

**Lodi-Woodbridge Winegrape Commission**  
2003 and 1998 IPM Program Grower Questionnaires

---

# **2003 and 1998 Report of Results**

---

Prepared by  
Jeff Dlott, PhD  
and  
Franklin Dlott, MS



January 24, 2005

**Lodi-Woodbridge Winegrape Commission**  
2003 and 1998 IPM Program Grower Questionnaires

---

# **Table of Contents**

---

# **Lodi-Woodbridge Winegrape Commission**

## **2003 IPM Program Grower Questionnaire**

### **Table of Contents**

Introduction .....	<b>5</b>
Background on the LWWC IPM and Sustainable Farming Program.....	<b>5</b>
Why Conduct Surveys? .....	<b>7</b>
Methods: How the Surveys Were Conducted.....	<b>10</b>
Results Section 1: LWWC IPM Program Evaluation.....	<b>12</b>
Results Section 2: Monitoring.....	<b>18</b>
Results Section 3: Information Sources.....	<b>24</b>
Results Section 4: Vineyard Management Practices.....	<b>30</b>
Results Section 5: IPM Barriers and Perceptions.....	<b>38</b>
Results Section 6: Grower Demographics.....	<b>47</b>

**Lodi-Woodbridge Winegrape Commission**  
2003 and 1998 IPM Program Grower Questionnaires

---

# Introduction

---

## **INTRODUCTION<sup>1</sup>**

---

### **BACKGROUND ON THE LWWC IPM AND SUSTAINABLE FARMING PROGRAM**

The Lodi-Woodbridge Winegrape Commission (LWWC) was founded in 1991 through a vote of growers in Crush District 11. In 2003, LWWC represented approximately 700 growers producing winegrapes on more than 70,000 acres.

LWWC established an Integrated Pest Management (IPM) program in 1992. The initial IPM program has evolved into a district-wide sustainable farming program that includes three integrated components:

1. Grower Outreach;
2. Field Implementation; and
3. Area-Wide Implementation.

Grower outreach involves providing information to LWWC growers and pest control advisors (PCAs) about sustainable farming practices that are appropriate for use in their vineyards. The field implementation component involves working with a core group of more than 40 LWWC growers and 15 PCAs in 60 different vineyards. Various sustainable farming practices are implemented in these vineyards so the growers and other LWWC members can see the effects of these practices. Area-wide implementation involves

encouraging all LWWC members to become more active in implementing sustainable viticulture practices in their vineyards.

#### **Grower Outreach:**

LWWC's grower outreach program includes a range of venues designed to accomplish specific outreach goals. These venues include:

Breakfast Meetings—informal, monthly meetings with a presenter speaking about a field-proven sustainable viticulture practice. Presenters include a variety of university research and extension personnel and/or representatives from nonprofit organizations and private companies.

Workshops/Field Days—specific sustainable viticulture practices are demonstrated at events in the vineyard and “hands on” learning opportunities are provided. For example a technique or piece of equipment might be demonstrated.

Half-day Research Seminars—results from basic and applied research projects relevant to sustainable viticulture practices are presented in a formal meeting format. Presenters are generally University researchers.

Neighborhood Grower Meeting (NGM)—a LWWC grower or PCA invites their neighbors to come to their ranch to discuss specific sustainable viticulture topics.

---

<sup>1</sup> Adapted from the Lodi-Woodbridge Winegrape Commission's website section on sustainable viticulture (<http://www.lodiwine.com/viticultureprogram1.shtml>), December 2004.

Newsletter—LWWC produces a bimonthly newsletter that is mailed out to all LWWC members and other interested parties. Each issue typically includes a feature article on either the results of LWWC-funded research projects or guest articles on sustainable viticulture topics; a profile of an LWWC grower who is implementing sustainable farming practices; timely viticultural advice from Paul Verdegaal, the UC viticulture farm advisor; IPM tips for vineyard pest management; and a calendar of upcoming events.

### **Field Implementation:**

In 1995, LWWC received a three-year Biologically Integrated Farming Systems (BIFS) grant from the University of California Sustainable Agriculture Research and Educational Program (UC SAREP). This grant supported the development of LWWC's vineyard demonstration efforts.

LWWC continued field implementation after the initial funded ended. In 2003, there were 43 LWWC participating growers and the 15 PCAs. Participating growers have designated one or more of their vineyards as a demonstration vineyard where specific sustainable viticultural practices are being implemented. There are more than 60 vineyards and 2300 acres in the field implementation program.

All the activities in these vineyards are recorded in a computer database so that LWWC can track the effects of these sustainable practices on winegrape growing and vineyard inputs such as water, fertilizer and pesticides. The goal is to optimize the use of these inputs. Experience in these vineyards encourages other LWWC growers and PCAs to adopt sustainable practices in their vineyards.

These vineyards also make great locations for LWWC field days.

### **Area-wide Implementation:**

The long-term goal of LWWC's sustainable viticulture program is to have every district grower actively implementing sustainable farming practices in their vineyards. The *Lodi Winegrower's Workbook: A self-assessment of integrated farming practices* was written to accomplish this goal<sup>2</sup>. The workbook helps a grower to do the following: Identify the sustainable practices they are using in their vineyards; Identify areas of concern on their farms pertaining to sustainability and/or quality winegrape-growing; Develop an action plan and a timetable to carry out this action plan to deal with the identified areas or concern; Provides the grower with hands-on winegrape growing information.

The workbook program is being implemented by having workbook workshops at growers' houses throughout the district. A grower invites 5 to 10 of their neighbors to their house. LWWC staff provides each of the participants with a copy of the workbook. Participants are instructed how to use the workbook and then they do a self-assessment on one of their vineyards.

---

<sup>2</sup> Clifford P. Ohmart and Stephen K. Matthiasson, 2000. *Lodi Winegrower's Workbook: A Self-Assessment of Integrated Farming Practices*. Lodi-Woodbridge Winegrape Commission, Lodi, California.

## WHY CONDUCT SURVEYS

In order for LWWC to meet and enhance the usefulness of its IPM and sustainable farming program for growers, managers and PCAs, it is critical to evaluate progress and understand needs, attitudes and the state of current practices.

To these ends, The Lodi-Woodbridge Winegrape Commission (LWWC) contracted Dr. Jeff Dlott and his staff, to design and implement surveys. These surveys address specific areas about LWWC grower, manager, and PCA attitudes (perceptions and opinions) and behaviors (self-reported).

LWWC obtained funding through grants expressively for the purpose of having third-party evaluators conduct survey research. This report presents the combined results from the 1998 and 2003 surveys.

The report is organized into the following eight sections:

1. Introduction
2. Methods
3. LWWC IPM Program Evaluation
4. Monitoring
5. Information Sources
6. Vineyard Management Practices
7. IPM Barriers and Perceptions
8. Demographics

The *Methods* section discusses the procedures and limitations of the two surveys. *Section 1* provides results from an evaluation of the LWWC IPM program from 1992 to 1997 (1998 Survey) and from 1998 to 2002 (2003 Survey).

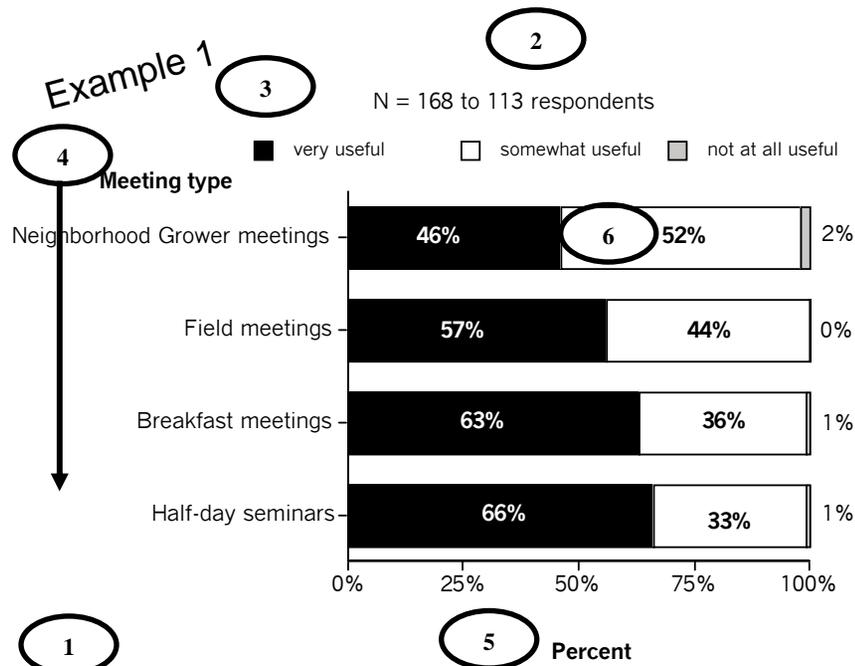
*Section 2* provides results on monitoring changes that have taken place since the establishment of the LWWC IPM program in 1992 (1998 Survey) and during the period from 1998 to 2002 (2003 Survey). *Section 3* shows the results from data collected on the information sources that members of the Commission find useful and includes what information they would like to have on a regular basis.

*Section 4* contains data on which IPM practices respondents have used as well as an evaluation on the efficacy of those practices. *Section 5* provides results from questions on perceived barriers, general perceptions of IPM as well as perceived threats and opportunities for winegrape production in the District. Also in section five is a graph illustrating the percentage of respondents who reported currently using IPM in 1998 and in 2003 as well as the percentage of respondents who were using IPM prior to the establishment of the Commission's IPM program.

*Section 6* is a collection of basic data on the demographics of respondents; growers, managers, PCAs and winery representatives. These data were collected to provide a demographic picture of Crush District 11.

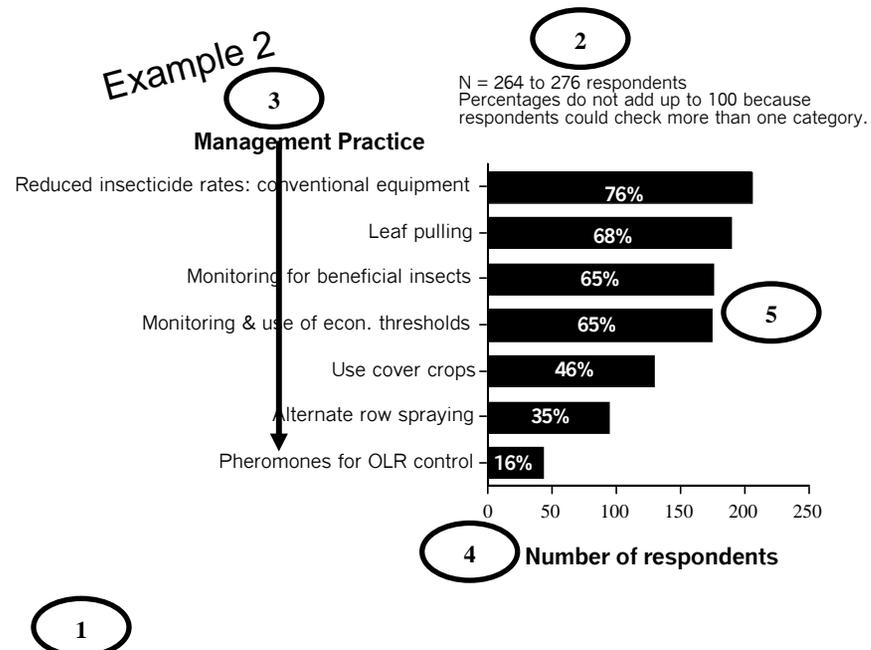
### **Graphs in this report**

Most of the graphs resemble the three graphs on the next two pages. The large numbers refer to explanations below the graph



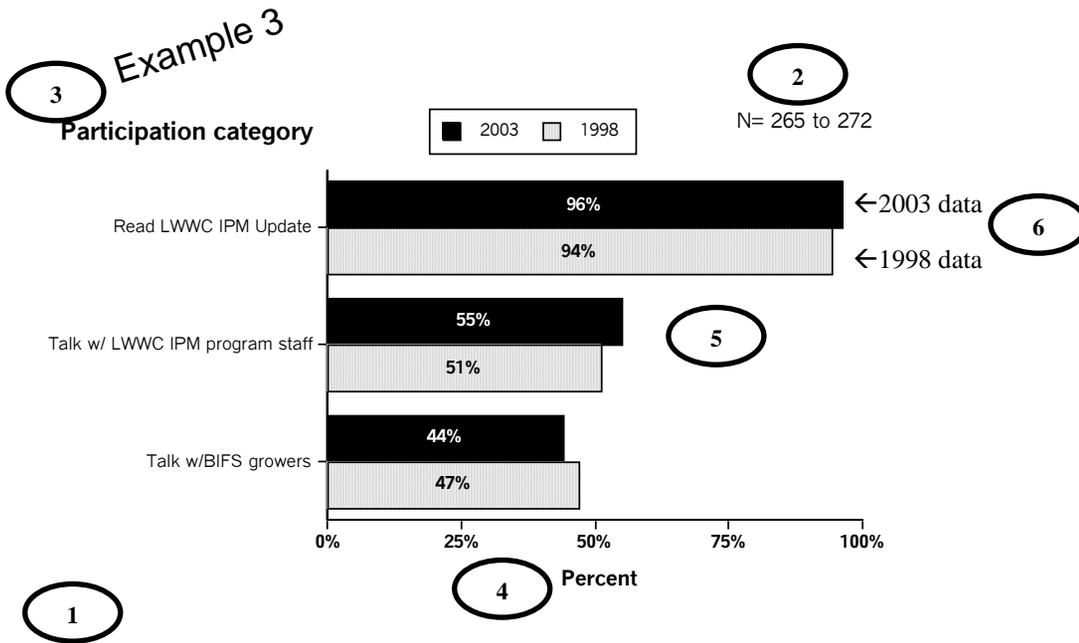
**Figure E1 (1998). Usefulness of LWWC-sponsored meetings**

- 1: The figure's title describes the graphs' information
- 2: Listed above the graph, the 'N' shows the number of valid responses to the question(s) covered in the graph.
- 3: The legend at the top describes the different categories of responses and their corresponding shades in the graph
- 4: Vertical information describes categories that were rated.
- 5: Horizontal information shows the percentage of respondents in each category
- 6: Percentages within and next to bars provide specific results per category.



**Figure E2. (1998). Insect management practices used**

- 1: The figure's title describes the graphs' information
- 2: Listed above the graph, the 'N' shows the number of valid responses to the question(s) covered in the graph.
- 3: Vertical information describes categories.
- 4: Horizontal information shows the number or proportions in each category
- 5: In most graphs, percentages provide additional information



**Figure E3. (1998 and 2003) Participation in LWWC IPM Program**

- 1: The figure's title describes the graphs' information
- 2: Listed above the graph, the 'N' shows the number of valid responses to the question(s) covered in the graph.
- 3: Vertical information describes categories.
- 4: Horizontal information shows the number or proportions in each category
- 5: In most graphs, percentages provide additional information
- 6: This graph shows 1998 and 2003 side by side comparisons

**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

---

**Methods:**  
**How the Surveys Were Conducted**

---

## **QUESTIONNAIRE DESIGN AND ADMINISTRATION**

Both the 1998 and the 2003 questionnaires were designed with guidance from the Lodi-Woodbridge Winegrape Commission Research Committee. The surveys were administered by the Commission.

**1998 Survey**—Two weeks following the first mailing of the questionnaire a reminder/thank you postcard was mailed to all growers, managers, and PCAs. Replacement questionnaires were mailed to those who had not returned their questionnaires at four, six and eight weeks after the initial mailing. This was done to secure a sufficient response rate for statistically reliable results.

**2003 Survey**—A similar procedure was used in 2003.

### **Data collection**

**1998 and 2003 Surveys**—Data was collected in five main areas of interest: 1) LWWC IPM Program evaluation, 2) Monitoring, 3) Information sources, 4) Vineyard management practices, 5) Grower, manager and PCA perceptions of IPM. A sixth section on grower demographic information was included to provide additional information about the population characteristics.

### **Data analysis**

**1998 and 2003 Surveys**—Returned questionnaires were coded and the information entered into a computer spreadsheet. Frequency distributions and cross-tabulations were calculated using SPSS, a standard statistical software package.

### **Sample size, missing data and reporting errors**

Occasionally, a respondent may not answer all of the questions or may provide an answer in an incorrect manner. Unanswered questions create missing data and cause the response number (N) to vary from figure to figure. Questions answered incorrectly due to misunderstanding, carelessness and so forth turn up in the

data as reporting errors. These were handled as missing data and lower the response number for some questions.

### **Limitations**

Like all surveys, these studies have limitations which should be considered when interpreting the results.

1. It is not possible to know whether the responses reflect actual behavior. This disadvantage applies to all such studies.
2. Data with a sample size of less than 30 were eliminated because such results are unreliable.
3. Growers, managers, and PCAs who did not return the questionnaire may differ from respondents in their evaluations of the LWWC IPM Program and their opinions of IPM. The validity and scope of the data is therefore bound by the response rate, discussed below.

### **Response Rate**

**1998 Survey**—A total of 608 valid surveys were mailed to LWWC growers, managers, and PCAs. Returned completed questionnaires totaled 288. This is a response rate of forty-seven (47) percent with a  $\pm 5$  percent sampling error rate. This means that the data presented for 1998 on the following pages are correct with  $\pm 5$  percent.

**2003 Survey**—A total of 695 valid surveys were mailed to LWWC growers, managers, and PCAs. Returned completed questionnaires totaled 307. This is a response rate of forty-four percent with a  $\pm 5$  percent sampling error rate. This means that the data presented for 2003 on the following pages are correct with  $\pm 5$  percent.

### **Confidentiality**

All survey responses were held strictly confidential. At no time were names linked to specific answers in reporting results. When analysis of the questionnaire is completed, all name and address files linked to questionnaire numbers are destroyed.

**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

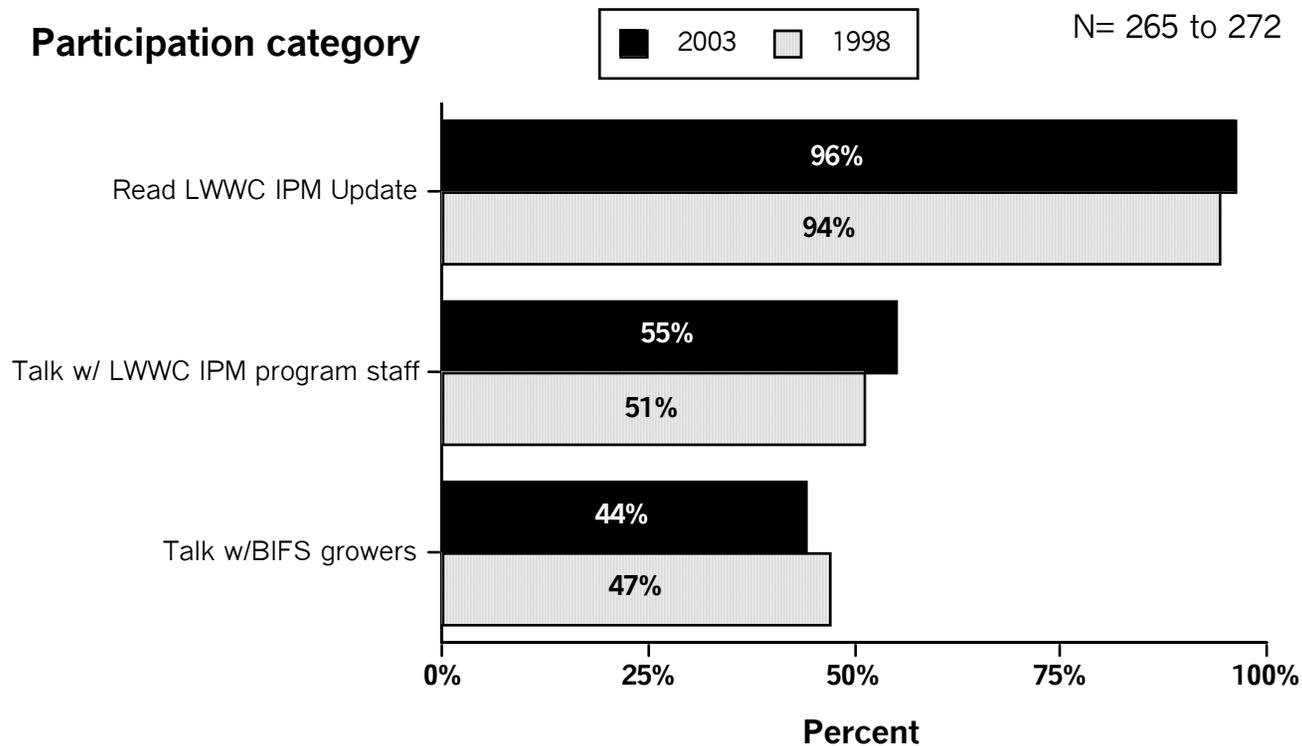
---

# **Results Section 1:**

## **LWWC IPM Program Evaluation**

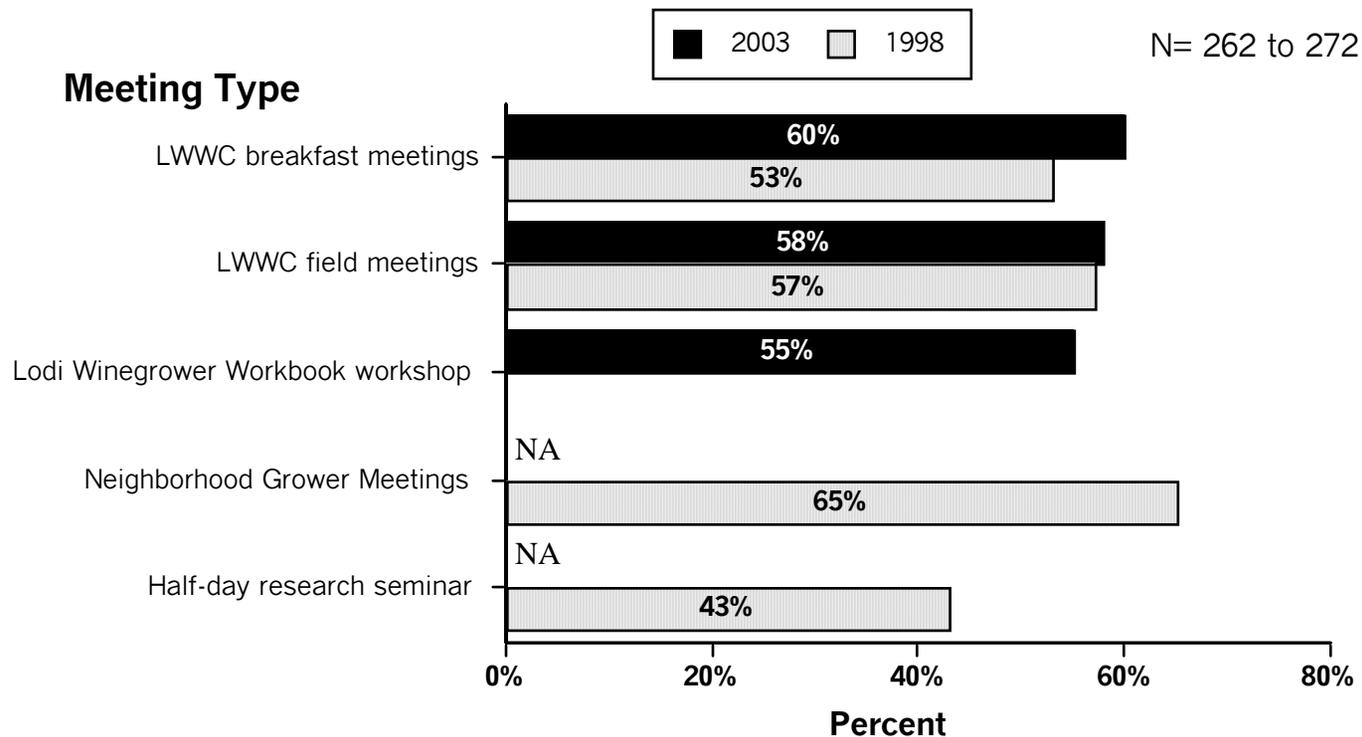
---

*Section 1 contains 6 graphs that represent responses to questions concerning the Commission's IPM Program from 1992-2002. Respondents were first asked their level of participation in the program—from reading the newsletter to talking to staff and/or attending meetings. Those who attended meetings were asked to evaluate the usefulness and quality of meeting components. Figures 1 through 4 provide an overall picture of participation, usefulness and the quality of the IPM Program's Grower Outreach component. Conclusions and recommendations are offered at the end of this section on page 17.*



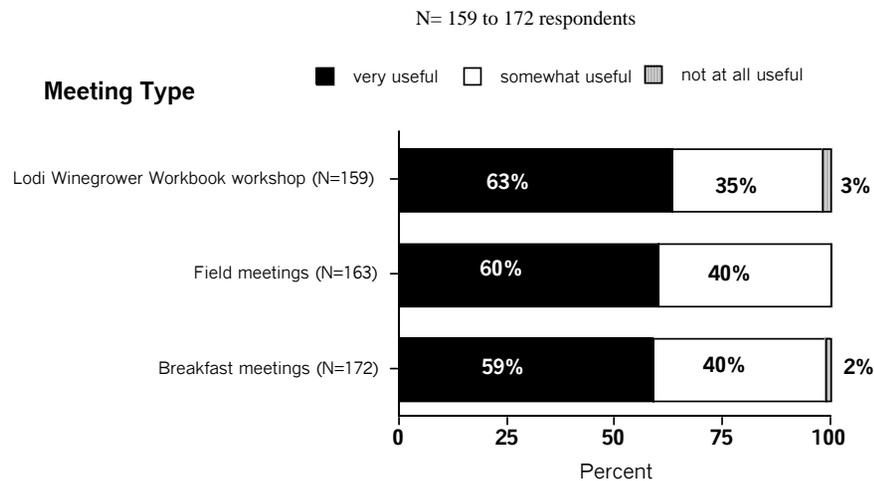
**Figure 1. (1998 and 2003) Participation in LWWC IPM Program**

Respondents were asked if they had read the LWWC *Research/IPM Update*, talked with the LWWC IPM program staff and/or talked with Biologically Integrated Farming Systems (BIFS) project growers since the establishment of the Commissions' IPM program. In 1998, 94 percent of the respondents had read the IPM Update, 51 percent had talked with program staff and 47 percent had talked to BIFS growers. In 2003, 96 percent of the respondents had read the IPM Update, 55 percent had talked with program staff and 44 percent had talked to BIFS growers. In 2003 sample size (N) was slightly higher at 272, compared to 265 in 1998.



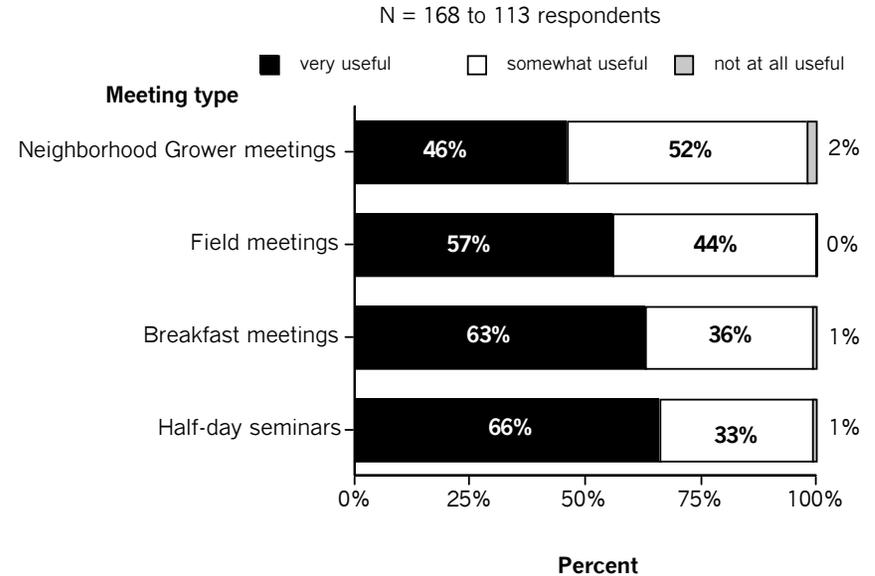
**Figure 2. (1998 and 2003) LWWC meeting participation**

Figure 2 shows the percentage of respondents attending the five different meeting types offered by the Commission since 1992. Data from 1998 show four meeting types, with most (65%) having attended a Neighborhood Grower Meeting, just over half attended LWWC field (57%) and LWWC breakfast meetings (53%), and the Half-day Research Seminar with the least attendance (43%). In 2003, three types of meetings were offered, all with over 50% respondent attendance. The Commission did not host Neighborhood grower meetings or Half-day Research Seminars in 2003. In 2003, attendance was nearly equal for LWWC breakfast meetings (60%), and LWWC field meetings (58%). The Lodi Winegrower Workbook Workshop meetings were new in 1998 with fifty-five (55) percent of respondents attending.



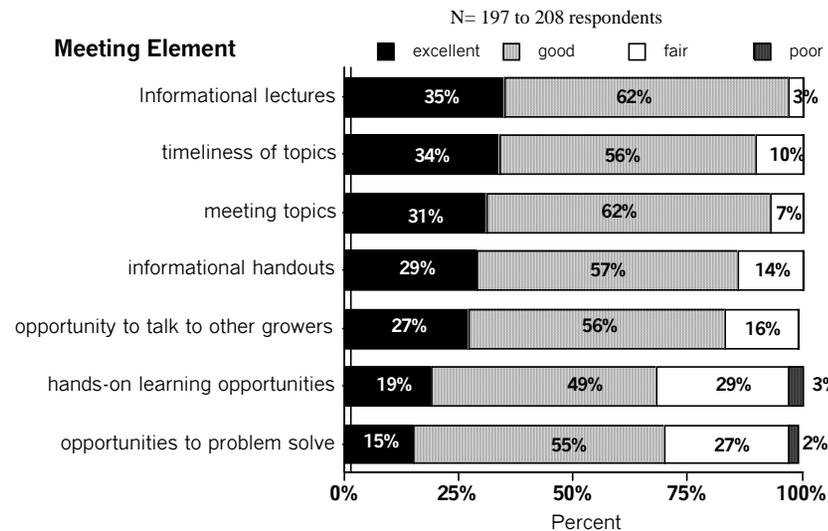
**Figure 3a (2003). Usefulness of LWWC-sponsored meetings**

Respondents who reported having attended at least one LWWC-sponsored meeting in the period from 1999-2002 were asked to rate the usefulness of these meetings (figure 3b). Almost all respondents (97%) reported that Lodi Winegrower Workbook workshops were at least somewhat useful. All respondents reported that field meetings were at least somewhat useful, with 60 percent of respondents rating field meetings as very useful. Nearly all (98%) found the breakfast meetings at least somewhat useful and of these 59 percent rated the meetings as very useful. Three percent (3%) reported the Lodi Winegrower Workbook workshop not at all useful, and 2 percent reported breakfast meetings to be not at all useful.



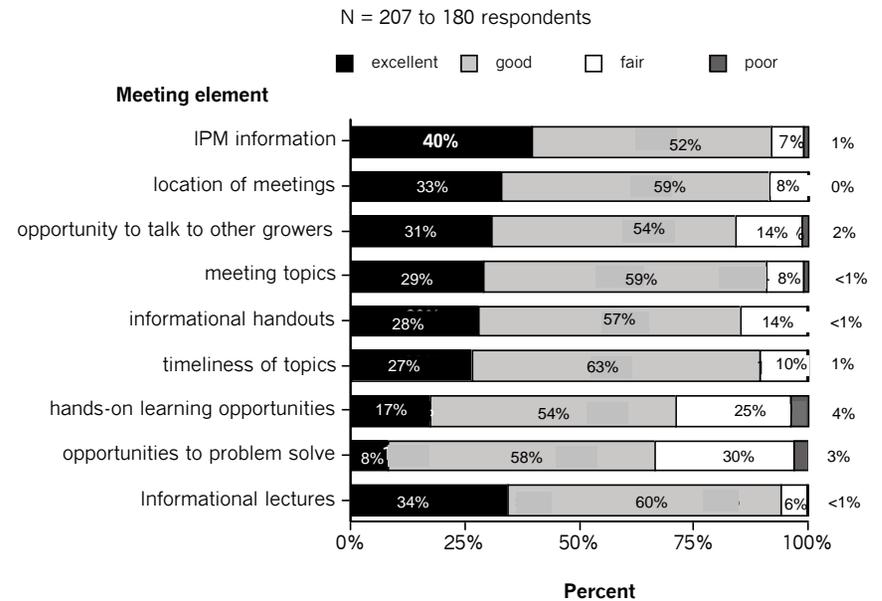
**Figure 3b (1998). Usefulness of LWWC-sponsored meetings**

Respondents who reported having attended at least one LWWC-sponsored meeting during the period between 1992 and 1998 were asked to rate the usefulness of these meetings (figure 3b). Almost all respondents (98%) reported that Neighborhood Grower meetings were at least somewhat useful. All respondents reported that Field meetings were at least somewhat useful, with 57 percent of respondents rating field meetings as very useful. Nearly all (99%) found the breakfast meetings at least somewhat useful and of these 63 percent rated the meetings as very useful. Respondents reported half-day seminars as very useful 66 percent of the time and nearly all (99%) found these meetings to be at least somewhat useful.



**Figure 4a (2003). Quality of meeting elements**

Respondents who reported having attended at least one LWWC-sponsored meeting in the three year period 1999-2002 were asked to rate the quality of meeting components. The meeting elements in figure 4a are presented in order of highest percentage of respondents that rated the element as *excellent*. Over 60% of respondents rated each meeting element as good or excellent. The only two meeting elements that received any poor ratings were *hands-on-learning opportunities* (3%) and *opportunities to problem solve* (2%). Both these elements tend to be fairly specific, and participants rating these elements as *fair* or *poor* may not have had their specific problem(s) addressed.



**Figure 4b (1998). Quality of meeting elements**

Respondents who attended at least one LWWC meeting in the period between 1992 and 1998 were asked to rate the quality of nine meeting elements at the meeting(s) they attended (figure 4b). Over 60% of respondents rated each meeting element as good or excellent. Less than 4% of respondents rated any element as poor.

## Section 1: LWWC IPM Program Evaluation

### Conclusions and Recommendations.

The Commission spends a considerable amount of resources on the Grower Outreach component of the IPM/Sustainable Farming program. The survey addressed participation, usefulness, and quality of the Grower Outreach components for growers, managers and PCAs.

***The survey results show strong program participation. In addition, the majority of participants reported that the Grower Outreach venues are of high quality and are useful to very useful.***

With over ninety percent of respondents from both surveys reporting that they had read the *LWWC Research/IPM Update*, and over half talking with program staff; the level of involvement in the program remains high.

Meeting attendance is also at an excellent level with over fifty percent attendance for both survey dates.

The meetings were rated as *not at all useful* by only handful of participants (3% or less), while over fifty-five percent of respondents rated meetings during the period from 1999 to 2002 as very useful.

Given the information above, it is reasonable to believe that if respondents who did not attend any meetings were to attend one, they would also find the meetings useful.

The overall quality of the different meeting components remains high. Less than 4% of respondents reported any meeting element as *poor* in 1998, and that figure dropped by one percent in 2003. The two areas identified as needing work in 1998, *hands-on learning opportunities*, and *opportunities to problem solve* continue to be areas where work is needed. However, the percent of respondents rating *hands-on learning opportunities*, and *opportunities to problem solve* as *excellent* improved from 1998 to 2003.

The quality of two meeting elements could be improved. These elements include:

- hands-on learning opportunities; and
- opportunities to problem solve.

These two meeting elements are the most difficult to address and may require a new grower outreach venue given the relatively low quality responses in both 1998 and 2003.

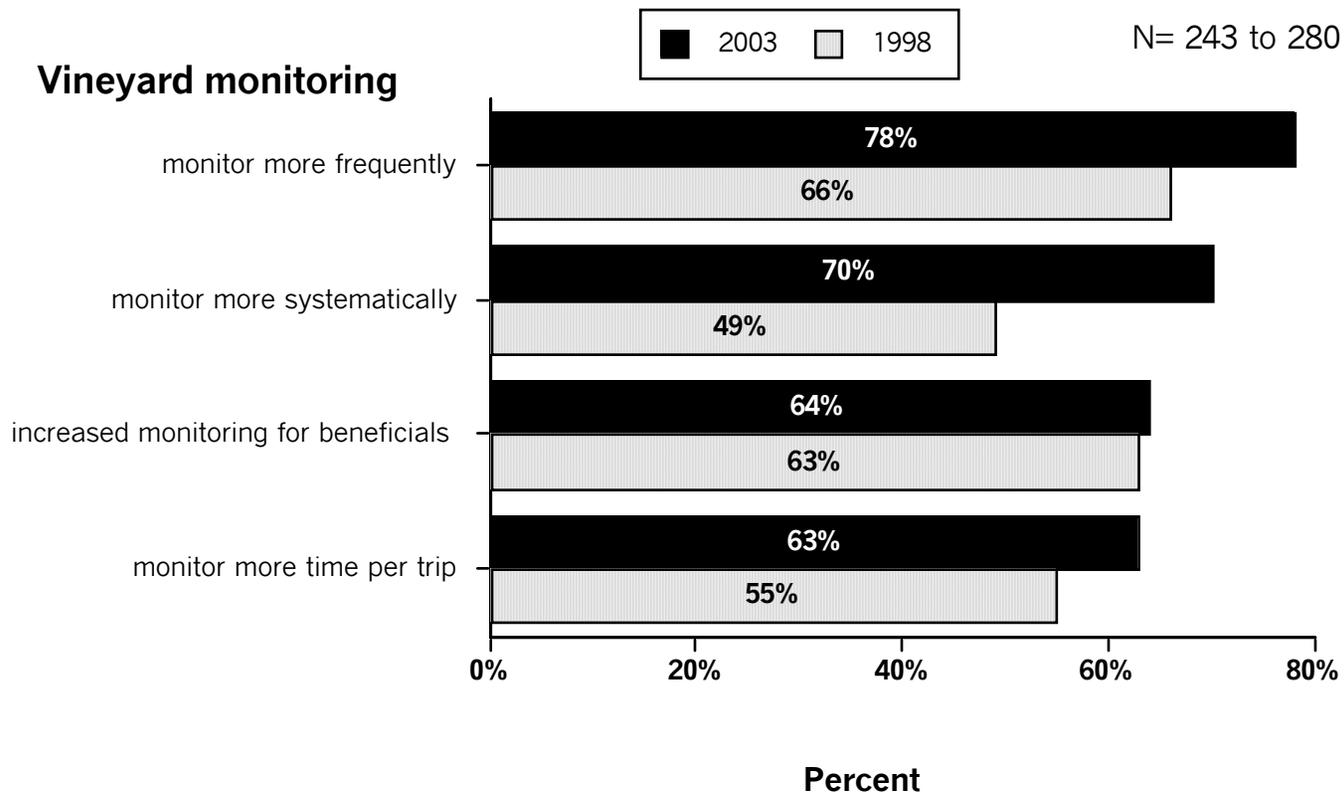
**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

---

## **Results Section 2: Monitoring**

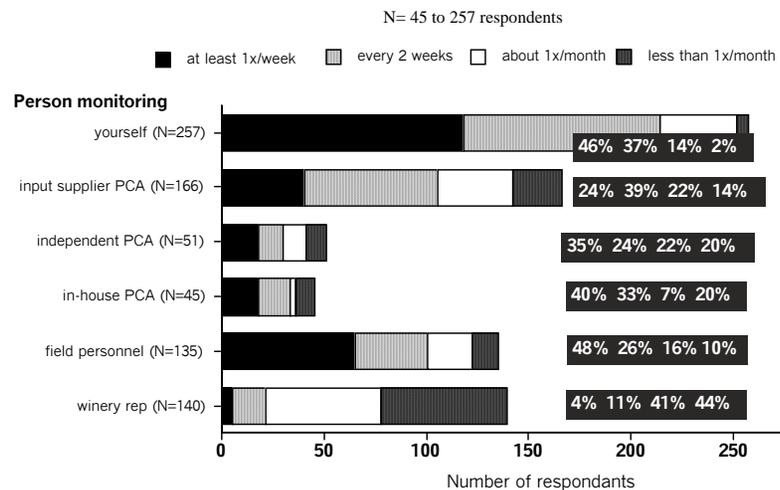
---

*In order to determine the impact that the LWWC IPM Program is having on growers, managers, and PCAs, respondents were asked a series of questions related to their monitoring practices—an important component to the program. Section 2 contains 5 graphs that represent responses to questions concerning how growers, managers, and PCAs monitor vineyards. Figures 5 through 8 provide an overall picture of monitoring in District 11. Conclusions and recommendations for monitoring are offered at the end of this section on page 23.*



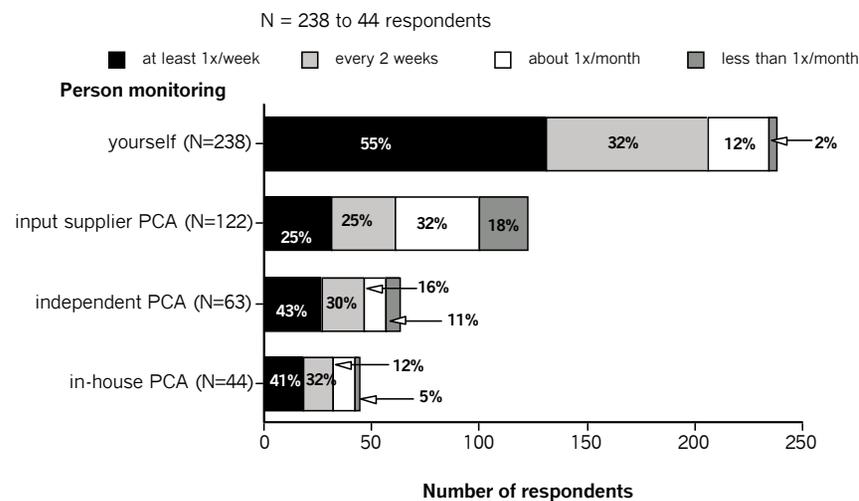
**Figure 5. (1998 and 2003) Changes in monitoring since 1992**

Vineyard monitoring is an important component of implementing a successful IPM program. Respondents were asked if they had changed their monitoring practices since the establishment of the LWWC IPM program in 1992 (figure 5). Modest to significant improvements were made in each category from 1998 to 2003. In 2003, seventy eight (78) percent of respondents reported monitoring more frequently, up 12 percent from 1998. Seventy (70%) reported monitoring more systematically, up 21 percent from 1998. Monitoring for beneficials did not change appreciably, and remained at just under two thirds. Sixty-three (63) percent of respondents reported an increase in the amount of time per trip, an increase of eight (8) percent from 1998.



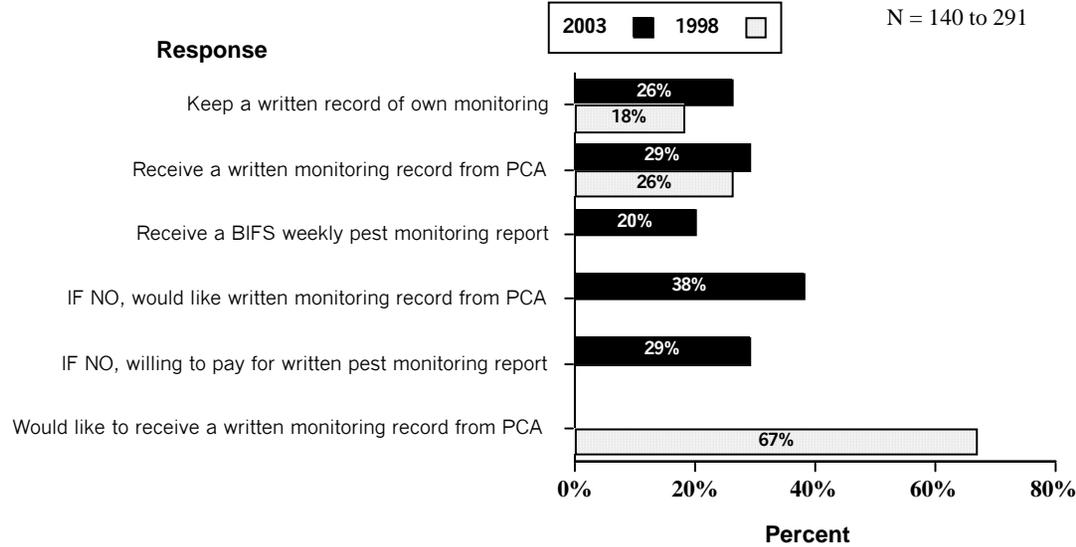
**Figure 6a (2003). Frequency of vineyard monitoring**  
 Respondents were asked how often they and their PCAs monitor their fields (figure 6a). Forty six (46) percent reported that they monitor at least once a week, while 37 percent reported monitoring every two weeks. The remaining 16 percent monitored their fields once per month or less.

Growers reported on the monitoring frequency of PCAs (input supplier, independent, and in-house), vineyard field personnel, and winery representatives. In-house PCAs and growers' field personnel monitored more frequently than all others. Forty (40) percent of those reporting on in-house PCAs monitored at least once a week, and vineyard personnel were reported as monitoring at least once a week by 48 percent of respondents.



**Figure 6b (1998). Frequency of vineyard monitoring**  
 Respondents were asked how often they and their PCAs monitor their fields during the period from 1992-1998 (figure 6b). More than half (55%) reported that they monitor at least once a week, while 32 percent reported monitoring every two weeks. The remaining 14 percent monitored their fields once per month or less.

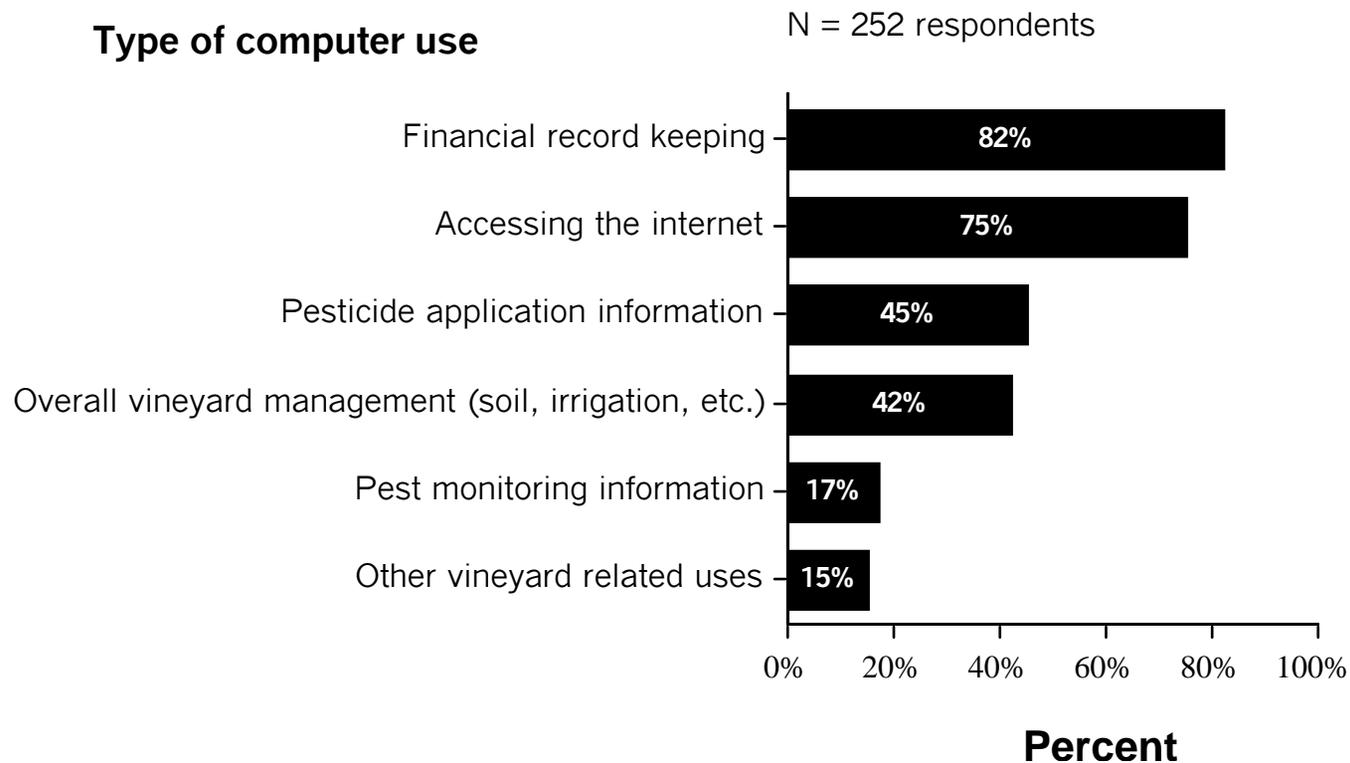
Some growers reported on the monitoring of input suppliers, independent, and/or in-house PCAs. Input suppliers monitored less often than in-house or independent PCAs.



**Figure 7. (1998 and 2003) State of written monitoring reports**

An important component of implementing IPM is keeping written pest monitoring records for use in identifying trends from month to month and from year to year. Respondents were asked if they kept a written record of their own pest monitoring information. This improved 8 percent from 1998 to 2003. When asked about written records provided by PCAs, this improved 3 percent from 1998 to 2002. For the 1999-2002 questionnaire, respondents were asked if they received the BIFS monitoring report. This tool was unavailable in 1998. Twenty (20) percent of respondents reported receiving the BIFS pest monitoring records in 2003.

In 1998 the survey asked about reports they received from PCAs. Sixty seven (67) percent of respondents (N=253) reported wanting to receive or wanting to continue receiving written pest monitoring reports from a PCA. In 2003 the question was asked in a different format. The 2003 question was whether respondents who were not receiving or keeping a written pest monitoring records, would like to receive one from a PCA. In 2003, thirty eight percent (38) of respondents (N=193) when asked this question reported wanting a written pest monitoring report from a PCA. Twenty-nine (29) percent of respondents (N=140) reported being willing to pay for such a written pest monitoring report.



**Figure 8. (2003) Computer use**

Respondents were asked if they, or the winegrowing operations they worked for, currently use a computer and if so for what purposes. Most computer use was reported for financial record keeping, (82%) and for accessing the internet (75%). Slightly less than half (45%) reported using a computer for pesticide application information. Over forty percent use a computer for overall vineyard management; this includes soils, irrigation, harvest, yields, pest monitoring, etc. When asked specifically about pest monitoring, seventeen (17) percent reported computer use, while 15 percent reported using a computer for other vineyard related activities.

## Section 2: Monitoring

### Conclusions and Recommendations.

The most significant improvements were reported for the following two areas:

- Monitoring more systematically (Figure 5, page 19); and
- Keeping written records (Figure 7, page 21)

These improvements provide evidence of the LWWC IPM program's positive impact on monitoring behavior by growers, managers and PCAs.

Monitoring frequency varies widely among growers, PCAs of all types, field personnel, and winery representatives. For example, 40 percent of in-house PCAs monitor at least once a week while only 24 percent of input-supplier PCAs do. Forty seven percent of respondents reported monitoring once a week. Frequent monitoring allows for early detection of potential problems and therefore is a crucial part of any IPM program.

In 1998, only 18 percent of respondents kept written records of their own monitoring, this improved to 26 percent in 2003. In 1998 the number of respondents that wanted to receive, or continue to receive, written pest monitoring records from a PCA was sixty-seven (67) percent. This question was asked in a different way in 2003 and nearly one-third (29 percent) of respondents reported as willing to pay for written pest monitoring reports from a PCA. This shows that monitoring records are a valuable service that PCAs can offer their customers

One in six (16%) respondents reported using a computer for pest monitoring information in the 2003 survey. This is compared to five out of six (83%) using computers for financial record keeping and three out of four for accessing the internet. Nearly half of respondents reported using computers for pesticide application information (45%) or overall vineyard management (42%). Computers will continue to be an important tool for growers, managers, PCAs and winery representatives. Monitoring records, well know as a valuable resource, would become more accessible through increased computer use.

Recommendations for improving monitoring practices in the district include:

- Increase the percentage of growers, managers and PCAs that monitor at least once/week;
- Reduce the percentage of growers, managers and PCAs that monitor about once per month or less; and
- Increase the percentage of growers, managers and PCAs that keep written and/or electronic records.

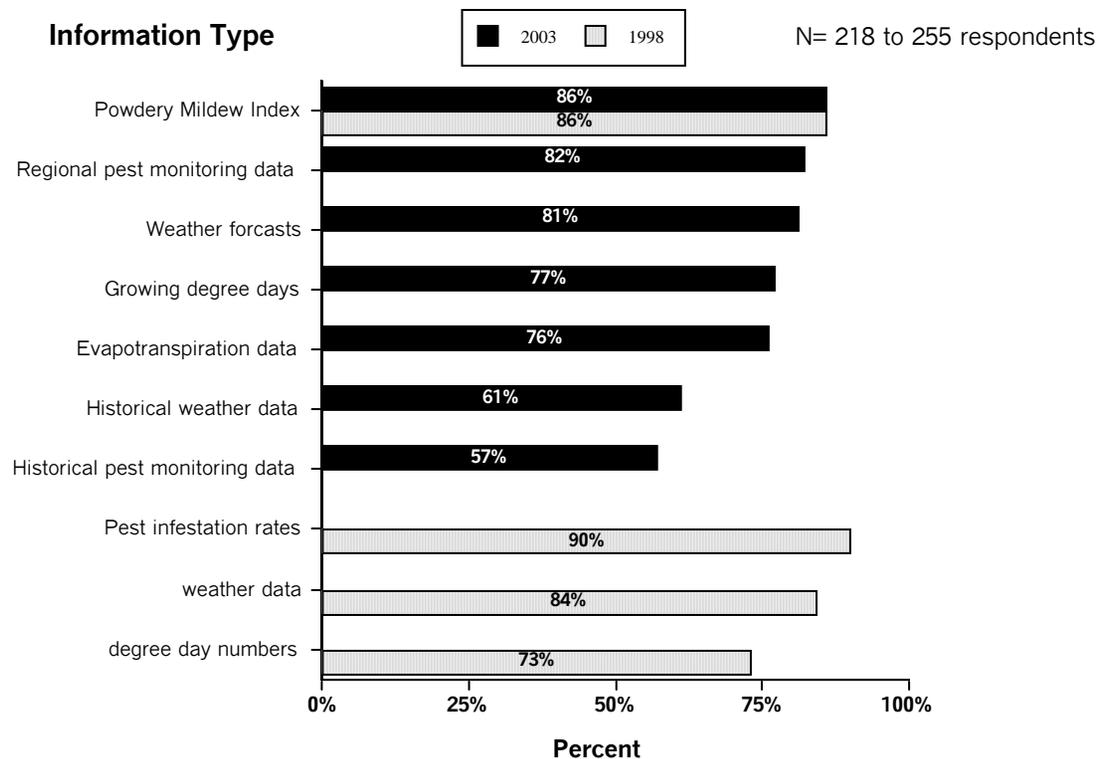
**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

---

## **Results Section 3: Information Sources**

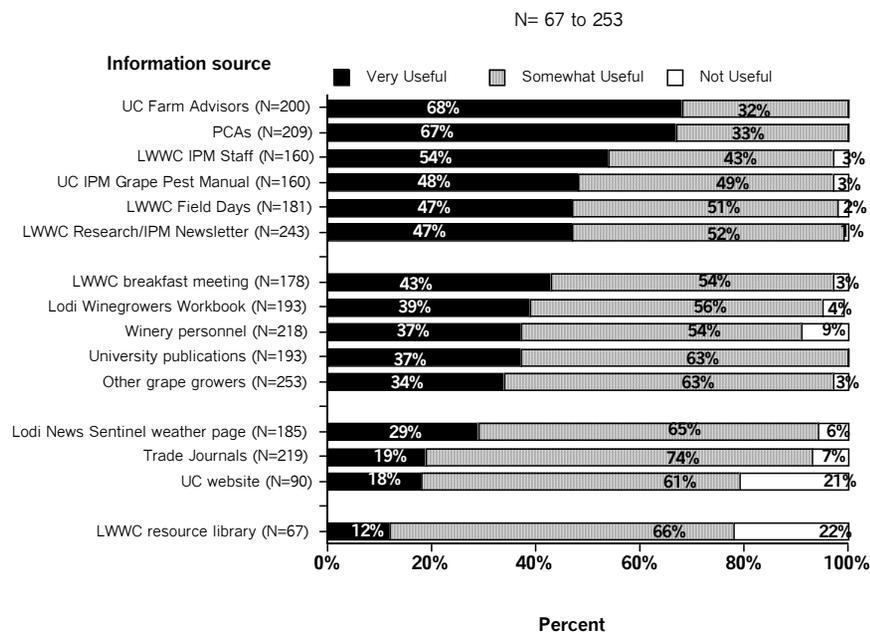
---

*To effectively and efficiently communicate with growers, managers, and PCAs, in Crush District 11, it is important to understand what sources of information Commission members find useful, what additional information they would like to have available on a regular basis, and how they would like to receive this information. To these ends, Section 3 presents 5 graphs presenting results from questions on information sources. Conclusions and recommendations for monitoring are offered at the end of this section on page 29.*



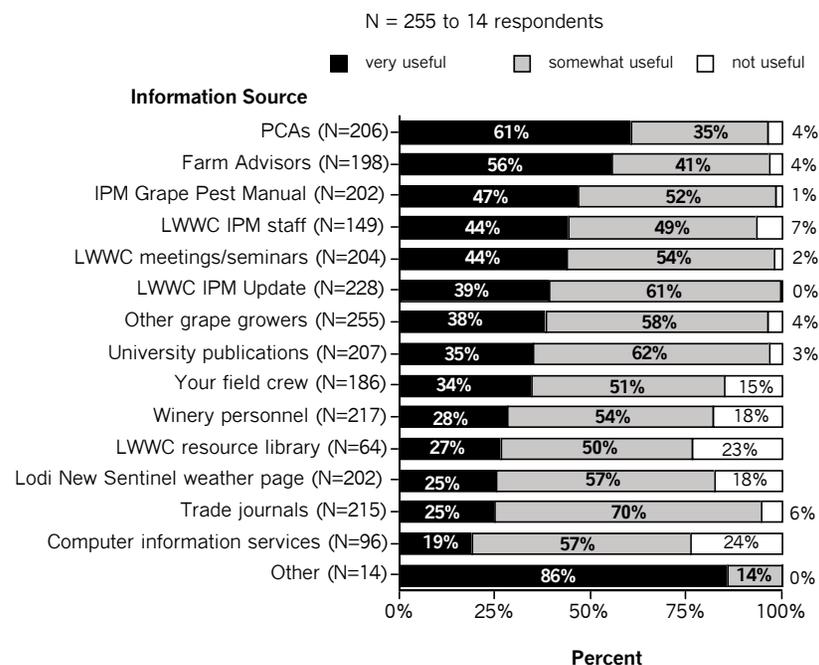
**Figure 9. (1998 and 2003) Type of information wanted on a regular basis**

Respondents were asked in 1998 and in 2003 what information they would like to receive on a regular basis (figure 9). The way the questions were asked differed between the 1998 and 2003 survey with the exception of the question regarding the Powder Mildew Index. Consequently, Figure 9 presents the combined results from the 1998 and 2003 surveys. Regular reporting on *Powdery Mildew Index* remained unchanged at eighty-six (86) percent of respondents in 1998 and 2003. Respondents reported that they would like to have information provided on a regular basis on *Pest infestation rates* (90%) in 1998 and *regional pest monitoring data* (82%) in 2003. In 1998, 84% of respondents wanting *weather data* on a regular basis and 81% reporting *weather forecasts* in 2003. Interest in *degree day numbers* (73% in 1998) and *growing degree days* (77% in 2003) remained strong. A majority of respondents in 2003 reported a desire for information on *evapotranspiration* (76%), *historical weather data* (61%), and *historical pest monitoring data* (57%).



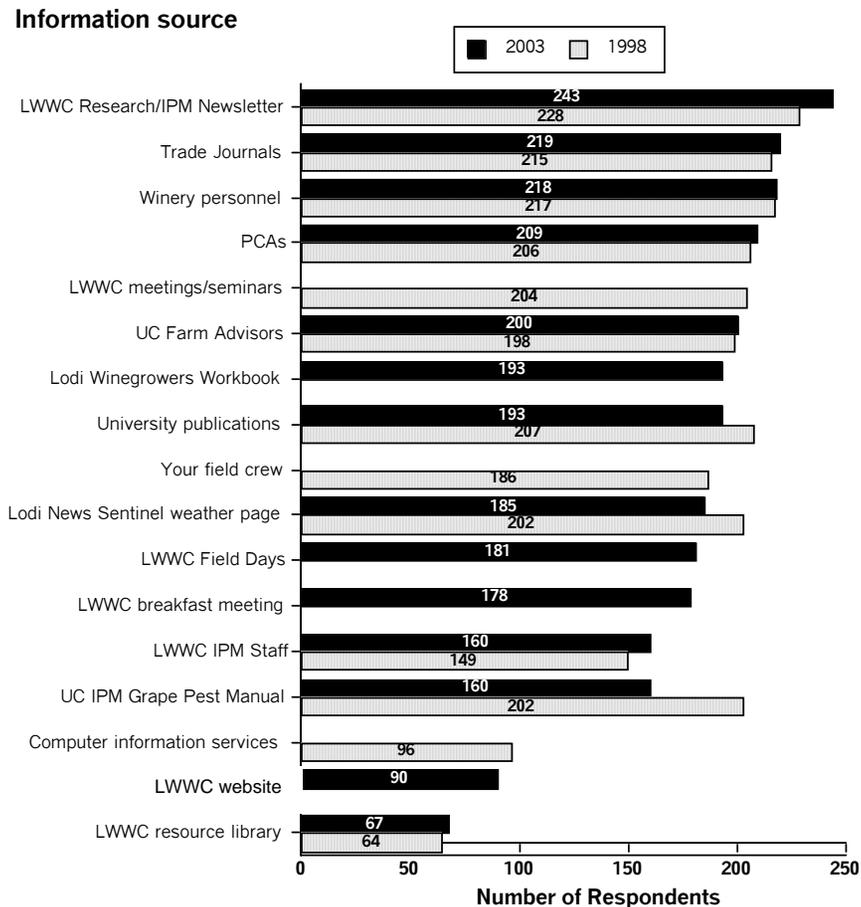
**Figure 10a (2003). Usefulness of information sources for vineyard management**

Respondents were given a list of information sources and asked to rate the usefulness of each source that they used (figure 10a). Results are presented in the order of the percentage of respondents who rated the source as *very useful*. All information sources were rated as very or somewhat useful by over 78% of respondents. Ag professionals including UC Farm Advisors, PCAs, and LWWC IPM program staff were rated as very useful by a majority of respondents.



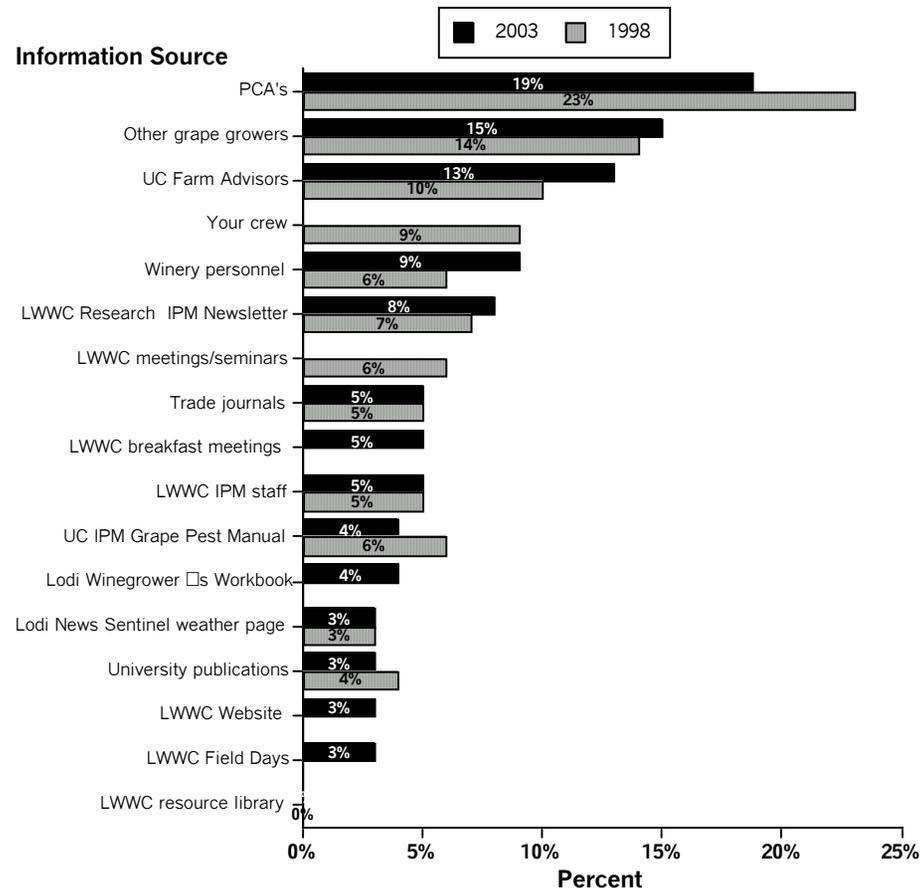
**Figure 10b (1998). Usefulness of information sources for vineyard management**

Respondents were given a list of information sources and asked to rate the usefulness of each source that they used (figure 10b). Results are presented in the order of the percentage of respondents who rated the source as *very useful*. All information sources were rated as very useful or somewhat useful by over 75% of respondents. PCAs and UC Farm Advisors were rated as very useful by a majority of respondents.



**Figure 11. (1998 and 2003) Information source use**

From the information in figure 10a and 10b above, the number of respondents that used each information source was calculated. The information is presented in order of how much it was used in the 2003 survey. In 2003, two-hundred-forty-three (243) respondents used the LWWC research/IPM newsletter and it was ranked fifth in usefulness in 2003 with 47% of respondents rating it as very useful, an improvement from 1998 where 39% rated it as very useful (Figures 10a and 10b). Trade journals are a much used source, with 219 users in 2003 and 215 in 1998, but only 19% of respondents ranked trade journals as very useful in 2003 and 25% ranked them as very useful in 1998 (Figures 10a and 10b).



**Figure 12. (1998 and 2003) Most important information sources**

After rating each of the information sources, respondents were asked to identify the most important sources of information for their vineyard management. PCA's were the most important source of information for both 1998 and 2003 but the percentage dropped from 28% in 1998 to 19% in 2003. Other grape growers were second (14% in 1998 and 15% in 2003) and UC farm advisors were third, rated most important for 10% in 1998 and 13% in 2003.

### **Section 3: Information Sources Conclusions and Recommendations.**

The vast majority of respondents continue to be interested in receiving information on powdery mildew index, pest infestation rates, weather data, and degree day/growing degree days. Growers, managers, PCAs and winery representatives continue to show a great deal of interest in receiving information relevant to winegrape production. Providing as much of this information as feasible should continue to be a goal of the LWWC IPM/Sustainable Farming program.

Responses regarding the usefulness, use, and importance of information offer some interesting insights into how LWWC members receive and value information. Of the fourteen sources of information listed in 2003, twelve were used by over half of respondents. The LWWC website, and the LWWC resource library were used by the fewest respondents, N=90 and 67 respectively. The resource library continues to be underutilized. The Commission could increase the use of its resource library with increased awareness of its existence, perhaps through on-going advertising in the IPM Update or by offering guided tours of the facilities.

The usefulness of the varied sources of information shows that the direct efforts of the LWWC IPM program compares favorably with other sources available. For example, in 2003, five of the top eight most useful sources of information are LWWC affiliated. The other three in the top eight are,

UC Farm Advisors, PCAs, and the UC IPM Grape Pest Manual.

Every information source listed was rated by at least one person as their most important source of information; therefore none of the information sources should be neglected as potential targets for getting information to growers, managers, PCAs and winery reps.

The direct efforts of the LWWC IPM program from 1999 to 2002 held four of top eight most important sources of information, the other four were PCAs, other grape growers, UC Farm Advisors, and winery personnel.

It is important to note that the top four spots are people, therefore maintaining venues and opportunities for people to interact should remain a focus of the Commission.

**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

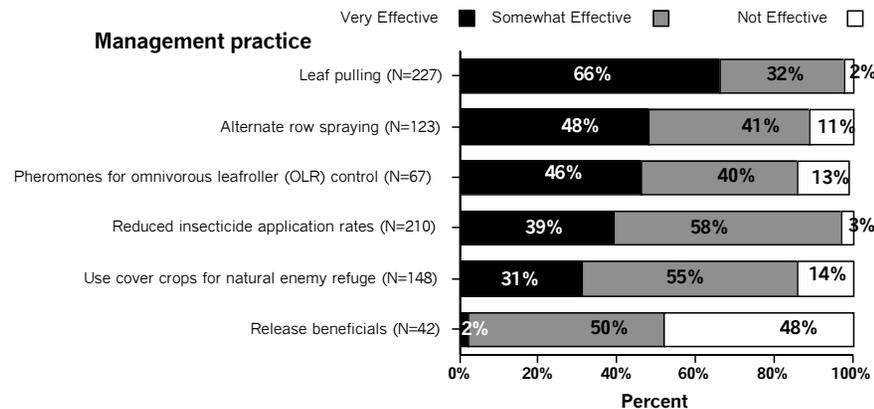
---

## **Results Section 4:**

### **Vineyard Management Practices**

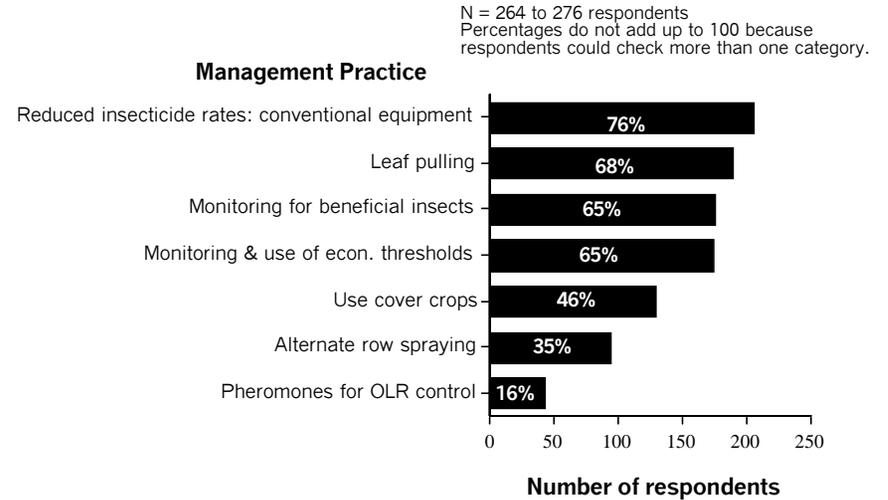
---

*To assess the level of use for IPM practices promoted by the Commission, respondents were asked to indicate which IPM practices they have used since the establishment of the IPM program in 1992. Section 4 provides 11 graphs which illustrates the results to these questions. Data from 1998 served as a baseline of use of IPM practices. Conclusions and recommendations for vineyard management practices are offered at the end of this section on page 37.*



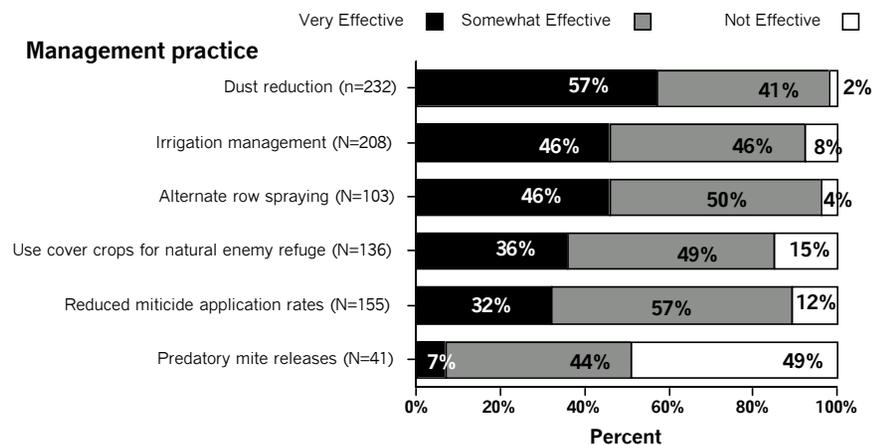
**Figure 13a (2003). Effectiveness of insect management practices used**

Respondents were given a list of IPM practices for insect pest management and asked to rate the effectiveness of the practices used. Results are presented in the order of the percentage of respondents who rated the practice as *very effective*. Two thirds of the 227 respondents who used leaf pulling found it very effective in managing insect pests and nearly all (98%) found this to be at least somewhat effective. Nearly half (48%) of respondents rated alternate row spraying as very effective, and 89% found the practice to be at least somewhat effective. Reduced insecticide applications were rated as at least somewhat effective for 97% of respondents. Pheromone use for OLR was not as widely practiced (N=67), but was rated as at least somewhat effective by 97% of respondents. Forty-two respondents released beneficials but with mixed results, 52% found the practice at least somewhat effective and 48% reported this practice was not effective. This figure may be compared to figure 13b by comparing the number of respondents that used the practice (N).



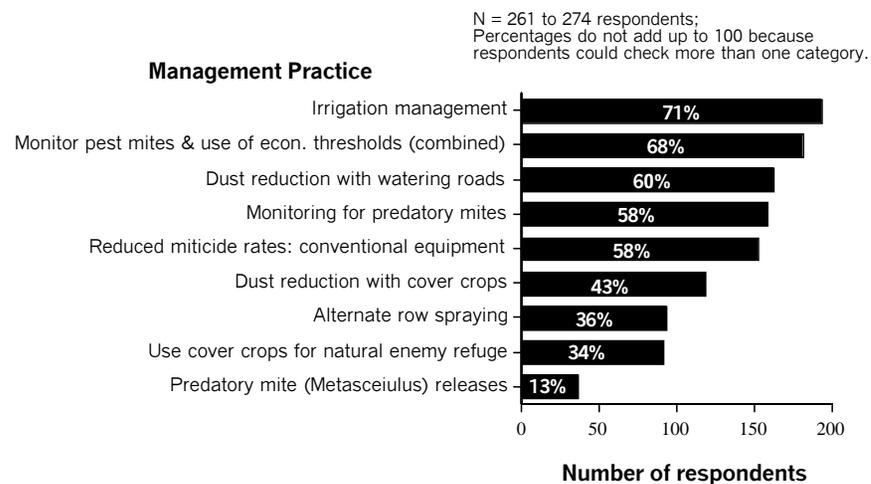
**Figure 13b (1998). Insect management practices used**

Respondents were given a list of IPM practices that the Commission is promoting for insect management. Figure 13b shows which insect management practices have been used by respondents since the start of the IPM program in 1992. The most used insect management IPM practice is reducing insecticide application rates using conventional equipment. Leaf pulling, monitoring for beneficial insects, and monitoring and use of economic thresholds (combined) were also tried by more than half the respondents. The least tried IPM practice for insect management is using pheromones for OLR control.



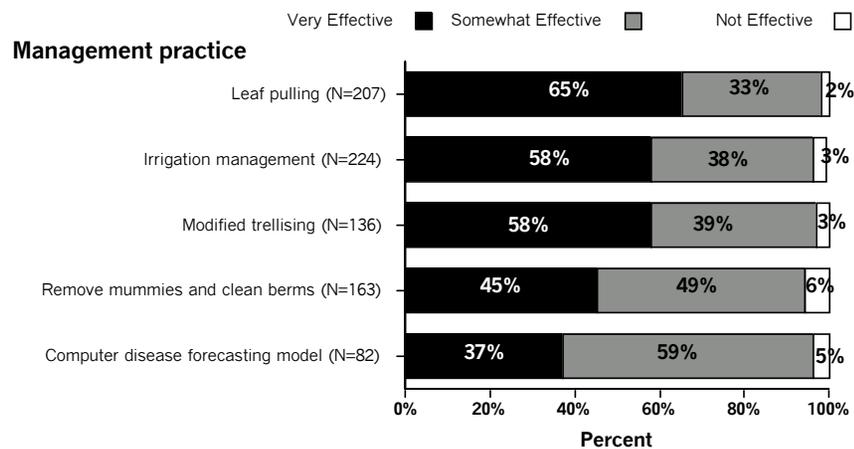
**Figure 14a (2003). Effectiveness of mite management practices used**

Respondents were given a list of IPM practices for mite management and asked to rate the effectiveness of the practices used. Results are presented in the order of the percentage of respondents who rated the practice as *very effective*. A majority (57%) of the 232 respondents who practiced dust reduction found this practice to be very effective and 98% found it to be at least somewhat effective. Other mite management practices were not as frequently used. Releasing predatory mites was the least used practice, N=41, and it was rated as somewhat effective or better by a bare majority (51%). All other mite management practices were rated as at least somewhat effective by between 85-98 percent of respondents. This figure may be compared to figure 14b by comparing the number of respondents that used the practice (N).



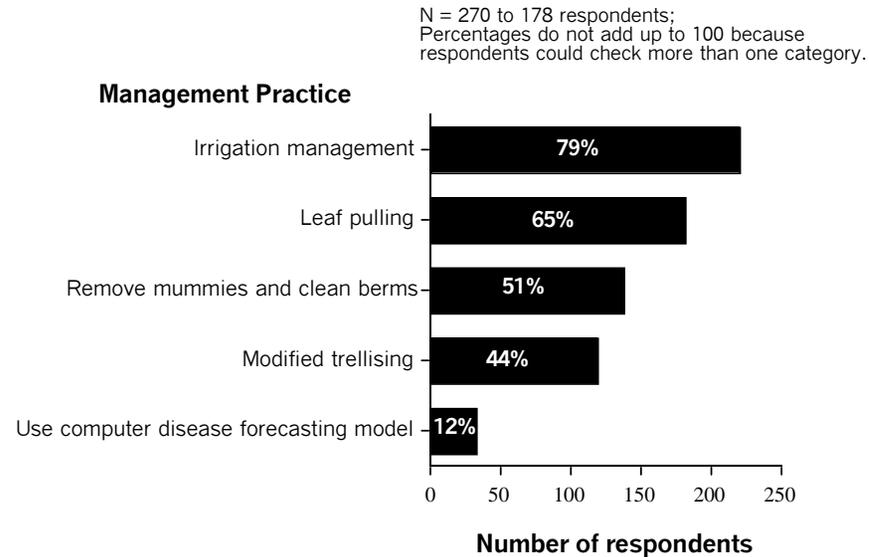
**Figure 14b (1998). Mite management practices used**

Respondents were given a list of IPM practices that the Commission is promoting for mite management. Figure 14b shows which mite management practices have been used by respondents since the start of the IPM program in 1992. The most used IPM practice for mite management is irrigation management (71%), with monitoring pest mites and use of economic thresholds (combined) following closely as the second most tried mite management IPM practice (68%). Dust reduction with watering roads, monitoring for predatory mites, and reduces miticide application rates using conventional equipment were also tried by more than 50 percent of respondents. The least tried IPM practice for mite management was predatory mite (*Metasceiulus*) releases at 13 percent.

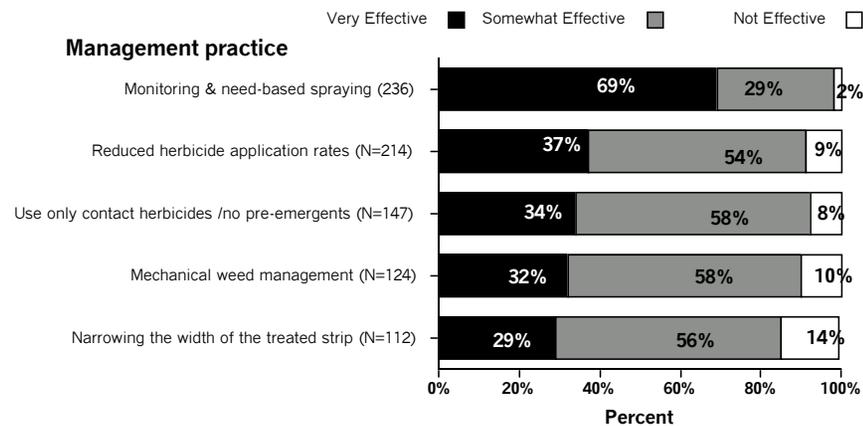


**Figure 15a (2003). Effectiveness of disease management practices used**

Respondents were given a list of IPM practices for disease management and asked to rate the effectiveness of the practices used. Results are presented in the order of the percentage of respondents who rated the practice as *very effective*. All of the practices were rated as at least somewhat effective by over 94% of respondents. The most used disease management practice was irrigation management and least used was computer forecasting, the ranking was unchanged from 1992. This figure may be compared to figure 15b by comparing the number of respondents that used the practice (N).

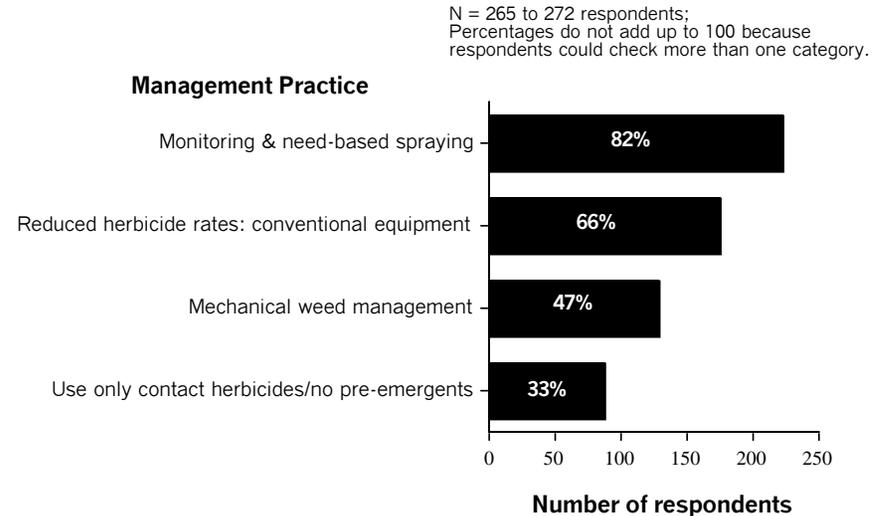


**Figure 15b (1998). Disease management practices used**  
Respondents were given a list of IPM practices that the Commission is promoting for disease management. Figure 15b shows which mite management practices have been used by respondents since the start of the IPM program in 1992. The most used practice was irrigation management (79%). Leaf pulling and removal of mummies and cleaning berms were also used by more than half the respondents. The least used IPM practice for disease management was the use of a computer disease forecasting model (12%).

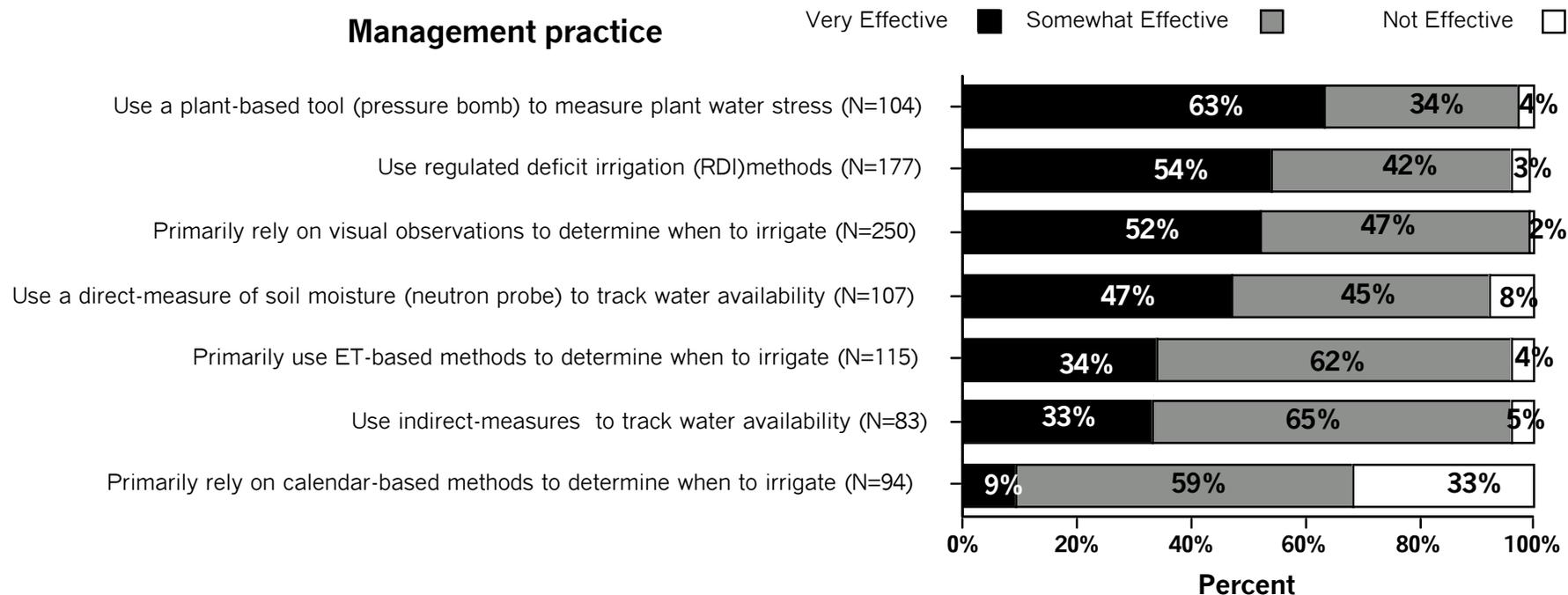


**Figure 16a (2003). Effectiveness of weed management practices used**

Respondents were given a list of IPM practices for weed management and asked to rate the effectiveness of the practices used. Results are presented in the order of the percentage of respondents who rated the practice as *very effective*. Monitoring and need-based spraying was rated as very effective by over two thirds (69%) of respondents. Over 86% of respondents using these IPM weed management practices rated them as somewhat effective or very effective. This figure may be compared to figure 16b by comparing the number of respondents that used the practice (N).

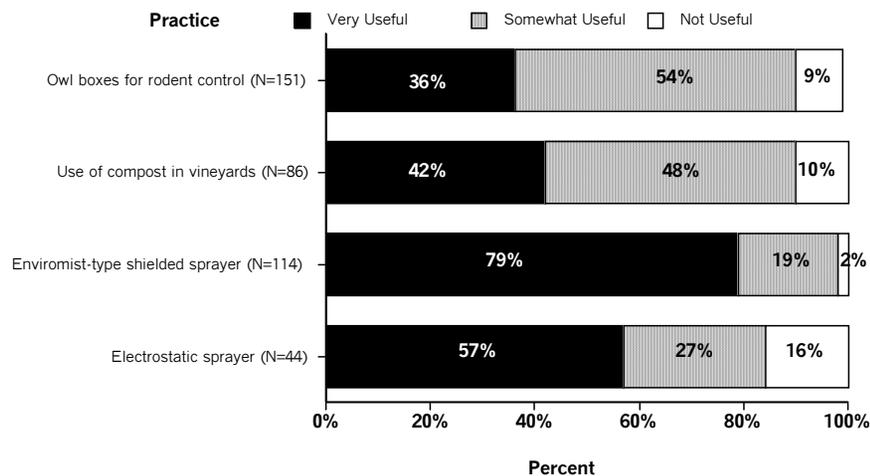


**Figure 16b (1998). Weed management practices used**  
Respondents were given a list of IPM practices that the Commission is promoting for weed management. Figure 16b shows which weed management practices have been used by respondents since the start of the IPM program in 1992. The most used weed management IPM practice was monitoring and need-based spraying (82%). Reduced herbicide application rates using conventional equipment was used by two-thirds of the respondents (66%), mechanical weed management was used by just under half the respondents (47%), and the use of only contact herbicides with no pre-emergents was used by 33% of respondents.



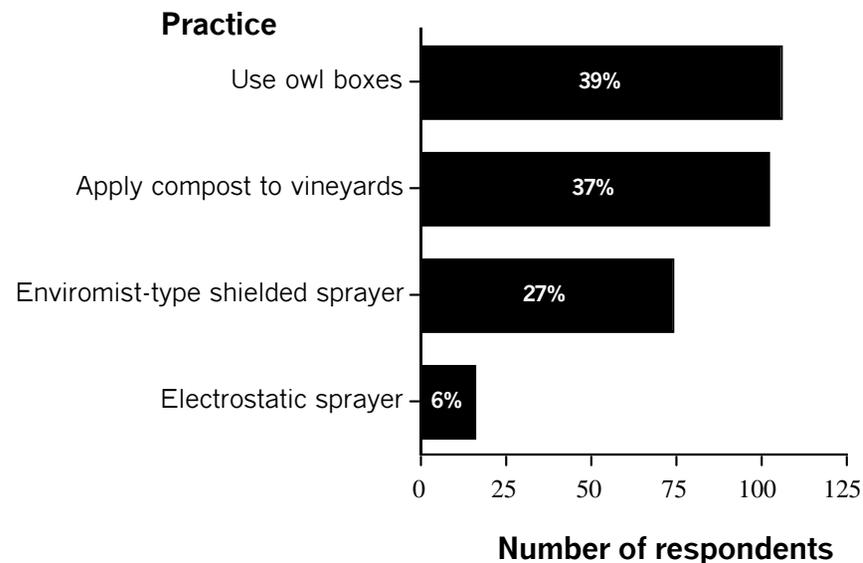
**Figure 17 (2003). Effectiveness of irrigation, plant and soil management practices used**

Respondents were given a list irrigation, plant and soil water management practices and asked to rate the effectiveness of the practices used. Results are presented in the order of the percentage of respondents who rated the practice as *very effective*. Measuring plant water stress was reported as very effective by 63% of the 104 users. The most frequent method used was relying on visual observations to determine irrigation, N=250, and this was reported as very effective by a majority (52%) of users. The use of RDI methods was rated as very effective by majority (54%) of users (N=177). Using calendar based methods to determine irrigation was reported as used by 94 respondents, but of those, one-third (33%) reported the practice to not be effective.



**Figure 18a (2003). Effectiveness of other management practices used**

Respondents were given a list of IPM practices for other management practices and asked to rate the effectiveness of the practice used. Results are presented in the order of use from the 1998 survey. An enviromist-type shielded sprayed was rated as very useful by the highest percentage of respondents (79%). In 1998, seventy-four (74) respondents had used this type of sprayer, and in 2003 that number had increased significantly to one-hundred-fourteen (114). The other novel spray equipment gaining use since the program's inception in 1992 was the electrostatic sprayer. This sprayer was reported as used by sixteen (16) respondents in 1998, and that number grew by nearly three-fold to forty-four (44) by 2003. Owl box use was up slightly, and compost use was slightly down. More than 80% of respondents using any of these practices reported them as very to somewhat useful.



**Figure 18b (1998). Other management practices used**

Respondents were given a list of other IPM practices that the Commission is promoting for vineyard management. Figure 18b shows which of these practices have been used by respondents since the start of the IPM program in 1992. Owl boxes were used by 39 percent of respondents, applying compost to vineyards was used by 37 percent of respondents, and 22 percent of respondents created habitat islands or “refuges” for wildlife.

## Section 4: Vineyard Management Practices Conclusions and Recommendations.

The following tables show the practices used as reported in 1998 and in 2003 and the percent increase or decrease.

<b>Insect Management Practices</b>	<b>Use 2003</b>	<b>Use 1998</b>	percent change
Leaf Pulling	79%	68%	<b>11%</b>
Reduced Insecticide Rate	75%	76%	-1%
Pheromones For OLR	25%	16%	<b>9%</b>
Alternate Row Spraying	44%	35%	<b>9%</b>
Cover Crops for Natural Enemy Refuge	53%	46%	<b>7%</b>
Release Beneficial Insects	15%	NA	

<b>Mite Management Practices</b>	<b>Use 2003</b>	<b>Use 1998</b>	Percent change
Irrigation Management	76%	71%	<b>5%</b>
Dust Reduction	84%	60%	<b>24%</b>
Cover Crops for Natural Enemy Refuge	50%	34%	<b>16%</b>
Predatory Mite Release	15%	13%	<b>2%</b>
Reduced Miticide Application Rates	57%	58%	-1%
Alternate Row Spraying	38%	36%	<b>2%</b>

<b>Disease Management Practices</b>	<b>Use 2003</b>	<b>Use 1998</b>	Percent change
Using Computer Disease Forecasting Model	30%	12%	<b>18%</b>
Irrigation Management	81%	79%	<b>2%</b>
Leaf Pulling	75%	65%	<b>10%</b>
Modified Trellising	50%	44%	<b>6%</b>
Remove Mummies and Clean Berms	58%	51%	<b>7%</b>

<b>Weed Management Practices</b>	<b>Use 2003</b>	<b>Use 1998</b>	Percent change
Monitoring And Needs Based Spraying	87%	82%	<b>5%</b>
Reduced Herbicide Application Rates	78%	66%	<b>12%</b>
Mechanical Weed Management	45%	47%	-2%
Use Only Contact Herbicides/No Pre-Emergents	53%	33%	<b>20%</b>
Narrowing The Treated Strip	41%	NA	

<b>Other Management Practices</b>	<b>Use 2003</b>	<b>Use 1998</b>	Percent change
Use Of Compost In Vineyards	31%	37%	-6%
Owl Boxed For Rodent Control	54%	39%	<b>15%</b>
Enviro-mist-Type Shielded Sprayer	42%	27%	<b>15%</b>
Electrostatic Sprayer	16%	6%	<b>10%</b>

These data show increased adoption and use of nearly all of the practices since the 1998 survey.

***The widespread adoption as well as the reported effectiveness of these practices should be seen as a major success of the LWWC IPM program.***

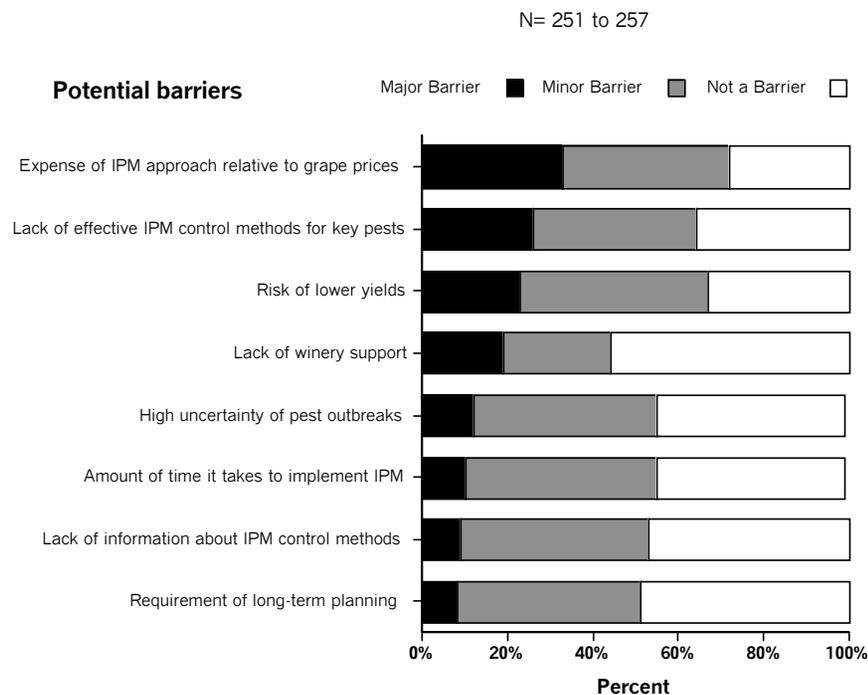
**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

---

## **Results Section 5: Barriers and Perceptions**

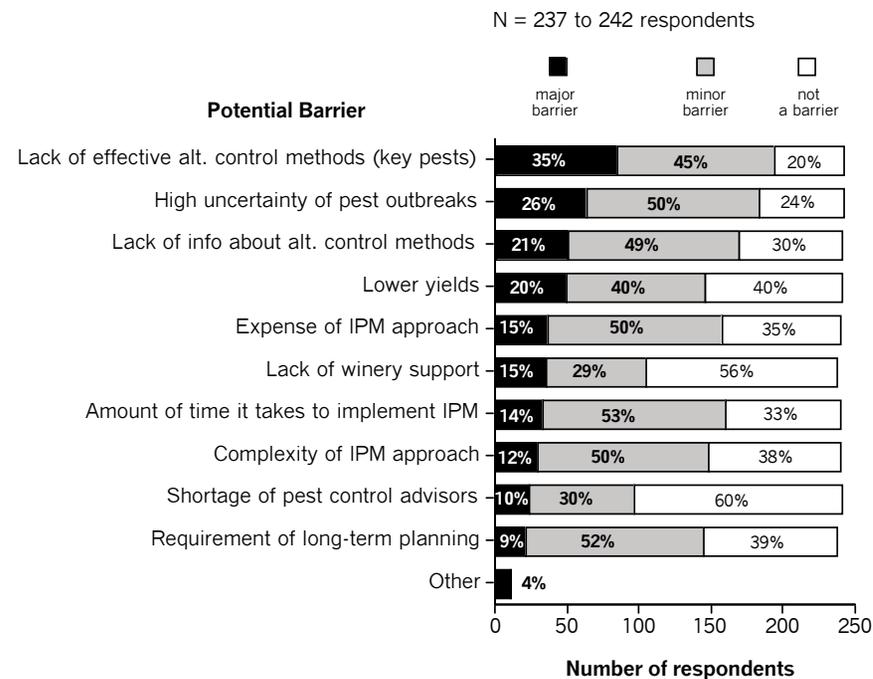
---

*To further promote the concept and use of IPM in the district it is essential to know 1) how District members currently perceive IPM 2) what changes have occurred in growers' self-reported use of IPM since the establishment of the IPM program, and 3) the perceived threats and opportunities facing the winegrape industry. Section 5 presents the results from questions on perceived barriers, threats and opportunities and overall impressions of IPM as well as the past and present use of IPM. Conclusions and recommendations are offered at the end of this section on page 46.*



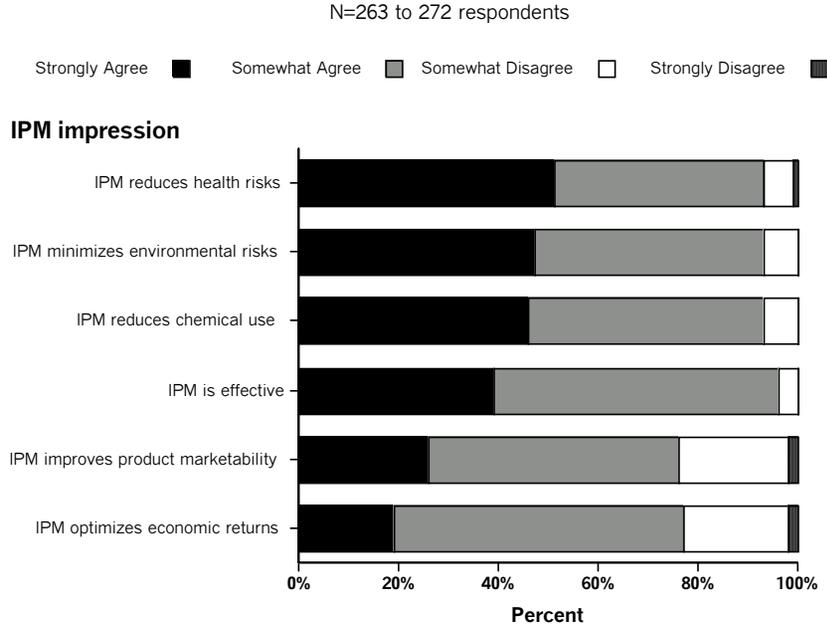
**Figure 19a (2003). Perceived barriers to implementing IPM**

Respondents were given a list of potential barriers to implementing IPM, and they were asked to rate whether they thought these items were a major barrier, a minor barrier, or not a barrier. Results are presented in the order of the percentage of respondents who rated the barrier as a major barrier. The expense of IPM approaches relative to grape prices was rated most often as a major barrier to implementing IPM (33%). The lack of winery support was most often rated as not a barrier (56%), and the requirement of long-term planning was the second most often rated item as not a barrier (49%).



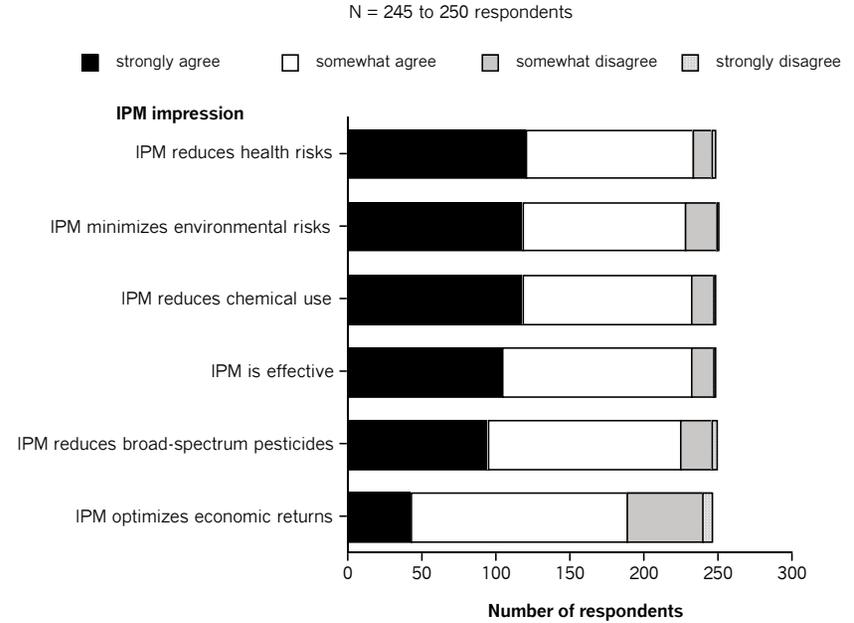
**Figure 19b (1998). Perceived barriers to implementing IPM**

Respondents were given a list of potential barriers to implementing IPM, and they were asked to rate whether they thought these items were a major barrier, a minor barrier, or not a barrier. Results are presented in the order of the percentage of respondents who rated the barrier as a major barrier. The lack of effective control methods for key pests was rated most often as a major barrier to implementing IPM (35%), followed by uncertainty of pest outbreaks (26%). The shortage of PCAs was most often rated as not a barrier (60%), and the lack of winery support was the second most often rated item as not a barrier (56%).



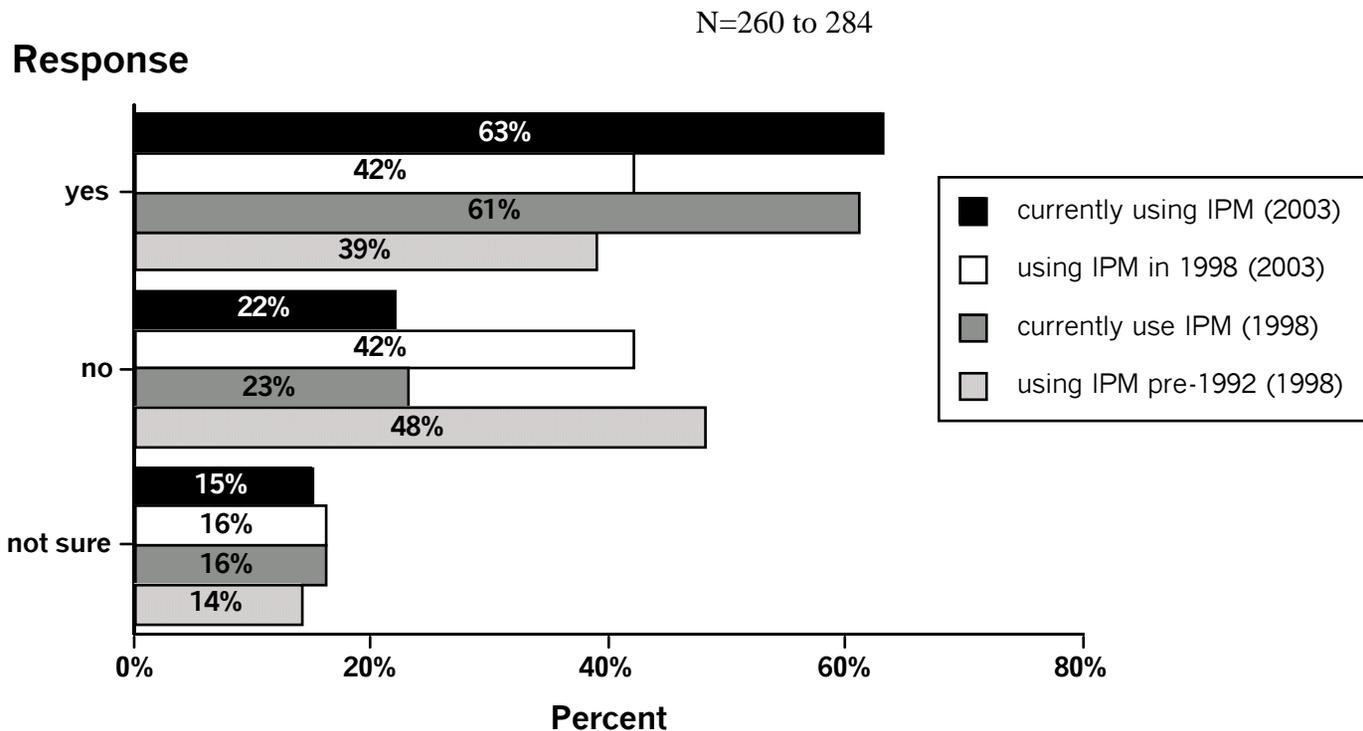
**Figure 20a (2003). Impressions of IPM**

Respondents were again asked about the six statements concerning IPM and rated their level of agreement for each statement. Figures 20a and b show that the impressions of IPM did not change much from the 1998 survey. As in 1998, a significant percentage of respondents strongly agreed that IPM reduces health risks (51%), reduces chemical use (46%), and minimizes environmental risks (47%). Thirty-nine percent strongly agree that IPM is effective. However, only 19 percent of respondents strongly agree with the statement that IPM improves product marketability with a nearly equal percentage (21%) of respondents stating that they somewhat disagreed.



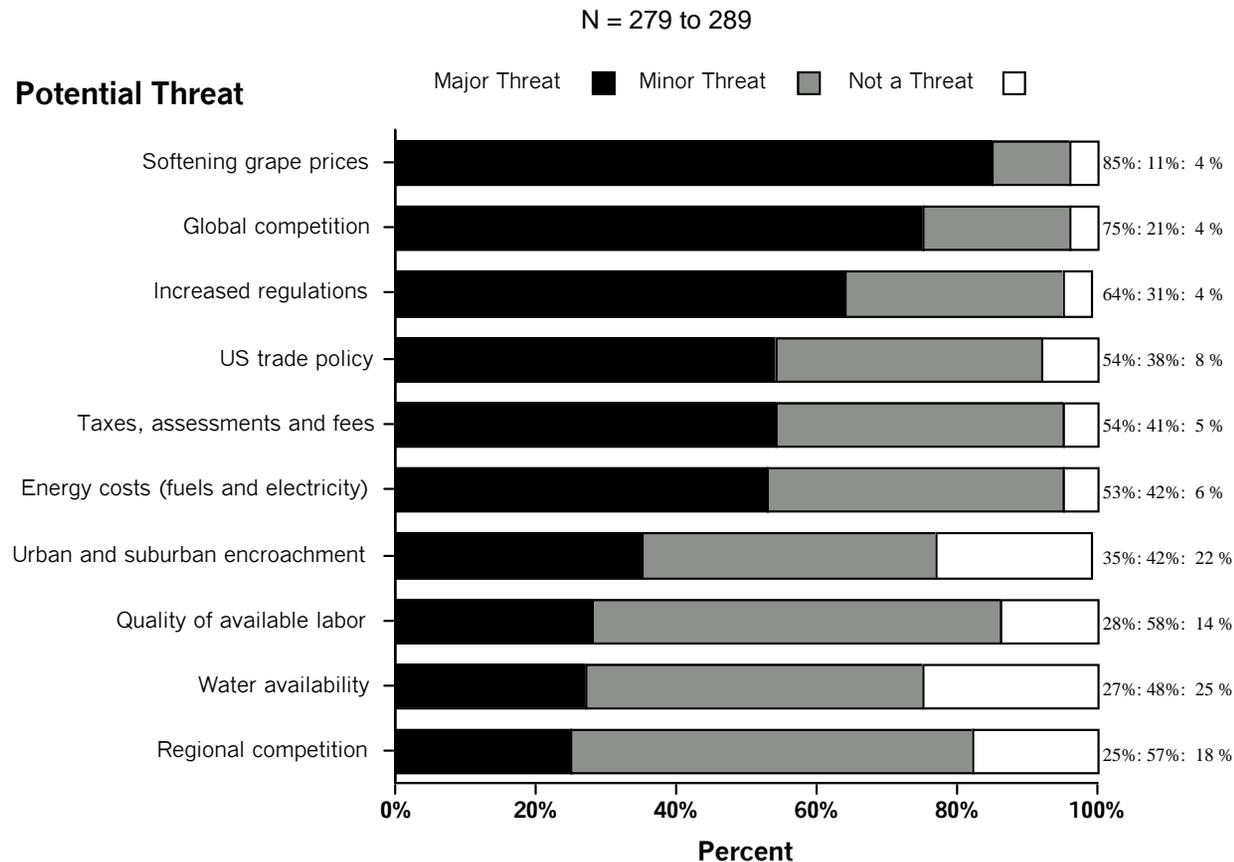
**Figure 20b (1998). Impressions of IPM**

In order to develop baseline data in impressions of IPM in the District, respondents were provided with six statements concerning IPM and were asked to rate their level of agreement for each statement. Figure 20b shows that a significant percentage of respondents strongly agreed that IPM reduces health risks (48%), reduces chemical use (48%), and minimizes environmental risks (47%). Forty-two percent strongly agree that IPM is effective. However, only 18 percent of respondents strongly agree with the statement that IPM improves product marketability with a greater percentage (21%) of respondents stating that they somewhat disagreed.



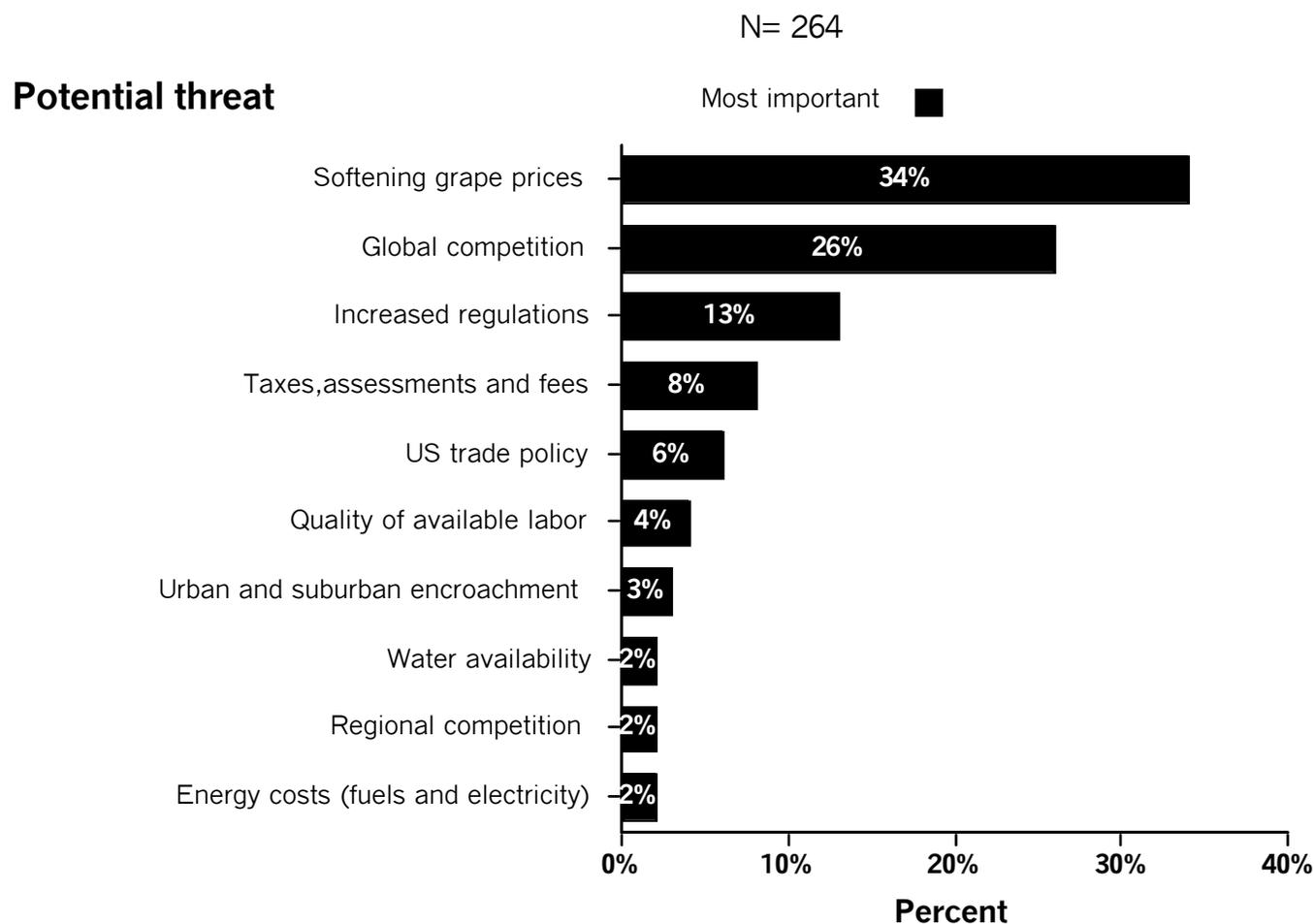
**Figure 21. (1998 and 2003) IPM use**

Respondents were asked in 1998 if they were using IPM for their vineyard pest management currently and prior to the establishment of LWWC’s IPM Program in 1992. In 2003, respondents were asked if they were using IPM for their vineyard pest management currently and if they were using them in 1998. More than half of respondents reported that they were currently using IPM practices for both surveys (1998-61% **yes**-dark-shaded, 2003-63% **yes**-black), while slightly less than one-quarter reported not currently using IPM for both surveys (1998-23% **no**-shaded, 2003-22% **no**-solid). When asked to review past practices, approximately 20% fewer respondents reported that they had been using IPM (compare black to white and dark-gray to light gray). It is interesting to note that most respondents in 1998 and again in 2003 reported that they currently use IPM but when asked about past practices, they reported that they had not been using IPM.



**Figure 22. (2003) Perceived threats to vineyard enterprise**

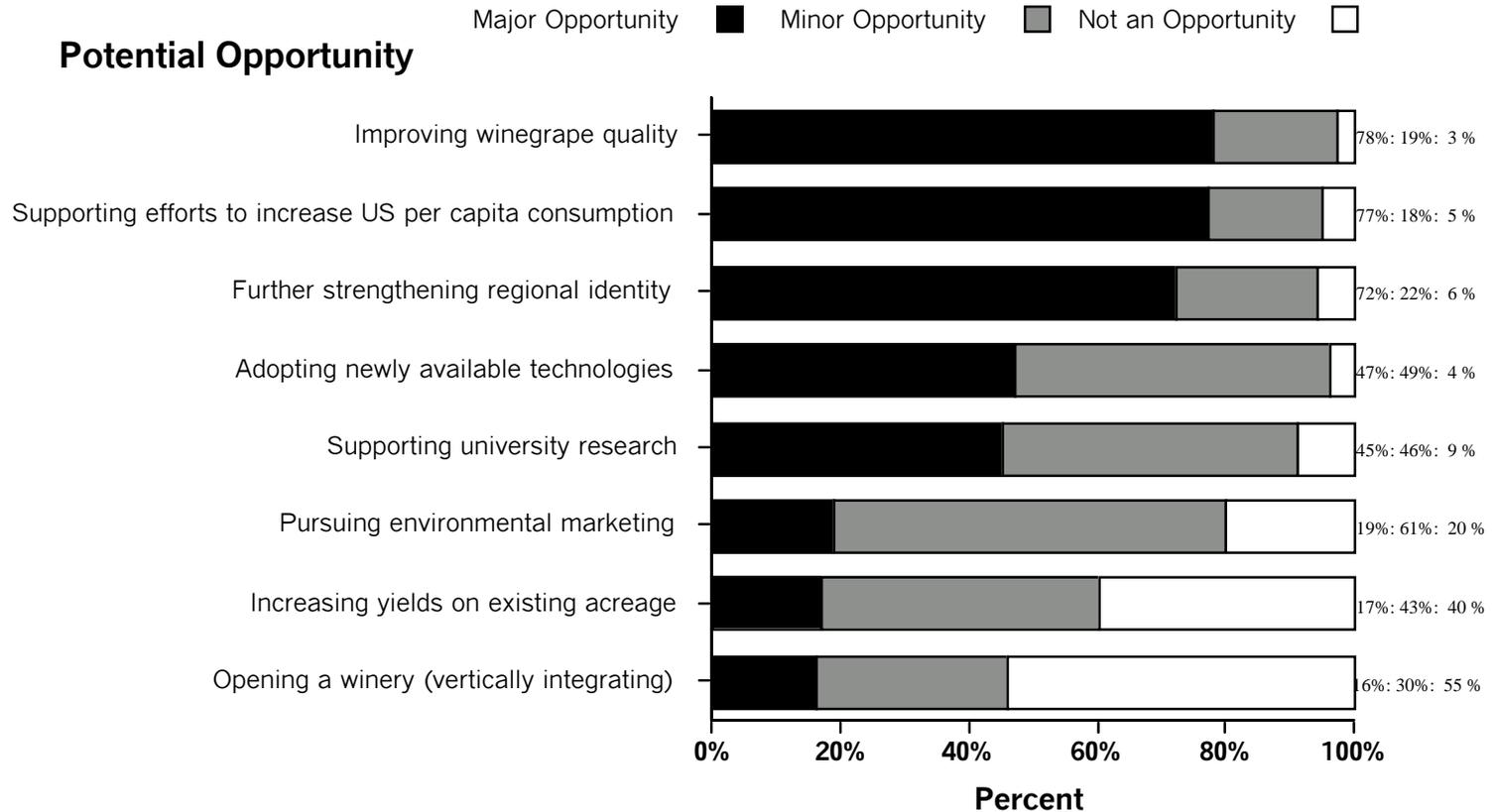
Respondents were given a list of potential threats to their vineyard operations, and they were asked to rate whether they thought these items were a major threat, a minor threat, or not a threat. Results are presented in the order of the percentage of respondents who rated the potential threat as a major threat. Over half of respondents named *grape prices*, *competition*, *regulations*, *trade policy*, *taxes*, and *energy costs* as major threats. Less than half of respondents named *encroachment*, *labor*, *water*, or *regional competition* as major threats. All of the listed potential threats were perceived as at least a minor threat by over two-thirds of respondents.



**Figure 23. (2003) Most important perceived threats to vineyard enterprise**

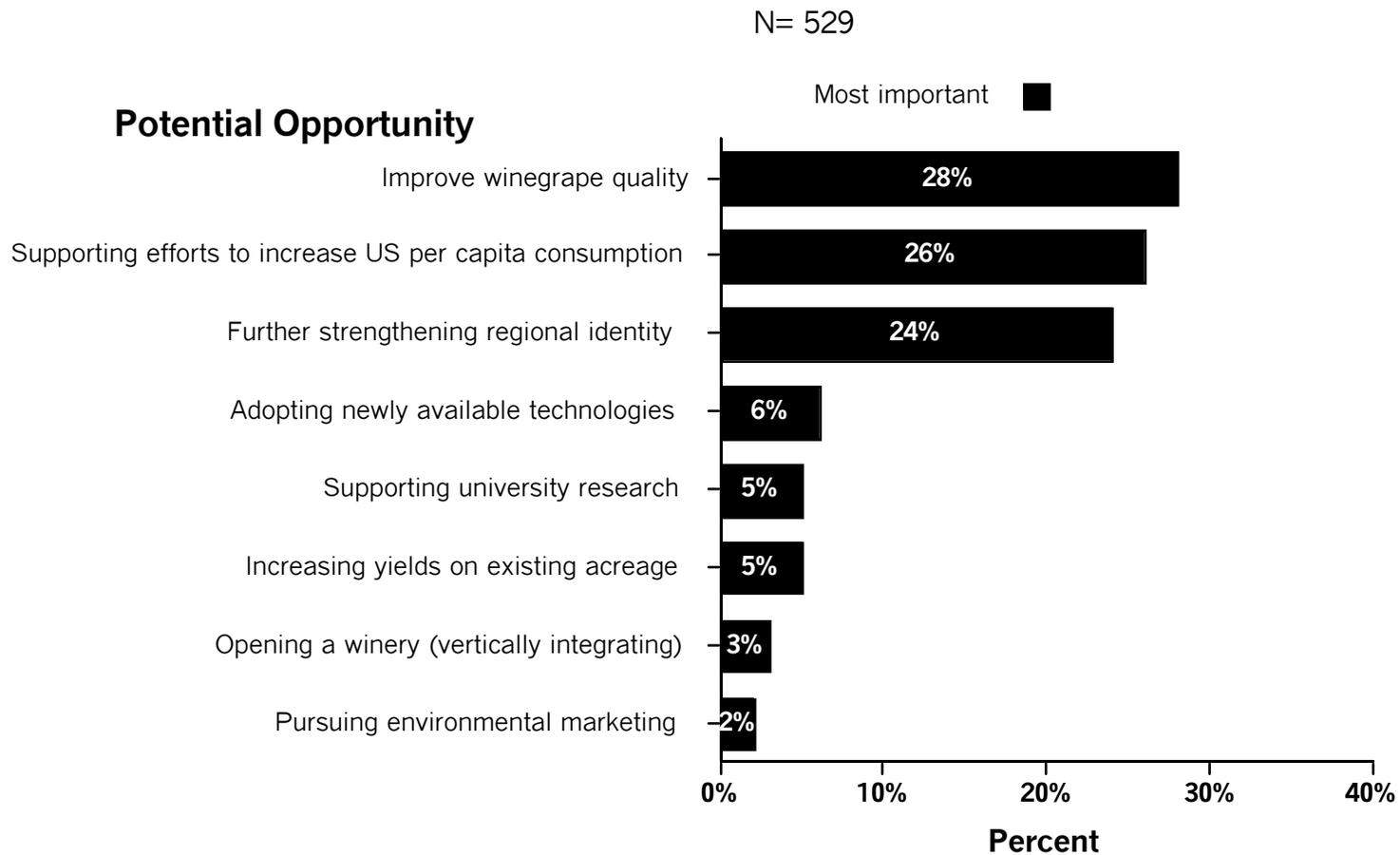
After rating each of the potential threats, respondents were asked to identify the most important major threats for their vineyard management. Thirty-four percent of respondents reported softening grape prices as the most important threat, while twenty-six (26) percent reported *global competition* as the most important threat and thirteen (13) percent cited *increased regulations*. Other potential threats were reported as most important by less than ten (10) percent of respondents. However, it is important to remember that even for those less often cited; some respondents reported them as the most important threats.

N= 274 to 288



**Figure 24. (2003) Perceived opportunities for vineyard enterprise**

Respondents were given a list of potential opportunities for their vineyard operations, and they were asked to rate whether they thought these items were a major opportunity, a minor opportunity, or not an opportunity. Results are presented in the order of the percentage of respondents who rated the potential opportunity as a major opportunity. *Improving quality, increasing consumption, and strengthening regional identity* were the cited as major opportunities by approximately three-quarters of respondents. About half of respondents reported that *new technologies* and *supporting university research* are major opportunities.



**Figure 25. (2003) Most important perceived opportunities for vineyard enterprise**

After rating each of the potential opportunities, respondents were asked to identify the most important major opportunities for their vineyard management. Twenty-eight (28) percent of respondents reported *improving winegrape quality* as the most important opportunity, while twenty-six (26) percent reported *increasing US consumption* as the most important opportunity and twenty-four (24) percent cited *strengthening regional identity*. Other potential opportunities were reported as most important by less than ten (10) percent of respondents. However, it is important to remember that even for these opportunities that are less often cited, these were reported as the most important by some respondents.

## **Section 5: Barriers and Perceptions Conclusions and Recommendations**

The perceived barriers to implementing Integrated Pest Management (IPM) practices changed slightly from 1998 to 2003. In 1998, respondents were most concerned about effective control methods for key pests, and pest outbreaks. Effective pest management of key pests was still perceived as a barrier in 2003 however it dropped in ranking. In 2003 more respondents rated the list of perceived barriers as *Not a Barrier* compared to 1998, suggesting increased comfort with IPM practices.

The impressions of IPM did not change appreciably between the 1998 and 2003 surveys. IPM practices are by and large perceived as reducing health risks, minimizing environmental risks, reducing chemical use, and being effective. A clear majority perceive IPM as improving marketability and optimizing economic returns.

A majority of respondents from both 2003 and 1998 (63% and 61% respectively) reported that they were using IPM practices at the time of the survey. However, when asked about past farming practices less than half (42% in 2003 and 39% in 1998) reported as using IPM. What can be noted here is that there is an impression that today's practices are better than those of a few years ago. This probably means that there is a perception that practices are improving over time.

The biggest perceived threats to the industry are softening grape prices, global competition, and increased regulation. These were named as major threats by over 60% of respondents and were the top three when respondents were asked to identify the most important threats. Two of these top three concern price and market, and the other perceived threat is regarding the ability to continue current practices without undue local, state or federal regulation.

The biggest perceived opportunities are improving quality, increasing US consumption, and strengthening regional identity. These were named as major opportunities by over 70% of respondents and ranked as the three top most important opportunities. It is interesting to note whether the perceived threats are directly addressed by the perceived opportunities. One response to potential low prices is to increase quality, thereby increasing price. This can be seen as addressing the top two perceived threats. Increasing US consumption would increase demand, again strengthening prices. Further strengthening regional identity would similarly increase demand for winegrapes from Crush District 11, again presumably increasing prices. The remaining perceived threat, namely that of increased regulations was not directly addressed by the three top perceived opportunities. The threat of increased regulation may be countered by adopting newly available technologies, supporting University research, or pursuing environmental marketing which were named as potential opportunities, but not in the top tier. What is clear from the perception of threats and opportunities is that most agree that in the face of softening grape prices, making winegrapes from Crush District 11 more desirable in the market place should remain a priority.

**Lodi-Woodbridge Winegrape Commission**  
2003 IPM Program Grower Questionnaire

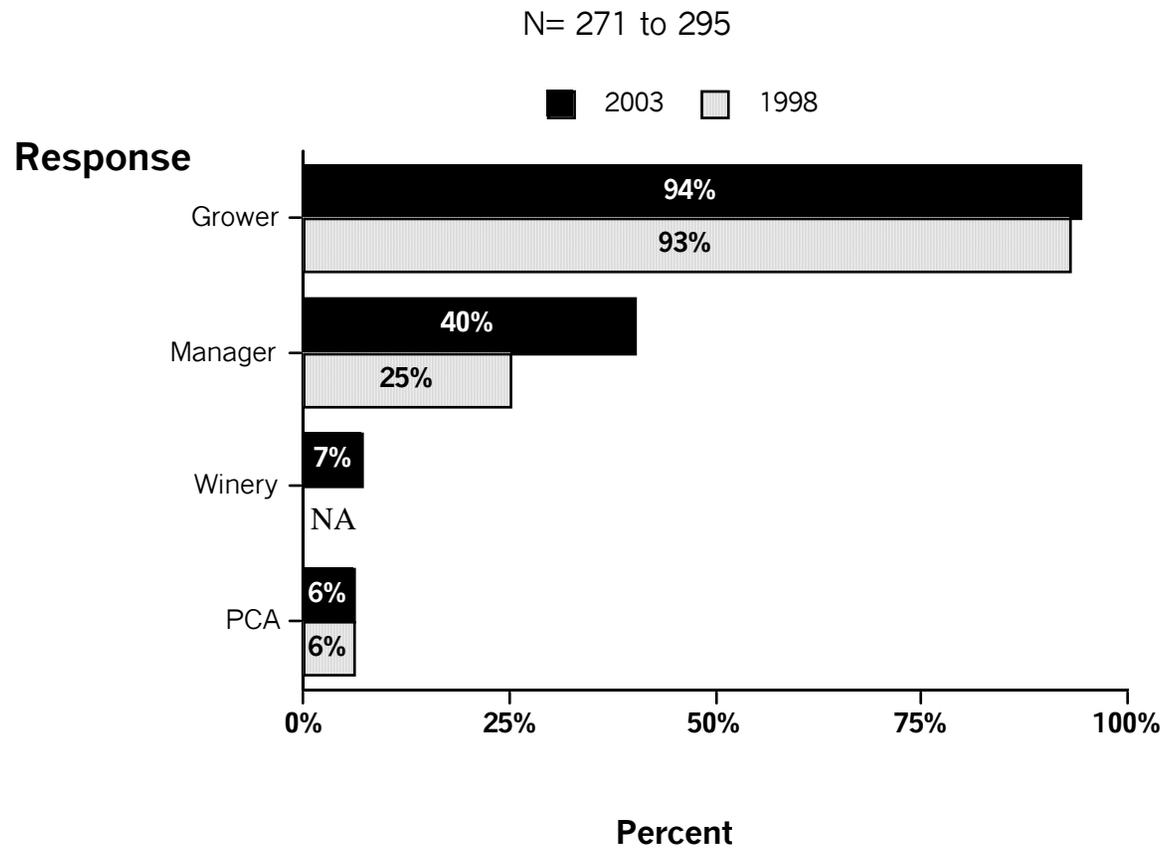
---

## **Results Section 6:**

### **Demographics**

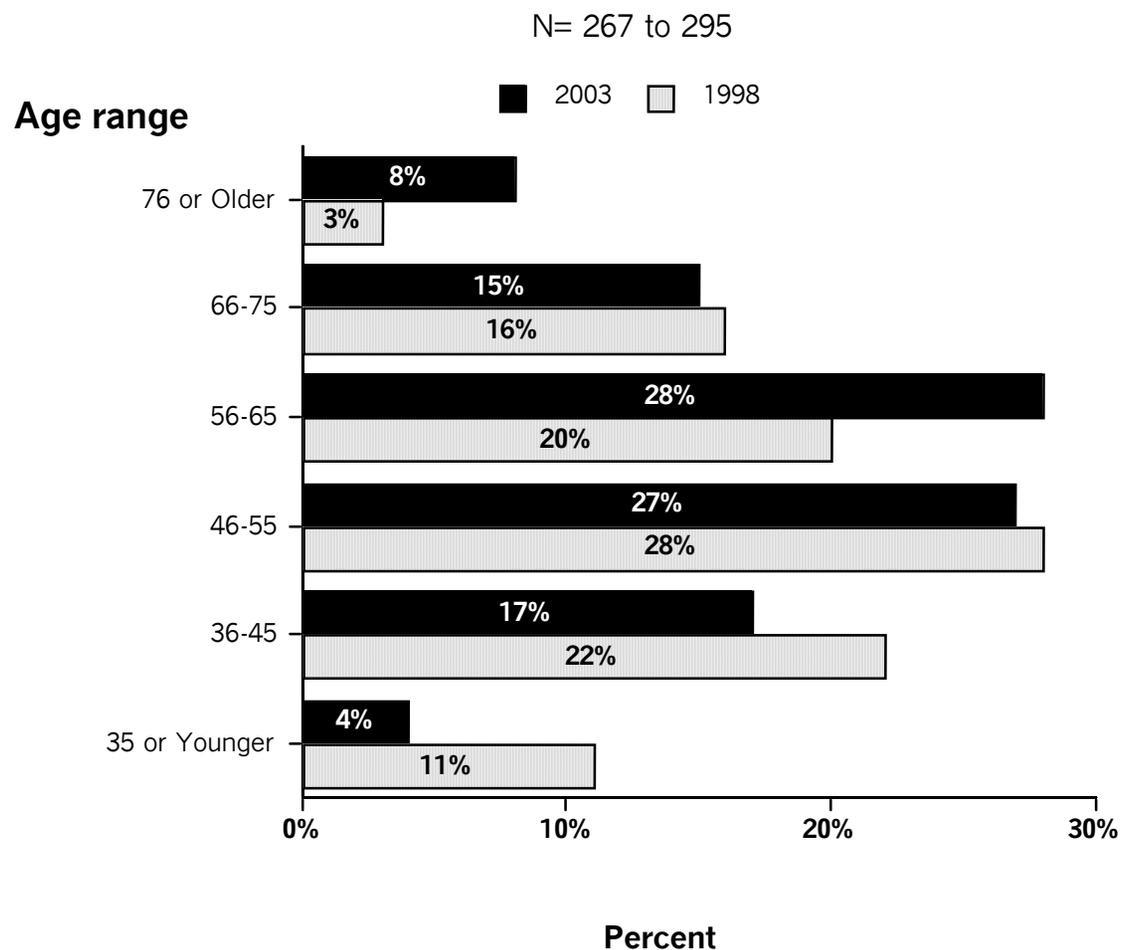
---

*To gain an overall picture of respondent characteristics, some basic demographic information was collected. Results collected in 1998 have been compared to demographics collected in 2003.*



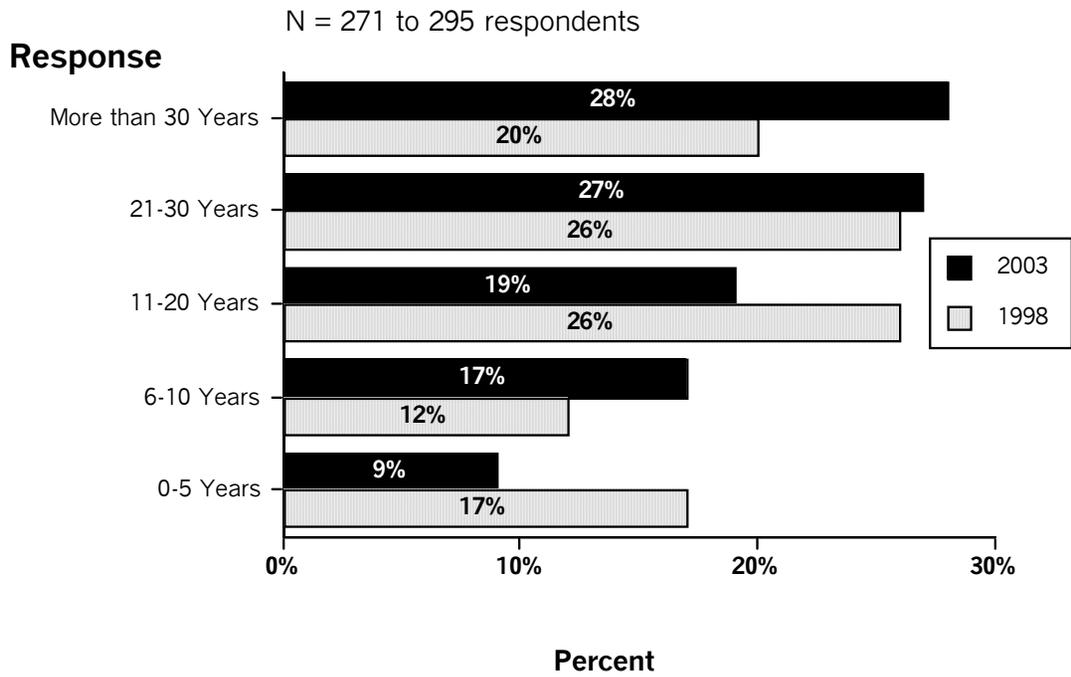
**Figure 26. (1998 and 2003) Distribution of vineyard professionals**

Respondents in 1998 and again in 2003 were asked if they are a grower, manager, and/or PCA in Crush District 11 (figure 26). Ninety-three percent reported that they are grower in 1998 and that figure increased to 94% in 2003. Twenty-five percent reported that they are vineyard managers in 1998 and forty percent in 2003. A new category, Winery Owner, was added in 2003 and 7% identified themselves as winery owners. Those self-identifying as PCAs remained unchanged at six percent.



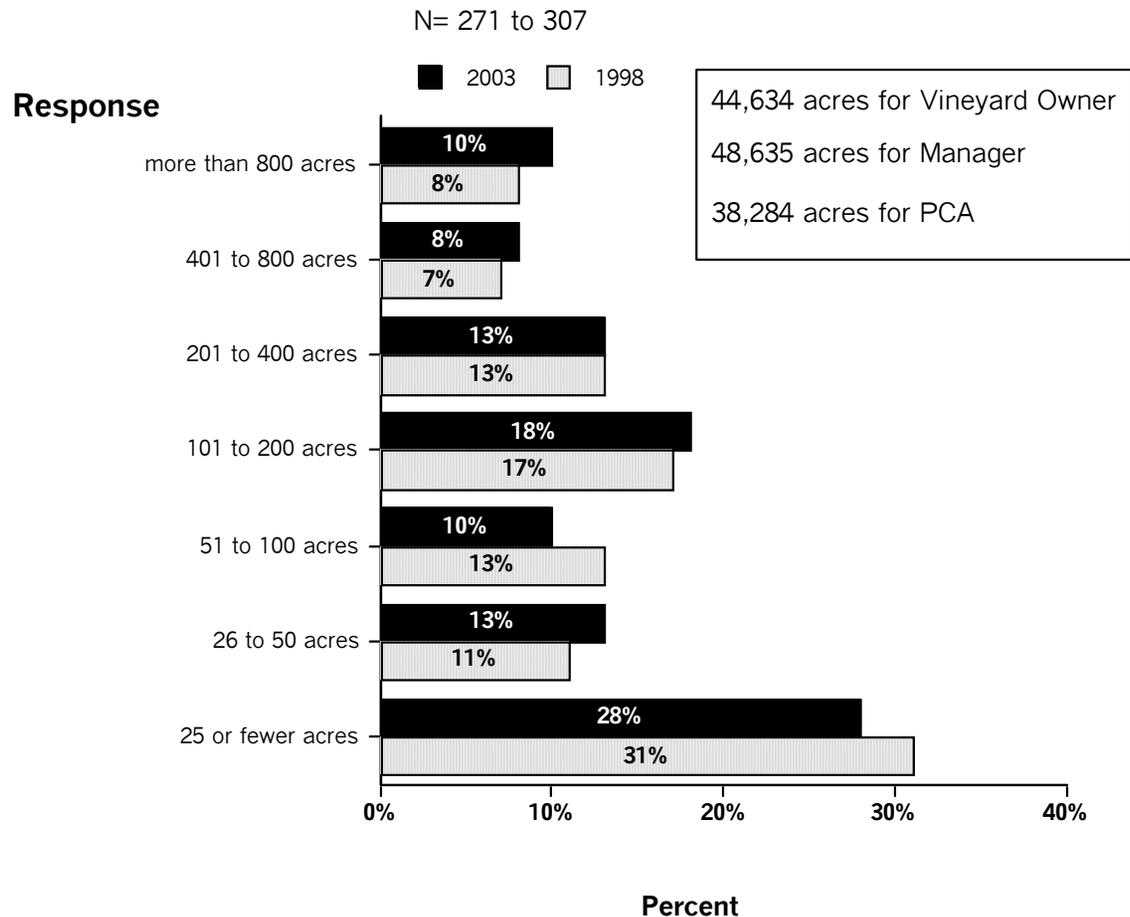
**Figure 29. (1998 and 2003) Age distribution**

In 1998, one-half of the respondents were between the ages of 36 and 55, while 11 percent were 35 or younger. In 2003, forty-four percent were between the ages of 36 and 55, and 4 percent were 35 or younger. Respondents were older in 2003 compared with 1998. In 1998, twenty percent of respondents were between 55 and 65, while in 2003 that figure was 28 percent. Respondents aged 66 and older increased from 19 percent in 1998 to 23 percent in 2003 with the difference falling in the 76 and older category.



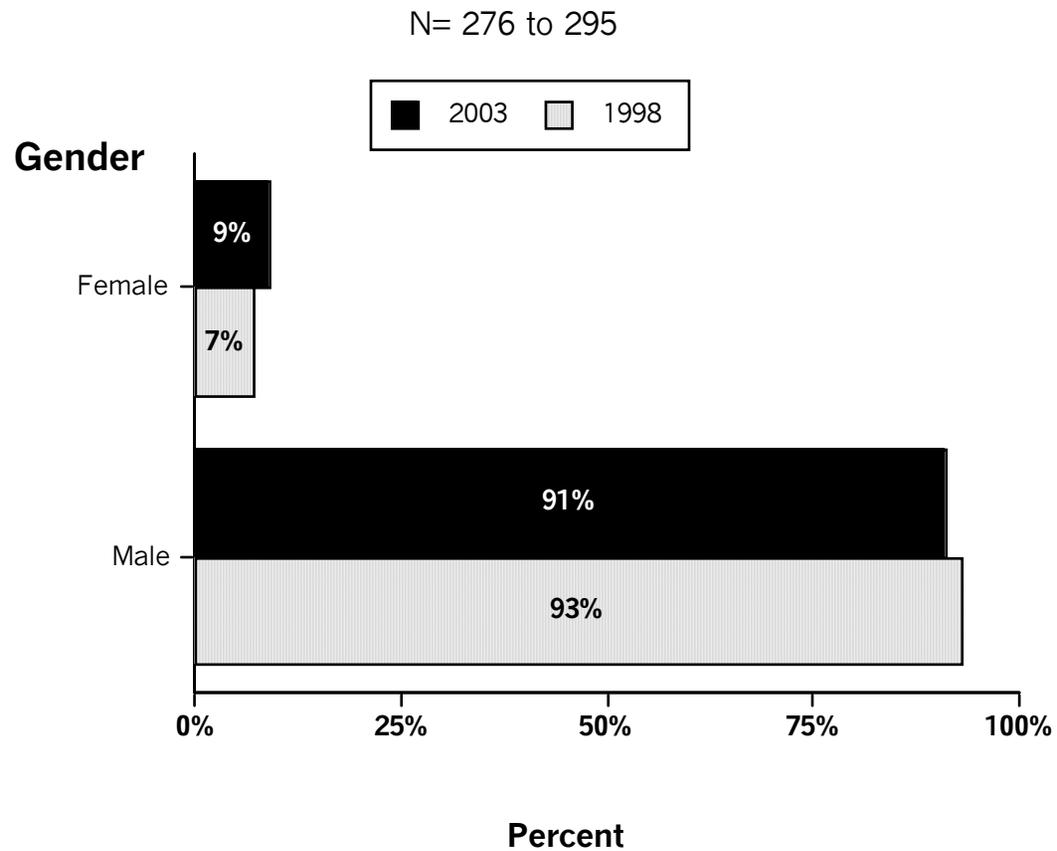
**Figure 27. (1998 and 2003) Years of vineyard experience distribution**

In 1998 and again in 2003 respondents were asked how long they have been a grower, manager, and/or PCA in Crush District 11 (figure 27). In 2003, respondents reported more years of experience than in 1998. In 1998, nearly half the respondents (46%) reported that they have been active in Crush District 11 for over 20 years; 26 percent have been a part of the District for 11 to 20 years; 12 percent have been in the District for 6 to 10 years; and 17 percent have been in the District for fewer than five years. In 2003, more than half the respondents reported over twenty years experience (55%) in the District, nineteen percent had 11-20 years experience, seventeen percent had 6-10 year experience and nine percent were new to the District with 5 years experience or less.



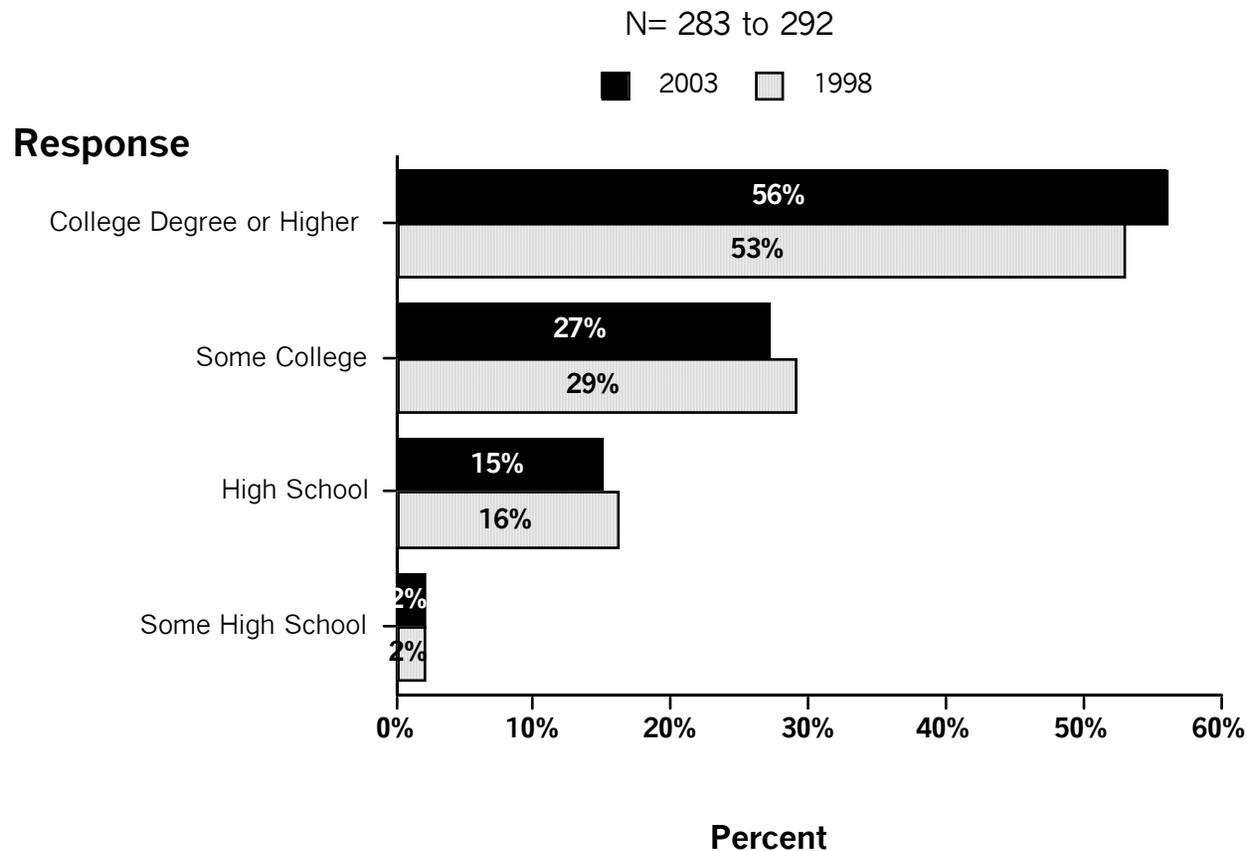
**Figure 28. (1998 and 2003) Size distribution for vineyard owners, managers and PCAs**

This size distribution of respondents from 1998 to 2003 has not significantly changed. The largest contingent in both years grow/manage/ or are PCAs for 25 acres or less in the District, with 31% in 1998, and 28% in 2003. The size distribution for the other categories was very similar, within a few percentage points, for both questionnaires. The second most frequent size category in 1998 and 2003 was 101 to 200 acres with just over one out of six respondents identifying with that size category. Respondents reporting on over 800 acres in the district grew by two percent from 8% in 1998 to 10% in 2003.



**Figure 30. (1998 and 2003) Gender distribution**

Most respondents were men; the percent of women respondents increased from seven percent in 1998 to nine percent in 2003.



**Figure 31. (1998 and 2003) Education distribution**

The level of education changed only slightly between the two questionnaires. In 1998, more than half the respondents (53%) had a college degree or higher; 29 percent had some college; 16 percent finished high school, and 2 percent attended some high school. In 2003, over half (56%) had a college degree or higher, 27 percent had had some college, 15 percent had finished high school and 2 percent had attended some high school.