

# Use Trends of Biopesticides: Pounds Applied

[Text files](https://files.cdpr.ca.gov/pub/outgoing/pur/data/) of data are available at <<https://files.cdpr.ca.gov/pub/outgoing/pur/data/>>. The reported pounds of chemicals used that are biopesticides. Biopesticides include microorganisms and naturally occurring compounds, or compounds similar to those found in nature that are not toxic to the target pest (such as pheromones). Use includes both agricultural and reportable nonagricultural applications. The word "none" or "N/A" indicates no use at all that year. Values > 1 are rounded.

| Chemical  | 2011  | 2012  | 2013  | 2014  | 2015 | 2016  | 2017 | 2018  | 2019  | 2020  |
|---|-------|-------|-------|-------|------|-------|------|-------|-------|-------|
| <b>(3s, 6r)-3-methyl-6-isopropenyl-9-decen-1-yl acetate</b> | N/A   | <0.01 | N/A   | <0.01 | N/A  | <0.01 | 12   | 148   | 65    | 50    |
| <b>(3s, 6s)-3-methyl-6-isopropenyl-9-decen-1-yl acetate</b> | N/A   | <0.01 | N/A   | <0.01 | N/A  | <0.01 | 12   | 148   | 65    | 50    |
| <b>(e)-4-tridecen-1-yl acetate</b>                          | N/A   | N/A   | N/A   | 23    | N/A  | N/A   | N/A  | <0.01 | <0.01 | <0.01 |
| <b>(e)-5-decen-1-ol</b>                                     | N/A   | <0.01 | <0.01 | <0.01 | 1    | 8     | 2    | 2     | 45    | 51    |
| <b>(e)-5-decenol</b>  | <0.01 | 2     | 3     | 1     | 33   | 8     | 95   | 5     | 6     | 2     |
| <b>(e)-5-decenyl acetate</b>                                | 2     | 10    | 7     | 4     | 25   | 134   | 99   | 63    | 746   | 840   |
| <b>(e,e)-9, 11-tetradecadien-1-yl acetate</b>               | 6     | 3     | 4     | 3     | 3    | 1     | 12   | 2     | <0.01 | <0.01 |
| <b>(e,z)-7,9-dodecadien-1-yl acetate</b>                    | 249   | 270   | 24    | 24    | N/A  | N/A   | N/A  | N/A   | N/A   | N/A   |
| <b>(s)-kinoprene</b>  | 191   | 300   | 285   | 311   | 429  | 327   | 253  | 378   | 531   | 478   |
| <b>(s)-verbenone</b>  | N/A   | 55    | N/A   | N/A   | 781  | 633   | 28   | 5     | 26    | 593   |

| Chemical                                    | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| (z)-11-hexadecen-1-yl acetate               | 1     | N/A   | N/A   | N/A   | N/A   | <0.01 | 98    | 34    | 30    | 92    |
| (z)-11-hexadecenal                          | N/A   | N/A   | N/A   | N/A   | 1     | 1     | 98    | 33    | 19    | 92    |
| (z)-4-tridecen-1-yl acetate                 | N/A   | N/A   | N/A   | 1     | N/A   | N/A   | N/A   | <0.01 | 3     | 6     |
| (z)-9-dodecenyl acetate                     | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | N/A   | N/A   | N/A   | N/A   | N/A   |
| (z,e)-7,11-hexadecadien-1-yl acetate        | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | <0.01 |
| (z,z)-11,13-hexadecadienal                  | 571   | 271   | 321   | 619   | 969   | 1,072 | 1,086 | 1,404 | 1,846 | 1,511 |
| (z,z)-7,11-hexadecadien-1-yl acetate        | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | <0.01 |
| 1,4-dimethylnaphthalene                     | 544   | 893   | 1,163 | 1,085 | 891   | 660   | 133   | 836   | 379   | 274   |
| 1,7-dioxaspiro-(5,5)-undecane               | <0.01 | <0.01 | 1     | <0.01 | 1     | N/A   | N/A   | N/A   | N/A   | N/A   |
| 1-methylcyclopropene                        | <0.01 | 1     | 1     | <0.01 | 1     | 1     | 1     | 1     | 1     | <0.01 |
| 1-naphthaleneacetamide                      | 20    | 20    | 19    | 22    | 18    | 14    | 11    | 17    | 11    | 11    |
| 2,4-decadienoic acid, ethyl ester, (2e,4z)- | N/A   | N/A   | N/A   | <0.01 | 4     | 3     | 3     | 2     | 1     | 48    |
| 2-methyl-1-butanol                          | N/A   | N/A   | <0.01 | <0.01 | <0.01 | <0.01 | 1     | <0.01 | 1     | 1     |
| 3,13 octadecadien-1-yl acetate              | 12    | N/A   | <0.01 | N/A   | <0.01 | 142   | N/A   | N/A   | N/A   | N/A   |
| 3,7-dimethyl-6-octen-1-ol                   | 12    | 28    | 54    | 42    | 49    | 72    | 95    | 98    | 70    | 62    |

| <b>Chemical</b>                                  | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>acetic acid</b>                               | 73          | 601         | 43          | 62          | 20,806      | 9,111       | 5,357       | 4,248       | 1,508       | 2,007       |
| <b>agrobacterium radiobacter</b>                 | 919         | 28          | 230         | 271         | 137         | 2,561       | 64          | 59          | 248         | 49          |
| <b>agrobacterium radiobacter, strain k1026</b>   | <0.01       | <0.01       | 34          | <0.01       | <0.01       | <0.01       | N/A         | N/A         | N/A         | N/A         |
| <b>allyl isothiocyanate</b>                      | N/A         | <0.01       | N/A         | N/A         | N/A         | <0.01       | N/A         | N/A         | <0.01       | N/A         |
| <b>almond, bitter</b>                            | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | N/A         | <0.01       | <0.01       | <0.01       | <0.01       |
| <b>amino ethoxy vinyl glycine hydrochloride</b>  | 1,194       | 1,368       | 1,444       | 1,757       | 2,011       | 1,380       | 1,296       | 2,532       | 2,983       | 3,003       |
| <b>ammonium bicarbonate</b>                      | 14          | 7           | 51          | 34          | 42          | N/A         | N/A         | N/A         | N/A         | <0.01       |
| <b>ammonium nitrate</b>                          | 52,072      | 66,531      | 86,008      | 88,037      | 91,564      | 89,252      | 86,912      | 78,360      | 84,599      | 80,341      |
| <b>ammonium nonanoate</b>                        | N/A         | N/A         | 1,937       | 3,131       | 3,399       | 27,356      | 19,625      | 17,272      | 5,421       | 8,618       |
| <b>aspergillus flavus strain af36</b>            | <0.01       | 4           | 4           | 8           | 9           | 14          | 15          | 16          | 18          | 20          |
| <b>aureobasidium pullulans strain dsm 14940</b>  | N/A         | N/A         | 81          | 458         | 356         | 1,095       | 2,493       | 3,956       | 2,794       | 2,353       |
| <b>aureobasidium pullulans strain dsm 14941</b>  | N/A         | N/A         | 81          | 458         | 356         | 1,095       | 2,493       | 3,956       | 2,794       | 2,353       |
| <b>azadirachtin</b>                              | 2,404       | 4,193       | 3,387       | 4,323       | 5,108       | 4,774       | 4,884       | 4,424       | 4,582       | 6,190       |
| <b>bacillus amyloliquefaciens strain d747</b>    | N/A         | 869         | 84,957      | 177,589     | 131,298     | 209,773     | 395,706     | 272,746     | 298,243     | 230,216     |
| <b>bacillus amyloliquefaciens strain mbi 600</b> | N/A         | <0.01       | <0.01       | N/A         | N/A         | 15          | 79          | 275         | 699         | 1,300       |

| Chemical  | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>bacillus firmus (strain i-1582)</b>  | N/A    | N/A    | N/A    | 42     | 190    | 170    | 212    | 160    | 33     | 28     |
| <b>bacillus mycoides isolate j</b>  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | 1,085  | 568    | 531    | 423    |
| <b>bacillus popilliae</b>   | N/A    | N/A    | <0.01  | <0.01  | <0.01  | <0.01  | N/A    | <0.01  | N/A    | N/A    |
| <b>bacillus pumilus, strain qst 2808</b>  | 7,571  | 6,771  | 6,249  | 7,957  | 8,123  | 7,890  | 9,239  | 7,552  | 7,735  | 10,181 |
| <b>bacillus sphaericus 2362, serotype h5a5b, strain abts 1743 fermentation solids, spores and insecticidal toxins</b> | 10,602 | 9,123  | 10,500 | 10,499 | 12,357 | 13,122 | 16,362 | 10,812 | 11,726 | 10,427 |
| <b>bacillus subtilis gb03</b>   | <0.01  | 1      | 1      | 2      | 3      | 3      | 4      | 3      | 3      | 2      |
| <b>bacillus subtilis strain iab/bs03</b>  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | 5      | 48     | 18     |
| <b>bacillus subtilis var. amyloliquefaciens strain fzb24</b>  | N/A    | 2      | 94     | 119    | 178    | 6      | <0.01  | N/A    | N/A    | N/A    |
| <b>bacillus thuringiensis (berliner)</b>  | 26     | 18     | 11     | 4      | 29     | 21     | 14     | 17     | 8      | 13     |
| <b>bacillus thuringiensis (berliner), subsp. aizawai, gc-91 protein</b>   | 11,666 | 17,042 | 13,265 | 18,776 | 16,771 | 18,882 | 34,178 | 45,073 | 54,344 | 58,210 |
| <b>bacillus thuringiensis (berliner), subsp. aizawai, serotype h-7</b>  | 814    | 714    | 359    | 333    | 184    | 73     | 118    | 48     | 548    | 43     |

| Chemical  | 2011    | 2012   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018    | 2019    | 2020    |
|---|---------|--------|--------|--------|--------|--------|--------|---------|---------|---------|
| <b>bacillus thuringiensis (berliner), subsp. israelensis, serotype h-14</b> | 17,167  | 6,028  | 2,588  | 4,932  | 6,633  | 5,829  | 5,957  | 5,563   | 8,430   | 5,870   |
| <b>bacillus thuringiensis (berliner), subsp. kurstaki strain sa-12</b>      | 4,700   | 10,361 | 8,311  | 7,971  | 8,579  | 9,804  | 2,218  | 563     | 336     | 379     |
| <b>bacillus thuringiensis (berliner), subsp. kurstaki, serotype 3a,3b</b>   | 244     | 234    | 53     | 41     | 18     | 34     | 76     | 91      | 27      | 4       |
| <b>bacillus thuringiensis (berliner), subsp. kurstaki, strain eg 2348</b>   | 478     | 44     | 500    | 514    | 344    | 645    | 396    | 8       | <0.01   | <0.01   |
| <b>bacillus thuringiensis (berliner), subsp. kurstaki, strain eg2371</b>    | <0.01   | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     |
| <b>bacillus thuringiensis (berliner), subsp. kurstaki, strain sa-11</b>     | 115,695 | 52,424 | 78,064 | 80,401 | 80,958 | 74,963 | 96,414 | 119,097 | 116,440 | 142,755 |
| <b>bacillus thuringiensis (berliner), subsp. san diego</b>                  | N/A     | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | 2       | N/A     |
| <b>bacillus thuringiensis subspecies kurstaki strain bmp 123</b>            | N/A     | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | 5       |

| Chemical  | 2011   | 2012    | 2013   | 2014    | 2015   | 2016    | 2017    | 2018    | 2019    | 2020    |
|---|--------|---------|--------|---------|--------|---------|---------|---------|---------|---------|
| <b>bacillus thuringiensis<br/>subspecies kurstaki,<br/>genetically engineered<br/>strain eg7841<br/>lepidopteran active toxin</b> | 75     | 298     | 116    | 65      | 3      | 43      | 3       | 1       | 2,503   | 14,065  |
| <b>bacillus thuringiensis var.<br/>kurstaki strain m-200</b>  | N/A    | N/A     | N/A    | N/A     | <0.01  | N/A     | <0.01   | 1       | <0.01   | N/A     |
| <b>bacillus thuringiensis var.<br/>kurstaki, genetically<br/>engineered strain eg7826</b>   | N/A    | 528     | N/A    | N/A     | N/A    | 7       | N/A     | 15      | N/A     | N/A     |
| <b>bacillus thuringiensis,<br/>subsp. aizawai, strain<br/>abts-1857</b>   | 24,321 | 30,649  | 29,863 | 49,186  | 55,914 | 72,261  | 92,931  | 88,725  | 118,022 | 129,576 |
| <b>bacillus thuringiensis,<br/>subsp. aizawai, strain sd-<br/>1372, lepidopteran active<br/>toxin(s)</b>                          | 88     | 1       | 18     | 6       | 43     | 13      | 6       | 16      | 2       | 1       |
| <b>bacillus thuringiensis,<br/>subsp. israelensis, strain<br/>am 65-52</b>  | 58,261 | 179,756 | 56,363 | 49,610  | 55,727 | 80,137  | 73,504  | 75,322  | 66,789  | 74,182  |
| <b>bacillus thuringiensis,<br/>subsp. kurstaki, strain<br/>abts-351, fermentation<br/>solids and solubles</b>                     | 83,214 | 95,440  | 83,415 | 111,388 | 95,487 | 117,902 | 134,880 | 121,702 | 160,878 | 132,204 |
| <b>bacillus thuringiensis,<br/>subsp. kurstaki, strain hd-<br/>1</b>  | 2,573  | 3,187   | 2,323  | 1,928   | 1,860  | 186     | 111     | 13      | 24      | 16      |

| Chemical   | 2011  | 2012  | 2013  | 2014  | 2015   | 2016   | 2017    | 2018    | 2019    | 2020    |
|--|-------|-------|-------|-------|--------|--------|---------|---------|---------|---------|
| <b>bacillus thuringiensis, var. kurstaki delta endotoxins cry 1a(c) and cry 1c (genetically engineered) encapsulated in pseudomonas fluorescens (killed)</b> | <0.01 | 4     | N/A   | <0.01 | N/A    | <0.01  | N/A     | 5       | N/A     | <0.01   |
| <b>bacteriophage active against xanthomonas campestris pv. vesicatoria and pseudomonas syringae pv. tomato</b>   | <0.01 | <0.01 | <0.01 | <0.01 | N/A    | N/A    | <0.01   | N/A     | <0.01   | <0.01   |
| <b>bacteriophages active against xylella fastidiosa</b>  | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A     | N/A     | N/A     | <0.01   |
| <b>balsam fir oil</b>  | N/A   | <0.01 | <0.01 | <0.01 | 1      | <0.01  | N/A     | <0.01   | <0.01   | N/A     |
| <b>beauveria bassiana hf 23</b>  | N/A   | N/A   | N/A   | N/A   | N/A    | 37     | 55      | 67      | 70      | 78      |
| <b>beauveria bassiana strain gha</b>   | 622   | 1,221 | 1,796 | 2,749 | 3,514  | 2,850  | 5,690   | 7,040   | 6,211   | 6,989   |
| <b>beta-conglutin</b>  | N/A   | N/A   | N/A   | N/A   | 6,762  | 6,099  | 7,383   | 4,314   | 2,968   | 4,819   |
| <b>buffalo gourd root powder</b>   | N/A   | 1     | 25    | 5     | 6      | 8      | 3       | 73      | 33      | 7       |
| <b>burkholderia sp strain a396 cells and fermentation media</b>  | N/A   | N/A   | N/A   | 2,829 | 58,593 | 53,655 | 115,528 | 216,387 | 412,580 | 552,149 |
| <b>butyl mercaptan</b>   | N/A   | <0.01 | N/A   | N/A   | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |

| Chemical                                   | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    | 2017    | 2018    | 2019    | 2020    |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| calcium salts of phosphorous acid          | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | <0.01   | N/A     |
| canola oil                                 | 26      | 15      | 28      | 61      | 97      | 247     | 286     | 2,177   | 2,833   | 3,051   |
| capsicum oleoresin                         | 4       | 12      | 10      | 27      | 92      | 125     | 203     | 635     | 409     | 419     |
| carbon dioxide                             | 21,239  | 42,612  | 21,186  | 18,297  | 17,675  | 25,366  | 26,359  | 36,307  | 73,226  | 38,421  |
| castor oil                                 | <0.01   | 2       | <0.01   | 8       | <0.01   | 4       | N/A     | 3       | N/A     | 15      |
| chenopodium ambrosioides near ambrosioides | 7,897   | 10,231  | 20,267  | 17,504  | 12,828  | 10,207  | 8,300   | 387     | 186     | 85      |
| chromobacterium subtsugae strain praa4-1   | N/A     | 1,169   | 30,262  | 46,419  | 45,917  | 31,445  | 36,395  | 42,933  | 39,024  | 37,369  |
| cinnamaldehyde                             | 1       | N/A     | N/A     | N/A     | N/A     | N/A     | 59      | 1       | N/A     | 4,032   |
| citric acid                                | 92,556  | 94,969  | 128,806 | 114,940 | 126,174 | 142,111 | 136,398 | 152,412 | 166,070 | 178,100 |
| clarified hydrophobic extract of neem oil  | 71,739  | 78,007  | 119,298 | 197,351 | 222,748 | 166,062 | 173,113 | 138,380 | 139,316 | 199,294 |
| codling moth granulosus virus              | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | 1       |
| coniothyrium minitans strain con/m/91-08   | 176     | 245     | 611     | 641     | 786     | 657     | 665     | 424     | 216     | 543     |
| corn syrup                                 | 4,377   | 4,766   | 3,216   | 3,344   | 4,342   | 4,850   | 14,787  | 22,773  | 18,305  | 16,161  |
| cottonseed oil                             | 318,868 | 114,610 | 105,083 | 132,464 | 87,451  | 55,082  | 45,678  | 35,072  | 39,589  | 16,873  |
| coyote urine                               | 1       | 2       | 3       | 9       | 6       | 3       | 6       | 3       | 3       | 3       |
| cytokinin (as kinetin)                     | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   |
| diallyl disulfide                          | N/A     | N/A     | N/A     | N/A     | N/A     | 103     | 94      | N/A     | N/A     | 26      |
| dihydro-5-heptyl-2(3h)-furanone            | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | N/A     | <0.01   | N/A     |

| Chemical   | 2011  | 2012  | 2013  | 2014  | 2015  | 2016   | 2017   | 2018  | 2019  | 2020  |
|--|-------|-------|-------|-------|-------|--------|--------|-------|-------|-------|
| dihydro-5-pentyl-2(3h)-furanone  | N/A   | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A   | <0.01 | N/A   |
| e,e-8,10-dodecadien-1-ol   | 1,376 | 1,995 | 2,276 | 1,395 | 1,445 | 1,079  | 5,420  | 1,209 | 863   | 1,214 |
| e-11-tetradecen-1-yl acetate   | 172   | 133   | 142   | 61    | 73    | 32     | 295    | 40    | 8     | 12    |
| e-8-dodecenyl acetate  | 195   | 283   | 273   | 224   | 769   | 390    | 1,714  | 271   | 323   | 538   |
| encapsulated delta endotoxin of bacillus thuringiensis var. kurstaki in killed pseudomonas fluorescens | 1     | <0.01 | N/A   | N/A   | N/A   | N/A    | N/A    | N/A   | N/A   | N/A   |
| essential oils   | <0.01 | 1     | <0.01 | 15    | 12    | 20     | 24     | 11    | 7     | 1     |
| ethylene   | 1,018 | 954   | 1,359 | 1,333 | 1,683 | 1,299  | 1,248  | 953   | 1,022 | 898   |
| eucalyptus oil   | <0.01 | N/A   | N/A   | N/A   | N/A   | N/A    | N/A    | N/A   | N/A   | N/A   |
| eugenol  | N/A   | 1     | <0.01 | 1     | <0.01 | 1      | <0.01  | <0.01 | N/A   | N/A   |
| farnesol   | 5     | 11    | 21    | 17    | 20    | 29     | 38     | 39    | 28    | 25    |
| fenugreek  | 5     | 8     | 2     | 1     | 7     | N/A    | <0.01  | 10    | <0.01 | <0.01 |
| ferric sodium edta   | 1,979 | 6,351 | 5,855 | 6,790 | 8,000 | 12,449 | 12,329 | 8,118 | 8,568 | 5,866 |
| fish oil   | 1,657 | 5,466 | 4,114 | N/A   | N/A   | 1,078  | N/A    | N/A   | N/A   | 2,561 |
| formic acid  | 241   | 634   | 66    | 337   | 2,606 | 1,243  | 984    | 1,647 | 352   | 6,568 |
| fox urine  | <0.01 | 2     | 1     | 4     | 3     | 1      | 4      | 2     | 1     | 1     |
| gamma aminobutyric acid  | 40    | 133   | 42    | 15    | 15    | N/A    | N/A    | N/A   | N/A   | N/A   |
| garlic   | 29    | 1,905 | 2,832 | 1,392 | 667   | 849    | 529    | 1,127 | 1,098 | 1,556 |
| geraniol   | 12    | 28    | 54    | 42    | 49    | 72     | 95     | 98    | 70    | 62    |

| Chemical                                     | 2011      | 2012      | 2013      | 2014      | 2015      | 2016      | 2017      | 2018      | 2019      | 2020      |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| german cockroach pheromone                   | <0.01     | <0.01     | <0.01     | <0.01     | N/A       | <0.01     | <0.01     | <0.01     | <0.01     | N/A       |
| gibberellins                                 | 23,717    | 24,216    | 41,418    | 27,422    | 27,409    | 23,142    | 27,104    | 28,657    | 25,410    | 29,027    |
| gibberellins, potassium salt                 | <0.01     | 5         | N/A       | N/A       | N/A       | N/A       | 1         | N/A       | N/A       | N/A       |
| gliocladium virens gl-21 (spores)            | 649       | 1,957     | 3,538     | 2,989     | 4,586     | 4,395     | 2,829     | 2,707     | 1,218     | 136       |
| glutamic acid                                | 40        | 133       | 42        | 15        | 15        | N/A       | N/A       | N/A       | N/A       | N/A       |
| gs-omega/kappa-hxtx-hv1a (versitide peptide) | N/A       | N/A       | N/A       | N/A       | N/A       | <0.01     | N/A       | 3         | 22        | 1,423     |
| harpin protein                               | 11        | 1         | 1         | <0.01     | N/A       | <0.01     | <0.01     | N/A       | N/A       | N/A       |
| heptyl butyrate                              | <0.01     | <0.01     | 14        | 6         | 4         | 3         | 13        | 4         | 28        | 12        |
| hydrogen peroxide                            | 59,387    | 36,310    | 47,239    | 49,826    | 74,419    | 130,417   | 312,065   | 355,410   | 460,488   | 564,035   |
| hydroprene                                   | 11,261    | 3,948     | 7,352     | 5,734     | 6,456     | 3,920     | 3,155     | 2,935     | 4,250     | 2,667     |
| iba  | 9         | 12        | 15        | 14        | 13        | 10        | 19        | 17        | 29        | 31        |
| indole                                       | N/A       | N/A       | <0.01     | N/A       | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     | <0.01     |
| iron hedta                                   | N/A       | 43        | 92        | 120       | 91        | 170       | 213       | 113       | 157       | 185       |
| iron phosphate                               | 2,874     | 2,327     | 2,119     | 2,007     | 2,071     | 2,250     | 3,482     | 2,837     | 3,208     | 3,541     |
| kaolin                                       | 1,686,874 | 2,014,970 | 2,473,768 | 2,854,542 | 3,411,740 | 3,591,384 | 3,193,218 | 3,270,212 | 2,723,538 | 2,957,863 |
| kinoprene                                    | 9         | 3         | 8         | 33        | 17        | 10        | 1         | <0.01     | <0.01     | 2         |
| lactic acid                                  | N/A       | N/A       | N/A       | N/A       | 2         | 3         | 12        | 10        | 15        | 19        |
| lactose                                      | 9,374     | 6,554     | 7,143     | 6,616     | 7,855     | 8,501     | 8,889     | 7,959     | 8,192     | 7,389     |
| lagenidium giganteum (california strain)     | N/A       | 5         | N/A       | N/A       | N/A       | N/A       | N/A       | N/A       | N/A       | N/A       |
| lauryl alcohol                               | 497       | 755       | 449       | 293       | 501       | 319       | 2,566     | 309       | 230       | 437       |
| lavandulyl senecioate                        | 6,120     | 586       | 477       | 3,166     | 507       | 1,035     | 1,312     | 2,282     | 4,188     | 3,322     |

| <b>Chemical</b>   | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>limonene</b>   | 62,925      | 74,369      | 61,334      | 68,137      | 72,906      | 67,550      | 92,320      | 106,974     | 56,867      | 57,299      |
| <b>linalool</b>   | 95          | 136         | 72          | 62          | 93          | 15          | 11          | 2           | 1           | <0.01       |
| <b>margosa oil</b>  | 7,886       | 9,106       | 12,189      | 22,585      | 26,019      | 32,493      | 25,061      | 13,756      | 41,100      | 38,846      |
| <b>menthol</b>  | <0.01       | N/A         | 20          | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| <b>metarhizium anisopliae strain f52</b>  | N/A         | 116         | 89          | 121         | 20          | 54          | 2           | 1           | 1           | <0.01       |
| <b>metarhizium anisopliae, var. anisopliae, strain esf1</b>                               | <0.01       | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| <b>methoprene</b>   | 1,809       | 1,304       | 1,350       | 3,556       | 1,390       | 1,271       | 1,064       | 764         | 801         | 1,683       |
| <b>methyl anthranilate</b>  | 448         | 300         | 1,237       | 634         | 672         | 789         | 1,118       | 958         | 1,208       | 1,388       |
| <b>methyl eugenol</b>   | 5           | N/A         | 9           | N/A         | N/A         | 126         | 386         | 1,149       | 1,138       | 500         |
| <b>methyl nonyl ketone</b>  | N/A         | N/A         | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | 1           | <0.01       | <0.01       |
| <b>methyl salicylate</b>  | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | <0.01       | <0.01       | N/A         | N/A         |
| <b>muscalure</b>  | 15          | 16          | 13          | 17          | 23          | 29          | 44          | 60          | 18          | 14          |
| <b>muscodor albus strain sa13</b>   | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | 270         |
| <b>myristyl alcohol</b>   | 102         | 155         | 91          | 60          | 102         | 65          | 520         | 63          | 47          | 89          |
| <b>myrothecium verrucaria, dried fermentation solids &amp; solubles, strain aarc-0255</b> | 27,757      | 25,556      | 26,005      | 17,675      | 30,810      | 26,033      | 22,923      | 23,021      | 21,639      | 22,057      |
| <b>n6-benzyl adenine</b>  | 129         | 168         | 183         | 184         | 230         | 221         | 161         | 198         | 477         | 364         |
| <b>naa</b>  | 4           | 9           | 15          | 12          | 18          | 11          | 100         | 11          | 14          | 20          |
| <b>naa, ammonium salt</b>   | 839         | 1,400       | 1,056       | 945         | 996         | 125         | 181         | 335         | 249         | 257         |

| Chemical                     | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| naa, ethyl ester             | 23     | 4      | 3      | 5      | 3      | 38     | 10,502 | 13,162 | 13,844 | 7,899  |
| naa, potassium salt          | N/A    | N/A    | 53     | 15     | 2      | 934    | 1,017  | 607    | 613    | 599    |
| naa, sodium salt             | N/A    | N/A    | 2      | 1      | <0.01  | <0.01  | N/A    | N/A    | 1      | N/A    |
| natamycin                    | N/A    | N/A    | <0.01  | 1      | 1      | 1      | <0.01  | N/A    | 96     | 288    |
| nerolidol                    | 12     | 28     | 54     | 42     | 49     | 72     | 95     | 98     | 70     | 62     |
| nitrogen, liquefied          | 216    | 74     | 594    | 6      | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |
| nonanoic acid                | 17,939 | 18,200 | 21,545 | 17,530 | 14,482 | 13,301 | 14,610 | 12,755 | 12,359 | 13,721 |
| nonanoic acid, other related | 944    | 958    | 1,134  | 923    | 762    | 700    | 769    | 671    | 649    | 722    |
| nosema locustae spores       | <0.01  | 1      | <0.01  | <0.01  | <0.01  | 1      | <0.01  | <0.01  | N/A    | <0.01  |
| oil of anise                 | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | N/A    |
| oil of black pepper          | <0.01  | <0.01  | 1      | 1      | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  | <0.01  |
| oil of cedarwood             | N/A    | N/A    | N/A    | N/A    | <0.01  | <0.01  | N/A    | N/A    | N/A    | N/A    |
| oil of citronella            | 46     | N/A    | N/A    | 1      | 5      | <0.01  | 1      | <0.01  | 1      | 1      |
| oil of jojoba                | 1,232  | 507    | 135    | 376    | 44     | 19     | 2      | N/A    | 12     | N/A    |
| oil of lemon eucalyptus      | <0.01  | 3      | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |

| <b>Chemical</b>   | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>oil of orange</b>  | N/A         | N/A         | N/A         | N/A         | 198         | 386         | 1,360       | 479         | 487         | 506         |
| <b>oxypurinol</b>   | N/A         | N/A         | N/A         | <0.01       | N/A         | N/A         | N/A         | N/A         | N/A         | <0.01       |
| <b>paecilomyces fumosoroseus apopka strain 97</b>   | N/A         | 508         | 3,302       | 5,951       | 5,631       | 8,947       | 8,659       | 5,100       | 8,344       | 8,646       |
| <b>pantoea agglomerans strain e325, nrri b-21856</b>  | 1           | 1           | 1           | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         | N/A         |
| <b>phenylethyl propionate</b>   | 423         | 535         | 701         | 712         | 185         | 96          | 140         | 34          | 20          | 15          |
| <b>phosphoric acid, monopotassium salt</b>  | 9,079       | 3,927       | 1,918       | 374         | 9,585       | 15,002      | 11,445      | 10,125      | 3,350       | 275         |
| <b>piperine</b>   | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       |
| <b>polyhedral occlusion bodies (ob's) of the nuclear polyhedrosis virus of helicoverpa zea (corn earworm)</b> | 51          | 6           | 1           | 2           | 4           | 20          | 41          | 41          | 22          | 32          |
| <b>polyoxin d, zinc salt</b>  | 3,519       | 4,738       | 6,731       | 7,412       | 8,613       | 10,308      | 10,655      | 11,455      | 13,146      | 11,802      |
| <b>potassium bicarbonate</b>  | 358,917     | 229,238     | 239,909     | 223,547     | 318,119     | 462,830     | 489,086     | 350,400     | 470,446     | 313,835     |
| <b>potassium phosphite</b>  | 279,964     | 281,901     | 390,547     | 708,940     | 666,757     | 952,554     | 1,167,494   | 1,205,221   | 1,652,976   | 1,408,631   |
| <b>potassium silicate</b>   | 1,412       | 988         | 5,407       | 23,582      | 36,525      | 25,901      | 33,039      | 13,821      | 28,004      | 51,209      |

| Chemical   | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   | 2017    | 2018    | 2019    | 2020    |
|--|--------|--------|--------|--------|--------|--------|---------|---------|---------|---------|
| potassium sorbate  | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | 3       |
| propylene glycol   | 50,584 | 60,679 | 86,335 | 90,353 | 87,138 | 91,155 | 103,909 | 108,383 | 122,404 | 103,531 |
| propyleneglycol monolaurate                              | N/A    | N/A    | 203    | 44     | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| pseudomonas chlororaphis subsp. aurantiaca strain afs009 | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | 3,387   |
| pseudomonas fluorescens, strain a506                     | 274    | 59     | 92     | 270    | 87     | 123    | 111     | 113     | 66      | 38      |
| pseudomonas syringae, strain esc-10                      | N/A    | N/A    | 3      | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| purpureocillium lilacium strain 251                      | 515    | 840    | 4,073  | 5,031  | 6,408  | 6,273  | 5,474   | 3,817   | 2,939   | 3,417   |
| putrescent whole egg solids                              | 1      | 1      | 1      | 1      | 1      | 6      | 5       | 6       | 2       | 6       |
| pythium oligandrum dv74                                  | <0.01  | <0.01  | <0.01  | N/A    | N/A    | N/A    | N/A     | N/A     | N/A     | N/A     |
| qst 713 strain of dried bacillus subtilis                | 23,965 | 23,645 | 24,605 | 20,969 | 20,919 | 21,063 | 21,952  | 21,291  | 25,549  | 19,020  |
| quillaja   | 1,081  | 785    | 1,040  | 775    | 829    | 1,027  | 1,385   | 1,452   | 1,636   | 1,259   |
| reynoutria sachalinensis                                 | 14,844 | 14,803 | 15,355 | 16,105 | 18,362 | 23,508 | 23,644  | 20,091  | 23,168  | 23,759  |
| s-abscisic acid  | 1,854  | 2,651  | 2,131  | 2,382  | 2,114  | 2,192  | 2,220   | 1,861   | 1,856   | 1,222   |
| s-methoprene   | 2,313  | 2,324  | 2,331  | 2,524  | 2,781  | 3,220  | 3,133   | 4,077   | 11,691  | 4,178   |
| sawdust  | N/A    | 4      | 4      | N/A    | N/A    | 1      | N/A     | N/A     | N/A     | <0.01   |
| sesame oil   | 1,327  | 15     | <0.01  | N/A    | N/A    | N/A    | N/A     | 2       | N/A     | N/A     |
| silver nitrate   | <0.01  | <0.01  | N/A    | N/A    | N/A    | <0.01  | <0.01   | N/A     | <0.01   | <0.01   |

| Chemical                                   | 2011    | 2012    | 2013    | 2014    | 2015    | 2016    | 2017    | 2018    | 2019    | 2020    |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| sodium bicarbonate                         | 515     | 179     | 44      | 479     | 420     | 13,604  | 3,679   | 3       | N/A     | 1       |
| sodium carbonate peroxyhydrate             | 298,763 | 300,693 | 295,762 | 463,448 | 244,233 | 261,347 | 165,621 | 329,252 | 276,474 | 277,896 |
| sodium chloride                            | 169     | 111     | 119     | 211     | 216     | 128     | 81      | 110     | 147     | 82      |
| sodium lauryl sulfate                      | 458     | 884     | 431     | 570     | 1,749   | 507     | 1,200   | 1,334   | 1,148   | 1,223   |
| sorbitol octanoate                         | 35      | N/A     | N/A     | N/A     | N/A     | N/A     | <0.01   | N/A     | N/A     | N/A     |
| soybean oil                                | 24,109  | 22,065  | 45,973  | 59,297  | 69,771  | 84,295  | 80,999  | 82,753  | 70,316  | 70,934  |
| streptomyces griseoviridis strain k61      | <0.01   | <0.01   | 10      | 11      | 18      | 5       | 4       | 2       | 1       | <0.01   |
| streptomyces lydicus wyc 108               | 1       | 2       | 3       | 3       | 3       | 4       | 3       | 2       | 3       | 2       |
| sucrose octanoate                          | 230     | 55      | 188     | 98      | 203     | 29      | 7       | N/A     | N/A     | N/A     |
| sugar                                      | 448     | 1,240   | 51      | 16      | 60      | 667     | 4       | 20      | 775     | 120     |
| thyme                                      | 665     | 844     | 1,135   | 1,150   | 257     | 122     | 181     | 25      | 11      | 9       |
| thyme oil                                  | N/A     | N/A     | N/A     | N/A     | 1       | 3       | 12      | 7       | 7       | 3       |
| thymol                                     | 265     | 181     | 398     | 314     | 278     | 570     | 564     | 679     | 162     | 455     |
| trichoderma harzianum rifai strain krl-ag2 | 129     | 158     | 186     | 86      | 65      | 112     | 64      | 86      | 95      | 80      |
| trichoderma icc 012 asperellum             | 13      | 19      | 43      | 2       | 2       | 9       | 4       | 1       | 32      | 24      |
| trichoderma icc 080 gamsii                 | 13      | 19      | 43      | 2       | 2       | 9       | 4       | 1       | 32      | 24      |
| trimethylamine                             | N/A     | N/A     | <0.01   | N/A     | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   | <0.01   |
| ulocladium oudemansii (u3 strain)          | N/A     | N/A     | 29      | 792     | 516     | 155     | 34      | 2,131   | 1,444   | 836     |
| vanillin                                   | 1       | 1       | <0.01   | <0.01   | 1       | N/A     | <0.01   | 2       | <0.01   | <0.01   |
| vegetable oil                              | 514,884 | 276,278 | 315,218 | 267,446 | 485,628 | 517,951 | 665,971 | 828,425 | 669,353 | 581,767 |

| <b>Chemical</b>                            | <b>2011</b> | <b>2012</b> | <b>2013</b> | <b>2014</b> | <b>2015</b> | <b>2016</b> | <b>2017</b> | <b>2018</b> | <b>2019</b> | <b>2020</b> |
|--|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>xanthine</b>                            | N/A         | N/A         | N/A         | <0.01       | N/A         | N/A         | N/A         | N/A         | N/A         | <0.01       |
| <b>yeast</b>                               | 1,165       | 818         | 80          | 32          | 86          | 14          | 4           | 12          | <0.01       | <0.01       |
| <b>yucca schidigera</b>                    | 1,649       | 7,147       | 12,327      | 5,652       | 2,565       | 3,130       | 2,173       | 5,733       | 6,806       | 4,935       |
| <b>z,e-9,12-tetradecadien-1-yl acetate</b> | 7           | 6           | 14          | 122         | 20          | 10          | 21          | 62          | 159         | 20          |
| <b>z-11-tetradecen-1-yl acetate</b>        | 4           | 8           | 8           | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       | <0.01       |
| <b>z-8-dodecenol</b>                       | 34          | 48          | 44          | 38          | 98          | 60          | 201         | 47          | 52          | 93          |
| <b>z-8-dodecenyl acetate</b>               | 3,010       | 4,005       | 3,467       | 3,248       | 4,461       | 4,300       | 6,479       | 4,157       | 4,048       | 8,206       |
| <b>Total</b>                               | 4,439,952   | 4,320,493   | 5,090,982   | 6,167,978   | 6,883,247   | 7,690,006   | 8,119,184   | 8,399,943   | 8,648,896   | 8,614,408   |