

TITLE: META-ANALYSIS OF MEBR AND ALTERNATIVES FOR PEST CONTROL IN STRAWBERRY AND TOMATO

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The EPA evaluated a meta-analysis technique to compare methyl bromide (MeBr) with its potential alternatives because of its possible utility in comparing treatments across studies. While meta-analyses are commonly used in the medical and social sciences they are not typically used in agricultural sciences; agricultural science publications typically do not provide enough information regarding within and across study variability. For this reason statistical experts were consulted to develop a novel approach to calculate variability among and within studies, absent the required information to conduct a meta-analysis. The meta-analysis included studies that measured strawberry and/or tomato yields for each of the following: untreated control (i.e., with no chemical or non-chemical alternatives to MeBr), MeBr treatment, and potential alternative treatments. The analysis excluded experiments if the difference in MeBr yield and yield under untreated control (control yield) was less than 10 percent. This work evaluated data from over 400 studies, from which 59 strawberry experiments and 32 tomato experiments met the selection criteria for the meta-analysis.

The preliminary meta-analysis evaluated differences between the potential alternative treatments and the untreated control using a confidence interval (95 percent). The first question addressed was whether the rates of methyl bromide tested (low is < 224 kg/ha of MeBr:chloropicrin; medium is ≥ 224 and ≤ 392 kg/ha; and high is ≥ 392 kg/ha) produced statistically different results in yield from the untreated control. For strawberries in California the low rate of methyl bromide:chloropicrin was not statistically different than the untreated control. In Florida strawberries the medium rate was not statistically different from the control. For strawberries produced in Spain the low, medium, and high rates were all statistically different than the untreated control. For tomatoes in Florida the low and medium rates were not statistically different than the untreated control. The result of the meta-analysis indicates that there is a lack of available alternatives to MeBr for the U.S. and that methyl bromide does not work similarly in all sites and for all rates. The outcome of the meta-analysis work supports the U.S. claim that lower rates suggested by Methyl Bromide Technical Options Committee (MBTOC) are not effective in the U.S. under situations of moderate to high pest pressure (i.e., where pest pressure would result in >10 percent yield loss).