Empirical Results

Model statistics, estimated coefficients and t-tests for the OLS-Principal Component regressions are presented in Tables 8 through 15. Results for each commodity in each model are given in individual tables. Within each table, results for different aggregations of the dependent variable are shown in separate columns and labeled accordingly. Performance statistics for each regression are located in the top section of each table. These include: the number of observations and regressors; the degrees of freedom; the number of principal components retained in the model (if this number equals the number of regressors, then the principal components procedure was not applied); F tests for the significance of the overall regression and the principal components restriction when applicable, and; measures of the goodness of fit in the form of R^2 and adjusted R^2 statistics. Coefficients and significance levels (p values) for each variable can be read horizontally from left to right across the lower half of each table. All variables were centered and normalized as a prerequisite for the application of principal components (Chatterjee and Price). This has the added benefit that coefficients are comparable in terms of proportions of their standard deviation. Shaded cells are used to indicate those regressions and coefficients which were significant at the 0.10 level or better in a 1-way test.

Attributes Models

The outcome of six regressions using the Attributes model (equation (6b)) are given in Tables 8 and 9. Attribute models for tomatoes and strawberries were each regressed on insecticide and fungicide residues separately, and then combined. All regressions were significant at the 0.02 level, except for insecticides in strawberries. The poor performance of this regression is probably due to the fact that only 38 percent of the strawberry samples were found to contain any insecticide residues. In comparison, fungicide residues were detected in over 94 percent of strawberry samples. Adjusted R^2 statistics for the significant attribute regressions ranged from 0.330 to 0.438. The regressions on insecticides and fungicides combined did not out-perform those on each type of pesticide individually, except of course for insecticides in strawberries. Principal components were not used in the regressions for combined fungicides and insecticides, and fungicides alone in strawberries.

The first four variables in each attributes regression measured the relationships between residues and the characteristics of the pest management decision-maker. The position or function of this decision-maker within the firm was coded so that higher values were assigned to individuals further removed from ownership (i.e., an owner was designated as a 1; partner, 2; and a manager, 3). For tomatoes, decision-makers further removed from ownership had significantly lower fungicide residues but greater insecticide residues. In the strawberry regressions the function coefficients had the same signs as in the tomato model but none were significant. Coefficients for education and certification were significantly positive for fungicides and aggregate residues in strawberries, and education was significantly positive for fungicides in tomatoes. These results contradict the hypothesized relationship that education and training should reduce the incidence of pesticide residues in produce. Years of experience was insignificant in all regressions.