This data article provides supporting information to a related research article "Identification of volatile organic compounds for the biocontrol of postharvest litchi fruit pathogen Peronophythora litchii" (Zheng et al., 2019) [1]. The litchi downy blight (LDB) caused by Peronophythora litchii is a major postharvest disease that can severely damage litchi trees and harvested litchi fruit. This data article describes the analysis of volatile compounds (VOCs) in three bacterial biological control agents (BCAs) of LDB (Bacillus amyloliquefaciens PP19, Bacillus pumilus PI26, and Exiguobacterium acetylicum SI17) via gas chromatography/mass spectrometry (GC–MS). Volatile compounds produced by the three BCAs were captured at

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five culture time of 24, 36, 48, 60 and 72 h by a solid-phase micro extraction method. The chemical compositions were identified and their retention times as well as relative peak areas were analyzed. Compounds commonly produced at more than one time points were then subjected to in vitro (on petri dish) and in vivo (litchi fruit and leaves) evaluations for their antagonistic activities against the pathogen *Peronophythora litchii*.

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Specifications Table

| Subject area                      | Agricultural and Biological Sciences |
|-----------------------------------|--------------------------------------|
| More specific subject area        | Plant disease                        |
| Type of data                      | Table and figure                     |
| How data was acquired             | Volatile compounds produced by three bacterial isolations (*Bacillus amyloliquefaciens* PP19, *Bacillus pumilus* PI26, and *Exiguobacterium acetylicum* SI17) were analyzed using gas chromatography coupled with mass spectrometry |
| Data format                       | Raw and analyzed                     |
| Experimental factors              | Three bacteria (PP19, PI26, and SI17); five culture stages of each isolation (24, 36, 48, 60, and 72 h); two assays of the biocontrol activities against the pathogen *Peronophythora litchii* (in vitro on plate and in vivo on detached fruit and leaves) |
| Experimental features             | Identification of bacterial volatile compounds using GC-MS; examination of identified volatile components for their in vitro antagonism and in vivo biocontrol efficacy. |
| Data source location              | Guangzhou, Guangdong province, China |
| Data accessibility                | The data are available with this article and accessible to the public. |
| Related research article          | L. Zheng., J.-J. Situ., Q.-F. Zhu., P.-G. Xi., Y. Zheng., H.-X. Liu., X.-F. Zhou., Z.-D. Jiang. Identification of volatile organic compounds for the biocontrol of postharvest litchi fruit pathogen *Peronophythora litchii*. Postharvest biology and technology, 2019, 155: 37–46 [1]. |

Value of the data

- The data reveals distinct volatile profiles produced by different biological control agents (BCAs) of litchi downy blight which is valuable for researchers working on the disease.
- The data could be used by researchers to further investigate the mechanisms underlying the biocontrol activities of the bacterial volatile compounds reported in this study.
- The data allows to compare the reported compounds for their modes of action against *Peronophythora litchii* in vitro and/or in vivo.
- The data provides valuable information on the relationship between concentrations of compounds and their biocontrol efficacies.

1. Data

We collected data on different BCAs produced by GC-MS across different culture time, and against the pathogen *Peronophythora litchii* in *in vitro* and *in vivo* conditions. The six tables and two figures that are provided as data for this article contain the retention times, volatile compound names and the relative peak area (in percentage) of the three strains, antagonistic activity, efficacy to litchi downy blight at different concentrations.

2. Experimental design, materials and methods

2.1. Collection and identification of VOCs produced by strain PP19, SI17 and PI26

The three bacterial suspension was coated evenly on LB in sample vials. The bacterial VOCs were collected using advanced headspace solid phase microextraction (SPME) technique [2], and the
compounds were extracted using the protocol described by Raza et al. [3] with some modifications. The bacteria were incubated in water bath at 45 °C for 80 min, and VOCs were extracted by headspace solid phase microextraction (SPME) (Supelco Co., Bellefonte, PA, USA; 50/30 µm DVB/CAR/PDMS, gray) during the last 40 min. The SPME fiber was inserted in the injector of GC-MS system (SHIMADZU GCMS-QP2010 Ultra), and desorbed at 250 °C (3 min) with an HP-5MS column (30 m, 0.25-mm inside diameter, 0.25 µm). The protocol used for over temperature was 50 °C (2 min), and 250 °C (6 °C/min). The volatile compounds were identified based on their diversity in the three isolation in gas chromatograph equipped with mass spectrometer. HP-5MS column was used for the separation. Gas carrier was helium 1 mL/min. The relative amounts of volatile compounds in each part from the bacteria were determined by comparing spectra of each compound with library NIST11S and by data analysis in a GC-MS workstation (Software Version SHIMADZU GCMS solution) (Tables 1–3, Fig. 1).

2.2. Overview the levels of the volatile compounds from the three isolation at antagonistic activity against P. litchii and relative peak area

The antagonistic activity against P. litchii and relative peak area across five time point to assess the volatile compounds level (Table 4, Fig. 2). The former was referred to Xing et al. [4] and the latter was analyzed from the GC-MS dataset.

2.3. Measures taken against the P. litchii in vivo on litchi fruit and leaves

The pathogen P. litchi was cultured on CA medium (carrot juice from 200 g carrot topped up to 1 L, 15 g/L agar) at 28 °C for 5 d, which was observed under an electronic microscope; its concentration was adjusted to 5 × 10⁴ sporangia/mL followed the method of Jiang LQ et al. [5].

Six chemicals were evaluated at the concentrations of 1000, 500 and 200 mg L⁻¹, while the corresponding solvent-only dilutions were used as control for each chemical and concentration tested. The healthy fruit of litchi cultivar “Huaizhi” (about 85% ripening degree, a private farm, Conghua district, Guangzhou City, Guangdong Province) or 5 branches (a private farm, Huadu district, Guangzhou City, Guangdong Province) with at least 10–20 leaves per replicate were collected and immediately transported to the laboratory for processing. Every 30 detached fruit were placed in a container (323 × 220 × 100 mm; Hualong Plastic Factory, Foshan, China) whose bottom was covered with two pieces of sterile filter paper (D = 18 cm), moistened with 15 mL sterile water. 300 mL was used for each treatment by spray. After 24 hours, fruit in each treatment were inoculated with the pathogen P. litchii at 5 × 10⁵ sporangia/mL by spray. The relative humidity in the container was 85—90%, which was placed in a small greenhouse maintained at 25 °C and with 24 h light cycle and the relative humidity of 60%–75% (the parameters were monitored by TH6 automatic humidity and temperature data logge, Hangzhou Meacon Automation Technology Co., Ltd). Disease severity was monitored during 48–84 hours post inoculation (hpi) (Tables 5 and 6), and the levels of disease severity were determined using the method of Jiang YM et al. [6].

Disease severity was defined as follows: 0, 1, 3, 5, 7, and 9 represent 0, <5, 6 to 10, 11 to 25, 26 to 50, and >50% leaf area with symptoms, respectively. Disease index and biocontrol efficacy was calculated as follows: Disease index (%) = Σ (Disease level × number of fruit in each level)/(the highest level × total number of fruit) × 100; Biocontrol efficacy (%) = [(Disease index of control - Disease index of treatment)/Disease index of control] × 100.

2.4. Data analysis

Data on plate antagonism assay disease index, control efficacy were processed and analyzed in Microsoft Excel. Least significant difference test (P < 0.05) was performed using the statistical software data processing system (DPS version 7.05, Zhejiang University, Hangzhou, China). One-way ANOVA was used to compare the factors investigated.
|                | Volatile organic compounds | PP19-RT (min) | Relative peak area (%) | Volatile organic compounds | PI26-RT (min) | Relative peak area (%) | Volatile organic compounds | SI17-RT (min) | Relative peak area (%) | Volatile organic compounds |
|----------------|----------------------------|---------------|------------------------|----------------------------|---------------|------------------------|----------------------------|---------------|------------------------|----------------------------|
| 7.068          | *6-Methyl-2-heptanone      | 7.088         | 13.95                  | **6-Methyl-2-heptanone**   | 7.113         | 2.92                   | 2-Heptanone                |               |                        |                             |
| 7.3            | 5-Methyl-2-heptanone       | 7.327         | 21.81                  | 5-Methyl-2-heptanone       | 7.351         | 1.42                   | 2-Ethyl-1-butanol          |               |                        |                             |
| 8.933          | **2-Ethylhexan-1-ol**      | 12.259        | 16.02                  | 2-Decaneone                | 7.515         | 3.33                   | 1-Methyl-1,3-cyclopentadiene |               |                        |                             |
| 9.587          | **2-Nonanone**             | 12.335        | 1.72                   | 2-Decanol                  | 8.905         | 0.62                   | Tricyclo[2.2.1.02,6]heptan-3-ol |               |                        |                             |
| 12.262         | 2-Decaneone                | 12.513        | 4.02                   | 2-Dodecanol                | 8.636         | 1.63                   | (1Z)-Cyclooctene          |               |                        |                             |
| 15.476         | Pentadecane                | 14.985        | 28.81                  | **2-Isobutyl-3-isopropylpyrazine** | 8.846        | 3.49                   | (3aR,6aR)-1,2,3,3a,4,6a-Hexahydroptalene |               |                        |                             |
| 19.717         | 1-Iodohexadecane           | 16.82         | 10.62                  | **2-Dodecanone**           | 9.598         | 3.04                   | 2-Nonanone                |               |                        |                             |
| 20.007         | *(3E,6E)-3,7,11-Trimethyl-1,3,6,10-dodecatetraene* | 20.011        | 3.04                   | *(3E,6E)-3,7,11-Trimethyl-1,3,6,10-dodecatetraene* | 9.869        | 1.1                    | 2-Nonanol                 |               |                        |                             |
| 28.695         | Ethyl palmitate            |               |                        |                             |               |                        |                             |               |                        |                             |

*a* Volatile organic compounds printed in bold type were selected for the *in vivo* antagonism assay.
Table 2
Relative peak area of the 17 main volatile compounds of three BCAs identified across 24 h–72 h.

| Strain | Time point (h) | 2,5-Dimethylpyrazine | [4Z,6Z]-Octadeca-2,6,11-triene | 1-[(2-Aminophenyl)ethanone | 2-Undecanone | Benzo[1,2,3-cd]thiazole | 2-ethylhexanol-1-ol | 2-Nonanone | (3E,6E)-3,7,11-Trimethyl-1,3,6,10-dodecatetraene | 1-Tridecene | 6-Methyl-2-heptanone | 5-Methyl-2-heptanone | nonlyc-clopropane | 6,10,14-trimethylpentadecan-2-one | 2-Dodecanone | 1-iodohexadecane | 5-Methyl-2-heptanone |
|--------|----------------|-----------------------|---------------------------------|-----------------------------|--------------|----------------------|------------------|----------|--------------------------------|--------------|----------------------|---------------------|------------------|------------------------|------------------|----------------------|-----------------|
| PP19   | 24             | 0                     | 0                               | 0                           | 0            | 1.40                  | 7.21             | 6.15     | 3.54                            | 0             | 40.67                | 0                   | 0                | 0                      | 0                | 4.89                  | 32.35 |
|        | 36             | 4.86                  | 7.18                            | 0.61                        | 0.21         | 0.78                  | 0.09             | 0.73      | 6.61                            | 0.31         | 0.19                  | 11.73               | 10.82            | 20.66                  | 0.38             | 0.52                  | 0.26 |
|        | 48             | 0                     | 0                               | 0                           | 0            | 1.21                  | 0               | 0         | 24.66                           | 41.47        | 0                     | 1.9                 | 0                | 0                      | 1.9              | 0                     | 0.45 |
|        | 60             | 5.52                  | 3.9                             | 3.71                        | 0.3          | 0.48                  | 0               | 0         | 0.55                            | 0.2          | 0.78                  | 4.61                | 14.05            | 39.63                  | 0.27             | 0.57                  | 0.03 |
|        | 72             | 0                     | 0                               | 0                           | 0            | 4.07                  | 0               | 0         | 7.64                            | 4.16         | 0                     | 0                   | 0                | 0                      | 0                | 0                     | 0    |
| PI26   | 24             | 0                     | 0                               | 0                           | 0            | 0                     | 0               | 0         | 3.04                            | 0            | 13.95                 | 0                   | 0                | 0                      | 10.62            | 0                     | 21.81 |
|        | 36             | 0                     | 0                               | 0                           | 0            | 0                     | 0               | 0         | 0.29                            | 0            | 5                     | 5.1                 | 0                | 69.9                   | 0                | 0                     | 0    |
|        | 48             | 0                     | 0                               | 0                           | 0            | 7.76                  | 0               | 0         | 0.31                            | 0            | 39.84                 | 0                   | 0                | 0                      | 0                | 0                     | 0    |
|        | 60             | 3.14                  | 0.17                            | 0.19                        | 0            | 0                     | 0               | 0         | 0.19                            | 0            | 0                     | 0                   | 0                | 0                      | 0                | 0.78                  | 0    |
|        | 72             | 0                     | 0                               | 0                           | 0            | 6.26                  | 0               | 0         | 23.46                           | 0            | 0                     | 0                   | 0                | 0                      | 0                | 4.78                  | 0    |
| SI17   | 24             | 0                     | 7.4                             | 0                           | 0            | 3.04                  | 1.04             | 0         | 0.01                            | 0            | 0                     | 0                   | 10.63            | 8.8                    | 0                | 0                     | 0    |
|        | 36             | 0                     | 3.94                            | 1.13                        | 0            | 0                     | 0.46             | 0         | 0.38                            | 5.98         | 3.96                  | 36.77               | 0                | 0                      | 0                | 0                     | 0    |
|        | 48             | 0                     | 12.03                           | 0                           | 0            | 1.62                  | 0               | 0         | 0.01                            | 0            | 0                     | 0                   | 0                | 0                      | 0                | 0                     | 0    |
|        | 60             | 1.69                  | 5.41                            | 0.01                        | 0            | 0                     | 0.19             | 0         | 0.3                             | 0            | 0                     | 0                   | 0                | 0                      | 0                | 0.22                  | 0    |
|        | 72             | 0                     | 5.6                             | 0                           | 0            | 1.97                  | 0               | 0         | 3.62                            | 1.01         | 0                     | 18.7                | 0                | 0                      | 0                | 0                     | 0    |
Table 3
Numbers of bacterial VOCs compounds at 24, 36, 48, 60, 72 h.

| Strain | 24 h | 36 h | 48 h | 60 h | 72 h |
|--------|------|------|------|------|------|
| PP19   | 9    | 33   | 14   | 28   | 17   |
| SI17   | 26   | 22   | 13   | 16   | 21   |
| PI26   | 8    | 13   | 11   | 16   | 22   |

Fig. 1. Numbers of bacterial VOCs compounds at 24, 36, 48, 60, 72 h (A) and Chemical classes of volatiles (B). A-K: 2,5-Dimethylpyrazine (C₅H₈N₂); Bicyclo[4.2.0]octa-1,3,5-triene (C₈H₈); 1-(2-Aminophenyl)ethanone (C₄H₉NO); 2-Undecanone (C₁₁H₂₂O); Benzothiazole (C₇H₅NS); Pentadecane (C₁₅H₃₂); 2-ethylhexan-1-ol (C₈H₁₈O); 2-Nonanone (C₉H₁₈O); a-Farnesene (C₁₅H₂₄); 1-Tridecene (C₁₃H₂₆); 6-Methyl-2-heptanone (C₈H₁₆O), respectively released from PP19 (B. amyloliquefaciens), SI17 (Exiguobacterium acetylicum), PI26 (B. pumilus), and HS10 (B. licheniformis) and L-N, three positive compounds from the references of BABA (3-Aminobutanoic acid), SA (Salicylic acid), MeJa (Methyl jasmonate), respectively.
## Table 4
Overview of the volatile compounds of three BCAs identified across 24 h–72 h.

| Pure Compounds                          | Antagonistic activity | Relative peak area (%) |
|-----------------------------------------|-----------------------|------------------------|
|                                         |                       | PP19  | SI17  | PI26 |
| 2,5-Dimethylpyrazine                    | +                     | 10.38 | 1.69  | 3.14 |
| Bicyclo[4.2.0]octa-1,3,5-triene         | −                     | 11.08 | 0     | 0    |
| 1-(2-Aminophenyl)ethanone               | +                     | 4.32  | 9.35  | 5.17 |
| 2-Undecanone                            | +                     | 0.51  | 26.16 | 0    |
| Benzothiazole                           | +                     | 1.26  | 0     | 0.19 |
| Pentadecane                             | −                     | 1.58  | 0     | 0    |
| 2-Ethylhexan-1-ol                       | +                     | 7.94  | 0     | 0    |
| 2-Nonanone                              | −                     | 19.59 | 11.09 | 14.02|
| (3E,6E)-3,7,11-Trimethyl-1,3,6,10-dodecatriene | −              | 3.85  | 1.05  | 3.33 |
| 1-Tridecane                             | −                     | 0.39  | 0.57  | 0.19 |
| 6-Methyl-2-heptanone                    | −                     | 89.31 | 9.6   | 82.25|
| 5-Methyl-2-heptanone                    | −                     | 70.5  | 3.96  | 5.1  |
| Nonylcyclopropane                       | +                     | 60.29 | 37.07 | 0    |
| 6,10,14-trimethylpentadecan-2-one       | −                     | 0.65  | 11.64 | 69.9 |
| 2-Dodecanone                            | +                     | 2.99  | 27.5  | 15.4 |
| 1-Iodohexadecane                        | −                     | 5.15  | 0     | 0    |
| 5-Methyl-2-heptanone                    | −                     | 46.78 | 0.22  | 22.59|

**Fig. 2.** The VOCs of PI26 (A) and compounds of BTH (Benzothiazole), EA (1-(2-Aminophenyl)ethanone), AF (α-Farnesene) and the positive control of SA (Salicylic acid), MeJA (Methyl jasmonate), BABA (3-Aminobutanoic acid) (B) against the pathogen *P. litchii* in the petri dish at 5 d.
| Material | Treatment | Concentration (mg L⁻¹) | 48 hpi | 60 hpi | 72 hpi | 84 hpi |
|----------|-----------|------------------------|--------|--------|--------|--------|
|          |           |                        | Disease index | Disease index | Disease index | Disease index |
|          | Repeat I  | Repeat II | Repeat III | Repeat I  | Repeat II | Repeat III | Repeat I  | Repeat II | Repeat III | Repeat I  | Repeat II | Repeat III |
| fruit    | BABA      | 1000      |          | 9.26    | 11.85   | 14.44   | 11.48    | 23.33    | 19.26    | 17.78    | 35.19    | 29.26    |
|          | AF        |           |          | 25.93   | 37.04   | 38.15   | 35.19    | 42.59    | 64.44    | 54.81    | 57.04    | 81.11    |
|          | CK        |           |          | 19.26   | 24.44   | 32.22   | 32.22    | 33.70    | 46.67    | 40.74    | 55.56    | 58.15    |
|          | BABA      | 500       |          | 54.07   | 23.33   | 24.07   | 57.78    | 39.26    | 39.63    | 64.81    | 54.44    | 60.00    |
|          | AF        |           |          | 44.44   | 47.41   | 48.89   | 47.04    | 53.70    | 54.44    | 73.70    | 70.00    | 74.81    |
|          | CK        |           |          | 47.04   | 45.93   | 45.19   | 52.59    | 61.85    | 57.78    | 79.63    | 82.22    | 78.52    |
|          | SA        |           |          | 37.78   | 37.78   | 35.56   | 66.67    | 72.22    | 72.22    | 81.11    | 81.11    | 77.04    |
|          | Me-JA     |           |          | 38.52   | 32.59   | 21.85   | 69.26    | 55.56    | 35.93    | 78.52    | 63.70    | 62.96    |
|          | FK        | 17.41     |          | 50.37   | 62.59   | 68.52   | 71.48    | 81.11    | 78.52    | 81.48    | 85.56    | 83.33    |
|          | EA        | 200       |          | 47.41   | 52.59   | 54.07   | 77.78    | 61.11    | 70.00    | 79.63    | 76.30    | 77.41    |
|          | BTH       | 20.74     |          | 35.56   | 46.67   | 32.59   | 54.07    | 81.85    | 61.48    | 65.93    | 83.33    | 71.11    |
|          | SA        | 7.78      |          | 13.33   | 38.52   | 25.19   | 33.70    | 45.19    | 51.85    | 53.33    | 71.11    | 75.56    |
|          | Me-JA     | 20.00     |          | 28.89   | 53.70   | 28.89   | 44.81    | 69.63    | 52.96    | 69.63    | 85.56    | 71.48    |
|          | CK        | 28.89     |          | 62.22   | 62.96   | 64.81   | 61.11    | 66.67    | 76.76    | 66.67    | 82.22    | 87.04    |
| leaf     | BABA      | 1000      |          | 88.10   | 88.01   | 71.99   | 87.50    | 72.66    | 73.61    | 92.86    | 74.78    | 87.04    |
|          | AF        |           |          | 76.28   | 60.77   | 83.12   | 84.19    | 66.67    | 85.47    | 86.22    | 78.69    | 81.25    |
|          | CK        |           |          | 73.72   | 63.75   | 75.00   | 72.44    | 68.31    | 67.36    | 59.96    | 77.25    | 61.24    |
|          | BABA      | 500       |          | 20.50   | 22.75   | 25.06   | 53.26    | 80.95    | 63.31    | 92.34    | 61.00    | 86.63    |
|          | AF        |           |          | 80.27   | 41.04   | 56.58   | 85.44    | 51.25    | 85.60    | 92.34    | 61.00    | 86.63    |
|          | EA        | 9.95      |           | 35.00   | 9.66    | 31.20   | 44.91    | 17.87    | 83.12    | 62.04    | 21.98    | 79.70    |
|          | BTH       | 9.00      |           | 12.26   | 24.91   | 30.56   | 23.95    | 38.17    | 37.73    | 19.16    | 37.63    | 34.72    |
|          | SA        | 28.89     |           | 44.44   | 75.00   | 39.61   | 60.85    | 83.56    | 66.67    | 83.59    | 85.88    | 58.21    |
|          | Me-JA     | 23.61     |           | 21.76   | 46.15   | 61.46   | 65.74    | 63.68    | 80.73    | 67.13    | 75.00    | 79.34    |
|          | CK        | 22.22     |           | 25.99   | 17.05   | 40.98   | 84.23    | 72.80    | 76.32    | 84.05    | 31.23    | 75.77    |
|          | EA        | 200       |           | 24.27   | 37.04   | 12.59   | 57.89    | 38.89    | 48.70    | 60.82    | 65.28    | 66.85    |
|          | BTH       | 46.53     |           | 46.53   | 11.75   | 30.16   | 62.50    | 55.34    | 42.86    | 67.13    | 58.33    | 69.64    |
|          | SA        | 19.67     |           | 19.67   | 23.95   | 12.90   | 62.48    | 67.05    | 29.37    | 66.67    | 69.92    | 65.28    |
|          | Me-JA     | 6.19      |           | 6.19    | 20.30   | 16.91   | 12.57    | 41.24    | 75.85    | 17.12    | 45.73    | 39.61    |
|          | CK        | 11.46     |           | 11.46   | 11.73   | 33.10   | 27.78    | 38.58    | 69.44    | 26.74    | 43.83    | 52.08    |
Table 6
Efficacy against LDB of the VOCs blends of different concentration in vivo fruit or leaves “Huazizhi” (analyzed).

| Material | Treatment | Concentration (mg L⁻¹) | 48 hpi | 60 hpi | 72 hpi | 84 hpi |
|----------|-----------|------------------------|--------|--------|--------|--------|
|          |           |                        | Disease index (%) | Efficacy (%) | Disease index (%) | Efficacy (%) | Disease index (%) | Efficacy (%) | Disease index (%) | Efficacy (%) |
| fruit    | BABA      | 1000                   | 8.77±1.79b         | 5.33    | 11.85±1.50b   | 4      | 18.02±3.48b      | 19.78   | 27.41±5.11b       | 18.68    |
|          | AF        | 27.66±5.38a            | 27.86±4.72a        | 30.32   | 60.47±6.11c   | 40.84 | 59.75±3.00e       | 28.4    |
|          | Control   | 0                      | 12.35±3.76b        | 0       | 22.47±3.64b   | 0     | 33.71±3.76b       | 0       |
| P-value  |           | 0.0214                 | 0.0048             | 0.0244  | 0.0109        |       |
| BABA     | 500       |                        | 13.33±3.85c        | 47.83   | 25.31±3.77c   | 58.16 | 37.53±4.59d       | 51.28   | 51.48±5.42e       | 38.31   |
| AF       | 24.44±4.72ab | 4.35                 | 33.82±10.13bc      | 44.08   | 45.56±6.11c   | 40.87 | 59.75±3.00e       | 28.4    |
| BTH      | 26.42±8.9ab | –3.38                 | 46.91±1.31a        | 22.45   | 51.73±2.35c   | 32.85 | 72.84±1.45bc      | 12.72   |
| SA       | 33.71±3.56a | –3.18                 | 46.05±0.54a        | 23.88   | 57.41±2.68b   | 25.48 | 80.12±1.10ab      | 3.99    |
| MeJA     | 23.03±2.39bc | 9.66                 | 37.04±0.74bc       | 38.78   | 70.37±1.85a   | 8.65  | 79.75±3.16ab      | 4.44    |
| Control  | 17.28±1.84bc | 32.37                | 30.99±0.84bc       | 48.76   | 53.58±9.67c   | 30.45 | 68.39±5.07cd      | 18.05   |
| P-value  |           | 0.0203                 | 0.0033             | 0.001   |               |       |
| EA       | 200       |                        | 29.38±4.69ab       | 19.87   | 51.36±2.02a   | 18.91 | 69.63±4.82a       | -2.17   | 77.78±0.98a       | 1.1     |
| BTH      | 22.59±2.23b | 38.38                | 38.27±4.28bc       | 39.57   | 65.80±8.31a   | 3.44  | 73.46±5.16a       | 6.59    |
| SA       | 17.04±4.83b | 53.54                | 25.68±7.28bc       | 59.45   | 43.58±5.30b   | 36.05 | 66.67±6.79a       | 15.23   |
| MeJA     | 19.63±4.56b | 46.46                | 37.16±8.27bc       | 41.33   | 55.80±7.30b   | 18.12 | 75.56±5.03a       | 3.92    |
| Control  | 36.67±4.13a | 0                    | 60.49±3.54a        | 48.76   | 77.04±2.88a   | 0     | 83.46±1.18a       | 0       |
| P-value  |           | 0.059                  | 0.0052             | 0.0681  | 0.5325        |       |
| leaf     | BABA      | 1000                   | 8.70±3.36a         | 98.55   | 77.92±4.80a   | -10.03| 84.89±5.33a       | -22.38  | 87.54±3.70a       | -7.39   |
|          | AF        | 75.00±9.71a            | 73.39±6.61a        | 0       | 70.82±3.56a   | 0     | 69.37±1.56a       | 0       | 81.52±1.72a       | 0       |
|          | Control   | 41.44±3.09b            | 0.6359             | 0.1448  | 0.3874        |       |
| P-value  |           | 0.0101                 |                   |        |               |       |
| BABA     | 500       |                        | 8.98±3.01d         | 58.96   | 22.77±3.12c   | 18.69 | 65.84±8.09a       | 15.35   | 66.15±5.56a       | -3.87   |
|          | AF        | 28.25±3.99abc          | 59.30±11.41a       | -111.73 | 74.10±11.42a | 4.74  | 79.99±9.64a       | -25.6   |
|          | BTH       | 9.38±3.03d             | 26.12±8.43c        | 6.74    | 48.63±1.89c   | 37.47 | 54.57±17.08b      | 14.31   |
|          | SA        | 16.13±4.24cd           | 22.58±5.41c        | 19.39   | 33.28±4.67b   | 57.21 | 30.50±5.73b       | 52.1    |
|          | MeJA      | 31.51±6.13ab           | 53.02±10.08a       | -89.31  | 70.36±6.81a   | 9.54  | 75.89±8.87a       | -19.17  |
|          | Control   | 35.93±8.37a            | 43.12±11.56abc     | -53.98  | 70.05±5.37a   | 9.94  | 73.82±3.57a       | -15.92  |
| P-value  |           | 0.0004                  | 0.0046             | 0.0057  | 0.0072        |       |
| EA       | 200       |                        | 24.62±7.06a        | 31.29   | 23.14±5.84a   | -1.55 | 48.49±5.49a       | -7.13   | 64.32±1.81a       | -57.32  |
| BTH      | 29.48±10.05a | 57.12               | 42.05±4.18a        | -84.52  | 53.57±5.74a   | -18.33| 65.03±4.23a       | -90.84  |
| SA       | 18.84±3.22a | 0.4                   | 28.58±4.88a        | -25.41  | 52.97±11.87a  | -17   | 67.29±1.37a       | -64.59  |
| MeJA     | 14.47±4.25a | 22.9                  | 22.12±8.05a        | 2.93    | 43.22±18.29a  | 4.53  | 34.15±8.70b       | 16.46   |
| Control  | 18.76±7.17a | 0                    | 22.79±8.15a        | 0       | 45.27±12.48a  | 0     | 40.88±7.46b       | 0       |
| P-value  |           | 0.5837                 | 0.2238             | 0.9584  | 0.0034        |       |

*Bacterial VOCs composition were sprayed to fruit (about 80% ripening degree) or leaves of branches in the lab of the fresh-box, and the suspension of *P. litchii* at *5 × 10⁶* sporangium mL⁻¹ was sprayed onto the fruit or leaves at 24 hpt. Data are presented as means of four replicates ± standard errors; different letters indicate significant differences between treatments according to LSD test at *P* < 0.05.
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Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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