Supplemental Table S1. Composition and methylation analyses of tissues obtained from transgenic poplars (Trg) overexpressing xyloglucanase (AaXEG2).

| Component | Wild type | | | Trg (AaXEG2) | | |
|---|---|---|---|---|---|---|
| | Bark | Xylem | Leaf | Bark | Xylem | Leaf |
| | mg / 100 mg dry weight | | | | | |
| Cellulose | 45.9 | 42.5 | 30.5 | 47.0 | 45.0 | 33.9 |
| Lignin | 12.4 | 19.0 | 13.1 | 12.0 | 18.6 | 13.8 |
| Neutral polysaccharides | 33.2 | 37.1 | 38.2 | 32.1 | 34.3 | 36.0 |
| Fucosyl terminal | 0.7 | 0.4 | 1.4 | 0.4 | 0.4 | 0.5 |
| Arabinosyl terminal | 1.8 | 0.7 | 3.3 | 1.8 | 0.9 | 3.6 |
| 5-linked | 2.7 | 1.8 | 4.2 | 2.9 | 2.0 | 4.4 |
| Xylosyl terminal | 3.4 | 4.1 | 3.7 | 2.0 | 2.8 | 3.2 |
| 4-linked | 13.8 | 20.1 | 12.1 | 14.3 | 20.3 | 15.0 |
| Glucosyl 4-linked | 1.2 | 1.4 | 2.1 | 1.3 | 0.8 | 1.3 |
| 4,6-linked | 2.1 | 1.1 | 3.2 | 0.1 | ND | 0.1 |
| Galactosyl terminal | 1.0 | 1.6 | 2.2 | 1.4 | 1.2 | 2.2 |
| 2-linked | 2.3 | 1.1 | 1.2 | 2.4 | 1.1 | 1.8 |
| 4-linked | 2.0 | 1.2 | 2.0 | 2.5 | 1.4 | 2.2 |
| 3,6-linked | 0.6 | 1.4 | 1.0 | 1.0 | 1.1 | 1.2 |
| Mannosyl 4-linked | 1.6 | 2.2 | 1.8 | 2.0 | 2.3 | 2.4 |

Each data point represents the mean of three different experiments, with individual values varying from the mean by < 5.5%.

Supplemental Table S2. Radiocesium distributions in poplar seedlings

The surfaces of the main (stump) stems were treated with 1 μl of 0.1 μM [$^{137}$Cs]CsCl (2.5 MBq/mmol) in 20 mM MES/NaOH (pH 6.2) buffer approximately 2 cm above the soil, and then the seedlings were cultured for five weeks.

| Tissue | Natural Stem | | Perforated Stem | |
|---|---|---|---|---|
| | Radiocesium | Distribution | Radiocesium | Distribution |
| | x $10^3$ cpm | % | x $10^3$ cpm | % |
| Leaves | 21.45 ± 2.42 | 34.6 ± 3.9 | 16.20 ± 2.62 | 32.1 ± 5.2 |
| Stems | | | | |
| Apical | 2.91 ± 0.31 | 4.7 ± 0.5 | 2.27 ± 0.30 | 4.5 ± 0.6 |
| Bark (cortex) | 7.81 ± 0.87 | 12.6 ± 1.4 | 6.77 ± 0.76 | 13.4 ± 1.5 |
| Vascular cambium | 17.17 ± 2.17 | 27.7 ± 3.5 | 12.39 ± 1.92 | 24.5 ± 3.8 |
| Shoot xylem | 2.98 ± 0.68 | 4.8 ± 1.1 | 2.78 ± 0.91 | 5.5 ± 1.8 |
| Basal xylem | 1.86 ± 0.25 | 3.0 ± 0.4 | 2.52 ± 0.55 | 5.0 ± 1.1 |
| Roots | 7.87 ± 1.18 | 12.7 ± 1.9 | 6.57 ± 0.56 | 13.0 ± 1.1 |

A very small amount of radiocesium (less than 0.05%) was secreted from the roots into the soil.

Each data point represents the mean of three independent seedlings for each line.

Supplemental Table S3. Radiocesium distributions in poplar seedlings after exposed to low temperature along with a limited duration of light.

The surfaces of the main (stump) stems were treated with 1 μl of 0.1 μM [$^{137}$Cs]CsCl (2.5 MBq/mmol) in 20 mM MES/NaOH (pH 6.2) buffer approximately 2 cm above the soil, and then the seedlings were cultured for one week. The seedlings were further cultured at low temperatures less than 8°C along with a limited duration of light (eight h per day) for another one month.

| Tissue | Natural Stem | | Perforated Stem | |
|---|---|---|---|---|
| | Radiocesium | Distribution | Radiocesium | Distribution |
| | x $10^3$ cpm | % | x $10^3$ cpm | % |
| Leaves | 25.55 ± 3.53 | 50.1 ± 6.9 | 26.35 ± 2.92 | 47.9 ± 5.3 |
| Stems | | | | |
| Apical | 0.56 ± 0.26 | 1.1 ± 0.5 | 0.55 ± 0.11 | 1.0 ± 0.2 |
| Bark (cortex) | 7.45 ± 0.71 | 14.6 ± 1.4 | 8.69 ± 1.38 | 15.8 ± 2.5 |
| Vascular cambium | 2.40 ± 1.79 | 4.7 ± 3.5 | 1.87 ± 0.44 | 3.4 ± 0.8 |
| Shoot xylem | 2.45 ± 0.20 | 4.8 ± 0.3 | 1.15 ± 0.55 | 2.1 ± 1.0 |
| Basal xylem | 3.06 ± 0.26 | 6.0 ± 0.5 | 7.15 ± 1.16 | 13.0 ± 2.1 |
| Roots | 9.54 ± 1.20 | 18.7 ± 2.4 | 9.24 ± 1.65 | 16.8 ± 3.0 |

A very small amount of radiocesium (less than 0.05%) was secreted from the roots into the soil.

Each data point represents the mean of three independent seedlings for each line.

Supplemental Table S4. Radiocesium distributions in poplar seedlings after potassium fertilization.

The surfaces of the main (stump) stems were treated with 1 μl of 0.1 μM [$^{137}$Cs]CsCl (2.5 MBq/mmol) in 20 mM MES/NaOH (pH 6.2) buffer approximately 2 cm above the soil, and then the seedlings were cultured for one week. The seedlings were then further watered with 20 mM KCl solution for one month.

| Tissue | Natural Stem | | Perforated Stem | |
|---|---|---|---|---|
| | Radiocesium | Distribution | Radiocesium | Distribution |
| | x $10^3$ cpm | % | x $10^3$ cpm | % |
| Leaves | 33.12 ± 3.59 | 58.1 ± 6.3 | 29.26 ± 3.66 | 49.6 ± 6.2 |
| Stems | | | | |
| Apical | 1.03 ± 0.11 | 1.8 ± 0.2 | 0.53 ± 0.16 | 0.9 ± 0.3 |
| Bark (cortex) | 8.84 ± 1.25 | 15.5 ± 2.2 | 9.44 ± 1.18 | 16.0 ± 2.0 |
| Vascular cambium | 6.61 ± 1.68 | 11.6 ± 2.9 | 3.55 ± 1.77 | 6.0 ± 3.0 |
| Shoot xylem | 1.71 ± 0.43 | 3.0 ± 4.1 | 1.77 ± 0.79 | 3.0 ± 1.3 |
| Basal xylem | 1.71 ± 0.59 | 3.0 ± 1.0 | 9.66 ± 3.54 | 16.4 ± 6.0 |
| Roots | 3.99 ± 1.57 | 7.0 ± 2.8 | 4.78 ± 0.59 | 8.1 ± 1.0 |

A very small amount of radiocesium (less than 0.05%) was secreted from the roots into the soil.

Each data point represents the mean of three independent seedlings for each line.

Supplemental Table S5. Radiocesium distributions in poplar seedlings on new leaf formation after potassium fertilization and removal of foliage.

The surfaces of the main (stump) stems were treated with 1 μl of 0.1 μM [$^{137}$Cs]CsCl (2.5 MBq/mmol) in 20 mM MES/NaOH (pH 6.2) buffer approximately 2 cm above the soil, and then the seedlings were cultured for one week. The seedlings were then further watered with 20 mM KCl solution for one month. The $^{137}$Cs-permeated seedlings were defoliated and further cultured for additional one month.

| Tissue | Natural stem | | Perforated stem | |
|---|---|---|---|---|
| | Radiocesium | Distribution | Radiocesium | Distribution |
| | x $10^3$ cpm | % | x $10^3$ cpm | % |
| New leaves | 13.55 ± 3.28 | 36.6 ± 8.8 | 7.56 ± 2.81 | 25.1 ± 9.8 |
| Stems | | | | |
| Apical | 2.11 ± 1.21 | 5.7 ± 3.3 | 1.23 ± 0.43 | 4.1 ± 1.5 |
| Bark (cortex) | 4.66 ± 2.60 | 12.6 ± 7.0 | 2.82 ± 1.60 | 9.4 ± 5.6 |
| Vascular cambium | 7.00 ± 5.40 | 18.9 ± 14.6 | 3.84 ± 1.49 | 13.3 ± 5.2 |
| Shoot xylem | 2.15 ± 2.70 | 5.8 ± 7.3 | 1.93 ± 0.67 | 6.4 ± 2.3 |
| Basal xylem | 2.85 ± 1.21 | 7.7 ± 3.3 | 9.70 ± 2.21 | 33.7 ± 7.7 |
| Roots | 4.70 ± 1.81 | 12.7 ± 4.9 | 3.01 ± 1.81 | 10.0 ± 6.3 |

Each data point represents the mean of three independent seedlings for each line.

Supplemental Table S6. Radiocesium distributions in poplar seedlings on new leaf formation after defoliation.

The surfaces of the main (stump) stems were treated with 1 μl of 0.1 μM [$^{137}$Cs]CsCl (2.5 MBq/mmol) in 20 mM MES/NaOH (pH 6.2) buffer approximately 2 cm above the soil, and then the seedlings were cultured for one week. The $^{137}$Cs-permeated seedlings were defoliated and further cultured for additional one month.

| Tissue | Natural Stem | | Perforated Stem | |
|---|---|---|---|---|
| | Radiocesium | Distribution | Radiocesium | Distribution |
| | x $10^3$ cpm | % | x $10^3$ cpm | % |
| Leaves | 25.65 ± 3.00 | 53.2 ± 6.2 | 13.55 ± 1.26 | 36.6 ± 3.0 |
| Stems | | | | |
| Apical | 1.00 ± 0.21 | 2.1 ± 0.4 | 2.11 ± 0.21 | 5.7 ± 0.5 |
| Bark (cortex) | 6.55 ± 1.05 | 13.6 ± 2.2 | 4.66 ± 0.59 | 12.6 ± 1.4 |
| Vascular cambium | 6.05 ± 1.40 | 12.5 ± 2.9 | 7.00 ± 1.47 | 18.9 ± 3.5 |
| Shoot xylem | 1.70 ± 0.41 | 3.5 ± 0.8 | 2.15 ± 0.17 | 5.8 ± 0.4 |
| Basal xylem | 2.05 ± 0.59 | 4.3 ± 1.2 | 2.85 ± 0,21 | 7.7 ± 0.5 |
| Roots | 5.22 ± 1.37 | 10.8 ± 2.8 | 4.70 ± 0.80 | 12.7 ± 1.9 |

A very small amount of radiocesium (less than 0.05%) was secreted from the roots into the soil.

Each data point represents the mean of three independent seedlings for each line.