# Integrated Pest Management (IPM) Indicator Used in CEAP Cropland Modeling

Danesha Seth Carley, North Carolina State University, Raleigh, NC
Harold Coble, USDA ARS, Raleigh, NC
Robert L. Kellogg, USDA NRCS, Beltsville, MD

December 8, 2010

WORKING DRAFT

## Introduction

The USDA Conservation Effects Assessment Project (CEAP) was designed to quantify the effects of conservation practices that are applied on agricultural lands. Management practices that reduce the potential for loss of pesticides from farm fields consist of a combination of Integrated Pesticide Management (IPM) techniques and water erosion control practices. IPM consists of a management strategy for prevention, avoidance, monitoring, and suppression of pest populations. When the use of pesticides is necessary to protect crop yields, selection of pesticides that have the least environmental risk is an important aspect of the suppression component of IPM.

CEAP analysis uses the physical process model Agricultural Policy/Environmental eXtender or APEX (Williams et al., 2008; Gassman et al. 2010) to quantify pesticide losses at the edge of the field and the bottom of the soil profile. To estimate the effects of conservation practices, two model scenarios were constructed for each CEAP sample point, as described in the CEAP cropland reports. A baseline scenario, the "baseline conservation condition" scenario, provides model simulations that account for cropping patterns, farming activities, and conservation practices as reported in the NRI-CEAP Cropland Survey and other sources. An alternative scenario, the "no-practice" scenario, simulates model results as if no conservation practices were in use, including IPM, but holds all other model inputs and parameters the same as in the current conservation condition scenario. The effects of conservation practices are obtained by taking the difference in model results between the two scenarios.

The benefits of IPM practices were estimated in terms of reduced pesticide loss from fields and the associated environmental risk.[1] An IPM indicator was developed on the basis of survey responses to IPM-related questions in the NRI-CEAP Cropland Survey. To estimate the effects of IPM practices, the no-practice scenario was adjusted to represent a reduction in pesticide applications that would be expected on operations that practiced IPM. A likely result of IPM, in particular monitoring activities, would be pesticide applications based on observed pest problems rather than routine prophylactic applications. Thus, by only applying pesticides when they are needed, the total application of pesticides for a region would be expected to decrease under IPM. The benefits of this behavior were simulated by adding additional pesticide applications to the no-practice representation. For samples with a high level of IPM, the first application event between planting and 30 days before harvest was replicated twice for each crop, one week and two weeks after its original application, to simulate routine prophylactic applications. For samples with a moderate level of IPM, the first application event was replicated one time for each crop, one week after its original application. In addition, all soil-incorporated pesticide applications in the baseline condition for samples classified as having either high or moderate IPM use were changed to surface applications for the no-practice scenario to capture the benefits of application method where it occurred.

This report documents the development of the IPM indicator that was used in the CEAP cropland modeling.

## FORTHCOMING…

[1] The effects of conservation practices on pesticide losses were evaluated using potential risk indicators, as described in "Pesticide Risk Indicators Used in CEAP Cropland Modeling," available at http://www.nrcs.usda.gov/technical/nri/ceap/Cropland.html.

.