

## Supplementary file

### ***Streptomyces fradiae* mitigates the impact of Potato Virus Y by inducing systemic resistance in two Egyptian potato (*Solanum tuberosum* L.) cultivars**

**Fafy A Mohammed <sup>a</sup>, Samah H. Abu-Hussien<sup>b\*</sup>, Noha K. El Dougdoug <sup>c</sup>, Neima Koutb<sup>d</sup>, Abdalla S. Korayem<sup>b</sup>**

<sup>a</sup> Botany Department, Faculty of Women for Arts, Science and Education, Ain Shams University, Cairo, 11757, Egypt.

<sup>b</sup> Agricultural Microbiology Department, Faculty of Agriculture, Ain Shams University, Cairo, 11241, Egypt

<sup>c</sup> Department of Botany and Microbiology, Faculty of Science, Benha University, Benha, Egypt

<sup>d</sup> Genetics Department, Faculty of Agriculture, Ain Shams University, Cairo, 11241, Egypt

**Journal: Microbial Ecology**

**Corresponding author: Samah H. Abu-Hussien**

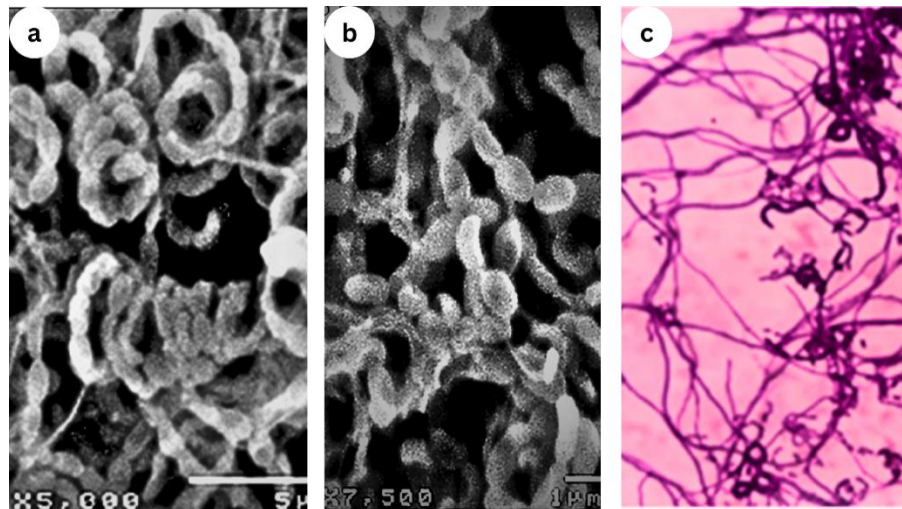
**e-mail: [samah\\_hashem1@agr.asu.edu.eg](mailto:samah_hashem1@agr.asu.edu.eg)**

**Table S1:** Physiological and biochemical characteristics of the D3 isolate grown for 7 days at 37°C.

| Characteristics                | Reaction |
|--------------------------------|----------|
| Physiological characteristics: |          |
| Sodium chloride tolerance      | 0%–7%    |
| Growth pH                      | 7–9.5    |
| Optimum pH                     | 8        |
| Melanin production             | –        |
| Carbon utilization             |          |
| L-Arabinose                    | +        |
| D-xylose                       | +        |
| D-Glucose                      | +        |
| Sucrose                        | +        |
| D-Fructose                     | -        |
| Rhamnose                       | +        |
| Raffinose                      | +        |
| Inositol                       | +        |
| D-Mannitol                     | -        |

|                             |   |
|-----------------------------|---|
| D-galactose                 | + |
| Sorbitol                    | - |
| Sodium acetate              | + |
| Biochemical characteristics |   |
| Starch hydrolysis           | + |
| Gelatin liquefaction        | + |
| Catalase production         | + |
| Urease production           | — |
| Nitrate reduction           | + |
| Nitrite reduction           | — |
| Tyrosine degradation        | — |
| Xanthine degradation        | — |

positive (+); negative (—)



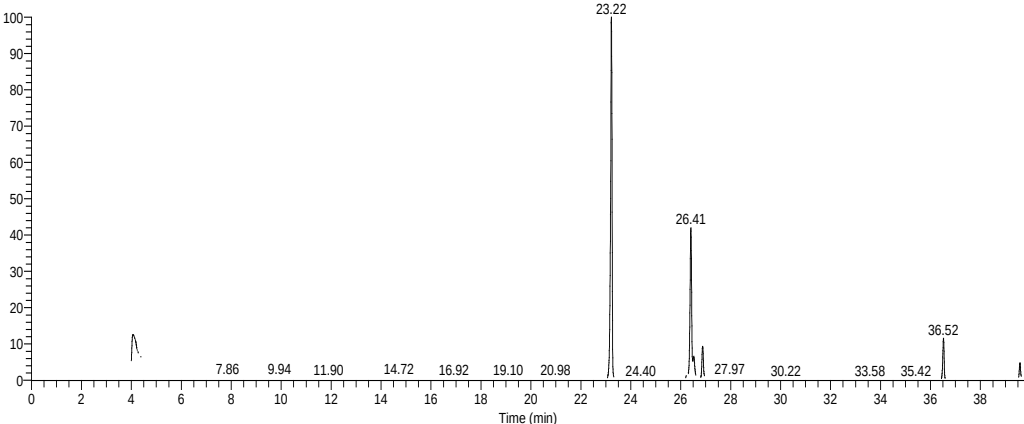
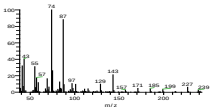
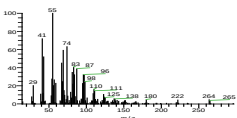
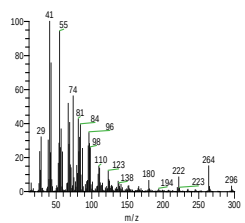
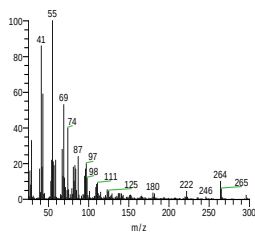
**Figure S1:** Micrographs of the D3 isolate. Scanning electron micrographs showing (a); the spiral arrangements (5000X) (b); the smooth spore surface(7500X) (c) a light microscope image (1000X) showing aerial mycelium grown on SCA for 7 days at 37°C.

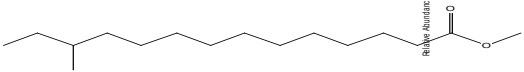
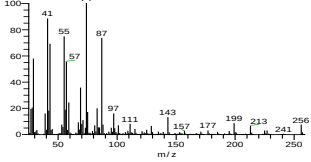
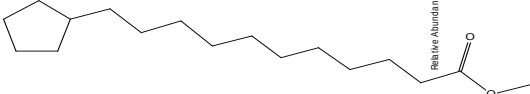
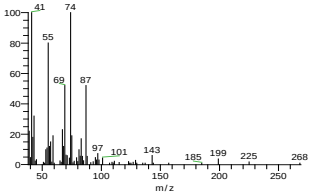
**Table S2:** Evaluation of foliar parameters and potato virus Y (PVY) infection in two potato cultivars under different foliar treatment conditions with *S. fradiae* QD3 filtrate

| Treatments         | Potato cultivars | No. Infected plants |         |         | virus infectivity (%) |         |         | Disease index |                  |         | Disease severity (%) |         |         | DAS-ELISA OD at 405 nm |         |         |
|--------------------|------------------|---------------------|---------|---------|-----------------------|---------|---------|---------------|------------------|---------|----------------------|---------|---------|------------------------|---------|---------|
|                    |                  | 7 days              | 14 days | 21 days | 7 days                | 14 days | 21 days | 7 days        | 14 days          | 21 days | 7 days               | 14 days | 21 days | 7 days                 | 14 days | 21 days |
| PVY infection      | Diamond          | 15/20               | 17/20   | 18/20   | 75                    | 85      | 90      | SM,           | SM ,VE,VN LR, Mo |         | 76                   | 85      | 89      | 0.37                   | 0.47    | 0.52    |
|                    | Spunta           | 14/20               | 15/20   | 16/20   | 70                    | 75      | 80      | mM,           | mM , LN, LR      |         | 72                   | 74      | 76      | 0.30                   | 0.32    | 0.38    |
| Pre PVY infection  | Diamond          | 7/20                | 8/20    | 8/20    | 35                    | 40      | 40      | mM            | mM, LR, VE       |         | 33                   | 43      | 48      | 0.18                   | 0.30    | 0.20    |
|                    | Spunta           | 4/20                | 5/20    | 5/20    | 20                    | 25      | 25      | mM            | mM , VE          |         | 25                   | 25      | 26      | 0.19                   | 0.21    | 0.215   |
| Post PVY infection | Diamond          | 8/20                | 9/20    | 10/20   | 40                    | 45      | 50      | mM            | mM LN,VN, Mo     |         | 35                   | 50      | 58      | 0.24                   | 0.31    | 0.23    |
|                    | Spunta           | 6/20                | 9/20    | 9/20    | 30                    | 35      | 45      | mM            | mM ,LN           |         | 25                   | 35      | 37      | 0.19                   | 0.22    | 0.12    |

SM= Sever mosaic, VE=Vein enation, VN= venial necrosis LR=Leaf rugosity, Mo=Mottling, mM=Mild mosaic, LN= Leaf narrow

Table S3: Spectral analysis of the prominent active metabolites produced by *S. fradiae* by GC-MS analysis.

| <div>RT: 0.00 - 39.77 SM: 15B</div> <div></div> <div>NL:<br/>1.09E9<br/>TIC MS<br/>5010236</div> |          |                                       |                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------|--------------------------------------------------------------------------------------|
| GC-MS Chromatogram displaying the retention times and relative intensities of separated components from D3 isolate filtrate.                                                       |          |                                       |                                                                                      |
| Rt*                                                                                                                                                                                | Area (%) | Compound structure                    |                                                                                      |
| 23.23                                                                                                                                                                              | 53.27    | <chem>CCCCCCCCCCCCCCCCC(=O)OC</chem>  |   |
| 26.41                                                                                                                                                                              | 23.75    | <chem>CCCCCCCC=CCCCCCCCC(=O)OC</chem> |  |
| 26.41                                                                                                                                                                              | 23.75    | <chem>CCCCCCCC=CCCCCCCCC(=O)OC</chem> |  |
| 26.52                                                                                                                                                                              | 3.11     | <chem>CCCCCCCC=CCCCCCCCC(=O)OC</chem> |  |

|       |      |                                                                                                             |                                                                                               |
|-------|------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| 26.88 | 4.64 |  <p>Relative Abundance</p> |  <p>m/z</p> |
| 26.8  | 4.64 |  <p>Relative Abundance</p> |  <p>m/z</p> |