The final specification of each model was based on research into the production technology and their agronomic relationships with pests and pesticides. As discussed above, it was often concluded that more than one mode of action could be at work between residues and a particular attribute, practice, or environmental factor. Also any given practice may have different impacts on different types of pests and the pesticides used to control them. Thus in many cases, it was not possible to hypothesize a definitive sign or direction to a relationship. A brief accounting of the modes of action and expected signs of all the hypothesized relationships for the three models is provided in Table 5. Where appropriate, the modes of action are coded numerically as was described in the Conceptual Framework section (i.e., either 1, 2, or 3). The expected signs are either negative (–), positive (+), or ambiguous (±). Indirect modes of action, as described with respect to attributes, are indicated with an arrow (→) followed by the relevant code number. A brief description of the empirical representation of each variable is given in Table 6.

Aggregation of Left and Right Hand Side Variables

Attribute and General Practice models were implemented with explanatory variable data aggregated and disaggregated across commodities. No individual growers were sampled for both tomatoes and strawberries. Preliminary models using aggregated strawberry and tomato data did not perform as well as those for each commodity alone. The use of intercept and slope shifting dummy variables as a way around this was considered, but found to be impractical given the loss in degrees of freedom and the added difficulty of interpretation.

Each of the three models were regressed on residues aggregated at two of three different levels. Both Attribute and General Practice models were regressed against the unweighted sum of all types of residues and then on residues aggregated as either insecticides or fungicides (there were only three grower samples containing herbicide residues). The Specific Practices models where specified for each particular generic chemical residue detected and then for residues aggregated as either insecticides or fungicides.

Data-Related Regression Problems

There were a small proportion of survey questions which experienced significant rates of refusal by interviewees. These included: firm objectives, planting and harvest dates, crop yields and grades, target pests, levels of infestation, pesticide application dates, and pesticide application rates. Generally, the more detailed or personal the questions, the higher the refusal rate. A respondent's refusal to answer a specific question in an interview creates missing values for that observation in the data set. To avoid losing a whole observation, these missing values were amended using the zero-order method. This involves replacing each missing value with the average of all non-missing observations or responses for that particular variable or question. Provided there is no self-selection bias, this is a statistically neutral and valid means of mitigating this problem. In some cases, a high refusal rate contributed to a decision to drop certain variables from the analysis altogether.