Supplementary Material

**Table S1.** MS parameters for MRM analysis of seven substances.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Analyte** | | **Sheath gas temperature (°C)** | **Capillary voltage (v)** | **Operate mode** | **Precursor ion** | **Fragmentor energy (v)** | **Fragment ion** | **Collision energy (v)** | **Retention time (min)** |
| Mesotrione | 350 | 3500 | Negative | 338.1 | 70 | 212.0  290.8\* | 36  4 | 1.6 |
| Nicosulfuron | 200 | 3500 | Positive | 411.0 | 63 | 182.1\*  213.1 | 20  15 | 2.9 |
| Atrazine | 216.0 | 115 | 132.0  174.0\* | 27  19 | 3.6 |
| 6-deisopropyl atrazine (DIA) | 174.0 | 79 | 68.1\*  104.0 | 35  25 | 2.1 |
| Deethylatrazine (DEA) | 188.0 | 99 | 79.0  146.0\* | 30  18 | 2.5 |
| 2-hydroxyatrazine (HA) | 198.1 | 94 | 114.0  156.1\* | 25  18 | 1.8 |
| Atrazine-desethyl-desisopropyl (DACT) | 200 | 4000 | Positive | 146.0 | 89 | 68.1\*  103.9 | 27  20 | 1.4 |

\* Represents the quantification fragment ion.

**Table S2.** Recovery (%) for mesotrione, nicosulfuron, atrazine and its four metabolites in four matrices in the samples of quality control.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Analyte** | **Matrix** | **Spiked Levels (mg/kg)** | **Recovery 1 (%)** | **Recovery 2 (%)** | **Average Recovery (%)** |
| Mesotrione | Fully-grown maize | 0.01 | 93 | 100 | 96 |
| 0.05 | 98 | 100 | 99 |
| Straw | 0.01 | 91 | 107 | 99 |
| 0.05 | 94 | 91 | 92 |
| Green maize | 0.01 | 93 | 85 | 89 |
| 0.05 | 94 | 92 | 93 |
| Green straw | 0.01 | 110 | 116 | 113 |
| 0.05 | 94 | 93 | 94 |
| Nicosulfuron | Fully-grown maize | 0.005 | 99 | 102 | 100 |
| 0.1 | 99 | 103 | 101 |
| Straw | 0.005 | 97 | 99 | 98 |
| 0.1 | 96 | 98 | 97 |
| Green maize | 0.005 | 93 | 95 | 94 |
| 0.1 | 96 | 96 | 96 |
| Green straw | 0.005 | 96 | 97 | 96 |
| 0.1 | 99 | 98 | 98 |
| Atrazine | Fully-grown maize | 0.005 | 103 | 98 | 100 |
| 0.05 | 105 | 103 | 104 |
| Straw | 0.005 | 100 | 72 | 86 |
| 0.05 | 94 | 96 | 95 |
| Green maize | 0.005 | 94 | 91 | 92 |
| 0.05 | 99 | 99 | 99 |
| Green straw | 0.005 | 95 | 96 | 96 |
| 0.05 | 97 | 96 | 96 |
| 6-deisopropyl atrazine (DIA) | Fully-grown maize | 0.005 | 108 | 108 | 108 |
| 0.05 | 99 | 100 | 100 |
| Straw | 0.005 | 90 | 95 | 92 |
| 0.05 | 91 | 95 | 93 |
| Green maize | 0.005 | 85 | 93 | 89 |
| 0.05 | 100 | 95 | 98 |
| Green straw | 0.005 | 87 | 93 | 90 |
| 0.05 | 95 | 100 | 98 |
| Deethylatrazine (DEA) | Fully-grown maize | 0.005 | 100 | 104 | 102 |
| 0.05 | 96 | 97 | 96 |
| Straw | 0.005 | 93 | 99 | 96 |
| 0.05 | 89 | 92 | 90 |
| Green maize | 0.005 | 96 | 96 | 96 |
| 0.05 | 95 | 95 | 95 |
| Green straw | 0.005 | 90 | 88 | 89 |
| 0.05 | 94 | 95 | 94 |
| 2-hydroxyatrazine (HA) | Fully-grown maize | 0.005 | 99 | 105 | 102 |
| 0.05 | 105 | 106 | 106 |
| Straw | 0.005 | 97 | 97 | 97 |
| 0.05 | 96 | 99 | 98 |
| Green maize | 0.005 | 90 | 92 | 91 |
| 0.05 | 103 | 103 | 103 |
| Green straw | 0.005 | 101 | 98 | 100 |
| 0.05 | 100 | 100 | 100 |
| Atrazine-desethyl-desisopropyl (DACT) | Fully-grown maize | 0.01 | 83 | 79 | 81 |
| 0.05 | 102 | 102 | 102 |
| Straw | 0.01 | 91 | 81 | 86 |
| 0.05 | 94 | 98 | 96 |
| Green maize | 0.01 | 92 | 93 | 92 |
| 0.05 | 97 | 105 | 101 |
| Green straw | 0.01 | 79 | 84 | 82 |
| 0.05 | 94 | 94 | 94 |

**Table S3.** Comparisons of matrix-matched and solvent calibration of seven substances.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Analyte** | **Linear Range (mg/L)** | **Matrix** | **Regression Equation** | **R2** | **ME (%)** | **LOQ (mg/kg)** |
| Mesotrione | 0.0005 – 0.02 | Solvent | y = 499790.616003x-36.625243 | 0.9975 | – | – |
| Fully-grown maize | y = 429391.438683x+15.281231 | 0.9998 | -14.1 | 0.01 |
| Straw | y = 284085.483985x+0.611254 | 0.9996 | -43.2 | 0.01 |
| Green maize | y = 603069.610723x+19.583920 | 0.9997 | 20.7 | 0.01 |
| Green straw | y = 216322.839640x+10.748036 | 0.9995 | -56.7 | 0.01 |
| Nicosulfuron | 0.00025 – 0.05 | Solvent | y = 308948.156384x+11.042616 | 0.9996 | – | – |
| Fully-grown maize | y = 477225.572528x-3.127096 | 0.9972 | 54.5 | 0.005 |
| Straw | y = 372244.298440x-0.423375 | 0.9987 | 20.5 | 0.005 |
| Green maize | y = 363755.312228x+14.177794 | 0.9993 | 17.7 | 0.005 |
| Green straw | y = 335246.686599x-2.101536 | 0.9994 | 8.5 | 0.005 |
| Atrazine | Solvent | y = 2744925.028036x+30.555633 | 0.9998 | – | – |
| Fully-grown maize | y = 2321027.863145x+3.224423 | 0.9980 | -15.4 | 0.005 |
| Straw | y = 2244993.489774x-69.565450 | 0.9982 | -18.2 | 0.005 |
| Green maize | y = 1926821.182093x-10.527045 | 0.9999 | -29.8 | 0.005 |
| Green straw | y = 2437464.357990x-18.382914 | 0.9998 | -11.2 | 0.005 |
| 6-deisopropyl atrazine (DIA) | Solvent | y = 360991.949670x+0.490053 | 0.9998 | – | – |
| Fully-grown maize | y = 363376.999814x-6.358123 | 0.9996 | 0.7 | 0.005 |
| Straw | y = 292809.096596x-1.507783 | 0.9993 | -18.9 | 0.005 |
| Green maize | y = 364893.444232x+1.033060 | 0.9995 | 1.1 | 0.005 |
| Green straw | y = 322359.209297x+1.502475 | 0.9996 | -10.7 | 0.005 |
| Deethylatrazine (DEA) | Solvent | y = 1300846.808220x+38.683109 | 0.9999 | – | – |
| Fully-grown maize | y = 1124206.066010x-29.201665 | 0.9994 | -13.6 | 0.005 |
| Straw | y = 1088909.933551x+20.478049 | 0.9990 | -16.3 | 0.005 |
| Green maize | y = 1221140.042165x+24.054247 | 0.9997 | -6.1 | 0.005 |
| Green straw | y = 1109213.705238x-9.275320 | 0.9997 | -14.7 | 0.005 |
| 2-hydroxyatrazine (HA) | Solvent | y=1979916.925422x+101.617362 | 0.9998 | – | – |
| Fully-grown maize | y=1811584.681108x+54.613962 | 0.9974 | -8.5 | 0.005 |
| Straw | y=1654899.129462x+92.410065 | 0.9995 | -16.4 | 0.005 |
| Green maize | y=1856250.382418x+132.729364 | 0.9997 | -6.2 | 0.005 |
| Green straw | y=1722773.589900x+95.417918 | 0.9997 | -13.0 | 0.005 |
| Atrazine-desethyl-desisopropyl (DACT) | 0.0005 – 0.05 | Solvent | y = 1188525.985310x+34.261175 | 0.9997 | – | – |
| Fully-grown maize | y = 430137.283205x+62.16624 | 0.9987 | -63.8 | 0.01 |
| Straw | y = 568559.836557x+2.434501 | 0.9992 | -52.2 | 0.01 |
| Green maize | y = 345486.250213x+51.127038 | 0.9969 | -70.9 | 0.01 |
| Green straw | y = 735451.335729x+25.964694 | 0.9997 | -38.1 | 0.01 |

**Table S4.** Recovery (%) and RSD (%) for mesotrione, nicosulfuron, atrazine and its four metabolites from four matrices at three spiked levels (n=5).

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Herbicide** | **Matrix** | **Spiked level**  **0.005 mg/kg** | | **Spiked level**  **0.01 mg/kg** | | **Spiked level**  **0.05 mg/kg** | | **Spiked level**  **0.1 mg/kg** | | **Spiked level**  **0.2 mg/kg** | |
| **Recovery** | **RSD** | **Recovery** | **RSD** | **Recovery** | **RSD** | **Recovery** | **RSD** | **Recovery** | **RSD** |
| Mesotrione | Fully-grown maize | – | – | 88% | 1.8% | 95% | 1.9% | 96% | 1.0% | – | – |
| Straw | – | – | 85% | 3.8% | 87% | 0.5% | 89% | 0.6% | – | – |
| Green maize | – | – | 86% | 1.9% | 92% | 1.4% | 91% | 0.3% | – | – |
| Green straw | – | – | 87% | 3.5% | 90% | 1.4% | 92% | 1.4% | – | – |
| Nicosulfuron | Fully-grown maize | 89% | 5.8% | – | – | – | – | 93% | 2.2% | 90% | 1.9% |
| Straw | 79% | 10.4% | – | – | – | – | 79% | 5.1% | 79% | 10.6% |
| Green maize | 84% | 6.4% | – | – | – | – | 83% | 2.5% | 90% | 7.2% |
| Green straw | 84% | 6.6% | – | – | – | – | 86% | 3.3% | 83% | 3.0% |
| Atrazine | Fully-grown maize | 93% | 5.8% | – | – | 100% | 2.2% | – | – | 98% | 3.1% |
| Straw | 79% | 13.1% | – | – | 97% | 5.0% | – | – | 80% | 12.5% |
| Green maize | 85% | 6.0% | – | – | 89% | 6.1% | – | – | 86% | 9.5% |
| Green straw | 91% | 4.7% | – | – | 92% | 1.7% | – | – | 86% | 2.6% |
| 6-deisopropyl atrazine (DIA) | Fully-grown maize | 92% | 7.6% | – | – | 98% | 3.4% | – | – | 94% | 1.4% |
| Straw | 84% | 15.4% | – | – | 98% | 3.1% | – | – | 86% | 7.9% |
| Green maize | 82% | 4.3% | – | – | 92% | 1.4% | – | – | 89% | 6.7% |
| Green straw | 84% | 4.3% | – | – | 95% | 1.0% | – | – | 88% | 2.2% |
| Deethylatrazine (DEA) | Fully-grown maize | 96% | 6.4% | – | – | 97% | 2.6% | – | – | 92% | 1.7% |
| Straw | 90% | 11.4% | – | – | 92% | 3.3% | – | – | 82% | 9.2% |
| Green maize | 78% | 6.6% | – | – | 89% | 2.2% | – | – | 87% | 6.0% |
| Green straw | 96% | 7.1% | – | – | 89% | 2.6% | – | – | 84% | 3.2% |
| 2-hydroxyatrazine (HA) | Fully-grown maize | 96% | 2.0% | – | – | 101% | 1.4% | – | – | 97% | 1.1% |
| Straw | 89% | 2.6% | – | – | 98% | 1.5% | – | – | 95% | 3.5% |
| Green maize | 88% | 3.9% | – | – | 93% | 1.1% | – | – | 91% | 6.8% |
| Green straw | 91% | 3.5% | – | – | 95% | 2.4% | – | – | 89% | 0.6% |
| Atrazine-desethyl-desisopropyl (DACT) | Fully-grown maize | – | – | 84% | 6.7% | 99% | 2.7% | – | – | 91% | 2.5% |
| Straw | – | – | 87% | 2.0% | 96% | 1.1% | – | – | 90% | 0.8% |
| Green maize | – | – | 101% | 13.4% | 84% | 4.8% | – | – | 87% | 0.7% |
| Green straw | – | – | 90% | 2.0% | 100% | 0.7% | – | – | 97% | 2.4% |

**Table S5.** Terminal residues of mesotrione, nicosulfuron, atrazine and its four metabolites in four matrices.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Matrix** | **Location** | **Mesotrione (mg/kg)** | **Nicosulfuron (mg/kg)** | **Atrazine (mg/kg)** | **6-deisopropyl atrazine (DIA) (mg/kg)** | **Deethylatrazine (DEA) (mg/kg)** | **2-hydroxyatrazine (HA) (mg/kg)** | **Atrazine-desethyl-desisopropyl (DACT) (mg/kg)** |
| Fully-grown maize | Zhejiang | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hunan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guangxi | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Beijing | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Liaoning | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Gansu | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Henan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Inner Mongolia | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Jilin | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Shandong | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guizhou | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hainan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Straw | Zhejiang | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hunan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guangxi | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Beijing | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Liaoning | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Gansu | <0.01a | 0.010 ± 0.001 | 0.140 ± 0.001 | 0.009 ± 0.001 | 0.005 ± 0.001 | 0.029 ± 0.002 | 0.027 ± 0.001 |
| Henan | <0.01a | <0.005b | 0.048 ± 0.012 | <0.005b | <0.005b | 0.025 ± 0.003 | <0.01a |
| Inner Mongolia | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Jilin | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Shandong | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guizhou | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hainan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Green maize | Zhejiang | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hunan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guangxi | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Beijing | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Liaoning | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Gansu | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Henan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Inner Mongolia | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Jilin | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Shandong | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guizhou | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hainan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Green straw | Zhejiang | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hunan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guangxi | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Beijing | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Liaoning | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Gansu | <0.01a | 0.007 ± 0.001 | 0.090 ± 0.028 | 0.006 ± 0.001 | <0.005b | 0.063 ± 0.012 | 0.024 ± 0.001 |
| Henan | <0.01a | <0.005b | 0.020 ± 0.007 | <0.005b | <0.005b | 0.011 ± 0.011 | <0.01a |
| Inner Mongolia | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Jilin | <0.01a | <0.005b | 0.011 ± 0.002 | <0.005b | <0.005b | <0.005b | <0.01a |
| Shandong | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Guizhou | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |
| Hainan | <0.01a | <0.005b | <0.005b | <0.005b | <0.005b | <0.005b | <0.01a |

a: <0.01 indicates the residue of mesotrione was below the LOQ value (0.01 mg/kg); b: <0.005 indicates the residue of nicosulfuron, atrazine, DIA, DEA or HA was below the LOQ (0.005 mg/kg).

**Table S6.** The chronic dietary risk of mesotrione on two categories of maize for different groups.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gender** | **Age** | **STMR (mg/kg)** | **Urban** | | | | | **Rural** | | | | |
| **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption**  **(kg)** | **RQ** | **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption (kg)** | **RQ** |
| Male | 2～3 | 0.01 | 14.5 | 0.0127 | 1.75E-05 | 0.0837 | 1.15E-04 | 12.9 | 0.0118 | 1.83E-05 | 0.0824 | 1.28E-04 |
| 4～6 | 0.01 | 18.8 | 0.0085 | 9.04E-06 | 0.0778 | 8.28E-05 | 16 | 0.0145 | 1.81E-05 | 0.1139 | 1.42E-04 |
| 7～10 | 0.01 | 26.2 | 0.0105 | 8.02E-06 | 0.1047 | 7.99E-05 | 22 | 0.0184 | 1.67E-05 | 0.1467 | 1.33E-04 |
| 11～13 | 0.01 | 40.9 | 0.0114 | 5.57E-06 | 0.1405 | 6.87E-05 | 32.4 | 0.0267 | 1.65E-05 | 0.161 | 9.94E-05 |
| 14～17 | 0.01 | 52.5 | 0.007 | 2.67E-06 | 0.1525 | 5.81E-05 | 45.8 | 0.0243 | 1.06E-05 | 0.1887 | 8.24E-05 |
| 18～29 | 0.01 | 65.4 | 0.0144 | 4.40E-06 | 0.1632 | 4.99E-05 | 57.1 | 0.0264 | 9.25E-06 | 0.2202 | 7.71E-05 |
| 30～44 | 0.01 | 69.3 | 0.0121 | 3.49E-06 | 0.1668 | 4.81E-05 | 64.7 | 0.0322 | 9.95E-06 | 0.2235 | 6.91E-05 |
| 45～59 | 0.01 | 69.1 | 0.0145 | 4.20E-06 | 0.1736 | 5.02E-05 | 62.9 | 0.0304 | 9.67E-06 | 0.2255 | 7.17E-05 |
| 60～69 | 0.01 | 68.3 | 0.0215 | 6.30E-06 | 0.1594 | 4.67E-05 | 60.4 | 0.033 | 1.09E-05 | 0.1984 | 6.57E-05 |
| >70 | 0.01 | 65.5 | 0.0156 | 4.76E-06 | 0.1318 | 4.02E-05 | 56.5 | 0.0263 | 9.31E-06 | 0.1867 | 6.61E-05 |
| Female | 2～3 | 0.01 | 13.2 | 0.0109 | 1.65E-05 | 0.0731 | 1.11E-04 | 12.1 | 0.0103 | 1.70E-05 | 0.0851 | 1.41E-04 |
| 4～6 | 0.01 | 17.9 | 0.0144 | 1.61E-05 | 0.0761 | 8.50E-05 | 16 | 0.0136 | 1.70E-05 | 0.1095 | 1.37E-04 |
| 7～10 | 0.01 | 25 | 0.0088 | 7.04E-06 | 0.1128 | 9.02E-05 | 21 | 0.0175 | 1.67E-05 | 0.1382 | 1.32E-04 |
| 11～13 | 0.01 | 40.2 | 0.0102 | 5.07E-06 | 0.1345 | 6.69E-05 | 32.6 | 0.0243 | 1.49E-05 | 0.161 | 9.88E-05 |
| 14～17 | 0.01 | 48.2 | 0.0113 | 4.69E-06 | 0.1301 | 5.40E-05 | 44.4 | 0.0228 | 1.03E-05 | 0.1664 | 7.50E-05 |
| 18～29 | 0.01 | 53.9 | 0.0137 | 5.08E-06 | 0.1474 | 5.47E-05 | 51.6 | 0.0221 | 8.57E-06 | 0.2042 | 7.91E-05 |
| 30～44 | 0.01 | 57.6 | 0.0135 | 4.69E-06 | 0.1522 | 5.28E-05 | 55.7 | 0.029 | 1.04E-05 | 0.2094 | 7.52E-05 |
| 45～59 | 0.01 | 61 | 0.016 | 5.25E-06 | 0.1569 | 5.14E-05 | 57.5 | 0.0283 | 9.84E-06 | 0.2096 | 7.29E-05 |
| 60～69 | 0.01 | 60.6 | 0.0179 | 5.91E-06 | 0.1404 | 4.63E-05 | 53.6 | 0.0279 | 1.04E-05 | 0.1828 | 6.82E-05 |
| >70 | 0.01 | 57.4 | 0.0152 | 5.30E-06 | 0.1201 | 4.18E-05 | 50.2 | 0.0243 | 9.68E-06 | 0.1625 | 6.47E-05 |

**Table S7.** The chronic dietary risk of nicosulfuron on two categories of maize for different groups.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gender** | **Age** | **STMR (mg/kg)** | **Urban** | | | | | **Rural** | | | | |
| **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption (kg)** | **RQ** | **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption (kg)** | **RQ** |
| Male | 2～3 | 0.005 | 14.5 | 0.0127 | 2.19E-06 | 0.0837 | 1.44E-05 | 12.9 | 0.0118 | 2.29E-06 | 0.0824 | 1.60E-05 |
| 4～6 | 0.005 | 18.8 | 0.0085 | 1.13E-06 | 0.0778 | 1.03E-05 | 16 | 0.0145 | 2.27E-06 | 0.1139 | 1.78E-05 |
| 7～10 | 0.005 | 26.2 | 0.0105 | 1.00E-06 | 0.1047 | 9.99E-06 | 22 | 0.0184 | 2.09E-06 | 0.1467 | 1.67E-05 |
| 11～13 | 0.005 | 40.9 | 0.0114 | 6.97E-07 | 0.1405 | 8.59E-06 | 32.4 | 0.0267 | 2.06E-06 | 0.161 | 1.24E-05 |
| 14～17 | 0.005 | 52.5 | 0.007 | 3.33E-07 | 0.1525 | 7.26E-06 | 45.8 | 0.0243 | 1.33E-06 | 0.1887 | 1.03E-05 |
| 18～29 | 0.005 | 65.4 | 0.0144 | 5.50E-07 | 0.1632 | 6.24E-06 | 57.1 | 0.0264 | 1.16E-06 | 0.2202 | 9.64E-06 |
| 30～44 | 0.005 | 69.3 | 0.0121 | 4.37E-07 | 0.1668 | 6.02E-06 | 64.7 | 0.0322 | 1.24E-06 | 0.2235 | 8.64E-06 |
| 45～59 | 0.005 | 69.1 | 0.0145 | 5.25E-07 | 0.1736 | 6.28E-06 | 62.9 | 0.0304 | 1.21E-06 | 0.2255 | 8.96E-06 |
| 60～69 | 0.005 | 68.3 | 0.0215 | 7.87E-07 | 0.1594 | 5.83E-06 | 60.4 | 0.033 | 1.37E-06 | 0.1984 | 8.21E-06 |
| >70 | 0.005 | 65.5 | 0.0156 | 5.95E-07 | 0.1318 | 5.03E-06 | 56.5 | 0.0263 | 1.16E-06 | 0.1867 | 8.26E-06 |
| Female | 2～3 | 0.005 | 13.2 | 0.0109 | 2.06E-06 | 0.0731 | 1.38E-05 | 12.1 | 0.0103 | 2.13E-06 | 0.0851 | 1.76E-05 |
| 4～6 | 0.005 | 17.9 | 0.0144 | 2.01E-06 | 0.0761 | 1.06E-05 | 16 | 0.0136 | 2.13E-06 | 0.1095 | 1.71E-05 |
| 7～10 | 0.005 | 25 | 0.0088 | 8.80E-07 | 0.1128 | 1.13E-05 | 21 | 0.0175 | 2.08E-06 | 0.1382 | 1.65E-05 |
| 11～13 | 0.005 | 40.2 | 0.0102 | 6.34E-07 | 0.1345 | 8.36E-06 | 32.6 | 0.0243 | 1.86E-06 | 0.161 | 1.23E-05 |
| 14～17 | 0.005 | 48.2 | 0.0113 | 5.86E-07 | 0.1301 | 6.75E-06 | 44.4 | 0.0228 | 1.28E-06 | 0.1664 | 9.37E-06 |
| 18～29 | 0.005 | 53.9 | 0.0137 | 6.35E-07 | 0.1474 | 6.84E-06 | 51.6 | 0.0221 | 1.07E-06 | 0.2042 | 9.89E-06 |
| 30～44 | 0.005 | 57.6 | 0.0135 | 5.86E-07 | 0.1522 | 6.61E-06 | 55.7 | 0.029 | 1.30E-06 | 0.2094 | 9.40E-06 |
| 45～59 | 0.005 | 61 | 0.016 | 6.56E-07 | 0.1569 | 6.43E-06 | 57.5 | 0.0283 | 1.23E-06 | 0.2096 | 9.11E-06 |
| 60～69 | 0.005 | 60.6 | 0.0179 | 7.38E-07 | 0.1404 | 5.79E-06 | 53.6 | 0.0279 | 1.30E-06 | 0.1828 | 8.53E-06 |
| >70 | 0.005 | 57.4 | 0.0152 | 6.62E-07 | 0.1201 | 5.23E-06 | 50.2 | 0.0243 | 1.21E-06 | 0.1625 | 8.09E-06 |

**Table S8.** The chronic dietary risk of atrazine on two categories of maize for different groups.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Gender** | | **Age** | **STMR (mg/kg)** | **Urban** | | | | | **Rural** | | | | |
| **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption (kg)** | **RQ** | **Body Weight (kg)** | **Fully-grown Maize Consumption (kg)** | **RQ** | **Green Maize Consumption (kg)** | **RQ** |
| Male | 2～3 | | 0.037 | 14.5 | 0.0127 | 1.62E-03 | 0.0837 | 1.07E-02 | 12.9 | 0.0118 | 1.69E-03 | 0.0824 | 1.18E-02 |
| 4～6 | | 0.037 | 18.8 | 0.0085 | 8.36E-04 | 0.0778 | 7.66E-03 | 16 | 0.0145 | 1.68E-03 | 0.1139 | 1.32E-02 |
| 7～10 | | 0.037 | 26.2 | 0.0105 | 7.41E-04 | 0.1047 | 7.39E-03 | 22 | 0.0184 | 1.55E-03 | 0.1467 | 1.23E-02 |
| 11～13 | | 0.037 | 40.9 | 0.0114 | 5.16E-04 | 0.1405 | 6.36E-03 | 32.4 | 0.0267 | 1.52E-03 | 0.161 | 9.19E-03 |
| 14～17 | | 0.037 | 52.5 | 0.007 | 2.47E-04 | 0.1525 | 5.37E-03 | 45.8 | 0.0243 | 9.82E-04 | 0.1887 | 7.62E-03 |
| 18～29 | | 0.037 | 65.4 | 0.0144 | 4.07E-04 | 0.1632 | 4.62E-03 | 57.1 | 0.0264 | 8.55E-04 | 0.2202 | 7.13E-03 |
| 30～44 | | 0.037 | 69.3 | 0.0121 | 3.23E-04 | 0.1668 | 4.45E-03 | 64.7 | 0.0322 | 9.21E-04 | 0.2235 | 6.39E-03 |
| 45～59 | | 0.037 | 69.1 | 0.0145 | 3.88E-04 | 0.1736 | 4.65E-03 | 62.9 | 0.0304 | 8.94E-04 | 0.2255 | 6.63E-03 |
| 60～69 | | 0.037 | 68.3 | 0.0215 | 5.82E-04 | 0.1594 | 4.32E-03 | 60.4 | 0.033 | 1.01E-03 | 0.1984 | 6.08E-03 |
| >70 | | 0.037 | 65.5 | 0.0156 | 4.41E-04 | 0.1318 | 3.72E-03 | 56.5 | 0.0263 | 8.61E-04 | 0.1867 | 6.11E-03 |
| Female | 2～3 | | 0.037 | 13.2 | 0.0109 | 1.53E-03 | 0.0731 | 1.02E-02 | 12.1 | 0.0103 | 1.57E-03 | 0.0851 | 1.30E-02 |
| 4～6 | | 0.037 | 17.9 | 0.0144 | 1.49E-03 | 0.0761 | 7.87E-03 | 16 | 0.0136 | 1.57E-03 | 0.1095 | 1.27E-02 |
| 7～10 | | 0.037 | 25 | 0.0088 | 6.51E-04 | 0.1128 | 8.35E-03 | 21 | 0.0175 | 1.54E-03 | 0.1382 | 1.22E-02 |
| 11～13 | | 0.037 | 40.2 | 0.0102 | 4.69E-04 | 0.1345 | 6.19E-03 | 32.6 | 0.0243 | 1.38E-03 | 0.161 | 9.14E-03 |
| 14～17 | | 0.037 | 48.2 | 0.0113 | 4.34E-04 | 0.1301 | 4.99E-03 | 44.4 | 0.0228 | 9.50E-04 | 0.1664 | 6.93E-03 |
| 18～29 | | 0.037 | 53.9 | 0.0137 | 4.70E-04 | 0.1474 | 5.06E-03 | 51.6 | 0.0221 | 7.92E-04 | 0.2042 | 7.32E-03 |
| 30～44 | | 0.037 | 57.6 | 0.0135 | 4.34E-04 | 0.1522 | 4.89E-03 | 55.7 | 0.029 | 9.63E-04 | 0.2094 | 6.95E-03 |
| 45～59 | | 0.037 | 61 | 0.016 | 4.85E-04 | 0.1569 | 4.76E-03 | 57.5 | 0.0283 | 9.11E-04 | 0.2096 | 6.74E-03 |
| 60～69 | | 0.037 | 60.6 | 0.0179 | 5.46E-04 | 0.1404 | 4.29E-03 | 53.6 | 0.0279 | 9.63E-04 | 0.1828 | 6.31E-03 |
| >70 | | 0.037 | 57.4 | 0.0152 | 4.90E-04 | 0.1201 | 3.87E-03 | 50.2 | 0.0243 | 8.96E-04 | 0.1625 | 5.99E-03 |

**Table S9.** The chronic risk of mesotrione, nicosulfuron and atrazine on fully-grown maize and green maize for different people in urban and rural regions.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Herbicide** | **Age** | **Risk Quotient of Fully-grown Maize (%)** | | | | **Risk Quotient of Green Maize (%)** | | | |
| **Urban Male** | **Urban Female** | **Rural Male** | **Rural Female** | **Urban Male** | **Urban Female** | **Rural Male** | **Rural Female** |
| Mesotrione | 2-3 | 0.00175 | 0.00165 | 0.00183 | 0.00170 | 0.01154 | 0.01108 | 0.01278 | 0.01407 |
| 4-6 | 0.00090 | 0.00161 | 0.00181 | 0.00170 | 0.00828 | 0.00850 | 0.01424 | 0.01369 |
| 7-10 | 0.00080 | 0.00070 | 0.00167 | 0.00167 | 0.00799 | 0.00902 | 0.01334 | 0.01316 |
| 11-13 | 0.00056 | 0.00051 | 0.00165 | 0.00149 | 0.00687 | 0.00669 | 0.00994 | 0.00988 |
| 14-17 | 0.00027 | 0.00047 | 0.00106 | 0.00103 | 0.00581 | 0.00540 | 0.00824 | 0.00750 |
| 18-29 | 0.00044 | 0.00051 | 0.00092 | 0.00086 | 0.00499 | 0.00547 | 0.00771 | 0.00791 |
| 30-44 | 0.00035 | 0.00047 | 0.00100 | 0.00104 | 0.00481 | 0.00528 | 0.00691 | 0.00752 |
| 45-59 | 0.00042 | 0.00052 | 0.00097 | 0.00098 | 0.00502 | 0.00514 | 0.00717 | 0.00729 |
| 60-69 | 0.00063 | 0.00059 | 0.00109 | 0.00104 | 0.00467 | 0.00463 | 0.00657 | 0.00682 |
| >70 | 0.00048 | 0.00053 | 0.00093 | 0.00097 | 0.00402 | 0.00418 | 0.00661 | 0.00647 |
| Nicosulfuron | 2-3 | 0.00022 | 0.00021 | 0.00023 | 0.00021 | 0.00144 | 0.00138 | 0.00160 | 0.00176 |
| 4-6 | 0.00011 | 0.00020 | 0.00023 | 0.00021 | 0.00103 | 0.00106 | 0.00178 | 0.00171 |
| 7-10 | 0.00010 | 0.00009 | 0.00021 | 0.00021 | 0.00100 | 0.00113 | 0.00167 | 0.00165 |
| 11-13 | 0.00007 | 0.00006 | 0.00021 | 0.00019 | 0.00086 | 0.00084 | 0.00124 | 0.00123 |
| 14-17 | 0.00003 | 0.00006 | 0.00013 | 0.00013 | 0.00073 | 0.00067 | 0.00103 | 0.00094 |
| 18-29 | 0.00006 | 0.00006 | 0.00012 | 0.00011 | 0.00062 | 0.00068 | 0.00096 | 0.00099 |
| 30-44 | 0.00004 | 0.00006 | 0.00012 | 0.00013 | 0.00060 | 0.00066 | 0.00086 | 0.00094 |
| 45-59 | 0.00005 | 0.00007 | 0.00012 | 0.00012 | 0.00063 | 0.00064 | 0.00090 | 0.00091 |
| 60-69 | 0.00008 | 0.00007 | 0.00014 | 0.00013 | 0.00058 | 0.00058 | 0.00082 | 0.00085 |
| >70 | 0.00006 | 0.00007 | 0.00012 | 0.00012 | 0.00050 | 0.00052 | 0.00083 | 0.00081 |
| Atrazine | 2-3 | 0.16203 | 0.15277 | 0.16922 | 0.15748 | 1.06790 | 1.02451 | 1.18171 | 1.30112 |
| 4-6 | 0.08364 | 0.14883 | 0.16766 | 0.15725 | 0.76559 | 0.78651 | 1.31697 | 1.26609 |
| 7-10 | 0.07414 | 0.06512 | 0.15473 | 0.15417 | 0.73929 | 0.83472 | 1.23361 | 1.21748 |
| 11-13 | 0.05156 | 0.04694 | 0.15245 | 0.13790 | 0.63551 | 0.61897 | 0.91929 | 0.91365 |
| 14-17 | 0.02467 | 0.04337 | 0.09816 | 0.09500 | 0.53738 | 0.49935 | 0.76222 | 0.69333 |
| 18-29 | 0.04073 | 0.04702 | 0.08553 | 0.07923 | 0.46165 | 0.50592 | 0.71343 | 0.73211 |
| 30-44 | 0.03230 | 0.04336 | 0.09207 | 0.09632 | 0.44528 | 0.48884 | 0.63906 | 0.69549 |
| 45-59 | 0.03882 | 0.04852 | 0.08941 | 0.09105 | 0.46478 | 0.47584 | 0.66324 | 0.67437 |
| 60-69 | 0.05824 | 0.05465 | 0.10108 | 0.09630 | 0.43176 | 0.42861 | 0.60768 | 0.63093 |
| >70 | 0.04406 | 0.04899 | 0.08612 | 0.08955 | 0.37226 | 0.38708 | 0.61132 | 0.59885 |

**Table S10.** The registered crops of mesotrione, nicosulfuron and atrazine in China and the corresponding MRLs registered by various countries.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **Registered crops** | **Food classification** | **MRLs (mg/kg)** | | | | | |
| **Japan** | **CAC** | **China** | **EU** | **USA** | **Australia** |
| Mesotrione | Maize | Other cereals | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Nicosulfuron | Maize | Other cereals | 0.1 | 0.01 | 0.1 | 0.01 | 0.1 | - |
| Atrazine | Maize | Other cereals | 0.2 | 0.05 | 0.05 | 0.05 | 0.2 | 0.1 |
| Sorghum | Other cereals | 0.02 | 0.05 | 0.05 | 0.05 | 0.2 | 0.1 |
| Spring onion | Soy sauce | 0.02 | 0.05 | 0.05 | 0.05 | - | - |
| Ginger | Soy sauce | 0.02 | 0.1 | 0.05 | 0.05 | - | - |
| Apple | Fruits | 0.02 | 0.05 | 0.05 | 0.05 | - | - |
| Pear | Fruits | 0.02 | 0.05 | 0.05 | 0.05 | - | - |
| Grape | Fruits | 0.02 | 0.05 | 0.05 | 0.05 | - | - |
| Sugarcane | Sugar, starch | 0.02 | 0.05 | 0.05 | 0.05 | 0.2 | 0.1 |
| Tea | Salt | 0.1 | 0.1 | 0.1 | 0.1 | - | - |