

# **Unveiling wheat growth promotion potential of phosphate solubilizing *Pantoea agglomerans* PS1 & PS2 through genomic, physiological, and metagenomic characterizations**

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**Supplementary Table S1:** Substrate utilization profile of *Pantoea agglomerans* PS1 and PS2 and their comparison with substrate utilization profile of phylogenetic-related *Pantoea* species.

| No. | Test                 | <i>P.</i><br><i>agglomerans</i> PS1 | <i>P.</i><br><i>agglomerans</i> PS2 | <i>P.</i><br><i>agglomerans</i> LMG 2660 | <i>P.</i><br><i>conspicua</i> | <i>P.</i><br><i>dispersa</i> LMG 2603 | <i>P.</i><br><i>stewartii</i> LMG 2715 | <i>P.</i><br><i>stewartii</i> LMG 2632 | <i>P.</i><br><i>vagans</i> LMG 2419 9 | <i>P.</i><br><i>eucalypti</i> LMG 2419 7 | <i>P.a</i><br><i>deleyi</i> LMG 2420 0 | <i>P.</i><br><i>anthophila</i> LMG 2558 | <i>P.</i><br><i>ananatis</i> LMG 2665 |
|-----|----------------------|-------------------------------------|-------------------------------------|------------------------------------------|-------------------------------|---------------------------------------|----------------------------------------|----------------------------------------|---------------------------------------|------------------------------------------|----------------------------------------|-----------------------------------------|---------------------------------------|
| 1   | Lactose              | ND                                  | ND                                  | ND                                       | +                             | ND                                    | ND                                     | +                                      | ND                                    | +                                        | ND                                     | ND                                      | +                                     |
| 2   | Xylose               | +                                   | +                                   | +                                        | +                             | +                                     | +                                      | +                                      | +                                     | +                                        | +                                      | +                                       | +                                     |
| 3   | Maltose              | +                                   | +                                   | +                                        | +                             | +                                     | +                                      | +                                      | +                                     | +                                        | +                                      | +                                       | +                                     |
| 4   | Fructose             | ND                                  | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 5   | Dextrose             | +                                   | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 6   | Raffinose            | +                                   | +                                   | +                                        | +                             | ND                                    | +                                      | +                                      | ND                                    | ND                                       | ND                                     | ND                                      | +                                     |
| 7   | Trehalose            | +                                   | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 8   | Melibiose            | +                                   | +                                   | ND                                       | ND                            | ND                                    | +                                      | +                                      | ND                                    | ND                                       | ND                                     | ND                                      | +                                     |
| 9   |                      |                                     |                                     |                                          |                               |                                       |                                        |                                        |                                       |                                          |                                        |                                         |                                       |
| 10  | Inulin               | +                                   | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 11  | Glycerol             | ND                                  | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | +                                      | +                                       | +                                     |
| 12  | Dulcitol             | +                                   | ND                                  | ND                                       | +                             | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | +                                     |
| 13  | Inositol             | ND                                  | +                                   | ND                                       | +                             | ND                                    | ND                                     | +                                      | +                                     | +                                        | ND                                     | +                                       | +                                     |
| 14  | Sorbitol             | ND                                  | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | +                                     |
| 15  | Mannitol             | ND                                  | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | +                                      | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 16  | Adonitol             | +                                   | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 17  | Arabitol             | ND                                  | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | +                                      | ND                                    | ND                                       | ND                                     | +                                       | ND                                    |
| 18  | Erythritol           | ND                                  | +                                   | ND                                       | ND                            | +                                     | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 19  | Rhamnose             | +                                   | +                                   | +                                        | +                             | +                                     | +                                      | ND                                     | +                                     | +                                        | +                                      | +                                       | +                                     |
| 20  | Cellobiose           | ND                                  | +                                   | ND                                       | +                             |                                       |                                        | +                                      |                                       |                                          |                                        | +                                       | +                                     |
| 21  | Xylitol              | +                                   | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       |                                        | ND                                      | ND                                    |
| 22  | ONPG                 | +                                   | +                                   | ND                                       | +                             | ND                                    | +                                      | ND                                     | ND                                    | ND                                       | +                                      | ND                                      | ND                                    |
| 23  | Esculin hydrolysis   | ND                                  | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | +                                     | ND                                       | ND                                     | ND                                      | +                                     |
| 24  | D-Arabinose          | ND                                  | ND                                  | ND                                       | ND                            | ND                                    | +                                      | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 25  | Citrate utilization  | +                                   | +                                   | ND                                       | ND                            | ND                                    | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | +                                       | +                                     |
| 26  | Malonate utilisation | ND                                  | ND                                  | ND                                       | ND                            | ND                                    | ND                                     | +                                      | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |
| 27  | Sorbose              | +                                   | +                                   | ND                                       | ND                            | +                                     | ND                                     | ND                                     | ND                                    | ND                                       | ND                                     | ND                                      | ND                                    |

Here ND: Not defined in the literature.

**Supplementary Table S2:** Antibiotic susceptibility profile of *Pantoea agglomerans* PS1 and PS2 and their comparison with antibiotic susceptibility profile of phylogenetic-related *Pantoea* species.

| No. | Antibiotics | <i>P.<br/>agglome<br/>rans<br/>PS1</i> | <i>P.<br/>agglome<br/>rans<br/>PS2</i> | <i>P.<br/>agglome<br/>rans Sp.</i> | <i>P.<br/>conspicu<br/>a</i> | <i>P.<br/>dispersa<br/>LMG<br/>2603</i> | <i>P.stewartii<br/>subsp.<br/>stewartii<br/>LMG<br/>2715</i> | <i>P.<br/>stewartii<br/>subsp.<br/>indologenes LMG<br/>2632</i> | <i>P.<br/>vagans<br/>LMG<br/>24199</i> | <i>P.<br/>eucalypti<br/>LMG<br/>24197</i> |
|-----|-------------|----------------------------------------|----------------------------------------|------------------------------------|------------------------------|-----------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------|----------------------------------------|-------------------------------------------|
| 1   | Amikacin    | +                                      | +                                      | +                                  | +                            | ND                                      | ND                                                           | ND                                                              | +                                      | ND                                        |
| 2   | Amoxicillin | ND                                     | ND                                     | ND                                 | ND                           | +                                       | ND                                                           | ND                                                              | ND                                     | ND                                        |
| 3   | Bacitracin  | ND                                     | ND                                     | ND                                 | ND                           | ND                                      | +                                                            | +                                                               | ND                                     | ND                                        |
| 4   | Cephalothin | ND                                     | +                                      | ND                                 | ND                           | ND                                      | ND                                                           | ND                                                              | +                                      | ND                                        |
| 5   | Novobiocin  | +                                      | ND                                     | ND                                 | ND                           | ND                                      | ND                                                           | +                                                               | ND                                     | ND                                        |
| 6   | Vancomycin  | ND                                     | +                                      | ND                                 | +                            | ND                                      | +                                                            | ND                                                              | ND                                     | ND                                        |
| 7   | Cefnaxone   | ND                                     | +                                      | ND                                 | +                            | ND                                      | ND                                                           | ND                                                              | ND                                     | ND                                        |
| 8   | Ceflazidime | ND                                     | ND                                     | +                                  | ND                           | ND                                      | ND                                                           | ND                                                              | +                                      | +                                         |
| 9   | Cefotaxime  | +                                      | ND                                     | +                                  | ND                           | ND                                      | ND                                                           | ND                                                              | +                                      | +                                         |
| 10  | Lincomycin  | +                                      | ND                                     | ND                                 | ND                           | ND                                      | ND                                                           | ND                                                              | ND                                     | ND                                        |
| 11  | Ofloxacin   | ND                                     | ND                                     | ND                                 | ND                           | ND                                      | ND                                                           | +                                                               | ND                                     | ND                                        |
| 1   | Amikacin    | +                                      | +                                      | +                                  | +                            | ND                                      | ND                                                           | ND                                                              | +                                      | ND                                        |
| 2   | Amoxicillin | ND                                     | ND                                     | ND                                 | ND                           | +                                       | ND                                                           | ND                                                              | ND                                     | ND                                        |
| 3   | Bacitracin  | ND                                     | ND                                     | ND                                 | ND                           | ND                                      | +                                                            | +                                                               | ND                                     | ND                                        |

**Supplementary Table S3:** Growth parameters of *Pantoea agglomerans* PS1 and PS2 and their comparison with other *Pantoea* strains.

| Microbes                    | pH      | Temperature (°C) | Minimum Inhibitory Concentration |         |         |          |          |                   |                               |
|-----------------------------|---------|------------------|----------------------------------|---------|---------|----------|----------|-------------------|-------------------------------|
|                             |         |                  | NaCl                             | KCl     | LiCl    | As(III)  | As(V)    | CdCl <sub>2</sub> | H <sub>2</sub> O <sub>2</sub> |
| <i>P. agglomerans</i> PS1   | 5–9     | 10–50            | 1750mM                           | 1750 mM | 1750 mM | 2000 PPM | 1000 PPM | ND                | 10mM,                         |
| <i>P. agglomerans</i> PS2   | 4–9     | 10–50            | 2000mM                           | 1750 mM | 1750 mM | 2000 PPM | 1000 PPM | ND                | 12.5mM                        |
| <i>P. agglomerans</i> SP1   | 6.0–8.5 | 5–40             | 0.50%                            | ND      | ND      | 100 mM   | ND       | ND                | 100µM                         |
| <i>P. alhagi</i>            | 5–9     | 7–48             | 9%                               | ND      | ND      | ND       | ND       | ND                | ND                            |
| <i>P. allii</i>             | 4–9     | 30–40            | ND                               | ND      | ND      | ND       | ND       | ND                | ND                            |
| <i>P. ananatis</i> D1       | 4.8–7   | 20–40            | 100 mmol/L                       | ND      | ND      | ND       | ND       | ND                | ND                            |
| <i>P. anthophila</i> BD 871 | 5–8     | 19 to 28         | ND                               | ND      | ND      | ND       | ND       | ND                | ND                            |
| <i>P. sp.</i> BS27          | 7–7.4   | 25–32            | 200mM                            | ND      | ND      | ND       | ND       | ND                | ND                            |
| <i>P. agglomerans</i> lma2  | 4–8     | 30–44            | 300 mM                           | ND      | 50mM    | ND       | ND       | ND                | ND                            |

**Supplementary Table S4:** Genomic assembly statistics of *Pantoea agglomerans* PS1 and PS2.

| <b>Genome features</b> | <b><i>P. agglomerans</i> PS1</b> | <b><i>P. agglomerans</i> PS2</b> |
|------------------------|----------------------------------|----------------------------------|
| Genome size            | 4987053 bp                       | 5,177,646 bp                     |
| Contigs                | 96                               | 406                              |
| CDS                    | 4,860                            | 5,275                            |
| GC                     | 55.2                             | 55.47                            |
| rRNA                   | 9                                | 11                               |
| tRNA                   | 71                               | 74                               |
| N50                    | 428,608                          | 562,669                          |

**Supplementary Table S5:** Average nucleotide identity (ANI) of *Pantoea agglomerans* PS1 and PS2 with other *Pantoea* species. Here the Bac1 to Bac12 represents the different *Pantoea* species represented as Bac1: *agglomerans* FDAARGOS 1447, Bac 2: *agglomerans* AR1a, Bac 3: *CFSAN 047153*, Bac 4: *agglomerans* GB1, Bac 5: *agglomerans* Pa58, Bac 6: *rhizophila* JC1, Bac 7: *rhizophila* QL-P4, Bac 8: *pavanii* MHSD12, Bac 9: *pavanii* BWK1, Bac 10: *alhagi* LTYR11Z, Bac 11: *ananatis* LMG 20103, Bac 12: *ananatis* PA13, Bac 13: *ananatis* PA4, Bac 14: *brenneri* 11, Bac 15: *conspicua* LMG 24534, Bac 16: *deleyi* LMG 24200, Bac 17: *dispersa* Lsch, Bac 18: *eucalypti* NFPP29, Bac 19: *stewartii* DC283, Bac 20: *vagans* SRS89 151, Bac 21: *stewartii* M009.

|                                  | 1                    | <i>P.<br/>agglomerans</i><br>PS1 | <i>P.agglomerans</i><br>PS2 | 2                    | 3                    | 4                    | 5                    | 6                    | 7                    | 8                    | 9                    | 10                   | 11                   | 12                   | 13                   | 14                   | 15                   | 16                   | 17                   |
|----------------------------------|----------------------|----------------------------------|-----------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 1                                | *                    | 97.7 (92.68)                     | 97.7 (92.72)                | 97.64<br>(92.63<br>) | 98.73<br>(93.77<br>) | 97.59<br>(65.57<br>) | 98.59<br>(94.31<br>) | 75.84<br>(63.19<br>) | 79.26<br>(75.94<br>) | 79.41<br>(74.65<br>) | 79.31<br>(75)        | 85.63<br>(80.66<br>) | 85.66<br>(84.6)      | 88.4<br>(82.68<br>)  | 79.26<br>(72.95<br>) | 90.9<br>(87.07<br>)  | 78.87<br>(62.26<br>) | 91.76<br>(88.33<br>) | 79.05<br>(74.25<br>) |
| <i>P.agglomerans</i><br>PS1      | 96.52<br>(72.7)      | *                                | 98.64 (96.09)               | 98.44<br>(82.93<br>) | 96.51<br>(73.76<br>) | 95.91<br>(61.11<br>) | 96.36<br>(73.28<br>) | 75.21<br>(51.97<br>) | 78.34<br>(64.58<br>) | 78.65<br>(62.57<br>) | 78.39<br>(61.84<br>) | 84.46<br>(70.48<br>) | 84.57<br>(70.71<br>) | 86.93<br>(74.25<br>) | 78.49<br>(58.48<br>) | 89.81<br>(71.5)      | 77.9<br>(52.6)       | 90.51<br>(79.4)      | 78.25<br>(64.22<br>) |
| <i>P.<br/>agglomerans</i><br>PS2 | 96.82<br>(75.21<br>) | 98.96 (89.35)                    | *                           | 97.79<br>(75.39<br>) | 99.83<br>(76.2)      | 96.3<br>(63.11<br>)  | 96.7<br>(75.82<br>)  | 75.33<br>(53.33<br>) | 78.48<br>(66.37<br>) | 78.75<br>(64.37<br>) | 78.53<br>(63.54<br>) | 84.72<br>(72.76<br>) | 84.81<br>(72.71<br>) | 87.19<br>(76.42<br>) | 78.58<br>(60.28<br>) | 90.07<br>(73.86<br>) | 78.12<br>(54.01<br>) | 90.8<br>(82.05<br>)  | 78.35<br>(65.86<br>) |
| 2                                | 97.58<br>(88.74<br>) | 99.59 (99.09)                    | 97.17 (89.05)               | *                    | 97.61<br>(88.59<br>) | 96.61<br>(61.26<br>) | 97.67<br>(89.3)      | 75.72<br>(61.2)      | 79.12<br>(72.98<br>) | 79.35<br>(71.94<br>) | 79.3<br>(72.56<br>)  | 85.61<br>(77.93<br>) | 85.63<br>(81.06<br>) | 88.21<br>(79.75<br>) | 79.21<br>(69.98<br>) | 90.64<br>(84.28<br>) | 78.83<br>(60.45<br>) | 91.56<br>(84.98<br>) | 78.87<br>(71.57<br>) |
| 3                                | 98.67<br>(92.41<br>) | 97.6 (92.56)                     | 98.59 (92.57)               | 97.63<br>(91.04<br>) | *                    | 97.55<br>(65.33<br>) | 98.64<br>(92.17<br>) | 75.74<br>(62.7)      | 79.15<br>(74.63<br>) | 79.28<br>(73.37<br>) | 79.22<br>(73.81<br>) | 85.53<br>(80.37<br>) | 85.61<br>(83.7)      | 88.33<br>(82.49<br>) | 79.21<br>(72.15<br>) | 90.83<br>(86.49<br>) | 78.72<br>(61.96<br>) | 91.68<br>(87.34<br>) | 78.91<br>(73.58<br>) |

|    |                      |               |               |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|----|----------------------|---------------|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 4  | 97.66<br>(74.17<br>) | 97.15 (88)    | 97.15 (87.97) | 96.65<br>(72.62<br>) | 97.68<br>(74.89<br>) | *                    | 97.59<br>(74.57<br>) | 74.95<br>(50.89<br>) | 78.2<br>(64)         | 78.44<br>(60.44<br>) | 78.25<br>(60.96<br>) | 84.47<br>(75.44<br>) | 84.51<br>(70.53<br>) | 87.06<br>(74.45<br>) | 78.34<br>(57.29<br>) | 89.8<br>(72.02<br>)  | 77.82<br>(53.65<br>) | 90.6<br>(81.08<br>)  | 77.94<br>(62.49<br>) |
| 5  | 98.64<br>(92.24<br>) | 97.65 (91.43) | 97.65 (91.46) | 97.72<br>(91.41<br>) | 98.64<br>(92.12<br>) | 97.65<br>(64.12<br>) | *                    | 75.79<br>(62.05<br>) | 79.31<br>(74.74<br>) | 79.36<br>(73.7)      | 79.28<br>(74.03<br>) | 85.64<br>(80.02<br>) | 85.64<br>(83)        | 88.3<br>(82.01<br>)  | 79.23<br>(71.62<br>) | 90.8<br>(86.02<br>)  | 78.89<br>(62.07<br>) | 91.71<br>(87.76<br>) | 79.05<br>(72.89<br>) |
| 6  | 75.87<br>(59.82<br>) | 75.65 (62.72) | 75.67 (62.76) | 75.83<br>(59.91<br>) | 75.8<br>(60.17<br>)  | 75.15<br>(42.85<br>) | 75.86<br>(59.6)      | *                    | 74.89<br>(59.82<br>) | 74.98<br>(58.24<br>) | 74.95<br>(58.35<br>) | 75.93<br>(58.13<br>) | 76.01<br>(59.67<br>) | 75.86<br>(60.02<br>) | 76.37<br>(58.85<br>) | 75.25<br>(58.91<br>) | 74.73<br>(50.49<br>) | 75.71<br>(61.06<br>) | 74.71<br>(59.03<br>) |
| 7  | 78.97<br>(65.16<br>) | 78.56 (70.4)  | 78.58 (70.41) | 78.88<br>(65.25<br>) | 78.92<br>(65.39<br>) | 78.03<br>(48.79<br>) | 78.97<br>(65.6)      | 74.63<br>(54.53<br>) | *                    | 98.7<br>(88.99<br>)  | 98.73<br>(89.21<br>) | 78.86<br>(63.8)      | 79.06<br>(64.51<br>) | 78.61<br>(66.76<br>) | 77.4<br>(60.92<br>)  | 78.56<br>(65.49<br>) | 83.48<br>(68.15<br>) | 78.46<br>(68.68<br>) | 83.66<br>(83.23<br>) |
| 8  | 79.08<br>(65.99<br>) | 79.02 (69.75) | 79.03 (69.97) | 79.1<br>(66.01<br>)  | 79.04<br>(66.02<br>) | 78.29<br>(47.43<br>) | 79.06<br>(66.41<br>) | 74.78<br>(54.17<br>) | 98.91<br>(90.92<br>) | *                    | 98.81<br>(91.53<br>) | 79.1<br>(63.46<br>)  | 79.2<br>(65.57<br>)  | 79.04<br>(67.6)      | 77.56<br>(61.23<br>) | 78.58<br>(66.06<br>) | 83.67<br>(66.79<br>) | 78.73<br>(67.38<br>) | 83.95<br>(81.87<br>) |
| 9  | 78.91<br>(61.88<br>) | 78.72 (64.63) | 78.72 (64.66) | 78.99<br>(62.26<br>) | 78.85<br>(62.1)      | 78.06<br>(44.3)      | 78.89<br>(62.17<br>) | 74.57<br>(50.73<br>) | 98.92<br>(85.73<br>) | 98.64<br>(86.6)      | *                    | 79.27<br>(60.16<br>) | 79.07<br>(61.27<br>) | 78.78<br>(62.69<br>) | 77.35<br>(57.09<br>) | 78.55<br>(62.68<br>) | 83.52<br>(63.26<br>) | 78.61<br>(63.21<br>) | 83.8<br>(77.54<br>)  |
| 10 | 85.1<br>(69.57<br>)  | 84.75 (77.55) | 84.77 (77.56) | 85.11<br>(70.38<br>) | 85.09<br>(70.55<br>) | 84.12<br>(57.41<br>) | 85.11<br>(70.54<br>) | 75.57<br>(52.87<br>) | 78.73<br>(64.17<br>) | 78.94<br>(62.13<br>) | 79.09<br>(63.24<br>) | *                    | 89.8<br>(76.92<br>)  | 83.73<br>(70.56<br>) | 79.08<br>(60.22<br>) | 83.97<br>(70.17<br>) | 78.69<br>(53.37<br>) | 84.22<br>(74.65<br>) | 78.53<br>(63.07<br>) |
| 11 | 85.41<br>(78.32<br>) | 85.08 (83.94) | 85.07 (83.99) | 85.41<br>(78.91<br>) | 85.37<br>(79)        | 84.2<br>(57.88<br>)  | 85.4<br>(78.78<br>)  | 75.71<br>(58.62<br>) | 79.11<br>(70.11<br>) | 79.18<br>(69.12<br>) | 79.19<br>(68.92<br>) | 90.04<br>(82.95<br>) | *                    | 84.16<br>(76.04<br>) | 79.16<br>(67.2)      | 84.25<br>(78.01<br>) | 78.77<br>(59.36<br>) | 84.54<br>(81.3)      | 78.83<br>(68.79<br>) |
| 12 | 87.8<br>(73.91<br>)  | 87.41 (83.97) | 87.42 (83.96) | 87.74<br>(74.05<br>) | 87.77<br>(74.78<br>) | 86.49<br>(59.18<br>) | 87.75<br>(74.42<br>) | 75.57<br>(55.98<br>) | 78.58<br>(69.06<br>) | 78.85<br>(67.91<br>) | 78.74<br>(67.27<br>) | 83.69<br>(72.83<br>) | 83.85<br>(73.27<br>) | *                    | 79.17<br>(62.57<br>) | 86.65<br>(75.67<br>) | 78.41<br>(57.51<br>) | 87.02<br>(81.49<br>) | 78.51<br>(69.43<br>) |

|    |                      |               |               |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |                      |
|----|----------------------|---------------|---------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| 13 | 79.34<br>(72.13<br>) | 79.11 (73.88) | 79.12 (73.91) | 79.32<br>(72.59<br>) | 79.3<br>(72.65<br>)  | 78.55<br>(50.58<br>) | 79.31<br>(72.25<br>) | 76.29<br>(61.64<br>) | 77.72<br>(70.48<br>) | 77.79<br>(68.91<br>) | 77.74<br>(69.01<br>) | 79.53<br>(69.21<br>) | 79.46<br>(71.82<br>) | 79.47<br>(70.22<br>) | *                    | 78.63<br>(72.19<br>) | 77.41<br>(58.23<br>) | 78.97<br>(72.08<br>) | 79.1<br>(69.18<br>)  |
| 14 | 90.73<br>(84.9)      | 90.63 (88.31) | 90.64 (88.31) | 90.63<br>(85.41<br>) | 90.72<br>(85.61<br>) | 89.71<br>(61.63<br>) | 90.65<br>(85.3)      | 75.26<br>(60.83<br>) | 78.78<br>(74.63<br>) | 78.77<br>(73.33<br>) | 78.73<br>(73.4)      | 84.27<br>(78.67<br>) | 84.32<br>(81.35<br>) | 86.99<br>(82.31<br>) | 78.6<br>(70.83<br>)  | *                    | 78.38<br>(61.83<br>) | 90.12<br>(85.75<br>) | 78.46<br>(73.09<br>) |
| 15 | 78.87<br>(57.93<br>) | 78.16 (62.9)  | 78.16 (62.92) | 78.84<br>(58.5)      | 78.74<br>(58.63<br>) | 77.83<br>(44.27<br>) | 78.87<br>(58.39<br>) | 74.65<br>(49.24<br>) | 83.72<br>(74.87<br>) | 83.81<br>(71.6)      | 83.66<br>(73.63<br>) | 78.79<br>(58.07<br>) | 78.9<br>(59.46<br>)  | 78.67<br>(63.49<br>) | 77.24<br>(54.89<br>) | 78.26<br>(60.04<br>) | *                    | 78.41<br>(61.67<br>) | 98.32<br>(82.47<br>) |
| 16 | 91.14<br>(77.45<br>) | 90.79 (88.85) | 90.79 (88.83) | 91.06<br>(77.58<br>) | 91.14<br>(77.59<br>) | 89.89<br>(63.02<br>) | 91.02<br>(78.38<br>) | 75.23<br>(56.69<br>) | 78.31<br>(69.92<br>) | 78.51<br>(67.05<br>) | 78.49<br>(67.33<br>) | 84.14<br>(75.6)      | 84.32<br>(76.33<br>) | 86.95<br>(80.2)      | 78.55<br>(63.42<br>) | 89.7<br>(77.39<br>)  | 78.05<br>(58.04<br>) | *                    | 78.12<br>(69.11<br>) |
| 17 | 78.55<br>(62.32<br>) | 78.27 (68.47) | 78.28 (68.5)  | 78.43<br>(62.38<br>) | 78.5<br>(63)         | 77.47<br>(47)        | 78.5<br>(62.44<br>)  | 74.26<br>(52.28<br>) | 83.59<br>(81.19<br>) | 83.81<br>(78.09<br>) | 83.65<br>(78.2)      | 78.48<br>(61.21<br>) | 78.66<br>(61.82<br>) | 78.34<br>(65.91<br>) | 76.98<br>(57.98<br>) | 78.2<br>(63.17<br>)  | 97.98<br>(71.4)      | 78.11<br>(66.06<br>) | *                    |

**Supplementary Table S6:** Tetra correlation among *Pantoea agglomerans* PS1 and PS2 and other *Pantoea* species by a wide distribution of Z-score.

| Organism                                                          | Z-Score |
|-------------------------------------------------------------------|---------|
| <i>Pantoea</i> sp. CFSAN033090                                    | 0.99951 |
| <i>Pantoea pleuroti</i> JZB 2120015                               | 0.99946 |
| <i>Pantoea agglomerans</i> 190                                    | 0.99936 |
| <i>Pantoea agglomerans</i> GB1                                    | 0.99928 |
| <i>Pantoea agglomerans</i> RIT273                                 | 0.99926 |
| <i>Pantoea agglomerans</i> Eh318                                  | 0.99925 |
| <i>Pantoea agglomerans</i> MP2                                    | 0.99921 |
| <i>Pantoea agglomerans</i> Tx10                                   | 0.99919 |
| <i>Pantoea vagans</i> ZBG6                                        | 0.99919 |
| <i>Pantoea agglomerans</i> P10c                                   | 0.9991  |
| <i>Pantoea agglomerans</i> FDAARGOS 1447                          | 0.99903 |
| <i>Pantoea agglomerans</i> NBRC 102470                            | 0.99896 |
| <i>Pantoea vagans</i> FDAARGOS_160                                | 0.99856 |
| <i>Pantoea alfalfae</i> CQ10                                      | 0.99843 |
| <i>Pantoea varia</i> OV426                                        | 0.99837 |
| <i>Pantoea vagans</i> C9-1                                        | 0.99829 |
| <i>Pantoea vagans</i> LMG 24199                                   | 0.99817 |
| <i>Pantoea gossypiicola</i> B_8                                   | 0.99812 |
| <i>Pantoea vagans</i> MP7                                         | 0.998   |
| <i>Pantoea eucalypti</i> LMG 24197                                | 0.99519 |
| <i>Pantoea eucalypti</i> LMG 24197                                | 0.99491 |
| <i>Pantoea</i> sp. aB                                             | 0.99467 |
| <i>Pantoea agglomerans</i> 299R                                   | 0.99438 |
| <i>Pantoea conspicua</i> LMG 24534                                | 0.98964 |
| <i>Pantoea anthophila</i> LMG 2558                                | 0.98806 |
| <i>Pantoea anthophila</i> 11-2                                    | 0.98716 |
| <i>Pantoea</i> sp. Sc1                                            | 0.98684 |
| <i>Pantoea brenneri</i> LMG 5343                                  | 0.98577 |
| <i>Pantoea</i> sp. 3.5.1                                          | 0.98525 |
| <i>Pantoea deleyi</i> LMG 24200                                   | 0.97336 |
| <i>Pantoea deleyi</i> LMG24200                                    | 0.97292 |
| <i>Pantoea deleyi</i> LMG 24200                                   | 0.97266 |
| [ <i>Erwinia</i> ] <i>mediterraneensis</i> Marseille-P5165        | 0.96327 |
| <i>Pantoea</i> sp. PSNIH1                                         | 0.95662 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> ST436:951358951 | 0.95633 |
| <i>Erwinia sorbitola</i> J780                                     | 0.95629 |
| <i>Lelliottia amnigena</i> ZB04                                   | 0.95607 |
| <i>Enterobacter cloacae</i> subsp. <i>dissolvens</i> GN02534      | 0.95558 |

|                                                                 |         |
|-----------------------------------------------------------------|---------|
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_855     | 0.95553 |
| <i>Enterobacter ludwigii</i> Hanford                            | 0.9553  |
| <i>Huaxiibacter chinensis</i> 155047                            | 0.95526 |
| <i>Pantoea eucrina</i> LMG 5346                                 | 0.95515 |
| <i>Enterobacter ludwigii</i> GN02226                            | 0.95498 |
| <i>Enterobacter cloacae</i> GGT036                              | 0.95489 |
| <i>Enterobacter ludwigii</i> GN02730                            | 0.95483 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> GN02174       | 0.95463 |
| <i>Enterobacter</i> sp. BIDMC 30                                | 0.95462 |
| <i>Enterobacter ludwigii</i> EcWSU1                             | 0.9546  |
| <i>Enterobacter cloacae</i> subsp. <i>dissolvens</i> ATCC 23373 | 0.9545  |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> CIDEIMsCOL10  | 0.9545  |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_1093    | 0.95441 |
| <i>Enterobacter ludwigii</i> P101                               | 0.95438 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> GN02616       | 0.95432 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_313     | 0.95426 |
| <i>Leclercia pneumoniae</i> 49125                               | 0.95411 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_901     | 0.95408 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_886     | 0.95404 |
| <i>Enterobacter ludwigii</i> EN-119                             | 0.95399 |
| <i>Enterobacter ludwigii</i> UW5                                | 0.95396 |
| <i>Enterobacter ludwigii</i> GN04920                            | 0.95391 |
| <i>Enterobacter cloacae</i> B2                                  | 0.9539  |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_1094    | 0.95384 |
| <i>Pantoea communis</i> Al-1710                                 | 0.95375 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> 42324         | 0.95374 |
| <i>Enterobacter cloacae</i> subsp. <i>dissolvens</i> SDM        | 0.95366 |
| <i>Enterobacter cloacae</i> 6kgm                                | 0.95355 |
| <i>Pseudocitrobacter faecalis</i> DSM 27453                     | 0.95351 |
| <i>Enterobacter</i> sp. 50793107                                | 0.95345 |
| <i>Enterobacter cloacae</i> ATCC 13047                          | 0.95339 |
| <i>Enterobacter cloacae</i> ATCC 13047                          | 0.95321 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> ATCC 13047    | 0.95319 |
| <i>Enterobacter cloacae</i> ATCC 13047                          | 0.95309 |
| <i>Enterobacter cloacae</i> DSM 30054                           | 0.95309 |
| <i>Pantoea wallisii</i> LMG 26277                               | 0.95309 |
| <i>Enterobacter cloacae</i> FDAARGOS 1431                       | 0.95307 |
| <i>Enterobacter</i> sp. BIDMC 26                                | 0.95296 |
| <i>Enterobacter kobei</i> DSM 13645                             | 0.95273 |
| <i>Enterobacter cloacae</i> CH1                                 | 0.95258 |
| <i>Duffyella gerundensis</i> null                               | 0.95222 |
| <i>Enterobacter kobei</i> GN02266                               | 0.9522  |
| <i>Enterobacter kobei</i> SMART_635                             | 0.95213 |
| <i>Enterobacteriaceae</i> bacterium strain FGI 57               | 0.95208 |

|                                                             |         |
|-------------------------------------------------------------|---------|
| <i>Enterobacter cancerogenus</i> M004                       | 0.95206 |
| <i>Enterobacter cloacae</i> subsp. <i>cloacae</i> SMART_628 | 0.95197 |
| <i>Pseudocitrobacter corydidari</i>                         | 0.9519  |
| <i>Enterobacter kobei</i> GN02275                           | 0.95173 |
| <i>Enterobacter kobei</i> GN03191                           | 0.95172 |
| <i>Erwinia persicina</i> NBRC 102418                        | 0.95172 |
| <i>Enterobacter kobei</i> MNCRE12                           | 0.95167 |
| <i>Enterobacter kobei</i> BIDMC 67                          | 0.95166 |
| <i>Enterobacter kobei</i> e1326                             | 0.95162 |
| <i>Enterobacter</i> sp. MGH 25                              | 0.95158 |
| <i>Enterobacter kobei</i> GN02186                           | 0.95151 |
| <i>Enterobacter kobei</i> GN02225                           | 0.9515  |
| <i>Enterobacter cloacae</i> DSM 30054                       | 0.9515  |
| <i>Enterobacter kobei</i> GN02204                           | 0.95149 |

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**Supplementary Table S7:** Subsystem-related protein features for the resistance of metal/metalloid, antibiotics, and oxidative stress within the genome of *Pantoea agglomerans* PS1 and PS2.

| <b>Nature of resistance</b>    | <b>Identified protein feature in <i>P. agglomerans</i> PS1</b> | <b>Identified protein feature in <i>P. agglomerans</i> PS2</b> |
|--------------------------------|----------------------------------------------------------------|----------------------------------------------------------------|
| Arsenic resistance             | Arsenic resistance protein, ArsH, ACR3                         | Arsenic resistance protein ArsH                                |
|                                | Arsenic resistance operon repressor                            | Arsenical resistance operon repressor                          |
|                                | Arsenate reductase                                             | Arsenate reductase                                             |
| Cobalt-Zinc-Cadmium resistance | Cobalt-zinc-cadmium resistance protein CzcD                    | Cobalt-zinc-cadmium resistance protein CzcD                    |
| Hydroperoxide resistance       | Organic hydroperoxide resistance protein                       | Organic hydroperoxide resistance protein                       |
|                                | Organic hydroperoxide resistance transcriptional regulator     | Organic hydroperoxide resistance transcriptional regulator     |
| Resistance to antibiotics      | Multidrug efflux system MdtABC-TolC                            | Multidrug efflux system AcrAB-TolC                             |

**Supplementary Table S8:** CAZymes encoding genes identified in *Pantoea agglomerans* PS1.

| <b>Sr no.</b> | <b>Enzyme family</b>                  | <b>Encoded enzymes</b>                                                                                                                                                                                                                           | <b>Hits</b> |
|---------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1             | Auxiliary Activity Family 10          | Lytic xylan monooxygenase / xylan oxidase (glycosidic bond-cleaving); Lytic chitin monooxygenase; Lytic cellulose monooxygenase (C1-hydroxylating); Lytic cellulose monooxygenase (C4-dehydrogenating)                                           | 2           |
| 2             | Auxiliary Activity Family 1           | [copper-containing] dihydrogeodin oxidase; Laccase / p-diphenol:oxygen oxidoreductase                                                                                                                                                            | 6           |
| 3             | Auxiliary Activity Family 3           | Ecdysone oxidase (EC 1.1.3.16); Glucose 1-oxidase (EC 1.1.3.4); Aryl alcohol oxidase (EC 1.1.3.7); Oligosaccharide dehydrogenase (FAD) (EC 1.1.5.-); Glucose 1-dehydrogenase (FAD, quinone) (EC 1.1.5.9); Pyranose dehydrogenase (EC 1.1.99.29); | 5           |
| 4             | Auxiliary Activity Family 3 / Subf 2  | Ecdysone oxidase;<br>Glucose 1-oxidase;<br>Aryl alcohol oxidase;<br>Oligosaccharide dehydrogenase (FAD);<br>Glucose 1-dehydrogenase (FAD, quinone);<br>Pyranose dehydrogenase;                                                                   | 3           |
| 5             | Auxiliary Activity Family 6           | P-benzoquinone reductase (NADPH);                                                                                                                                                                                                                | 2           |
| 6             | Carbohydrate-Binding Module Family 48 | Modules of approx. 100 residues with glycogen-binding function, appended to GH13 modules. Also found in the beta subunit (glycogen-binding) of AMP-activated protein kinases (AMPK)                                                              | 9           |
| 7             | Carbohydrate Esterase Family 1        | Trehalose 6-O-mycolyltransferase;<br>Diacylglycerol O-acyltransferase;<br>Carboxylic ester hydrolase;<br>Acetylxytan esterase;<br>Feruloyl esterase                                                                                              | 5           |
| 8             | Carbohydrate Esterase Family 19       | Pectin methylesterase                                                                                                                                                                                                                            | 1           |
| 9             | Carbohydrate Esterase Family 9        | N-acetylglucosamine-6-phosphate deacetylase                                                                                                                                                                                                      | 3           |

|    |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |    |
|----|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 10 | Glycoside Hydrolase Family 1            | anthocyanin 5-O-glucosyltransferase / 5-O-transglucosidase ; anthocyanin 7-O-glucosyltransferase / 7-O-transglucosidase ; $\beta$ -transglucosidase; $\alpha$ -L-arabinopyranosidase ; $\beta$ -1,2-glucosidase ; $\beta$ -rutinosidase / $\alpha$ -L-rhamnose-(1,6)- $\beta$ -D-glucosidase ;Isoflavone 7-O-glucosyl $\beta$ -glucosidase;3-a-(S)-strictosidine $\beta$ -glucosidase ;Lactase;Amygdalin $\beta$ -glucosidase ;Prunasin $\beta$ -glucosidase ; vicianin hydrolase ;Raucaffricine $\beta$ -glucosidase;Myrosinase; $\beta$ primeverosidase; $\beta$ -acuminosidase / $\beta$ -apiosyl $\beta$ -glucosidase / furcatin hydrolase ;ABA-specific $\beta$ -glucosidase ;Exo- $\alpha$ -sialidase ;DIMBOA $\beta$ -glucosidase ;Protodioscin 26-O- $\beta$ -D-glucosidase ;0-26-avenacosidase ;Oleuropein $\beta$ -glucosidase ; $\beta$ -glucosidase; $\beta$ -galactosidase; $\beta$ -mannosidase; $\beta$ -glucuronidase; Xylan $\beta$ -1,4-xylosidase; $\beta$ -D-fucosidase; $\beta$ -glucosylceramidase; $\beta$ -galactosylceramidase;Exo- $\beta$ -1,3-glucanase;Exo- $\beta$ -1,4-glucanase / cellodextrinase;6-P- $\beta$ -galactosidase;6-P- $\beta$ -glucosidase; | 18 |
| 11 | Glycoside Hydrolase Family 102          | Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3  |
| 12 | Glycoside Hydrolase Family 103          | Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3  |
| 13 | Glycoside Hydrolase Family 105          | D-4,5-unsaturated $\alpha$ -galacturonidase;D-4,5-unsaturated $\beta$ -glucuronyl hydrolase );Unsaturated rhamnogalacturonyl hydrolase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3  |
| 14 | Glycoside Hydrolase Family 109          | $\alpha$ -N-acetylgalactosaminidase; $\beta$ -N-acetylhexosaminidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 3  |
| 15 | Glycoside Hydrolase Family 13 / Subf 10 | $\alpha$ -amylase; maltooligosyltrehalose trehalohydrolase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 3  |
| 16 | Glycoside Hydrolase Family 13 / Subf 18 | $\alpha$ -glucoside phosphorylase; sucrose 6(F)-phosphate phosphorylase;Glucosylglycerate phosphorylase; glucosylglycerol phosphorylase;sucrose phosphorylase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2  |
| 17 | Glycoside Hydrolase Family 13 / Subf 26 | Malto-oligosyltrehalose synthase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2  |
| 18 | Glycoside Hydrolase Family 13 / Subf 5  | Maltopentaose-producing $\alpha$ -amylase ;] $\alpha$ -amylase; maltotriose-producing $\alpha$ -amylase; maltohexaose-producing $\alpha$ -amylase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3  |
| 19 | Glycoside Hydrolase Family 15           | Dextran dextrinase;[inverting] $\alpha$ -1,6-glucosidase / isomaltase; $\alpha$ , $\alpha$ -trehalase;[inverting] glucoamylase;Glucodextranase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 9  |
| 20 | Glycoside Hydrolase Family 177          | Exo- $\alpha$ -sialidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4  |
| 21 | Glycoside Hydrolase Family 179          | $\beta$ -N-acetylhexosaminidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3  |
| 22 | Glycoside Hydrolase Family 19           | Chitinase;Lysozyme;[reducing end] exo-chitinase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3  |

|    |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |    |
|----|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 23 | Glycoside Hydrolase<br>Family 2           | $\alpha$ -L-arabinopyranosidase; $\beta$ -1,3-galactosidase; $\beta$ -galacturonidase ; $\beta$ -galacturonidase RGII specific;Lactase ; Glycyrrhizin $\beta$ -glucuronidase ; $\beta$ -D-galactofuranosidase ;Mannosylglycoprotein endo- $\beta$ -mannosidase ;Exo- $\beta$ -1,4-glucosaminidase ; $\beta$ -glucosidase ; $\beta$ -galactosidase ; $\beta$ -mannosidase; $\beta$ -glucuronidase ;Xylan $\beta$ -1,4-xylosidase ; $\beta$ -N-acetylhexosaminidase ; $\alpha$ -L-arabinofuranosidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 9  |
| 24 | Glycoside Hydrolase<br>Family 20          | $\beta$ -1,6-N-acetylglucosaminidase; $\beta$ -N-acetyl-6-sulfo-glucosaminidase;Lacto-N-biosidase; $\beta$ -N-acetylhexosaminidase;Mannosyl-glycoprotein endo- $\beta$ -N-acetylglucosaminidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 6  |
| 25 | Glycoside Hydrolase<br>Family 23          | Chitinase ;Lysozyme ;Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 20 |
| 26 | Glycoside Hydrolase<br>Family 24          | Lysozyme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6  |
| 27 | Glycoside Hydrolase<br>Family 28          | Xylogalacturonan hydrolase;Endo-polygalacturonase;Rhamnogalacturonase;Rhamnogalacturonan $\alpha$ -1,2-galacturonohydrolase;Galacturonan $\alpha$ -1,4-galacturonidase;Exo-poly- $\alpha$ -digalacturonosidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3  |
| 28 | Glycoside Hydrolase<br>Family 3           | $\beta$ -N-Acetylglucosaminoside phosphorylase; $\beta$ -glycan phosphorylase;MLG exo- $\beta$ -1,4-glucosidase;[retaining] xyloglucan-specific exo- $\beta$ -1,4-glucosidase; $\alpha$ -L-arabinopyranosidase;Avenacinase; $\beta$ -1,2-glucosidase; $\beta$ -1,6-glucosidase;D-4,5-unsaturated $\beta$ -glucuronyl hydrolase;Exo- $\beta$ -1,3-1,4-glucanase;Stevioside- $\beta$ -1,2-glucosidase;Tomatinase $\beta$ -1,2-glucosidase;[retaining] isoprimeverose-producing oligoxyloglucan hydrolase;Coniferin $\beta$ -glucosidase;Chitosanase;Protodioscin 26-O- $\beta$ -D-glucosidase; $\beta$ -glucosidase; $\beta$ -galactosidase; $\beta$ -glucuronidase;Xylan $\beta$ -1,4-xylosidase; $\beta$ -D-fucosidase; $\beta$ -glucosylceramidase; $\beta$ -N-acetylhexosaminidase; $\alpha$ -L-arabinofuranosidase;Exo- $\beta$ -1,3-glucanase;Endo- $\beta$ -1,3(4)-glucanase / lichenase-laminarinase;Lichenase /endo- $\beta$ -1,3-1,4-glucanase;Exo- $\beta$ -1,4-glucanase / cellodextrinase;Endo- $\beta$ -1,4-xylanase | 6  |
| 29 | Glycoside Hydrolase<br>Family 31 / Subf 2 | Oligosaccharide $\alpha$ -4-glucosyltransferase; $\alpha$ -6-glucosyltransferase; $\alpha$ -3-isomaltosyltransferase / cycloalternan-forming enzyme;Exo- $\alpha$ -1,4-galactosidase;[retaining] oligo- $\alpha$ -1,6-glucosidase;Dextranase; $\alpha$ -xylosidase;Sulfoquinovosidase ; $\alpha$ -glucosidase;[retaining] cycloalternan-specific $\alpha$ -1,3-glucosidase / $\alpha$ -1,3-isomaltosidase ;Mannosyl-oligosaccharide $\alpha$ -1,3-glucosidase;Exo-acting protein- $\alpha$ -N-acetylglactosaminidase ; $\alpha$ -galactosidase; $\alpha$ -mannosidase ;[retaining] sucrose $\alpha$ -glucosidase ;Exo- $\alpha$ -1,3-glucanase / $\alpha$ -1,3-glucosidase ;Exo- $\alpha$ -1,4-glucan lyase                                                                                                                                                                                                                                                                                                                      | 3  |
| 30 | GlycosylTransferase<br>Family 84          | Cyclic $\beta$ -1,2-glucan synthase (elongation)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3  |

|    |                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |   |
|----|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 31 | Glycoside Hydrolase<br>Family 102 | Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3 |
| 32 | GlycosylTransferase<br>Family 20  | GDP-valeniol: validamine 7-phosphate<br>valeniolyltransferase; $\alpha,\alpha$ -trehalose-6-phosphate synthase<br>(UDP-forming);Glucosylglycerol-phosphate synthase; $\alpha,\alpha$ -<br>trehalose-6-phosphate synthase (GDP-forming);Trehalose-6-P<br>phosphatase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3 |
| 33 | GlycosylTransferase<br>Family 35  | $\alpha$ -1,4-glucan phosphorylase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3 |
| 34 | Glycoside Hydrolase<br>Family 77  | 4- $\alpha$ -glucanotransferase / amylomaltase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 3 |
| 35 | Glycoside Hydrolase<br>Family 42  | $\alpha$ -L-arabinopyranosidase;<br>$\beta$ -galactosidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3 |
| 36 | Glycoside Hydrolase<br>Family 53  | Endo- $\beta$ -1,4-galactanase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 3 |
| 37 | GlycosylTransferase<br>Family 101 | Hexosyltransferases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6 |
| 38 | GlycosylTransferase<br>Family 2   | GDP-Man $\alpha$ -mannosyltransferase;GDP-Man: $\beta$ -<br>mannosyltransferase;GDP- $\beta$ -L-Fuc : D-Glc- $\beta$ -1,3-D-GalNAc-<br>PP-Ph $\alpha$ -1,4-L-fucosyltransferase;Hexosyltransferases;LOS $\beta$ -<br>1,4-glucosyltransferase;N-acetylgalactosaminyltransferase;N-<br>acetylglucosaminyltransferase;UDP-Gal: $\alpha$ -GlcNAc-PP-lipid<br>$\beta$ -1,3-galactosyltransferase;UDP-Gal:queuosine $\beta$ -<br>galactosyltransferase;UDP-GalNAc: $\beta$ -1,3-N-<br>acetylgalactosaminyltrasferase;UDP-GalNAc: undecaprenyl-P<br>$\beta$ -N-acetylgalactosaminyltransferase;UDP-Glc : GalNAc-PP-<br>Und $\beta$ -1,3-glucosyltransferase;UDP-Glc: $\beta$ -1,6-glucan<br>synthase;UDP-Glc: $\beta$ -glucosyltransferase;UDP-Glc:<br>bactoprenol $\beta$ -glucosyltransferase;UDP-Glc: teichoic acid $\beta$ -<br>glucosyltransferase;UDP-GlcA: LOS $\beta$ -<br>glucuronyltransferase;UDP-GlcA: [hyaluronan] $\beta$ -1,4-<br>glucuronyltransferase;UDP-GlcNAc: [hyaluronan] $\beta$ -1,3-N-<br>acetylglucosaminyltransferase;[inverting] UDP-Glc: glycocin<br>S- $\beta$ -glucosyltransferase;[inverting] UDP-Glc: protein O- $\beta$ -<br>glucosyltransferas[inverting] UDP-GlcNAc:<br>[chitooligosaccharide] $\beta$ -1,4-N-<br>acetylglucosaminyltransferase;[inverting] UDP-GlcNAc:<br>teichoic acid $\beta$ -N-acetylglucosaminyltransferase;[inverting] $\beta$ -<br>1,6-glucosyltransferase;[inverting] dTDP-spectinose: $\beta$ -<br>spectinosyltransferase;[inverting] glucomannan synthase; $\alpha$ -<br>1,3-rhamnosyltransferase (unspecified donor);Alternating $\beta$ -<br>1,3/4-N-acetylmannan synthase;Arabinoglucan synthase; $\beta$ -<br>1,3-1,4-glucan synthase; $\beta$ -1,3-N-<br>acetylglucosaminyltransferase; $\beta$ -1,3-galactosyltransferase; $\beta$ -<br>1,3-glucosyltransferase; $\beta$ -1,4-galactosyltransferase; $\beta$ -1,4-<br>glucosyltransferase;Chlorobactene $\beta$ -glucosyltransferase<br>;DTDP-L-Rha: $\alpha$ -L-rhamnosyltransferase;Poly- $\beta$ -1,6-N-<br>acetylglucosamine synthase ;Staphyloxanthin $\beta$ - | 9 |

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glucosyltransferase;Xyloglucan  $\beta$ -1,4-glucan synthase ;UDP-Glc: dolichyl-phosphate  $\beta$ -glucosyltransferase ;UDP-Glc:  $\beta$ -1,4-glucan synthase / cellulose synthase (UDP-forming)  
 ;UDP-Glc: 1,2-diacylglycerol 3-glucosyltransferase ;Chitin transglycosylase ;UDP-GlcA:  $\beta$ -glucuronosyltransferase  
 ;UDP-GalNAc:  $\beta$ -1,3-glucuronyl-N-acetylgalactosaminyl-proteoglycan  $\beta$ -1,4-N-acetylgalactosaminyltransferase ; $\beta$ -Man-P-decaprenol:  $\alpha$ -1,6-mannooligosaccharide  $\alpha$ -1,6-mannosyltransferase;Hyaluronan synthase ;UDP-GlcA: N-acetylglucosaminyl-proteoglycan  $\beta$ -1,4-glucuronosyltransferase ;UDP-GlcA: N-acetylgalactosaminyl-proteoglycan  $\beta$ -1,3-glucuronosyltransferase ;UDP-Galf: rhamnopyranosyl-N-acetylglucosaminyl-PP-decaprenol  $\beta$ -1,4/1,5-galactofuranosyltransferase;UDP-Galf: [galactan] Galf-Galf-Rha-GlcNAc-PP-decaprenol  $\beta$ -1,5/1,6-galactofuranosyltransferase ;DTDP-L-Rha: N-acetylglucosaminyl-PP-decaprenol  $\alpha$ -1,3-L-rhamnosyltransferase ; $\beta$ -1,3-glucosyltransferase;[inverting]  
 GDP-Man:  $\beta$ -mannan  $\beta$ -1,4-mannosyltransferase / glucomannan synthase;Mannuronan synthase;UDP-Glc:  $\beta$ -1,3-glucan synthase / callose synthase ;GDP-Man: Dol-P  $\beta$ -mannosyltransferase;UDP-L-Arap-4N-formyl : undecaprenyl-P  $\alpha$ -L-4N-formylarabinosyltransferase

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**Supplementary Table S9:** CAZymes encoding genes identified in *Pantoea agglomerans* PS2.

| <b>Sr no.</b> | <b>Enzyme family</b>                  | <b>Encoded enzymes</b>                                                                                                                                                                                                                                           | <b>Hits</b> |
|---------------|---------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| 1             | Auxiliary Activity Family 1           | dihydrogeodin oxidase;Laccase / p-diphenol:oxygen oxidoreductase                                                                                                                                                                                                 | 5           |
| 2             | Auxiliary Activity Family 3           | Pyranose:oxygen 2-oxidoreductase / glucose 2-oxidase ; Alcohol oxidase;Ecdysone oxidase ; Glucose 1-oxidase ; Aryl alcohol oxidase; Oligosaccharide dehydrogenase (FAD) ;Glucose 1-dehydrogenase (FAD, quinone);Cellobiose dehydrogenase ;Pyranose dehydrogenase | 5           |
| 3             | Auxiliary Activity Family 6           | P-benzoquinone reductase                                                                                                                                                                                                                                         | 2           |
| 4             | Carbohydrate-Binding Module Family 48 | Modules of approx. 100 residues with glycogen-binding function, appended to GH13 modules. Also found in the beta subunit (glycogen-binding) of AMP-activated protein kinases (AMPK)                                                                              | 9           |
| 5             | Carbohydrate Esterase Family 1        | Trehalose 6-O-myceryltransferase;Diacylglycerol O-acyltransferase ;Carboxylic ester hydrolase ;Acetylxyln esterase;Feruloyl esterase                                                                                                                             | 2           |
| 6             | Carbohydrate Esterase Family 11       | UDP-3-O-acyl N-acetylglucosamine deacetylase                                                                                                                                                                                                                     | 3           |
| 7             | Carbohydrate Esterase Family 12       | Carboxylic ester hydrolase ;Pectin acetylerase ;Acetylxyln esterase ;Rhamnogalacturonan acetylerase                                                                                                                                                              | 2           |
| 8             | Carbohydrate Esterase Family 19       | Pectin methylesterase                                                                                                                                                                                                                                            | 4           |
| 9             | Carbohydrate Esterase Family 4        | Chitin oligosaccharide deacetylase;Acetylerase ;Acetylxyln esterase ;LPS deacetylase ;Poly-β-1,6-N-acetylglucosamine deacetylase ;Peptidoglycan N-acetylglucosamine deacetylase ;Chitin deacetylase                                                              | 2           |
| 10            | Carbohydrate Esterase Family 9        | N-acetylglucosamine-6-phosphate deacetylase                                                                                                                                                                                                                      | 3           |

|    |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |    |
|----|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 11 | Glycoside<br>Hydrolase Family 1            | anthocyanin 5-O-glucosyltransferase / 5-O-transglucosidase ; anthocyanin 7-O-glucosyltransferase / 7-O-transglucosidase ; $\beta$ -transglucosidase; $\alpha$ -L-arabinopyranosidase ; $\beta$ -1,2-glucosidase ; $\beta$ -rutinosidase / $\alpha$ -L-rhamnose-(1,6)- $\beta$ -D-glucosidase ;Isoflavone 7-O-glucosyl $\beta$ -glucosidase;3-a(S)-strictosidine $\beta$ -glucosidase ;Lactase;Amygdalin $\beta$ -glucosidase ;Prunasin $\beta$ -glucosidase ; vicianin hydrolase ;Raucaffricine $\beta$ -glucosidase;Myrosinase; $\beta$ primeverosidase; $\beta$ -acuminosidase / $\beta$ -apiosyl $\beta$ -glucosidase / furcatin hydrolase ;ABA-specific $\beta$ -glucosidase ;Exo- $\alpha$ -sialidase ;DIMBOA $\beta$ -glucosidase ;Protodioscin 26-O- $\beta$ -D-glucosidase ;0-26-avenacosidase ;Oleuropein $\beta$ -glucosidase ; $\beta$ -glucosidase; $\beta$ -galactosidase; $\beta$ -mannosidase; $\beta$ -glucuronidase; Xylan $\beta$ -1,4-xylosidase; $\beta$ -D-fucosidase; $\beta$ -glucosylceramidase; $\beta$ -galactosylceramidase;Exo- $\beta$ -1,3-glucanase;Exo- $\beta$ -1,4-glucanase / cellodextrinase;6-P- $\beta$ -galactosidase;6-P- $\beta$ -glucosidase; | 18 |
| 12 | Glycoside<br>Hydrolase Family 102          | Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |    |
| 13 | Glycoside<br>Hydrolase Family 103          | Peptidoglycan lytic transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 3  |
| 14 | Glycoside<br>Hydrolase Family 105          | D-4,5-unsaturated $\alpha$ -galacturonidase ;<br>D-4,5-unsaturated $\beta$ -glucuronyl hydrolase ;<br>Unsaturated rhamnogalacturonyl hydrolase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 3  |
| 15 | Glycoside<br>Hydrolase Family 109          | $\alpha$ -N-acetylgalactosaminidase ;<br>$\beta$ -N-acetylhexosaminidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2  |
| 16 | Glycoside<br>Hydrolase Family 13 / Subf 10 | [retaining] $\alpha$ -amylase;<br>[retaining] maltooligosyltrehalose<br>trehalohydrolase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3  |
| 17 | Glycoside<br>Hydrolase Family 13 / Subf 18 | [retaining] $\alpha$ -glucoside phosphorylase ;<br>[retaining] sucrose 6(F)-phosphate phosphorylase ;<br>Glucosylglycerate phosphorylase ;<br>[retaining] glucosylglycerol phosphorylase ;<br>[retaining] sucrose phosphorylase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3  |
| 18 | Glycoside<br>Hydrolase Family 13 / Subf 26 | Malto-oligosyltrehalose synthase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 3  |

|    |                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |    |
|----|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| 19 | Glycoside<br>Hydrolase Family<br>15  | Dextran dextrinase ;[inverting] $\alpha$ -1,6-glucosidase<br>/ isomaltase ; $\alpha$ , $\alpha$ -trehalase;[inverting]<br>glucoamylase;Glucodextranase                                                                                                                                                                                                                                                                                                                                                                      | 6  |
| 20 | Glycoside<br>Hydrolase Family<br>177 | Exo- $\alpha$ -sialidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7  |
| 21 | Glycoside<br>Hydrolase Family<br>179 | $\beta$ -N-acetylhexosaminidase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 4  |
| 22 | Glycoside<br>Hydrolase Family<br>19  | Chitinase;Lysozyme;[reducing end] exo-chitinase                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3  |
| 23 | Glycoside<br>Hydrolase Family 2      | $\alpha$ -L-arabinopyranosidase ; $\beta$ -1,3-galactosidase ; $\beta$ -<br>galacturonidase ; $\beta$ -galacturonidase RGII specific<br>;Lactase ;Glycyrrhizin $\beta$ -glucuronidase;<br>$\beta$ -D-galactofuranosidase ;Mannosylglycoprotein<br>endo- $\beta$ -mannosidase;Exo- $\beta$ -1,4-<br>glucosaminidase; $\beta$ -glucosidase; $\beta$ -galactosidase; $\beta$ -<br>mannosidase; $\beta$ -glucuronidase;Xylan $\beta$ -1,4-<br>xylosidase ; $\beta$ -N-acetylhexosaminidase; $\alpha$ -L-<br>arabinofuranosidase | 6  |
| 24 | Glycoside<br>Hydrolase Family<br>20  | $\beta$ -1,6-N-acetylglucosaminidase ; $\beta$ -N-acetyl-6-<br>sulfo-glucosaminidase;Lacto-N-biosidase; $\beta$ -N-<br>acetylhexosaminidase ;Mannosyl-glycoprotein<br>endo- $\beta$ -N-acetylglucosaminidase                                                                                                                                                                                                                                                                                                                | 6  |
| 25 | Glycoside<br>Hydrolase Family<br>23  | Chitinase ;Lysozyme ;Peptidoglycan lytic<br>transglycosylase / peptidoglycan lyase                                                                                                                                                                                                                                                                                                                                                                                                                                          | 22 |
| 26 | Glycoside<br>Hydrolase Family<br>24  | Lysozyme                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 6  |
| 27 | Glycoside<br>Hydrolase Family<br>28  | Xylogalacturonan hydrolase (EC 3.2.1.-);Endo-<br>polygalacturonase ;Rhamnogalacturonase<br>;Rhamnogalacturonan $\alpha$ -1,2-<br>galacturonohydrolase;Galacturonan $\alpha$ -1,4-<br>galacturonidase;Exo-poly- $\alpha$ -digalacturonosidase                                                                                                                                                                                                                                                                                | 2  |

|    |                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |   |
|----|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 28 | Glycoside<br>Hydrolase Family 3              | $\beta$ -N-Acetylglucosaminoside phosphorylase; $\beta$ -glycan phosphorylase;MLG exo- $\beta$ -1,4-glucosidase;[retaining] xyloglucan-specific exo- $\beta$ -1,4-glucosidase; $\alpha$ -L-arabinopyranosidase;Avenacinase; $\beta$ -1,2-glucosidase; $\beta$ -1,6-glucosidase;D-4,5-unsaturated $\beta$ -glucuronyl hydrolase;Exo- $\beta$ -1,3-1,4-glucanase;Stevioside- $\beta$ -1,2-glucosidase;Tomatinase $\beta$ -1,2-glucosidase;[retaining] isoprimeverose-producing oligoxyloglucan hydrolase;Coniferin $\beta$ -glucosidase;Chitosanase;Protodioscin 26-O- $\beta$ -D-glucosidase; $\beta$ -glucosidase; $\beta$ -galactosidase; $\beta$ -glucuronidase;Xylan $\beta$ -1,4-xylosidase; $\beta$ -D-fucosidase; $\beta$ -glucosylceramidase; $\beta$ -N-acetylhexosaminidase; $\alpha$ -L-arabinofuranosidase;Exo- $\beta$ -1,3-glucanase;Endo- $\beta$ -1,3(4)-glucanase / lichenase-laminarinase;Lichenase /endo- $\beta$ -1,3-1,4-glucanase;Exo- $\beta$ -1,4-glucanase /cellodextrinase;Endo- $\beta$ -1,4-xylanase | 6 |
| 29 | Glycoside<br>Hydrolase Family<br>31 / Subf 2 | Oligosaccharide $\alpha$ -4-glucosyltransferase; $\alpha$ -6-glucosyltransferase; $\alpha$ -3-isomaltosyltransferase / cycloalternan-forming enzyme;Exo- $\alpha$ -1,4-galactosidase;[retaining] oligo- $\alpha$ -1,6-glucosidase;Dextranase; $\alpha$ -xylosidase;Sulfoquinovosidase ; $\alpha$ -glucosidase;[retaining] cycloalternan-specific $\alpha$ -1,3-glucosidase / $\alpha$ -1,3-isomaltosidase ;Mannosyl-oligosaccharide $\alpha$ -1,3-glucosidase;Exo-acting protein- $\alpha$ -N-acetylgalactosaminidase ; $\alpha$ -galactosidase; $\alpha$ -mannosidase ;[retaining] sucrose $\alpha$ -glucosidase ;Exo- $\alpha$ -1,3-glucanase / $\alpha$ -1,3-glucosidase ;Exo- $\alpha$ -1,4-glucan lyase                                                                                                                                                                                                                                                                                                                    | 3 |

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**Supplementary Table S10:** Wheat Rhizospheric microbial diversity at different wheat growth stages.

|                       | <b>Feeks 1</b> |            |            |
|-----------------------|----------------|------------|------------|
|                       | <b>Control</b> | <b>PS1</b> | <b>PS2</b> |
| Acidobacteria         | 0.187059       | 0.670358   | 0.256772   |
| Actinobacteria        | 2.295723       | 7.577966   | 4.326614   |
| Aquificae             | 3.673157       | 0.058292   | 0.397997   |
| Armatimonadetes       | 0              | 2.185952   | 0          |
| Bacteroidetes         | 0.025508       | 0.058292   | 0.038516   |
| Caldiserica           | 0              | 0.058292   | 0          |
| Chlamydiae            | 0.144546       | 0.262314   | 0          |
| Chlorobi              | 0.025508       | 0          | 0.077032   |
| Chloroflexi           | 1.088343       | 0.29146    | 0.051354   |
| Chordata              | 0.051016       | 0.058292   | 0          |
| Chrysiogenetes        | 0.017005       | 0          | 0          |
| Cyanobacteria         | 0.161551       | 0.466336   | 0.064193   |
| Deferribacteres       | 0.025508       | 0          | 0          |
| Deinococcus-Thermus   | 0.153048       | 0.058292   | 0.564899   |
| Elusimicrobia         | 0              | 0.058292   | 0          |
| Euryarchaeota         | 34.58039       | 0          | 13.33932   |
| Fibrobacteres         | 10.23722       | 0.174876   | 14.76441   |
| Firmicutes            | 5.824335       | 20.69368   | 9.872898   |
| Fusobacteria          | 0.093529       | 0.087438   | 0          |
| Gemmatimonadetes      | 0              | 0.728651   | 0.051354   |
| Nitrospirae           | 0.017005       | 0          | 0          |
| Planctomycetes        | 0.042513       | 0.058292   | 0          |
| Proteobacteria        | 41.20398       | 62.83882   | 56.1176    |
| Spirochaetes          | 0.034011       | 0.29146    | 0.025677   |
| Synergistetes         | 0              | 0.14573    | 0          |
| Tenericutes           | 0.059519       | 0.408044   | 0.025677   |
| Thermodesulfobacteria | 0.017005       | 0.058292   | 0          |
| Thermotogae           | 0.017005       | 2.593996   | 0.025677   |
| Verrucomicrobia       | 0.025508       | 0.116584   | 0          |
|                       | <b>Feeks 2</b> |            |            |
|                       | <b>Control</b> | <b>PS1</b> | <b>PS2</b> |
| Acidobacteria         | 0.466931       | 1.710558   | 1.946794   |
| Actinobacteria        | 5.916592       | 6.098091   | 15.02      |
| Aquificae             | 0.179097       | 0.198115   | 0.155933   |
| Armatimonadetes       | 0.019189       | 0.072481   | 0.085054   |
| Bacteroidetes         | 2.136369       | 10.39865   | 2.256      |
| Caldiserica           | 0.031982       | 0.019328   | 0.014176   |
| Candidatus            | 0.019189       | 0.014496   | 0.023626   |
| Cloacimonetes         |                |            |            |
| Chlamydiae            | 0.076756       | 0.067649   | 0.075604   |
| Chlorobi              | 0.134323       | 0.14013    | 0.174833   |
| Chloroflexi           | 1.586286       | 3.020053   | 3.369088   |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Chordata              | 0.921069 | 1.299831 | 1.152956 |
| Chrysiogenetes        | 0.051171 | 0.028993 | 0.028351 |
| Crenarchaeota         | 0        | 0.009664 | 0.018901 |
| Cyanobacteria         | 1.918895 | 1.560763 |          |
| Deferribacteres       | 0.025585 | 0.077313 | 0.141757 |
| Deinococcus-Thermus   | 0.300627 | 0.488041 | 0.283514 |
| Dictyoglomi           | 0.031982 |          | 0.00945  |
| Elusimicrobia         | 0.044774 |          | 0.151207 |
| Euryarchaeota         | 0.057567 | 0.038657 | 0.066153 |
| Fibrobacteres         | 0.044774 | 0.02416  | 0.051978 |
| Firmicutes            | 12.63272 | 11.95458 | 8.977933 |
| Fusobacteria          | 0.089548 | 0.09181  | 0.184284 |
| Gemmatimonadetes      | 0.204682 | 0.531529 | 0.637906 |
| Ignavibacteriae       | 5.2      |          | 0.051978 |
| Nitrospirae           | 3        |          |          |
| Planctomycetes        | 0.575668 | 0.444552 | 1.691632 |
| Proteobacteria        | 56.90162 | 60.72    | 62.6403  |
| Spirochaetes          | 0.5422   | 0.647499 | 0.533951 |
| Synergistetes         | 0.095945 |          |          |
| Tenericutes           | 0.217475 | 0.329    |          |
| Thaumarchaeota        | 0        | 0.009664 | 0        |
| Thermodesulfobacteria | 2        | 0.005    | 0.051978 |
| Thermotogae           | 3        |          | 0.2047   |
| Verrucomicrobia       | 1.577    |          | 0        |

### Feeks 3

|                     | Control  | PS1      | PS2      |
|---------------------|----------|----------|----------|
| Acidobacteria       | 2.668737 | 2.737992 | 1.563308 |
| Actinobacteria      | 15.07448 | 11.85192 | 9.350285 |
| Aquificae           | 0.347385 | 0.237954 | 0.646759 |
| Armatimonadetes     | 0.431167 | 0.207447 | 0.048045 |
| Bacteroidetes       | 8.811329 | 12.67103 | 7.942198 |
| Caldiserica         | 0.034739 | 0.028982 | 0.02587  |
| Candidatus          |          |          |          |
| Cloacimonetes       | 0.030652 | 0.04576  | 0.044349 |
| Chlamydiae          | 0.11852  | 0.070166 | 0.062828 |
| Chlorobi            | 0.259517 | 0.17694  | 0.214354 |
| Chloroflexi         | 3.843717 | 2.890526 | 4.253825 |
| Chordata            | 0.132824 | 0.155585 | 0.291965 |
| Chrysiogenetes      | 0.055173 | 0.050336 | 0.036958 |
| Crenarchaeota       | 0.016348 | 0.018304 | 0.033262 |
| Cyanobacteria       | 2.513436 | 1.722113 | 2.80139  |
| Deferribacteres     | 0.159389 | 0.149484 | 0.162614 |
| Deinococcus-Thermus | 0.584425 | 0.462179 | 0.417621 |
| Dictyoglomi         | 0.055173 | 0.033558 | 0.036958 |
| Elusimicrobia       | 0.273821 | 0.196769 | 0.181092 |
| Euryarchaeota       | 0.040869 | 0.039659 | 0.044349 |
| Fibrobacteres       | 0.081738 | 0.050336 | 0.029566 |
| Firmicutes          | 8.533421 | 6.769475 | 8.962229 |
| Fusobacteria        | 0.167562 | 0.106774 | 0.262399 |
| Gemmatimonadetes    | 1.101416 | 0.774875 | 0.535886 |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Ignavibacteriae       | 0.136911 | 0.073216 | 0.055436 |
| Nitrospirae           | 0.782639 | 0.584207 | 0.554365 |
| Planctomycetes        | 2.023009 | 1.528394 | 2.165718 |
| Proteobacteria        | 46.98899 | 51.54594 | 55.02624 |
| Spirochaetes          | 0.821464 | 0.719962 | 0.813068 |
| Synergistetes         | 0.300386 | 0.186092 | 0.203267 |
| Tenericutes           | 0.398472 | 0.215073 | 0.546973 |
| Thermodesulfobacteria | 0.128737 | 0.11135  | 0.151526 |
| Thermotogae           | 0.437297 | 0.279138 | 0.251312 |
| Verrucomicrobia       | 2.646259 | 3.30847  | 2.283983 |

#### Feeks 6

|                       | <b>Control</b> | <b>PS1</b> | <b>PS2</b> |
|-----------------------|----------------|------------|------------|
| Acidobacteria         | 1.268961       | 1.617436   | 1.716751   |
| Actinobacteria        | 3.563175       | 10.33266   | 2.920589   |
| Aquificae             | 0.239506       | 0.174935   | 0.162925   |
| Armatimonadetes       | 0.121854       | 0.197878   | 0.099566   |
| Bacteroidetes         | 13.71906       | 18.95325   | 15.23051   |
| Caldiserica           | 0.025211       | 0.028678   | 0.009051   |
| Candidatus            |                |            |            |
| Cloacimonetes         | 0.033615       | 0.020075   | 0.012069   |
| Chlamydiae            | 0.092441       | 0.100373   | 0.066377   |
| Chlorobi              | 0.176478       | 0.11758    | 0.141805   |
| Chloroflexi           | 2.374049       | 1.866934   | 1.583997   |
| Chordata              | 0.277323       | 0.180671   | 0.171977   |
| Chrysiogenetes        | 0.042019       | 0.020075   | 0.033189   |
| Crenarchaeota         | 0.012606       | 0          | 0.012069   |
| Cyanobacteria         | 4.067398       | 1.617436   | 1.004707   |
| Deferribacteres       | 0.121854       | 0.057356   | 0.051291   |
| Deinococcus-Thermus   | 0.52103        | 0.324061   | 0.280594   |
| Dictyoglomi           | 0.008404       | 0.031546   | 0.018103   |
| Elusimicrobia         | 0.168074       | 0.206481   | 0.114651   |
| Euryarchaeota         | 0.050422       | 0.022942   | 0.036206   |
| Fibrobacteres         | 5              | 0.060224   | 0.039223   |
| Firmicutes            | 7.811253       | 5.334098   | 6.495897   |
| Fusobacteria          | 0.201689       | 0.108976   | 0.075428   |
| Gemmatimonadetes      | 0.369763       | 0.455979   | 0.265508   |
| Ignavibacteriae       | 0.189084       | 0.120447   | 0.096548   |
| Nitrospirae           | 0.537838       | 0.679667   | 0.398262   |
| Planctomycetes        | 2.151351       | 0.748494   | 0.524982   |
| Proteobacteria        | 47             | 53.75108   | 66.86278   |
| Spirochaetes          | 0.920207       | 0.576427   | 0.509896   |
| Synergistetes         | 0.210093       | 0.131919   | 0.102583   |
| Tenericutes           | 2.59           | 0.31259    | 0.181028   |
| Thermodesulfobacteria | 0.11345        | 0.068827   |            |
| Thermotogae           | 4              | 0.252366   | 0.153874   |
| Verrucomicrobia       | 2.029497       | 1.528535   | 0.63       |

#### Feeks 9

|                | <b>Control</b> | <b>PS1</b> | <b>PS2</b> |
|----------------|----------------|------------|------------|
| Acidobacteria  | 2.37521        | 3.070208   | 2.678325   |
| Actinobacteria | 5.83578        | 5.643766   | 6.044374   |
| Aquificae      | 0.524329       | 0.221988   | 0.28684    |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Armatimonadetes       | 0.534815 | 0.10535  | 0.165883 |
| Bacteroidetes         | 8.410235 | 13.73316 | 16.7473  |
| Caldiserica           | 0.041946 | 0.033863 | 0.041471 |
| Candidatus            |          |          |          |
| Cloacimonetes         | 0.036703 | 0.01505  | 0.034559 |
| Chlamydiae            | 0.146812 | 0.082775 | 0.065662 |
| Chlorobi              | 0.33557  | 0.142975 | 0.235001 |
| Chloroflexi           | 4.205117 | 2.57732  | 3.006635 |
| Chordata              | 0.346057 | 0.1204   | 0.124412 |
| Chrysiogenetes        | 0.089136 | 0.033863 | 0.082942 |
| Crenarchaeota         | 0.026216 | 0.033863 | 0.027647 |
| Cyanobacteria         | 1.316065 | 2.71277  | 0.915814 |
| Deferribacteres       | 0.183515 | 0.109113 | 0.15206  |
| Deinococcus-Thermus   | 0.681628 | 0.342388 | 0.525297 |
| Dictyoglomi           | 0.036703 | 0.04515  | 0.034559 |
| Elusimicrobia         | 0.597735 | 0.124163 | 0.214266 |
| Euryarchaeota         | 0.094379 | 0.04515  | 0.048383 |
| Fibrobacteres         | 0.104866 | 0.033863 | 0.079486 |
| Firmicutes            | 10.17722 | 8.853187 | 7.461294 |
| Fusobacteria          | 5.23     | 0.139213 | 0.093309 |
| Gemmatimonadetes      | 1.431418 | 0.301001 | 1.14736  |
| Ignavibacteriae       | 0.277894 | 0.097825 | 0.117501 |
| Nitrospirae           | 1.856124 | 0.481601 | 0.829417 |
| Planctomycetes        | 3.880034 | 1.659267 | 0.76721  |
| Proteobacteria        | 42.693   | 57.55136 | 55.99599 |
| Spirochaetes          | 0.996225 | 0.628339 | 0.642798 |
| Synergistetes         | 0.461409 | 0.158025 | 0.138236 |
| Tenericutes           | 2        | 0.331101 | 0.314487 |
| Thaumarchaeota        | 2.51     | 0        | 0.010368 |
| Thermodesulfobacteria | 0.262164 | 0.071488 | 0.127868 |
| Thermotogae           | 0.786493 | 0.237038 | 0.0653   |
| Verrucomicrobia       | 1.516    | 0.27     | 0.78     |

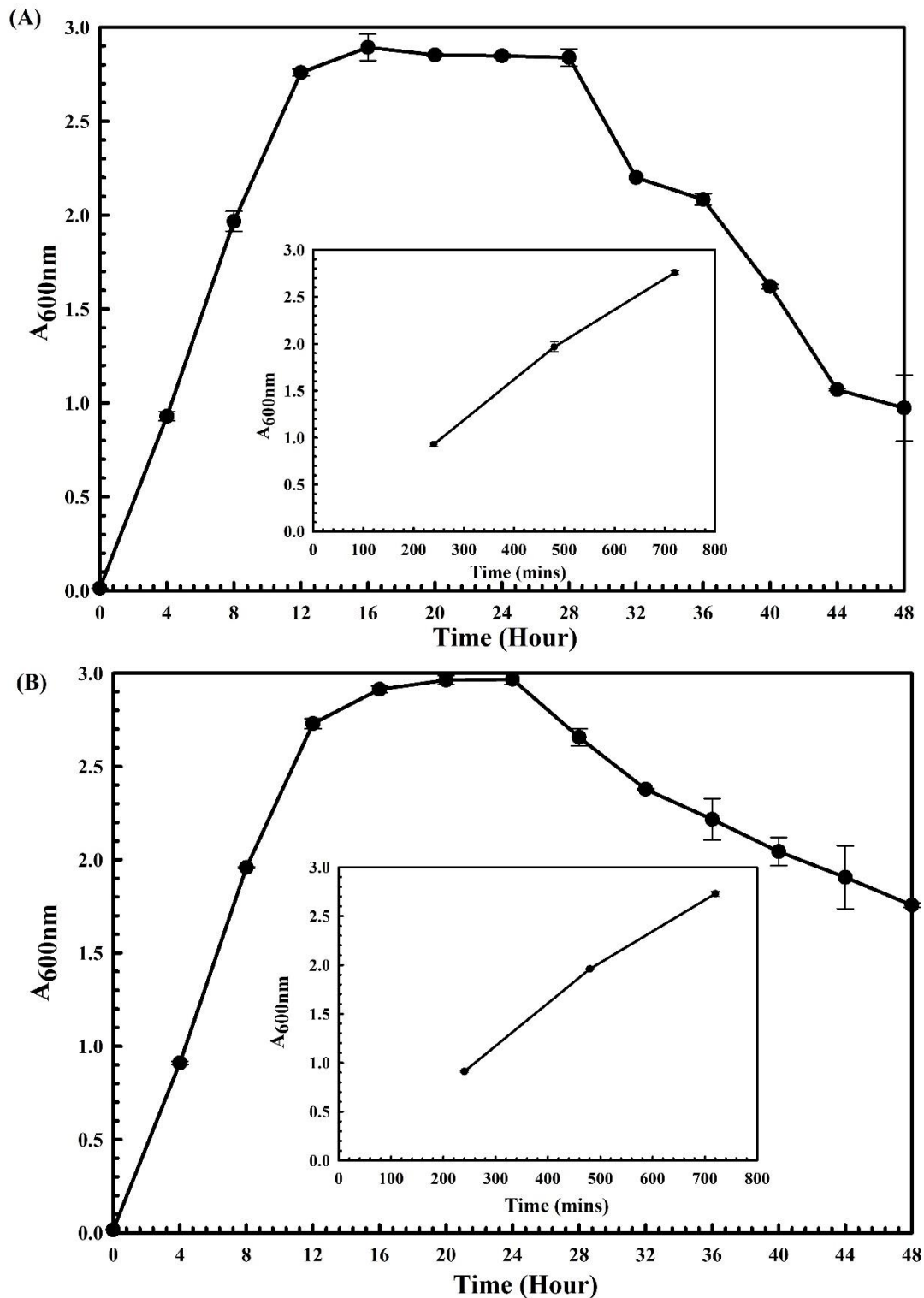
#### Feeks 10.5

|                 | Control  | PS1      | PS2      |
|-----------------|----------|----------|----------|
| Acidobacteria   | 1.673319 | 2.437223 | 2.263856 |
| Actinobacteria  | 5.802886 | 8.788774 | 7.272964 |
| Aquificae       | 0.583359 | 0.196947 | 0.520427 |
| Armatimonadetes | 0.49125  | 0.410307 | 0.4879   |
| Bacteroidetes   | 5.403746 | 10.43821 | 7.786885 |
| Caldiserica     | 0.092109 | 0.016412 | 0.039032 |
| Candidatus      |          |          |          |
| Cloacimonetes   | 0.015352 | 0.057443 | 0.058548 |
| Chlamydiae      | 0.230273 | 0.049237 | 0.169139 |
| Chlorobi        | 0.506601 | 0.205153 | 0.422847 |
| Chloroflexi     | 5.34234  | 5.0796   | 5.035129 |
| Chordata        | 0.445195 | 0.155917 | 0.227687 |
| Chrysiogenetes  | 0.076758 | 0.065649 | 0.058548 |
| Crenarchaeota   | 5.36     | 0.016412 | 0.065053 |

|                       |          |          |          |
|-----------------------|----------|----------|----------|
| Cyanobacteria         | 4.35984  | 2.420811 | 1.444184 |
| Deferribacteres       | 5.26     | 0.10668  | 0.279729 |
| Deinococcus-Thermus   | 1.197421 | 0.311833 | 1.014832 |
| Dictyoglomi           | 0.184219 | 0.041031 | 0.071559 |
| Elusimicrobia         | 0.629414 | 0.21336  | 0.637523 |
| Euryarchaeota         | 5.099    | 0.082061 | 0.084569 |
| Fibrobacteres         | 0.076758 | 0.049237 | 0.123601 |
| Firmicutes            | 7.706478 | 8.772362 | 8.26828  |
| Fusobacteria          | 0.260976 | 0.057443 | 0.227687 |
| Gemmatimonadetes      | 1.120663 | 0.82882  | 1.535259 |
| Ignavibacteriae       | 0.337734 | 0.155917 | 0.279729 |
| Nitrospirae           | 2.195272 | 1.329394 | 2.992454 |
| Planctomycetes        | 1.136015 | 1.04218  | 1.762946 |
| Proteobacteria        | 40       | 53.95536 | 53.35675 |
| Spirochaetes          | 0.337734 | 0.541605 | 0.565964 |
| Synergistetes         | 0.39914  | 0.180535 | 0.435857 |
| Tenericutes           | 1.128    | 0.61546  | 0.513921 |
| Thermodesulfobacteria | 0.138164 | 0.073855 | 0.065053 |
| Thermotogae           | 0.644765 | 0.328246 | 0.715587 |
| Verrucomicrobia       | 1.765428 | 0.97653  | 1.216498 |

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**Supplementary Figure SF1:** Growth pattern analysis of *Pantoea agglomerans* PS1 (A) and PS2 (B) after incubating the cultures for 48 hours in LB broth with constant shaking at 200 rpm. Experiments were carried out in triplicates and growth was observed by taking absorbance at 600nm after an interval of 4 hours. Plotted values are the mean of triplicates along with the observed standard deviation.



**Supplementary Figure SF2:** Total rhizospheric sugar at different wheat growth stages. Total sugar content estimated with the anthrone method at different feeks (1.0, 2.0, 3.0, 6.0, 9.0, 10.5) in the presence and the absence of microbial inoculants PS1( A) and PS2 (B), respectively. Reducing sugar content (estimated using DNS assay) at different feeks (1.0, 2.0, 3.0, 6.0, 9.0, 10.5) in the presence and the absence of microbial inoculants PS1 (C) and PS2 (D), respectively (B). Here control is specific to each feek for appropriate data presentation.. Experiments were carried out in triplicates and read at 620nm. Plotted values are the mean of triplicate readings along with their observed standard deviation.

