



## Article

# Bioremediation of Petroleum-Contaminated Soils with Biosurfactant-Producing Degraders Isolated from the Native Desert Soils

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## Supplementary information

**Table S1.** Biochemical analysis of isolates by GEN III MicroPlate after (a) 24-h incubation and (b) 48-h incubation.

| (a)                         |    |    |    |    |    |    |    |    |    |     |     |     |     |  |
|-----------------------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|--|
|                             | NS | NS | NS | NS | NS | NS | NS | CT | CT | CT1 | CT1 | CT1 | CT1 |  |
|                             | 1  | 2  | 3  | 4  | 5  | 6  | 8  | 7  | 9  | 0   | 1   | 2   | 4   |  |
| Dextrin                     | -  | -  | +  | -  | +  | -  | -  | +  | +  | +   | +   | +   | +   |  |
| D-Maltose                   | -  | -  | +  | -  | +  | -  | +  | +  | +  | +   | +   | +   | +   |  |
| D-Trehalose                 | +  | -  | +  | +  | +  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| D-Cellobiose                | -  | -  | +  | -  | +  | -  | -  | +  | -  | +   | +   | -   | +   |  |
| Gentiobiose                 | -  | -  | +  | -  | +  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| Sucrose                     | -  | -  | -  | -  | +  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| D-Turanose                  | +  | -  | +  | +  | +  | -  | -  | +  | +  | +   | +   | -   | +   |  |
| Stachyose                   | +  | -  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| D-Raffinose                 | -  | -  | -  | -  | +  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| $\alpha$ -D-Lactose         | -  | -  | +  | +  | -  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| D-Melibiose                 | -  | -  | +  | +  | +  | -  | +  | +  | -  | +   | +   | -   | +   |  |
| $\beta$ -Methyl-D-Glucoside | -  | -  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| D-Salicin                   | -  | -  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| N-Acetyl-D-Glucosamine      | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | -   | +   |  |
| N-Acetyl- $\beta$ -D-       |    |    |    |    |    |    |    |    |    |     |     |     |     |  |
| Mannosamine                 | +  | +  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| N-Acetyl-D-                 |    |    |    |    |    |    |    |    |    |     |     |     |     |  |
| Galactosamine               | +  | -  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| N-Acetyl    Neuraminic      |    |    |    |    |    |    |    |    |    |     |     |     |     |  |
| Acid                        | -  | -  | +  | +  | +  | -  | +  | +  | +  | +   | +   | -   | +   |  |
| $\alpha$ -D-Glucose         | +  | +  | +  | +  | +  | -  | +  | +  | +  | +   | +   | +   | +   |  |

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|                                   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Citric Acid                       | + | + | + | + | + | + | + | + | + | + | + | + | + |
| $\alpha$ -Keto-Glutaric acid      | + | + | + | + | + | + | + | + | + | + | + | + | + |
| D-Malic Acid                      | + | + | + | + | + | - | + | + | + | + | + | + | + |
| L-Malic Acid                      | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Bromo-Succinic Acid               | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Tween 40                          | + | + | + | + | + | + | + | - | + | + | + | + | + |
| $\gamma$ -Amino-Butyric Acid      | + | + | + | + | + | + | + | + | + | + | + | + | + |
| $\alpha$ -HydroxyButyric Acid     | + | + | + | + | + | + | + | + | - | + | + | - | + |
| $\beta$ -Hydroxy-D,L-Butyric Acid | + | + | + | + | + | + | + | + | + | + | + | + | + |
| $\alpha$ -Keto-Butyric Acid       | + | - | + | + | + | - | + | + | + | + | + | - | + |
| Acetoacetic Acid                  | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Propionic Acid                    | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Acetic Acid                       | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Formic Acid                       | + | + | + | + | + | + | + | + | + | + | + | - | + |
| pH 6                              | + | + | + | + | + | + | + | + | + | + | + | + | + |
| pH 5                              | - | + | + | + | + | + | - | + | - | - | - | - | - |
| 1% NaCl                           | + | + | + | + | + | + | + | + | + | + | + | + | + |
| 4% NaCl                           | + | + | + | + | + | + | - | + | - | + | + | - | + |
| 8% NaCl                           | - | - | - | - | - | - | - | + | - | - | - | - | - |
| 1% Sodium Lactate                 | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Fusidic Acid                      | + | + | + | + | + | + | + | + | - | - | - | - | - |
| D-Serine.1                        | - | - | - | - | - | - | - | + | - | - | + | - | - |
| Troleandomycin                    | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Rifamycin SV                      | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Minocycline                       | + | + | + | + | + | + | + | + | - | - | - | - | - |
| Lincomycin                        | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Guanidine HCl                     | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Niaproof 4                        | + | + | + | + | + | + | - | + | + | + | + | + | + |
| Vancomycin                        | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Tetrazolium Violet                | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Tetrazolium Blue                  | + | + | + | + | + | + | + | + | + | + | + | + | + |
| Nalidixic Acid                    | + | + | + | + | + | + | + | + | - | - | - | - | - |
| Lithium Chloride                  | - | - | - | - | - | - | - | + | + | + | + | + | + |
| Potassium Tellurite               | + | + | + | + | + | + | + | + | - | + | + | - | + |
| Aztreonam                         | - | + | - | - | - | - | - | + | - | - | + | - | + |
| Sodium Butyrate                   | - | - | - | - | - | - | - | + | - | - | - | - | - |
| Sodium Bromate                    | - | - | - | - | - | - | - | + | - | - | - | - | - |

(b)

|                                  | NS | NS | NS | NS | NS | NS | NS | CT | CT | CT1 | CT1 | CT1 | CT1 |
|----------------------------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
|                                  | 1  | 2  | 3  | 4  | 5  | 6  | 8  | 7  | 9  | 0   | 1   | 2   | 4   |
| Dextrin                          | -  | -  | +  | -  | -  | -  | -  | -  | -  | -   | -   | -   | -   |
| D-Maltose                        | -  | -  | +  | -  | -  | -  | -  | -  | +  | +   | +   | +   | +   |
| D-Trehalose                      | -  | -  | +  | +  | +  | -  | +  | -  | -  | -   | -   | -   | -   |
| D-Cellobiose                     | -  | -  | +  | -  | +  | -  | -  | -  | -  | -   | -   | -   | -   |
| Gentiobiose                      | -  | -  | +  | -  | -  | -  | -  | -  | -  | -   | -   | -   | -   |
| Sucrose                          | -  | -  | +  | -  | +  | -  | -  | -  | -  | -   | -   | -   | -   |
| D-Turanose                       | -  | -  | +  | -  | +  | +  | -  | -  | -  | -   | -   | -   | -   |
| Stachyose                        | -  | -  | +  | -  | +  | -  | -  | -  | -  | -   | -   | -   | -   |
| D-Raffinose                      | -  | -  | +  | -  | -  | -  | +  | -  | -  | -   | -   | -   | -   |
| $\alpha$ -D-Lactose              | -  | -  | +  | -  | -  | -  | -  | -  | -  | -   | -   | -   | -   |
| D-Melibiose                      | +  | -  | +  | +  | -  | +  | -  | -  | +  | -   | -   | +   | -   |
| $\beta$ -Methyl-D-Glucoside      | -  | -  | +  | +  | +  | +  | -  | -  | +  | -   | -   | -   | -   |
| D-Salicin                        | -  | -  | +  | +  | +  | +  | -  | -  | +  | -   | +   | -   | -   |
| N-Acetyl-D-Glucosamine           | +  | +  | +  | +  | +  | +  | +  | -  | +  | +   | -   | -   | -   |
| N-Acetyl- $\beta$ -D-Mannosamine | -  | +  | +  | +  | +  | +  | -  | -  | +  | +   | +   | -   | -   |
| N-Acetyl-D-Galactosamine         | -  | -  | +  | +  | +  | +  | -  | -  | +  | +   | -   | -   | -   |
| N-Acetyl Neuraminic Acid         | -  | -  | +  | +  | +  | +  | -  | -  | +  | -   | -   | -   | -   |
| $\alpha$ -D-Glucose              | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | +   |
| D-Mannose                        | +  | -  | +  | +  | +  | +  | +  | -  | +  | -   | -   | -   | -   |
| D-Fructose                       | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | +   |
| D-Galactose                      | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| 3-Methyl Glucose                 | +  | -  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| D-Fucose                         | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | +   |
| L-Fucose                         | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | +   |
| L-Rhamnose                       | -  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| Inosine                          | +  | +  | +  | +  | +  | +  | +  | -  | +  | +   | -   | -   | -   |
| D-Sorbitol                       | +  | -  | +  | +  | +  | +  | +  | -  | -  | -   | -   | -   | -   |
| D-Mannitol                       | +  | +  | +  | +  | +  | +  | +  | -  | +  | +   | -   | +   | -   |
| D-Arabitol                       | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| myo-Inositol                     | +  | -  | +  | +  | +  | +  | +  | -  | +  | +   | +   | +   | -   |
| Glycerol                         | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| D-Glucose-6-PO4                  | +  | -  | +  | +  | +  | +  | +  | -  | +  | +   | +   | +   | -   |
| D-Fructose-6-PO4                 | +  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | +   |
| D-Aspartic Acid                  | -  | +  | +  | +  | +  | +  | +  | -  | +  | +   | +   | +   | -   |
| D-Serine                         | -  | +  | +  | +  | +  | +  | +  | +  | +  | +   | +   | +   | -   |
| Gelatin                          | +  | +  | +  | +  | +  | +  | +  | -  | -  | -   | -   | -   | -   |

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