

## **Supplemental material**

**Figure S1.** Photograph of the experiment site, including 47 individual plots (each 2m × 2m).

**Figure S2.** The relationship between the biomass of *S. canadensis* and native plant species richness without 8-species treatment.

**Figure S3.** The relationship between biomass of *S. canadensis* and bacterial  $\alpha$  diversity. The overall trend across native species treatments **(a)**. Points and lines in different colors represent four native species richness levels **(b)**.

**Figure S4.** Beta-NTI values of the community assembly process of leaf bacteria.

**Figure S5.** Relative abundance of leaf bacteria taxa of the invader at the phylum level. The numbers above bars show the native plant species richness.

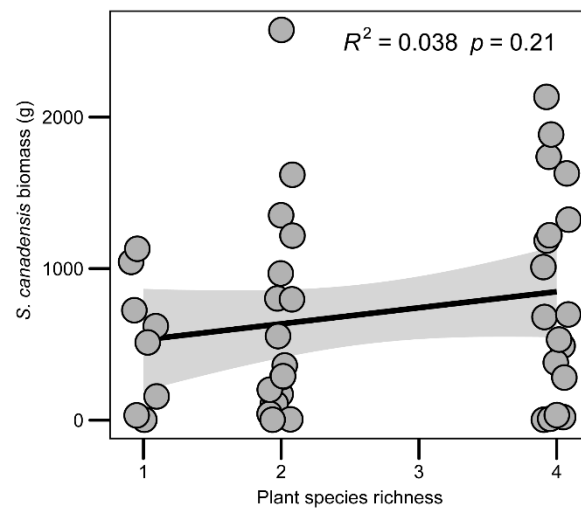
**Figure S6.** Relative abundance of the families of the top 40 ASVs.

**Table S1.** Information of the species pool used in this study. No. 1 is alien species.

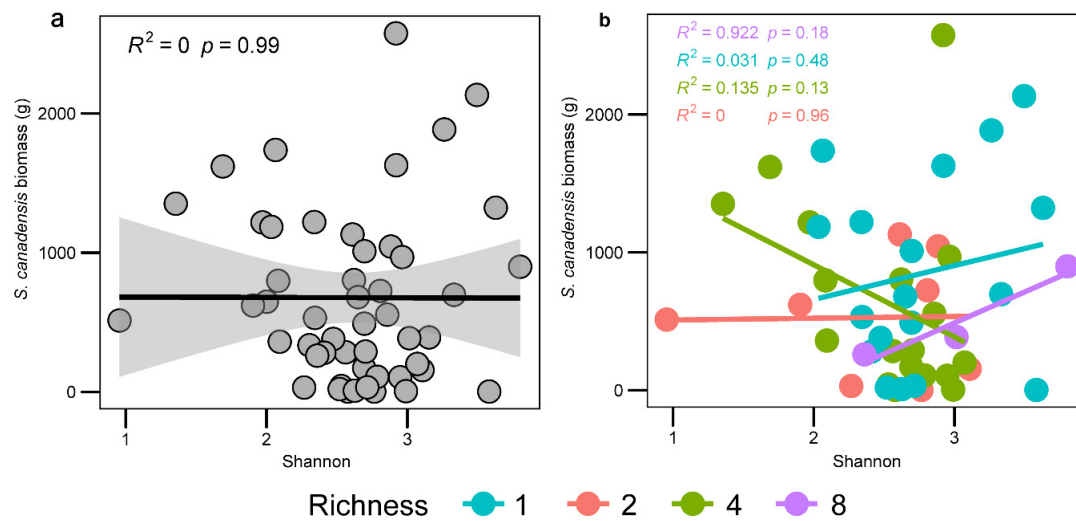
**Table S2.** Species composition of 47 plant communities. Abbreviation of species names are described as in Table S1. Numbers below the species shows the quantity of each species in a plot (community). Comm. is the abbreviation of community.



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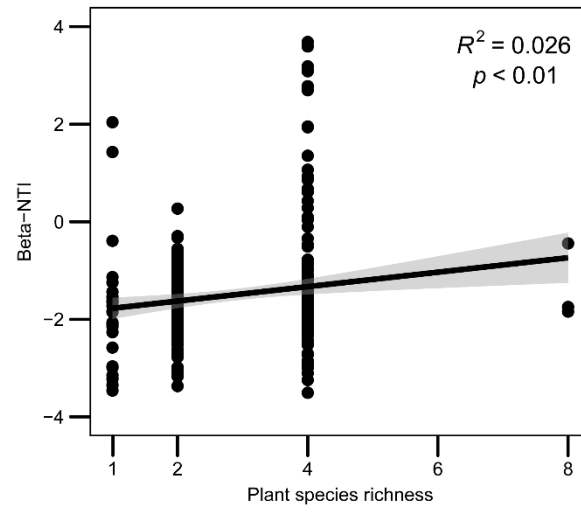


**Figure S2.** The relationship between the biomass of *S. canadensis* and native plant species richness without 8-species treatment.

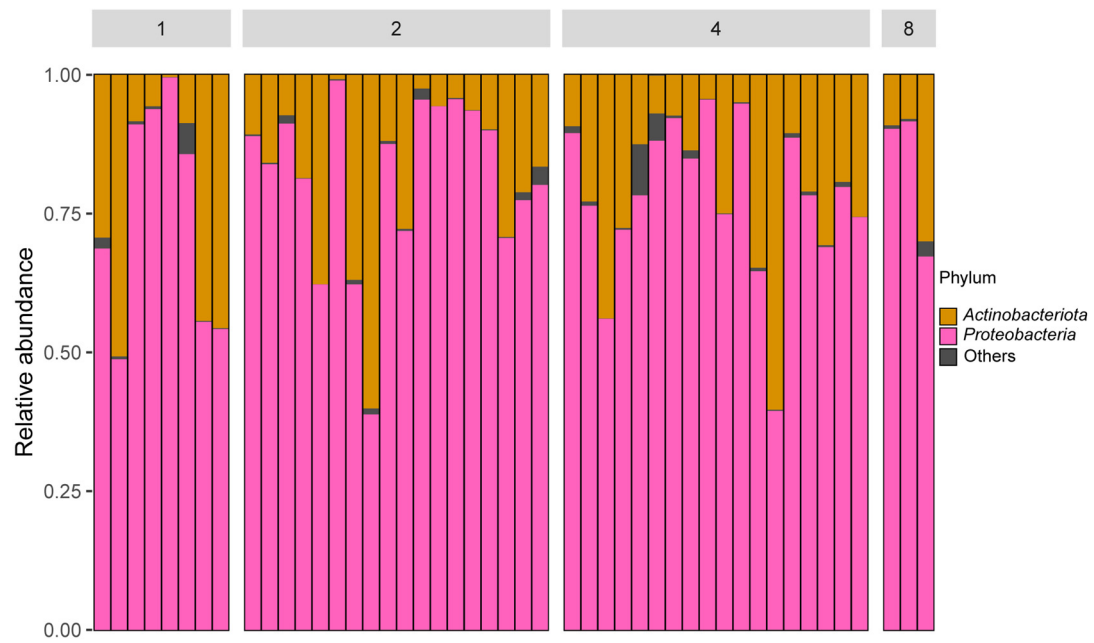


**Figure S3.** The relationship between biomass of *S. canadensis* and bacterial  $\alpha$  diversity.

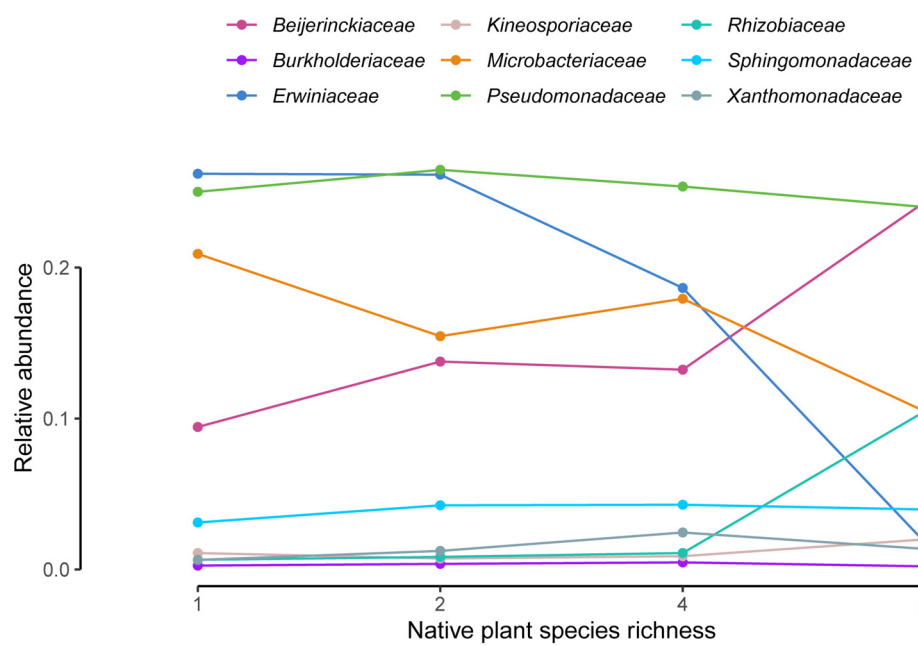
The overall trend across native species treatments (a). Points and lines in different colors represent four native species richness levels (b).



**Figure S4.** Beta-NTI values of the community assembly process of leaf bacteria.



**Figure S5.** Relative abundance of leaf bacteria taxa of the invader at the phylum level. The numbers above bars show the native plant species richness.



**Figure S6.** Relative abundance of the families of the top 40 most abundant ASVs.

**Table S1.** Information of the species pool used in this study. No. 1 is alien species.

| No. | Species   | Family                | Life form | Functional trait            | Abbreviation |
|-----|---|-----------------------|-----------|-----------------------------|--------------|
| 1   | <i>Solidago canadensis</i> L.                     | <i>Asteraceae</i>     | Perennial | /                           | Sc           |
| 2   | <i>Arctium lappa</i> L.                           | <i>Asteraceae</i>     | Biennial  | Tall; early growing season  | Al           |
| 3   | <i>Patrinia scabiosifolia</i> Fisch. ex Trev.     | <i>Caprifoliaceae</i> | Perennial | Tall; early growing season  | Ps           |
| 4   | <i>Achyranthes bidentate</i> Blume                | <i>Amaranthaceae</i>  | Perennial | Tall; late growing season   | Ab           |
| 5   | <i>Reynoutria japonica</i> Houtt.                 | <i>Polygonaceae</i>   | Perennial | Tall; late growing season   | Fj           |
| 6   | <i>Taraxacum officinale</i> F. H. Wigg.           | <i>Asteraceae</i>     | Perennial | Short; early growing season | To           |
| 7   | <i>Plantago asiatica</i> L.                       | <i>Plantaginaceae</i> | Perennial | Short; early growing season | Pa           |
| 8   | <i>Platycodon grandifloras</i> A. DC.             | <i>Campanulaceae</i>  | Perennial | Short; late growing season  | Pg           |
| 9   | <i>Antenoron filiforme</i> (Thunb.) Rob. et Vaut. | <i>Polygonaceae</i>   | Perennial | Short; late growing season  | Af           |



**Table S2.** Species composition of 47 plant communities. Abbreviation of species names are described as in Table S1. Numbers below the species shows the quantity of each species in a plot (community). Comm. is the abbreviation of community.

| Comm. No. | Species richness | Invader | Native species |    |    |    |    |    |    |    |
|-----------|------------------|---------|----------------|----|----|----|----|----|----|----|
|           |                  | Sc      | Al             | Ps | Ab | Fj | To | Pa | Pg | Af |
| 1         | 1                | 12      | 32             |    |    |    |    |    |    |    |
| 2         | 1                | 12      |                | 32 |    |    |    |    |    |    |
| 3         | 1                | 12      |                |    | 32 |    |    |    |    |    |
| 4         | 1                | 12      |                |    |    | 32 |    |    |    |    |
| 5         | 1                | 12      |                |    |    |    | 32 |    |    |    |
| 6         | 1                | 12      |                |    |    |    |    | 32 |    |    |
| 7         | 1                | 12      |                |    |    |    |    |    | 32 |    |
| 8         | 1                | 12      |                |    |    |    |    |    |    | 32 |
| 9         | 2                | 12      | 16             |    | 16 |    |    |    |    |    |
| 10        | 2                | 12      | 16             |    | 16 |    |    |    |    |    |
| 11        | 2                | 12      | 16             |    | 16 |    |    |    |    |    |
| 12        | 2                | 12      | 16             |    |    |    | 16 |    |    |    |
| 13        | 2                | 12      | 16             |    |    |    | 16 |    |    |    |
| 14        | 2                | 12      | 16             |    |    |    | 16 |    |    |    |
| 15        | 2                | 12      |                | 16 |    |    |    |    | 16 |    |
| 16        | 2                | 12      |                | 16 |    |    |    |    | 16 |    |
| 17        | 2                | 12      |                | 16 |    |    |    |    | 16 |    |
| 18        | 2                | 12      |                |    | 16 |    | 16 |    |    |    |
| 19        | 2                | 12      |                |    | 16 |    | 16 |    |    |    |
| 20        | 2                | 12      |                |    | 16 |    | 16 |    |    |    |
| 21        | 2                | 12      |                |    |    | 16 |    |    | 16 |    |
| 22        | 2                | 12      |                |    |    | 16 |    |    | 16 |    |
| 23        | 2                | 12      |                |    |    | 16 |    |    | 16 |    |
| 24        | 2                | 12      |                |    |    |    | 16 |    |    | 16 |

|    |   |    |   |   |   |   |    |   |   |    |
|----|---|----|---|---|---|---|----|---|---|----|
| 25 | 2 | 12 |   |   |   |   | 16 |   |   | 16 |
| 26 | 2 | 12 |   |   |   |   | 16 |   |   | 16 |
| 27 | 4 | 12 | 8 | 8 | 8 | 8 |    |   |   |    |
| 28 | 4 | 12 | 8 | 8 | 8 | 8 |    |   |   |    |
| 29 | 4 | 12 | 8 | 8 | 8 | 8 |    |   |   |    |
| 30 | 4 | 12 | 8 | 8 |   |   | 8  | 8 |   |    |
| 31 | 4 | 12 | 8 | 8 |   |   | 8  | 8 |   |    |
| 32 | 4 | 12 | 8 | 8 |   |   | 8  | 8 |   |    |
| 33 | 4 | 12 | 8 | 8 |   |   |    |   | 8 | 8  |
| 34 | 4 | 12 | 8 | 8 |   |   |    |   | 8 | 8  |
| 35 | 4 | 12 | 8 | 8 |   |   |    |   | 8 | 8  |
| 36 | 4 | 12 |   |   | 8 | 8 | 8  | 8 |   |    |
| 37 | 4 | 12 |   |   | 8 | 8 | 8  | 8 |   |    |
| 38 | 4 | 12 |   |   | 8 | 8 | 8  | 8 |   |    |
| 39 | 4 | 12 |   |   | 8 | 8 |    |   | 8 | 8  |
| 40 | 4 | 12 |   |   | 8 | 8 |    |   | 8 | 8  |
| 41 | 4 | 12 |   |   | 8 | 8 |    |   | 8 | 8  |
| 42 | 4 | 12 |   |   |   |   | 8  | 8 | 8 | 8  |
| 43 | 4 | 12 |   |   |   |   | 8  | 8 | 8 | 8  |
| 44 | 4 | 12 |   |   |   |   | 8  | 8 | 8 | 8  |
| 45 | 8 | 12 | 4 | 4 | 4 | 4 | 4  | 4 | 4 | 4  |
| 46 | 8 | 12 | 4 | 4 | 4 | 4 | 4  | 4 | 4 | 4  |
| 47 | 8 | 12 | 4 | 4 | 4 | 4 | 4  | 4 | 4 | 4  |