# Measuring IPM Utilization in Production Agriculture Using PAMS and the IPM Road Map.

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## Abstract

**The success of a program is measured by the ability to impart knowledge and then demonstrate the adoption and use of practices. With this in mind, we are developing a tool to score the utilization of IPM practices and techniques. Developed by the National Foundation for IPM Education, the PAMS (Prevention, Avoidance, Monitoring and Suppression) approach was utilized to measure the level of IPM utilization by producers, crop consultants and county extension agents who participated in Kentucky IPM training programs. In 2005, participants in IPM trainings completed surveys that included questions to determine their use of specific IPM practices or techniques. Each of these questions was identified as an indicator for one or more of the PAMS components. By scoring the answers to these questions, participants were placed on a continuum of IPM utilization as defined by the PAMS approach. This performance measure was conducted on a pilot scale, and will hopefully be used to measure progress and identify needs in meeting strategic directions of the IPM Road Map on a much larger scale.**

## Introduction

**Measuring the impact of Integrated Pest Management (IPM) has been a long standing goal of the program. However, this goal has been elusive, due in large part to our inability to agree upon a definition of IPM and methods of measurement. Generally then this effort has devolved upon individual program each in turn developing their own scheme. One early attempt by Kentucky IPM (UK-IPM) to provide a mathematical scale of IPM utilization was undertaken for field crops (Johnson and Lucas 1998). This effort generally consisted of asking respondents questions about basic IPM practices accepted for Kentucky and gauging their commonness of use. The assessment of these practices used an agree / disagree scale which was then scored on a 1 to 5 mathematical scale. Additionally, a "throw-out" question regarding calendar sprays was included which eliminated the respondent from IPM practitioners if they answered in the affirmative. The minimum score to be considered an IPM practitioner was set at a numeric level indicating that all the IPM positive questions were employed equal to or greater than half the time, and that the "throw-out" questions were answered in the negative. In addition to this minimum level, respondents could then be arrayed on the mathematical scale indicating a relative level of IPM adoption.**

**Building upon this original idea, we have incorporated the general format of asking questions and assigning values to the answers within the context of the Prevention, Avoidance, Monitoring, Suppression (PAMS) approach (Anonymous n.d.) of evaluation that has been proposed at the national IPM level. This approach says in part that an IPM practitioner should include at least one practice from three of the four PAMS categories.**

**This poster addresses our first attempts to utilize this process to score IPM practitioners and to evaluate the survey instrument for further use on a large scale.**

## Methods (abbreviated for this format)

**Three separate cohorts of participants were selected to complete the survey. These cohorts were comprised of participants attending either: 1.) an in-depth, county based IPM school, (county) 2.) an annual update session for field crops production (Princeton) or an annual update session for vegetable crops (Quicksand). Each participant was asked several questions designed to classify them demographically, questions describing their pesticide training and experience and a series of questions used to gauge their use of certain IPM practices (PAMS practices).**

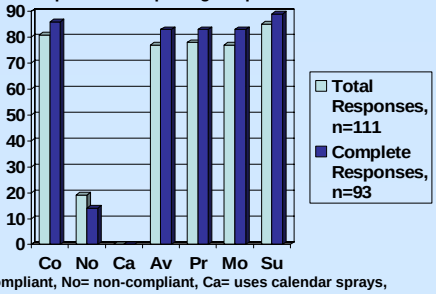
**Twelve of these questions were developed to determine whether or not an individual was a practitioner of IPM (PAMS series). Eleven of the questions were "IPM supportive" and dealt with practices that should be included in an IPM program. A single "non-IPM supportive" question dealt with a practice (calendar spraying) that is incompatible with IPM. The questions were scored by having the individual circle one 'descriptive term', in a range of five, which most closely illustrated their use pattern of these practices. The 'descriptive terms' were, in order: Never, Sometimes, Usually, Most of the time and Always. These responses are scored as 0, 1, 2, 3, and 4 respectively. The twelfth ("non-IPM supportive") question was scored in reverse. In addition to the numeric score, each "IPM supportive" question was assigned to represent one of the PAMS principals.**

**Minimum IPM practitioners via PAMS definition. To be included in the group of IPM practitioners each respondent must have answered "yes" to at least one question, in at least three of the four PAMS principal areas. The "yes" requires an answer of either "most of the time" or "always" to the actual survey question. Additionally, the respondent must have answered the "non-IPM supportive" question as "Never" or "Sometimes".**

## Results

**Minimum IPM practitioners via PAMS definition. Figure – 1., illustrates the level of IPM practice for survey respondents. Additionally, these results have been divided into two groups, the complete group of respondents (Total) and a subset group that is comprised of respondents that answered every question in the PAMS series (Complete). The original evaluation of results indicated that 81% of the respondents met the minimum IPM test, while 19% did not. However, after review it became apparent that this number was skewed downward because not all respondents answered all the questions in the PAMS series. Because the questions for minimum compliance were scored "yes" or "no", not supplying an answer has the effect of answering "no", thus inflating the "non-compliant" value. Thus it appears that a more appropriate figure for IPM compliance using the PAMS model is the 86% compliance of the "Complete" group. In either case the figure is quite high.**

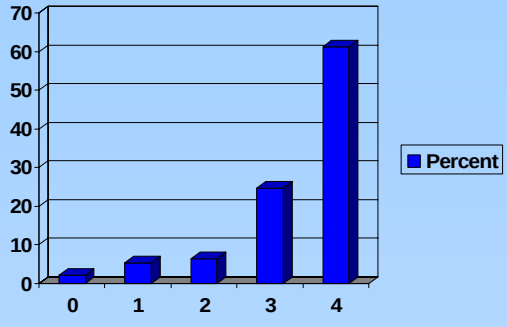
**Figure 1. Percentage compliance with PAMS categories between total responses and responses completing all questions.**




**Where: Co = Compliant, No= non-compliant, Ca= uses calendar sprays, Av= Avoidance, Pr= Prevention, Mo= Monitoring, Su= Suppression**

**Another method of viewing the level of PAMS compliance is shown in Figure 2. In this case we can clearly see that a majority of respondents (86%) indicated their use of three or four PAMS principals, and of that, a clear majority of respondents (61%) utilized techniques from all four PAMS principals.**

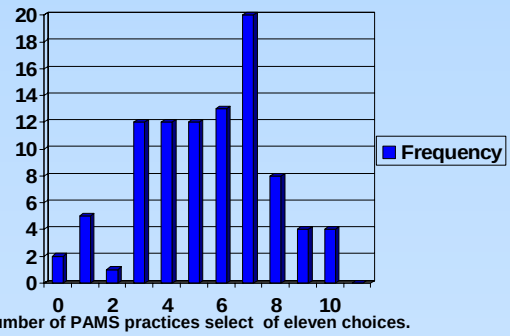
**Figure 2. Percent of individuals indicating they routinely used 0 through 4 PAMS principals.**




**n= 93.**

**Though not strictly a measure of PAMS compliance per se, Figure 3. illustrates that most individuals utilize multiple IPM techniques. Of the eleven IPM techniques available, the average number chosen was 5.5, with the median at 6 and the mode at 7.**

**Figure 3. Distribution of total PAMS practices selected.**




**n= 93**

**One might argue that these groups are not a good test for compliance as they are attending IPM trainings. On the surface one might expect higher scores because of their association with an IPM training. However, in Kentucky we have been teaching IPM for many years. Though these were training sessions sponsored by the UK-IPM program, only one program (county) contained basic IPM information. The other two (Princeton and Quicksand) were annual update sessions addressing new and / or changed information concerning specific commodities and pests.**

## Conclusions

**Though the sample size is small, respondents in this sample of Kentucky Ag-sector participants scored at high level of IPM participation via PAMS compliance.**

**We view this test a being very difficult because: 1.) there were a maximum of three practices for each PAMS area, when in reality there are probably many more activities that might have been included, 2.) the single "throw-out" question has a very harsh affect on the scoring and 3.) In our experience respondents are much less likely to answer in absolute terms; thus eliminating the "never" and "always" terms from the scoring.**

**Understanding the difference between questions that are answered in the negative, and questions that are not answered can have a major impact on interpretation of the results.**

**After review of this test and resulting changes we think this procedure will provide a multitude of ways to look at IPM acceptance including using the PAMS model as one set of criterion.**

## References

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