**Supplementary Material**

Encounter with a selfish virus sabotages its vector to orient towards requisite host plant: A case study with chilli leaf curl virus-whitefly

Rajeev Kumar Yadav1, Madhavi Reddy Kambham1\*, Saravan Kumar Parepally2, Meenal Vyas2, Krishna Reddy Manem2\*\* and Kamala Jayanthi Pagadala Damodaram 2†

1Divison of Vegetable Crops,2Divison of Crop Protection, ICAR-Indian Institute of Horticultural Research, Hesseraghatta Lake PO, Bangalore 560089, Karnataka, India

Correspondence:

†jaiinsect@gmail.com, KamalaJayanthi.PD@icar.gov.in, \*MadhaviReddy.K@icar.gov.in, kmreddy14@gmail.com & \*\*mkreddy60@gmail.com,  KrishanaReddy.M@icar.gov.in

**Supplementary Figure S1**.Heatmap showings-MS analysis of headspace volatiles from healthy and infected Chilli plants**.** The Percent area (% area) of the healthy and ChLCV infected chilli plant volatiles was plotted as a heat map to determine the abundance of the compounds present. The results showed significant variations between healthy and ChLCV infected chilli plants.



**Supplementary Table S1:** List of differentially expressed genes and primers for RT-PCR (*Bemisia tabaci*). The primers were designed to amplify products ranging from 85-100bp.

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **F/R** | **Sequences** | **Length** |
| Chemosensory protein 2 **(CSP1)** [*Bemisia tabaci*] | F | ACCGCACCGGTTGGTACATT | 20 |
| R | GGAGCGTATTTAGAGCGTTTGATG | 24 |
| Fragile X mental retardation syndrome-related protein 1 isoform X1 [*Bemisia tabaci*] | F | CGCTGCTCCAATTACTTTCTGA | 22 |
| R | GTGCCAGAGGAGCTTAGAGAA | 21 |
| Neuropeptide Y receptor type 6-like [*Bemisia tabaci*] | F | TGCTGGCAGTGGACGTTA | 18 |
| R | TGGCAATGAGGTGGCAGATAG | 21 |
| Odorant binding protein 1, partial [*Bemisia tabaci*] | F | GGCTAAGGATGCACCGATCATTG | 23 |
| R | CGTACGAAAGATCGCAAGTCTTC | 23 |
| Odorant binding protein 5, partial [*Bemisia tabaci*] | F | GAGGGTGGTCGAAGTATGTCA | 21 |
| R | CGATGCCCAAACCCAACAG | 19 |
| Odorant-binding protein 8 [*Bemisia tabaci*] | F | GTGCAACATTGCAGGAAAGCTA | 22 |
| R | GGGCACTGATGTTAAGCCAAC | 21 |
| Phosphatidylethanolamine-binding protein 1-like [*Bemisia tabaci*] | F | TGCTCTGGTGTGGTTTGGA | 19 |
| R | TCATGGCTGGCTTCTTCTGA | 20 |
| Protein D1-like [*Bemisia tabaci*] | F | TGGGTTGAGAGGAGCATTTGG | 21 |
| R | GCCGAAGATGTGAGAGCAA | 19 |
| Synaptic functional regulator FMR1 isoform X4 [*Bemisia tabaci*] | F | CGCTGCTCCAATTACTTTCTGA | 22 |
| R | GTGCCAGAGGAGCTTAGAGAA | 21 |

**Supplementary Table S2**. List of volatile organic compounds in healthy and ChLCV infected chilli host plants.

|  |  |  |
| --- | --- | --- |
| **Compounds** | **Area %** | **RI** |
| **Infested** | **Healthy** |
|  **Acid and esters** |
| Butanoic acid, 2-ethyl-2-methyl-, methyl ester | 0.00 | 0.22 | 910 |
| cis-3-Hexenyl iso-butyrate | 0.00 | 2.35 | 1145 |
| Ethyl benzoate | 0.40 | 0.00 | 1171 |
| Methyl salicylate | 0.65 | 1.28 | 1192 |
| Acetic acid, 2-phenylethyl ester | 1.98 | 0.00 | 1258 |
| n-Nonanyl acetate | 0.28 | 0.00 | 1308 |
| cis-Geranyl acetate | 1.38 | 0.00 | 1364 |
| Linalylformate | 0.00 | 0.27 | 1215 |
| Geranyl acetate | 38.44 | 0.00 | 1382 |
| Methyl 9-oxodecanoate | 0.00 | 0.10 | 1516 |
| Geranyl isovalerate | 0.06 | 0.04 | 1606 |
| (11Z)-12-(2-Oxiranyl)-11-dodecenyl acetate | 0.30 | 0.00 | 1849 |
| Geranyl acetate, 2,3-epoxy- | 0.35 | 0.00 | 1393 |
| 2-Octen-1-ol, 3,7-dimethyl-, isobutyrate, (Z)- | 5.81 | 0.00 | 1437 |
| Tetradecanoic acid, 1-methylethyl ester | 0.06 | 0.19 | 1827 |
| Cinnamic acid, 3,4-dimethoxy-, methyl ester | 0.12 | 0.00 | 1873 |
| Hexadecanoic acid, methyl ester | 0.71 | 0.00 | 1926 |
|  **Alkanes** |
| 2,3,4-Trimethylhexane | 0.00 | 0.06 | 849 |
| Octane, 2,6-dimethyl- | 0.76 | 0.00 | 933 |
| Undecane, 2-methyl- | 1.06 | 0.00 | 1164 |
| Decane, 2,4,6-trimethyl- | 0.00 | 4.70 | 1121 |
| Undecane | 5.66 | 25.75 | 1100 |
| Decane, 2,3-dimethyl | 0.00 | 0.21 | 1157 |
| Dodecane | 5.59 | 0.96 | 1200 |
| Undecane, 4-ethyl | 2.54 | 0.00 | 1242 |
| Farnesane | 0.00 | 0.63 | 1366 |
| Dodecane, 2,6,11-trimethyl- | 0.22 | 1.99 | 1275 |
| 2,3,5,8-Tetramethyldecane | 0.00 | 1.01 | 1318 |
| Naphthalene | 0.32 | 0.00 | 1182 |
| 4,6-Dimethyldodecane | 0.00 | 1.42 | 1325 |
| 3-Methyltridecane | 0.38 | 2.17 | 1371 |
| Tetradecane | 3.69 | 16.03 | 1400 |
| Pentadecane | 1.08 | 17.70 | 1500 |
| Tetradecane, 4-methyl- | 0.54 | 0.00 | 1459 |
| 2-Methyltetradecane | 0.00 | 3.86 | 1463 |
| Hexadecane | 2.15 | 0.68 | 1600 |
| 2-Methylhexadecane | 0.00 | 0.02 | 1664 |
| Phytane | 0.00 | 6.99 | 1792 |
| n-Heptadecane | 0.00 | 1.34 | 1700 |
| Heptadecane, 2-methyl- | 0.47 | 0.00 | 1765 |
| 5,5,7,7-Tetraethylundecane | 0.33 | 0.00 | 1733 |
| (3E)-3-Heptadecene | 0.00 | 0.73 | 1719 |
| Crocetane | 0.00 | 1.77 | 1792 |
| Heptadecane, 2,6,10,15-tetramethyl- | 0.64 | 0.18 | 1889 |
| 2-Methyloctadecane | 0.00 | 0.31 | 1863 |
| n-Nonadecane | 0.00 | 0.26 | 1900 |
| 7,7-Diethylheptadecane | 0.07 | 0.07 | 1988 |
| 3-Methylheneicosane | 0.00 | 0.07 | 2171 |
|  **Terpenes** |
| Limonene | 0.34 | 0.00 | 1030 |
| cis-Pinocarveol | 0.15 | 0.00 | 1180 |
| Limonene glycol | 0.93 | 0.00 | 1321 |
|  **Alcohols** |
| 2,3-Butanediol, 2,3-dimethyl | 0.00 | 1.19 | 850 |
| Epoxy-linalooloxide | 0.31 | 0.00 | 1075 |
| 1-Octanol, 3,7-dimethyl- | 2.18 | 1.40 | 1171 |
| 6-Octenal, 3,7-dimethyl | 0.13 | 0.00 | 1153 |
| 1-Octanol, 2-butyl | 0.00 | 0.28 | 1277 |
| cis-Geraniol | 0.40 | 0.00 | 1228 |
| trans-Geraniol | 0.80 | 0.00 | 1255 |
| Isomenthol | 2.20 | 0.00 | 1183 |
| Juniperol | 0.00 | 0.09 | 1592 |
| 2-Hexyl-1-decanol | 1.67 | 0.23 | 1504 |
| Himachalol | 0.00 | 0.35 | 1647 |
| 2-Hexadecanol | 0.33 | 0.00 | 1702 |
| 1-Dodecanol, 3,7,11-trimethyl- | 0.42 | 0.11 | 1571 |
| Cedrol | 0.00 | 0.06 | 1598 |
|  **Aromatic Hydrocarbons** |
| Benzene, 4-ethenyl-1,2-dimethyl- | 0.00 | 0.14 | 1100 |
| Benzene, (2,4-dimethylpentyl)- | 0.00 | 0.53 | 1247 |
| Benzene, 1,2,3-trimethoxy-5-(2-propenyl)- | 4.07 | 0.00 | 1554 |
| Benzene, 5(1-propenyl)-1,2,3-trimethoxy | 0.31 | 0.00 | 1645 |
|  **Aldehydes** |
| Ethyl-benzaldehyde | 0.62 | 0.58 | 1180 |
| p-Isopropylbenzaldehyde | 0.00 | 0.37 | 1239 |
| Veratraldehyde | 0.30 | 0.00 | 1458 |
| 3,4,5-trimethoxy Benzaldehyde | 1.21 | 0.00 | 1615 |
|  **Phenols** |
| Phenol, 3-ethyl- | 0.00 | 0.07 | 1169 |
| Phenol, 2,4-bis(1,1-dimethylethyl)- | 0.86 | 0.00 | 1519 |
|  **Terpenoids** |
| α-Thujene | 0.00 | 0.45 | 1190 |
| β-Citral | 0.11 | 0.00 | 1240 |
| 2,6-Octadienal, 3,7-dimethyl- | 0.25 | 0.00 | 1276 |
|  **Phenyl propenes** |
| Methyl eugenol | 0.13 | 0.34 | 1402 |
| Isoelemicin | 2.03 | 0.00 | 1654 |
|  **Sesquiterpenes** |
| Farnesene epoxide, E- | 0.03 | 0.00 | 1624 |
| trans-Farnesol | 0.48 | 0.38 | 1722 |
| α-Bisbalool oxide | 0.00 | 0.01 | 1654 |
|  **Others** |
| 4a,7-Methano-4aH-naphth[1,8a-b]oxirene, octahydro-4,4,8,8-tetramethyl- | 0.04 | 0.00 | 1544 |
| p-Benzoquinone, 2,6-di-tert-butyl- | 0.48 | 0.00 | 1633 |

RI = Retention Index

**Supplementary Table S3. Three-Way ANOVA with Tukey’s Multiple Comparisons Test for time spent by *B. tabaci*.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Interactions** |  **SS** |  **DF** |  **MS** |  ***F* (1, 56)** | ***P*** |
| Plant status (Healthy vs Infected) | 0.01 | 1 | 0.01 | 0.01 | 0.92 |
| Whitefly status (viruliferous vs non-viruliferous) | 6.48 | 1 | 6.48 | 3.76 | 0.05 |
| White fly sex (males vs females) | 7.35 | 1 | 7.35 | 4.20 | 0.04 |
| Plant status x Whitefly status | 48.86 | 1 | 48.86 | 28.38 | <0.0001 |
| Plant status x Whitefly sex | 0.03 | 1 | 0.03 | 0.02 | 0.89 |
| Whitefly status x Whitefly sex | 1.20 | 1 | 1.20 | 0.70 | 0.40 |
| Plant status x Whitefly status x Whitefly sex | 0.60 | 1 | 0.60 | 0.35 | 0.55 |

 SS = Sum of squares, DF= Degrees of freedom, MS = Mean square

**Supplementary Table S4. Three-Way ANOVA with Tukey’s Multiple Comparisons Test for entries made by *B. tabaci*.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Interactions** |  **SS** |  **DF** |  **MS** |  ***F* (1, 56)** |  ***P***  |
| Plant status (Healthy vs Infected) | 2.13 | 1 | 2.13 | 1.58 | 0.21 |
| Whitefly status (viruliferous vs non-viruliferous) | 4.80 | 1 | 4.80 |  3.84 | 0.05 |
| White fly sex (males vs females) | 2.70 | 1 | 2.70 | 2.00 | 0.16 |
| Plant status x Whitefly status | 32.03 | 1 | 32.03 |  25.63 | < 0.0001 |
| Plant status x Whitefly sex | 0.00 | 1 | 0.00 | 0.00 | >0.99 |
| Whitefly status x Whitefly sex | 0.13 | 1 | 0.13 | 0.10 | 0.74 |
| Plant status x Whitefly status x Whitefly sex | 0.03 | 1 | 0.03 | 0.02 | 0.87 |

 SS = Sum of squares, DF= Degrees of freedom, MS = Mean square