** |
| 9.7 | unclear identity as GS |
| **10.2** | **2-propenyl** |
| **10.5** | **(S)-2-hydroxy-2-phenylethyl and 2-Hydroxy-2-(4-hyrdroxyphenly)ethyl** |
| **11.4** | **(S)-2-hydroxy-2-phenylethyl and 2-Hydroxy-2-(4-hyrdroxyphenly)ethyl** |
| **11.4** | **2-hydroxy-4-pentenyl** |
| 12.5 | unclear identity as GS |
| **13.6** | **propyl** |
| **14.0** | **4-hydroxybenzyl** |
| **14.4** | **5-(methylsulfinyl) pentyl** |
| **15.2** | **3-butenyl**  |
| **15.6** | **3-hydroxybenzyl** |
| **16.2** | **4-hydroxy-3-indolymethyl** |
| 16.2 | unclear identity as GS |
| 17.0 | unclear identity as GS |
| **17.6** | **3,4-dihydroxybenzyl** |
| **17.6** | **6-(methylsulfinyl)hexyl** |
| **17.6** | **3-methoxybenzyl or 2-methoxybenzyl (isomers)** |
| **18.1** | **3-methoxybenzyl or 2-methoxybenzyl (isomers)** |
| **18.1** | **But-3-enyl** |
| 18.4 | Collapse with elution time 18.1 (3-methoxybenzyl) |
| 19.2 | unclear identity as GS |
| **20.1** | **benzyl** |
| **20.7** | **4-(methylthio)butyl**  |
| **21.3** | **3,4-dimethoxybenzyl**  |
| **21.6** | **indolyl-methyl** |
| *22.5* | *3-methoxybenzyl (Internal Standard)* |

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| **Table S2. Continued** |
| RT (min) | Identification prefix – all are GS unless otherwise noted  |
| 22.8 | unknown but clear identification as GS |
| 23.7 | unclear identification as GS |
| **24.8** | **2-phenylethyl** |
| **25.0** | **4-methoxy-3-indolylmethyl**  |
| 26.7 | unclear identity as GS |
| **28.5** | **9-(methylsulfonyl)nonyl (daughter or parent compound?)** |
| **29.5** | **9-(methylsulfinyl)nonyl (daughter or parent compound?)** |
| 30.2 | 10-(methylsulfonyl)decyl |
| 32.3 | unclear identification as GS |
| 32.9 | unclear identification as GS |
| 33.1 | 10-(methylsulfinyl)decyl |
| 34.0 | unclear identification as GS |
| 35.5 | unclear identification as GS |
| 36.5 | unknown but clear identity as GS |
| 37.6 | MeS-octyl |
| 38.5 | unknown but clear identification as GS |
| 39.2 | unclear identification as GS |
| 40.1 | unknown but clear identification as GS |
| 40.2 | unclear identification as GS |
| 40.8 | unclear identification as GS |
| 43 | unclear identification as GS |
| 44 | unclear identification as GS |

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| **Table S3.** concentration (μmol/g) of GS of the old leaves only of the plant species and populations included in this study. |
|   | 3-(methylsulfinyl)propyl | 2-hydroxypropyl | 2-(R)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl | 2-(R)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl | 2-propenyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 0.00 | 13.70 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 21.45 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 1.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.33 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.00 | 18.10 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 2.04 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 2.64 | 0.00 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.00 | 0.00 | 0.00 | 1.60 |

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| **Table S3 Continued**  |
|   | (S)-2-hydroxy-2-phenylethyl and 2-Hydroxy-2-(4-hyrdroxyphenly)ethy | 2-hydroxy-4-pentenyl | propyl | 4-hydroxybenzyl | 5-(methylsulfinyl)pentyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.59 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 1.03 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.65 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 1.25 | 0.00 |
| *Hesperis matronalis*  | 0.67 | 0.00 | 0.00 | 2.46 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 18.47 | 3.73 |
| *Lepidium campestre* (2nd pop) | 0.43 | 0.00 | 0.00 | 23.32 | 5.06 |
| *Lepidium crenatum* | 0.00 | 0.00 | 5.20 | 1.03 | 0.00 |
| *Lepidium draba*  | 9.70 | 0.00 | 0.00 | 16.38 | 0.00 |
| *Lepidium draba* (2nd pop) | 9.45 | 0.00 | 0.00 | 7.80 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.79 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.15 | 0.00 | 0.74 | 0.00 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 1.25 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 1.01 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 7.49 | 0.91 | 0.00 |
| *Stanleya viridiflora*  | 0.24 | 0.00 | 2.04 | 1.99 | 0.00 |

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| **Table S3 Continued**  |
|   | 3-butenyl | 3-hydroxybenzyl | 4-hydroxyindol-3-ylmethyl | unknown | 3,4-dihydroxybenzyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 1.01 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 1.08 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.56 | 0.00 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 1.68 | 0.00 | 0.00 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.86 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.05 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.06 | 0.00 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 4.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum*  | 0.00 | 0.07 | 0.00 | 1.13 | 0.86 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.60 | 0.33 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 0.08 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 3.46 | 0.00 | 0.00 | 0.00 | 0.00 |

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| **Table S3 Continued**  |
|   | 6-(methylsulfinyl)hexyl | 2-methoxybenzyl and 3-methoxybenzyl  | but-3-enyl\* | benzyl | 4-methylthiobutyl  |
| *Barbarea orthoceras*  | 0.00 | 45.71 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.00 | 0.08 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.00 | 24.34 | 0.08 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.91 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 4.59 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 13.72 | 0.00 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 0.07 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 0.19 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.00 | 1.11 | 0.28 | 0.00 |

\* Isomer not determined

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| **Table S3 Continued**  |
|   | 3,4-dimethoxybenzyl  | indol-3-ylmethyl | unknown | 2-phenylethyl | 4-methoxyindol-3-ylmethyl  | 9-(methylsulfonyl)nonyl and 9-(methylsulfinyl)nonyl |
| *Barbarea orthoceras*  | 0.00 | 5.84 | 0.00 | 3.52 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.66 | 0.00 | 0.36 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 1.03 | 0.00 | 2.30 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.23 | 0.00 | 0.00 | 0.08 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.92 | 6.57 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.35 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.76 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.86 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.26 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.55 | 0.00 |
| *Lepidium squamatum*  | 0.14 | 0.00 | 8.25 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.13 | 0.00 | 7.85 | 0.00 | 0.00 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.24 | 0.00 | 0.00 | 0.63 | 0.00 |

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| **Table S4** Concentration (μmol/g) GS profiles of the young leaves only of the plant species and populations included in this study. |
|   | 3-(methylsulfinyl)propyl | 2-hydroxypropyl | 2-(R)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl | 2-(R)-hydroxy-3-butenyl or 2-(S)-hydroxy-3-butenyl | 2-propenyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 0.00 | 23.03 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 28.68 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 11.31 | 0.00 | 0.00 | 0.00 | 0.83 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.19 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.00 | 24.09 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 6.47 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 10.87 | 0.00 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.00 | 0.94 | 1.09 | 0.63 |

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| **Table S4 Continued**  |
|   | (S)-2-hydroxy-2-phenylethyl and 2-Hydroxy-2-(4-hyrdroxyphenly)ethy | 2-hydroxy-4-pentenyl | propyl | 4-hydroxybenzyl | 5-(methylsulfinyl)pentyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.74 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 1.20 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.69 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.91 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.77 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.00 | 0.81 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.91 | 0.00 |
| *Hesperis matronalis*  | 0.77 | 0.00 | 0.00 | 2.65 | 0.00 |
| *Lepidium campestre* | 0.10 | 0.00 | 0.00 | 24.12 | 6.46 |
| *Lepidium campestre* (2nd pop) | 1.46 | 0.00 | 0.00 | 18.49 | 6.85 |
| *Lepidium crenatum* | 0.00 | 0.00 | 14.73 | 1.13 | 0.00 |
| *Lepidium draba*  | 31.03 | 0.00 | 0.00 | 22.47 | 0.00 |
| *Lepidium draba* (2nd pop) | 26.01 | 0.00 | 0.00 | 17.02 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.97 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.62 | 0.00 | 1.31 | 0.54 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 1.51 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 1.05 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 30.19 | 1.35 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.00 | 7.73 | 1.07 | 0.00 |

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| **Table S4 Continued**  |
|   | 3-butenyl | 3-hydroxybenzyl | 4-hydroxyindol-3-ylmethyl | unknown | 3,4-dihydroxybenzyl |
| *Barbarea orthoceras*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 1.22 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.07 | 0.00 | 1.84 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.68 | 0.00 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 2.09 | 0.00 | 0.00 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 1.64 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.00 | 0.05 | 0.00 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.26 | 0.00 | 0.00 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.47 | 0.00 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.38 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.09 | 0.00 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 12.79 | 0.00 | 0.23 | 0.00 | 0.00 |
| *Lepidium squamatum*  | 0.00 | 0.05 | 0.00 | 1.22 | 1.24 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.89 | 0.38 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 1.61 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 16.24 | 0.00 | 0.85 | 0.00 | 0.00 |

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| **Table S4 Continued**  |
|   | 6-(methylsulfinyl)hexyl | 2-methoxybenzyl and 3-methoxybenzyl  | but-3-enyl\* | benzyl | 4-methylthiobutyl  |
| *Barbarea orthoceras*  | 0.00 | 56.74 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.00 | 0.00 | 0.54 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.61 | 0.00 | 0.00 | 0.00 | 0.13 |
| *Lepidium crenatum* | 0.00 | 0.00 | 29.71 | 1.40 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.00 | 0.00 | 0.00 | 1.12 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 9.99 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 33.01 | 0.00 |
| *Lepidium squamatum*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 3.10 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 0.00 | 8.08 | 1.96 | 0.00 |

\* Isomer not determined

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| **Table S4 Continued**  |
|   | 3,4-dimethoxybenzyl  | indol-3-ylmethyl | unknown | 2-phenylethyl | 4-methoxyindol-3-ylmethyl  | 9-(methylsulfonyl)nonyl and 9-(methylsulfinyl)nonyl |
| *Barbarea orthoceras*  | 0.00 | 11.55 | 0.00 | 11.69 | 0.00 | 0.00 |
| *Brassica nigra* | 0.00 | 0.49 | 0.00 | 0.42 | 0.00 | 0.00 |
| *Brassica nigra* (2nd pop) | 0.00 | 0.62 | 0.00 | 2.74 | 0.00 | 0.00 |
| *Camelina microcarpa* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Camelina microcarpa* (2nd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Caulanthus inflatus* | 0.00 | 0.21 | 0.00 | 0.00 | 0.57 | 0.00 |
| *Draba nemorosa* | 0.00 | 0.00 | 0.00 | 0.00 | 2.12 | 16.05 |
| *Hesperis matronalis*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.16 | 0.00 |
| *Lepidium campestre* | 0.00 | 0.00 | 0.00 | 0.00 | 0.94 | 0.00 |
| *Lepidium campestre* (2nd pop) | 0.00 | 0.23 | 0.00 | 0.00 | 2.15 | 0.00 |
| *Lepidium crenatum* | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 | 0.00 |
| *Lepidium draba*  | 0.00 | 0.14 | 0.00 | 0.00 | 1.54 | 0.00 |
| *Lepidium draba* (2nd pop) | 0.00 | 0.18 | 0.00 | 0.00 | 0.99 | 0.00 |
| *Lepidium latifolium*  | 0.00 | 0.00 | 0.00 | 0.00 | 1.56 | 0.00 |
| *Lepidium latifolium* (3rd pop) | 0.00 | 0.00 | 0.00 | 0.00 | 2.12 | 0.00 |
| *Lepidium squamatum*  | 0.32 | 0.00 | 9.06 | 0.00 | 0.00 | 0.00 |
| *Lepidium squamatum* (2nd pop) | 0.52 | 0.00 | 10.93 | 0.00 | 0.14 | 0.00 |
| *Stanleya pinnata*  | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Stanleya viridiflora*  | 0.00 | 3.04 | 0.00 | 0.00 | 1.81 | 0.00 |



Figure S1. Dendrograms for species tested based on GS profiles from all leaves, young leaves only (collected above the middle node), and old leaves only (collected below the middle node).