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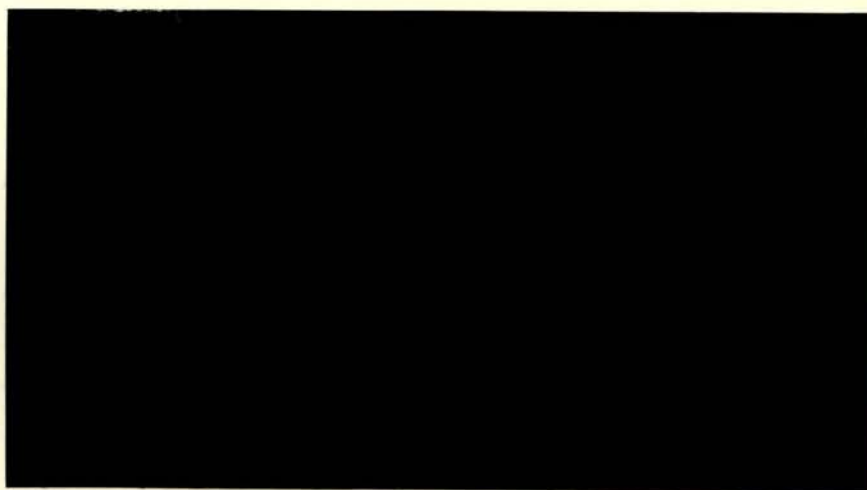
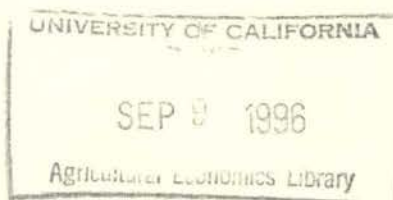
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**EUCALYPTUS SNOUT BEETLE SURVEY**  
**Preliminary Results From Southern**  
**California Households**

by

Karen Jetter, Douglas Larson,  
Karen Klonsky, and Timothy Paine

Working Paper No. 96-1 ✓

# **EUCALYPTUS SNOUT BEETLE SURVEY**

**Preliminary Results From  
Southern California Households**

by

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June 6, 1996

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## I. Introduction

A new infestation of eucalyptus snout beetles was discovered in Southern California in March 1994. This report presents the results of a household survey on three different pest control methods to manage it. A phone-mail-phone survey of households in Los Angeles, Ventura and Riverside Counties was completed from November 1995 through January 1996. During the first phone contact the purpose of the survey was explained and respondents were asked to participate in it. An information booklet was mailed to households which agreed to be interviewed. The survey was completed during the second phone contact.

The eucalyptus snout beetle was first discovered in Ventura County during March 1994. During 1995 the beetle spread into Los Angeles and Santa Barbara Counties. It is expected to spread into San Bernardino, Orange and Riverside Counties during 1996 and will continue to spread throughout California at a rate of about 50 kilometers a year. Because the snout beetle is new to California, natural enemies, which keep infestations of snout beetles under control elsewhere, were not present in the Californian landscape to control it here.

The primary hosts of the eucalyptus snout beetle are *Eucalyptus globulus* (manna gum) and *Eucalyptus viminalis* (blue gum). These two species account for about 1 in 5 eucalyptus trees planted in urban areas. Based on street tree inventories from Southern California, eucalyptus trees account for about 3% of all urban street trees. In addition, they are widely planted along freeways and highways in the survey area. The adult beetles chew through the edges of the leaves of vulnerable eucalyptus trees while the larvae eat leaf tissue layer by layer. The leaves then dry out and fall off the tree. Feeding by adult beetles and larvae can kill larger branches, cause the trunk and branches to stop growing and may kill or stunt eucalyptus trees. Over time, if the infestation of snout beetles is not controlled, eucalyptus trees will gradually die off.

The information booklet sent to respondents described three different public programs to control the eucalyptus snout beetle. The different programs varied in several key characteristics, including the length of time required to achieve effective control of the snout beetle, the environmental impacts, the number of applications needed for the method to be effective, and the cost of the program. These characteristics were varied across households in the survey.

The first program was to spray the eucalyptus tree with a chemical insecticide, Carbaryl. This program results in the immediate control of the snout beetle. However, if chemical pesticides are used, the control of the beetle may also kill other insects, including beneficial insects and cause



minor eye and skin irritation in some people. Another disadvantage to chemical insecticides is that they do not control pest infestations permanently. As a result, they must be reapplied in order to prevent defoliation or tree death in urban environments.

The second program was to spray the eucalyptus tree with a bacterial insecticide, *Bacillus thuringensis* var. *tenebrionis* (Btt). Bacterial sprays result in the immediate control of the snout beetle and will only kill other beetles, including beneficial beetles such as ladybugs. There are no negative impacts on people. The disadvantage to using bacterial sprays is that they do not control pest infestations permanently. As a result, they must also be reapplied in order to be effective.

The final program involved importing from another country, rearing in greenhouses and releasing into the environment a small stingless wasp, *Anaphes nitens*, which is a natural enemy of the eucalyptus snout beetle. *Anaphes nitens* does not attack any other insects. The stingless wasp lays its eggs in snout beetle eggs and the developing wasp embryo consumes the beetle egg as it matures. *Anaphes nitens* has been used successfully for over 50 years in New Zealand and South Africa to control the eucalyptus snout beetle and is expected to be successful here too.

The process of importing and releasing a natural enemy into a landscape is known as a classical biological control program. The natural enemy becomes a permanent part of the landscape and will result in the permanent reduction of pest populations so that no further pest management actions will need to be undertaken. The disadvantage is that it takes time to import, rear and release the natural enemy. It also takes time for the natural enemy to spread completely throughout the landscape and achieve effective control.

In addition to the public programs described above, respondents were asked to consider a private purchase of the natural enemy of the eucalyptus snout beetle, *Anaphes nitens*. The Department of Entomology at U.C. Riverside had previously made a stingless wasp, (*Encarsia partenopea*), which is a natural enemy of the ash whitefly, available for direct purchase and release by households. At the time of the survey there were plans to do so again with *Anaphes nitens* for snout beetle control.

Respondents were asked first to rank and then to rate the public programs based on the characteristics and cost of each. They were then asked whether they would support paying the cost as a special property tax assessment. Those people who said that they had eucalyptus trees in either their yard or neighborhood were asked whether they would like to purchase *Anaphes nitens* privately at a specified price that varied across households. In addition questions were asked on



the respondents' familiarity with pest control methods and public pest control programs, environmental attitudes, and socio-economic background.

Two types of households were surveyed. The first were random digit dialed (RDD) households in Los Angeles, Riverside and Ventura Counties. The second were from a list of households which had previous experience with purchasing the ash whitefly natural enemy, *Encarsia partenopea*, from the University of California, Riverside.

## II. Survey Response Rate

A total of 2151 numbers were dialed in the initial contact phase. Of these, 2055 were random digit dialed and 96 were numbers associated with *Encarsia* wasp purchasers. It was determined that 982 RDD and 56 *Encarsia* wasp purchasers were eligible to participate in the survey (Table 1). The remaining numbers were either for businesses, busy or disconnected numbers, or households with a language barrier. A total of 718 interviews were scheduled with 671 RDD households and 47 *Encarsia* wasp purchaser households. Of the 718 scheduled interviews 521, or 73%, were completed (Table 1). The response rate of completed interviews to eligible households was 50%. This is comparable to response rates obtained on other general household economic valuation surveys in California.

Table 1: Survey Response Rates

	RDD	<i>Encarsia</i> Wasp Purchaser	Total
Total Numbers Called	2055	96	2151
Households Known Eligible	982	56	1038
Interviews Scheduled	671	47	718
Interviews Completed	479	42	521
Percent of Eligible Households which Scheduled an Interview	68%	84%	69%
Percent of Eligible Households which Completed the Interview	49%	75%	50%
Percent of Scheduled Interviews which were Completed	71%	89%	73%

The random digit dialed households made up 92% of the total number of households surveyed (Table 2). Households which had previously purchased the *Encarsia* wasp from the University of California, Riverside, made up the remaining 8%.

Table 2: Household Category

Type of Household	Number	Percent
RDD	479	92%
<i>Encarsia</i> Wasp Purchaser	42	8%
Total	521	100%

The majority of respondents, 80%, resided in Los Angeles County. Twenty-one percent resided in Riverside County and 7% resided in Ventura County. Only one household, an *Encarsia* wasp purchaser, resided in Santa Barbara County (Table 3).

Table 3: Residence Locations for Surveyed Households

County	Number	Percent
Ventura	39	8%
Los Angeles	419	80%
Riverside	62	12%
Santa Barbara	1	0%
Total	521	100%

### III. Familiarity with Public Pest Control Programs and Pest Control Methods

The first question on the initial contact interview asked respondents whether they knew of any public pest control programs. Most, 72%, did not know of any public pest control programs (Table 4). Seventeen percent were familiar with the program to eradicate the Mediterranean Fruitfly, 5% knew about the ash whitefly biological control program and 4% had heard of some other program.

Table 4: Knowledge of Public Pest Control Programs

	Number	Percent
Yes Responses and Program:		
Ash Whitefly	24	5%
Trioza Eugeniae	1	0%
Mediterranean Fruitfly	87	17%
Don't Know	6	1%
Other	19	4%
No Responses	376	72%
Don't Know	2	0%
Refused to answer	6	1%
Total	521	100%

The next set of questions asked whether the respondent had read or heard of chemical sprays,



bacterial sprays or biological methods to control pest infestations. Most people, 61%, were familiar with the use of chemical sprays such as Raid or Carbaryl. Fourteen percent knew about bacterial sprays such as B.t. (*Bacillus thuringensis*), and 33% were familiar with biological methods (Table 5).

Table 5: Familiarity with Pest Control Methods

Are you familiar with the use of:	Chemical Sprays		Bacterial Sprays		Biological Methods	
	Number	Percent	Number	Percent	Number	Percent
Yes	318	61%	72	14%	172	33%
No	196	38%	439	84%	336	64%
Don't Know	0	0%	0	0%	4	1%
Refused to answer	7	1%	10	2%	9	2%
Total	521	100%	521	100%	521	100%

Of the 33% of respondents who were familiar with biological methods, 63% had heard about releasing natural enemies, 21% were familiar with pheromone confusion or releasing sterilized males, 6% had heard about the use of bacterial insecticides such as B.t., and 10% gave some other response (Table 6).

Table 6: Types of Biological Pest Control Methods Respondents are Familiar With

Control Method	Number	Percent
Bacterial Sprays, Bt, Safer Soap	10	6%
Release of natural enemies	109	63%
Pheromone confusion, release of sterilized males	36	21%
Other	17	10%
Total	172	100%

Respondents who had stated that they were familiar with a pest control method were asked how strongly they would support the use of that method. For the chemical spray method a plurality of respondents, 35%, were somewhat supportive of its use (Table 7). Eight percent strongly support, 25% somewhat oppose, and 21% strongly oppose the use of chemical sprays.

For the bacterial spray method, 35% of respondents strongly support its use. Twenty-nine percent somewhat support, 10% somewhat oppose, and 8% strongly oppose the use of bacterial sprays (Table 7).

Table 7: General Support of Pest Control Methods

Response	Chemical Sprays		Bacterial Sprays		Biological Methods	
	Number	Percent	Number	Percent	Number	Percent
Strongly support	24	8%	25	35%	118	69%
Somewhat support	111	35%	21	29%	36	21%
Somewhat oppose	81	25%	7	10%	3	2%
Strongly oppose	68	21%	6	8%	6	3%
Don't know	28	9%	11	15%	8	5%
Refused	6	2%	2	3%	1	1%
Total	318	100%	72	100%	172	100%

The biological pest control method had the highest percent, at 69%, of respondents who strongly support that method. Twenty-one percent somewhat support, 2% somewhat oppose, and 3% strongly oppose the use of biological methods (Table 7).

#### IV. Experience with Eucalyptus and Other Tree Pest Problems

The final survey asked respondents whether they had eucalyptus trees in their yard or neighborhood. Sixteen percent of respondents have eucalyptus trees in their yard, while 50% have eucalyptus trees in their neighborhood (Table 8).

Table 8: Respondents With Eucalyptus Trees

Response	In Own Yard		In Neighborhood	
	Number	Percent	Number	Percent
Yes	82	16%	260	50%
No	438	84%	225	43%
Don't Know	1	0%	36	7%
Refused	0	0%	0	0%
Total	521	100%	521	100%

Next, respondents were asked whether they had heard of any eucalyptus pest problems. Twelve percent of respondents have previously heard of some type of eucalyptus pest control problem (Table 9).



Respondents who had eucalyptus trees in either their yard or neighborhood were asked whether those trees were infested. Eight percent of respondents stated that there was a pest infestation in the eucalyptus trees in their yard or neighborhood (Table 9).

Table 9: Experience with Pest Problems

Response	Have you heard or read of eucalyptus pest control problems?		Are any eucalyptus trees in your yard or neighborhood infested with insect pests?		Have any of your other trees had problems with insect pests in the past five years?	
	Number	Percent	Number	Percent	Number	Percent
Yes	61	12%	22	8%	195	37%
No	459	88%	175	65%	306	59%
Don't Know	1	0%	73	27%	20	4%
Total	521	100%	270	100%	521	100%

Respondents were also asked whether they had experienced a pest infestation in any of their other trees in the past five years. Thirty-seven percent had experienced a pest infestation.

Respondents who had experienced a pest infestation were asked how they had controlled that infestation. Thirty-three percent had treated the infestation with chemical sprays, 23% did nothing, 8% removed the infested foliage, 3% used better watering and maintenance, and 33% used something else (Table 10). The most common other methods used were to purchase *Encarsia* wasps from the University of California, Riverside and to cut down the infested tree.

Table 10: How Respondents Treated Past Pest Problems

Treatment	Number	Percent
Chemical sprays	64	33%
Removed the infested foliage	15	8%
Used better watering and maintenance	6	3%
Other	64	33%
Nothing	45	23%
Don't know	1	1%
Total	195	100%



## V. Environmental Attitudes

Three statements, taken from the General Social Survey (GSS) on environmental attitudes, were asked in this survey to compare the respondents' environmental attitudes with the general population's. For the first statement, "People worry too much about human progress harming the environment." a plurality of respondents, 35%, disagreed with the statement. Seven percent strongly agreed, 33% agreed, 7% neither agreed nor disagreed, and 17% strongly disagreed with the statement. These results are similar to the results of the General Social Survey.

The next statement was "We worry too much about the future of the environment and not enough about prices and jobs today." As with the previous statement, a plurality of respondents, 43%, disagreed with it. Eight percent strongly agreed, 26% agreed, 9% neither agreed nor disagreed, and 13% strongly disagreed. These results are also similar to the results of the General Social Survey.

Table 11: Environmental Attitudes

Statement	People worry too much about human progress harming the environment.		We worry too much about the future of the environment and not enough about prices and jobs today		Almost everything we do in modern life harms the environment	
Response	Number	Percent	Number	Percent	Number	Percent
Strongly Agree	36	7%	41	8%	53	10%
Agree	174	33%	134	26%	177	34%
Neither agree nor disagree	38	7%	49	9%	62	12%
Disagree	180	35%	226	43%	206	40%
Strongly disagree	91	17%	68	13%	21	4%
Don't know	2	0%	1	0%	1	0%
Refused	0	0%	2	0%	1	0%
Total	521	100%	521	100%	521	100%

The final statement was "Almost everything we do in modern life harms the environment." Again, a plurality of respondents, 40%, disagreed with the statement. Ten percent strongly agreed, 34% agreed, 12% neither agreed nor disagreed, and 4% strongly disagreed. These results are slightly different from the General Social Survey results where 40% of respondents agreed with the statement and 26% disagreed.

## VI. Rankings of Public Pest Control Programs

Respondents were asked to pick their most preferred snout beetle control program given the characteristics and cost of each. As stated earlier, there was a chemical control program, (spray Carbaryl), a bacterial control program (spray *Btt*), and a classical biological control program, (release the *Anaphes nitens* parasitic wasp). The majority of respondents, 79%, ranked releasing the wasp as their most preferred program (Table 12). Sixty-five percent ranked spraying *Btt* as their second most preferred program and 69% ranked spraying Carbaryl as their least preferred program (Table 12).

The program to spray Carbaryl was ranked first by 8%, second by 15%, third by 69% and not ranked at all by 8% of respondents. The spray *Btt* program was ranked first by 12%, second by 65%, third by 16% and not ranked by 7% of respondents. The release of wasps was ranked first by 79% of respondents, second by 12%, third by 6%, and not ranked by 3% of households.

Table 12: Program Rankings

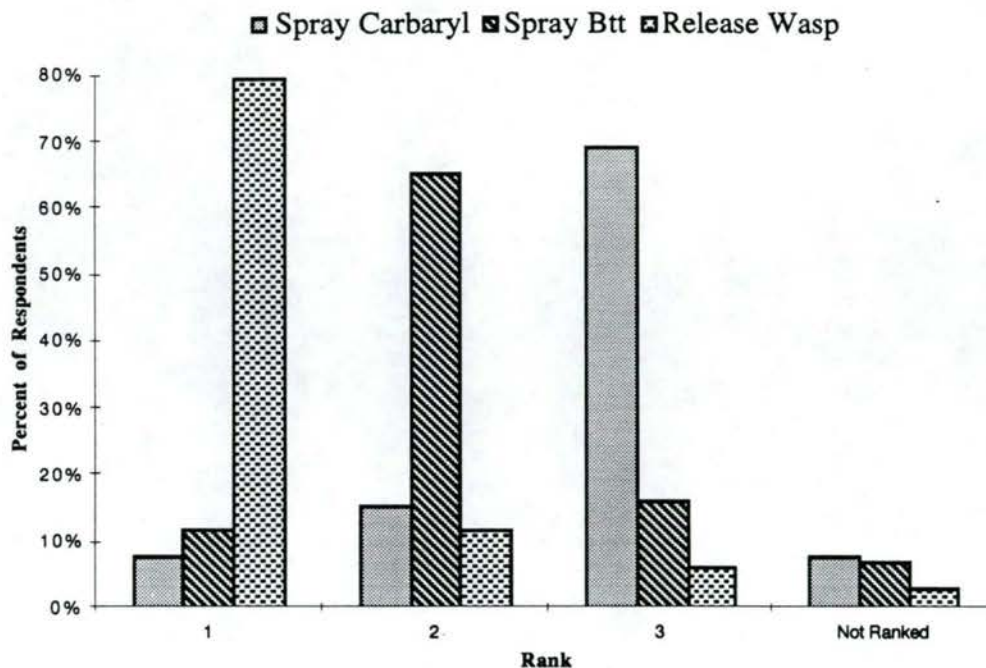
Program	Spray Carbaryl		Spray Btt		Release Wasps	
Ranking	Number	Percent	Number	Percent	Number	Percent
1st	40	8%	61	12%	414	79%
2nd	79	15%	338	65%	61	12%
3rd	362	69%	84	16%	32	6%
Not Ranked	40	8%	38	7%	14	3%
Total	521	100%	521	100%	521	100%

Six households did not rank any program (Table 12). The main reason households did not rank any program was either because they opposed their taxes being raised or because they think that eucalyptus trees should be allowed to die out. Thirty-seven households only stated what their most preferred program was and did not rank the remaining two programs. Households did not rank the remaining two programs either because they did not like the remaining choices, they did not like the harmful effects of the method used, or they were unfamiliar with the biological methods.

Figure 1 shows the relative rankings of all programs by the respondents.



**Figure 1: Program Rankings**



## VII. Ratings of Public Pest Control Programs

Respondents were asked to rate each program that was ranked by them on a Likert scale of 1 to 10. Ratings of one, two, three or four mean that the program is considered very poor to poor. Ratings of five or six mean that the program is considered good. Ratings of seven, eight, nine and ten mean that the program under consideration is considered very good to excellent.

The vast majority of respondents, 85%, rated the biological control program as very good to excellent (Table 13). Over half the respondents, 66%, rated the chemical control program, spray Carbaryl, as very poor to poor. Almost half of the households surveyed, 45%, rated the bacterial control program, spray *Btt* as good.

Sixty-six percent of respondents rated spraying Carbaryl as a poor to very poor alternative. Twenty-one percent rated it as good, and 13% rated it as very good to excellent (Table 13). Eighteen percent of all respondents rated spraying *Btt* as very poor to poor while 45% rated it as good and 38% rated it as very good to excellent. For the biological control program, release *Anaphes nitens* wasp, only 4% of respondents rated it as very poor to poor. Eleven percent rated it as good and 85% rated it as very good to excellent.

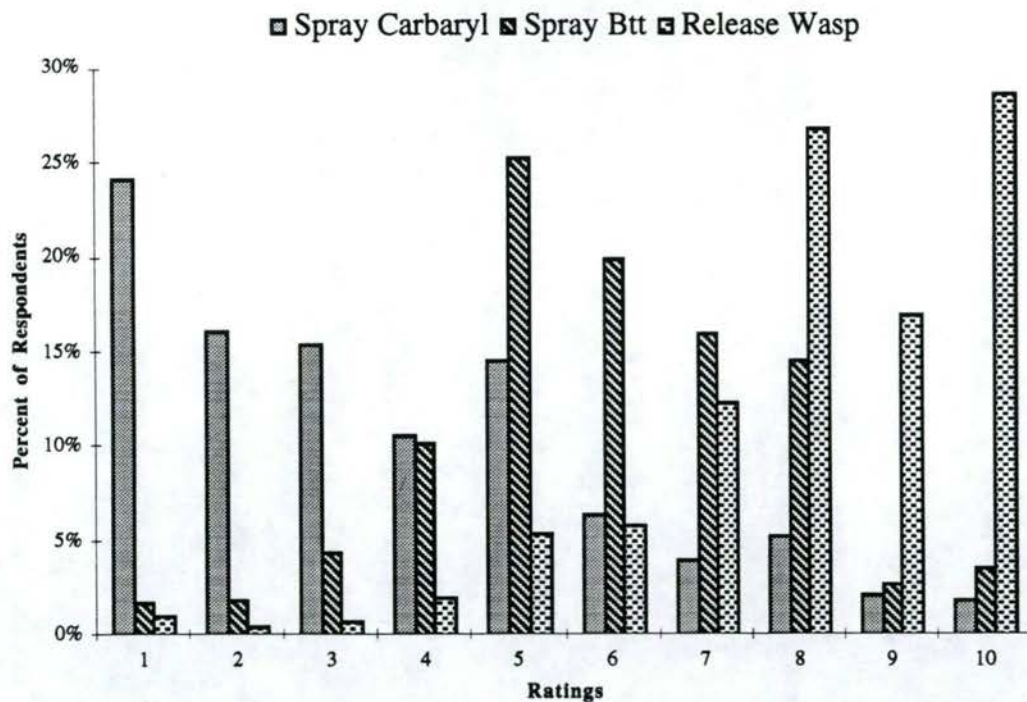


Table 13: Program Ratings

Program		Spray Carbaryl		Spray Btt		Release Wasp	
Rating		Number	Percent	Number	Percent	Number	Percent
Very Poor	1	116	24%	8	2%	5	1%
	2	77	16%	9	2%	2	0%
Poor	3	74	15%	21	4%	4	1%
	4	51	11%	49	10%	10	2%
Good	5	70	15%	122	25%	27	5%
	6	30	6%	96	20%	29	6%
Very Good	7	19	4%	77	16%	62	12%
	8	25	5%	70	15%	136	27%
Excellent	9	10	2%	13	3%	86	17%
	10	9	2%	17	4%	145	29%
	Don't Know	0	0%	1	0%	1	0%
Total		481	100%	483	100%	507	100%

Figure 2 shows all the ratings for each program.

Figure 2: Program Ratings



### VIII. Support for Public Pest Control Programs

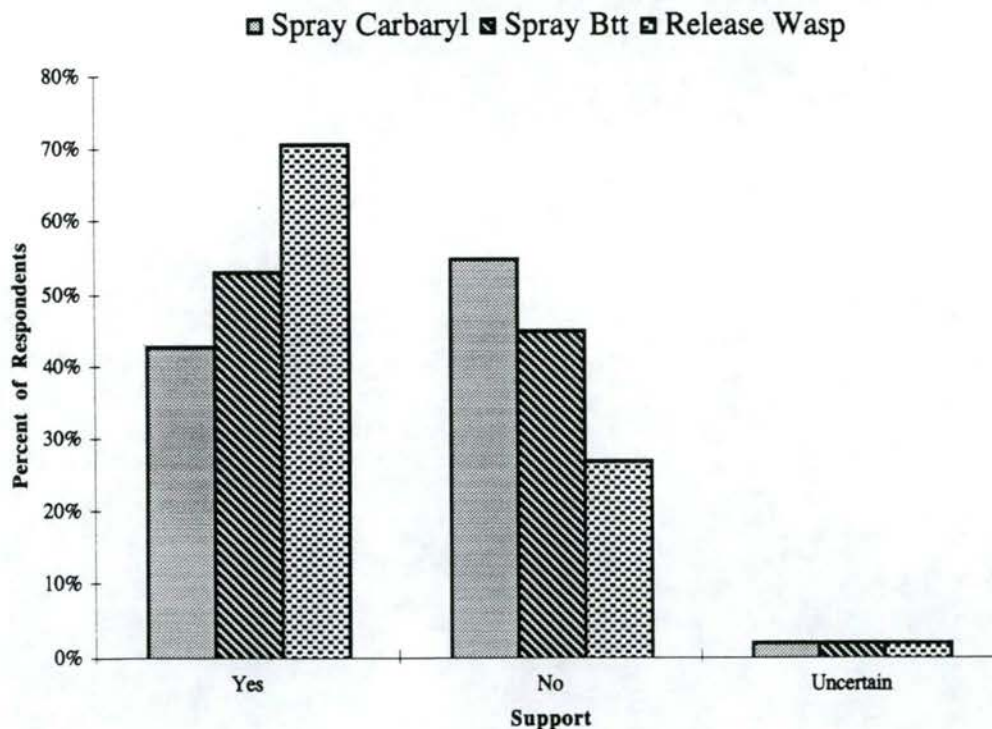
Respondents who ranked each program were also asked whether they would vote to support that program, as a special property tax assessment, given its costs and characteristics.

Table 14: Program Support

Program	Spray Carbaryl		Spray Btt		Release Wasp	
Response	Number	Percent	Number	Percent	Number	Percent
Yes	207	43%	255	53%	361	71%
No	266	55%	217	45%	135	27%
Uncertain	8	2%	11	2%	11	2%
Total	481	100%	483	100%	507	100%

A comparison of the percent of respondents who would support each program is shown in Figure 3.

Figure 3: Support of Pest Control Program

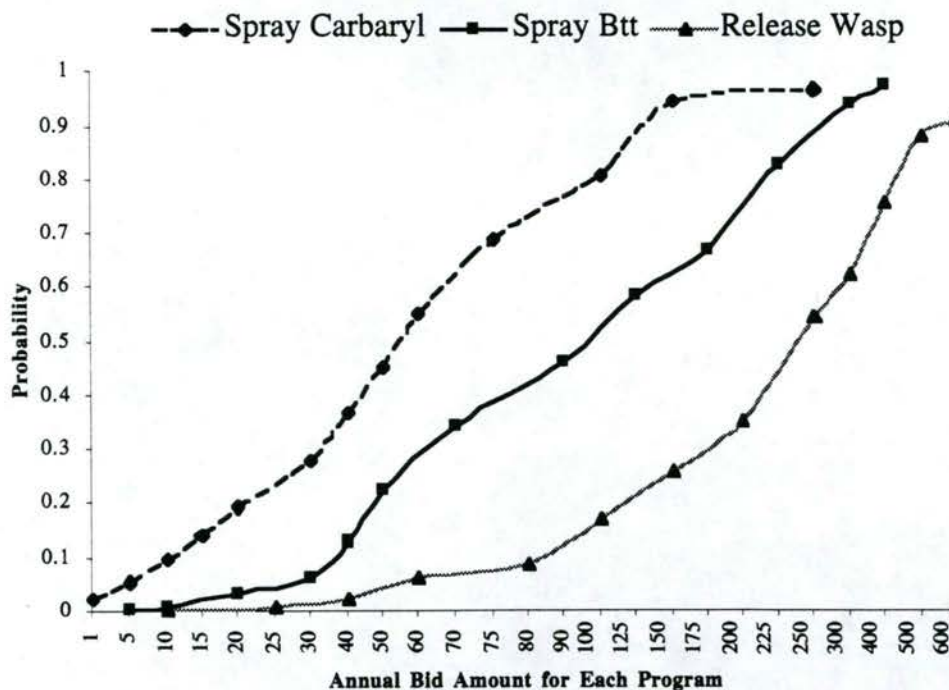




Slightly more than half, 51%, of respondents said that they would not vote to support the program to spray Carbaryl and 40% would vote to support it (Table 14). Almost half, 49%, of the respondents stated that they would support the program to spray *Btt*, given the characteristics and costs of the program whether they had to vote for it. Forty-two percent of respondents would not support it (Table 14). A majority of respondents, 69%, would support the release of parasitic wasps at the stated costs. Only 26% would not support this program (Table 14).

The annual cost of the program to spray Carbaryl ranged from a low of \$1 to a high of \$250. The median annual cost at which 50% of the respondents would choose to support this program is \$55. The annual cost of the program to spray *Btt* ranged from a low of \$5 to a high of \$400. The median annual cost at which 50% of the respondents would choose to support this program is \$114. This tax would be paid every year for seven years. The cost of the program to release the parasitic wasp into the environment ranged from a low of \$10 to a high of \$600. The median cost at which 50% of the respondents would choose to support this program is \$212. This tax would be paid once. The costs were varied across programs and households.

**Figure 4: Probability that Respondent Would Not Support Paying the Stated Cost of Each Program**



When the cost of the program is low, the probability that the respondent would not support the



implementing the pest control program is low. As the annual price of each program rises, the probability that a respondent would not support paying the cost of the program also rises. Figure 4 shows the probability that a respondent would answer no if asked to support each program in a referendum vote given the cost of the program.

Once the respondents stated their support for or against the pest control program under consideration, they were asked to give the main reason for their answer (Table 15). The main reason a plurality of respondents, 41%, would support the program to spray Carbaryl is because having some pest control program was better than having no pest control program. The second most frequent response, 17%, was to preserve the scenic beauty of trees in the respondent's neighborhood. Eleven percent said that it was the best value for their money, 9% felt that spraying the eucalyptus trees was the most effective pest control program, and 14% gave some other reason (Table 15).

Table 15: Reason Respondent Would Support Program for Each Pest Control Method

Program	Spray Carbaryl		Spray Btt		Release Wasp	
Reason	Number	Percent	Number	Percent	Number	Percent
To preserve the quality of my yard	2	1%	5	2%	8	2%
To preserve trees in my neighborhood	35	17%	21	8%	28	8%
Non-toxic or less toxic than others	5	2%	99	39%	155	43%
Will not harm the environment	5	2%	22	9%	72	20%
I prefer this type of control	4	2%	5	2%	24	7%
This is more effective than the other programs	19	9%	19	7%	22	6%
This is the best value for my money	22	11%	6	2%	20	6%
Better than nothing	85	41%	61	24%	6	2%
Don't know	2	1%	0	0%	0	0%
Other	28	14%	17	7%	26	7%
Total	207	100%	255	100%	361	100%

The main reason, 39%, respondents gave for supporting the program to spray *Btt*, was that it was less toxic than the other choices. Twenty-four percent felt that it was better than doing nothing, 9% wanted the program because it would not harm the environment, 8% wanted it to preserve trees in their neighborhood, 7% thought that it was more effective than the other programs, and 7% gave some other reason (Table 15).

The main reasons respondents gave for supporting the program to release wasps were that it was non-toxic, 43%, and would not harm the environment, 20%. Eight percent wanted to release the wasps in order to preserve the quality of trees in their neighborhood, 7% preferred biological controls, 6% thought that it was more effective than the other programs, 6% thought that it was the best value for their money, and 7% gave some other response (Table 15).

Respondents were also asked to state the main reason why they would not support the specified program if asked to vote on a special property tax assessment (Table 16). The majority of responses, 62%, for not supporting the program to spray Carbaryl was because it is toxic to the environment (Table 16). Fifteen percent do not think that the program is worth the money, 8% gave some other response and 7% just did not like the chemical control program.

The main reason, 56%, respondents would not support the spray *Btt* program was because they did not think that it was worth the cost (Table 16). Thirteen percent gave some other response and 12% would not support this program due to its toxic and environmental effects.

The main reason, 59%, respondents would not support the classical biological control program was because they did not think that it was worth the money. Nineteen percent gave some other reason, and 5% disapprove of special assessments (Table 16).



Table 16: Reason Respondent Would Not Support Program for Each Pest Control Method

Program Reason	Spray Carbaryl		Spray Btt		Release Wasp	
	Number	Percent	Number	Percent	Number	Percent
Not worth the money	39	15%	122	56%	79	59%
Eucalyptus pests are not a problem where I live	5	2%	5	2%	6	4%
I don't believe the government would spend the money for pest control	0	0%	1	0%	0	0%
I don't want my taxes or rent raised	7	3%	11	5%	6	4%
Eucalyptus trees aren't native to California	4	2%	5	2%	6	4%
I don't feel that I should have to pay for treatment of trees in public areas	1	0%	3	1%	2	1%
I disapprove of special assessments	6	2%	7	3%	7	5%
Toxic, harmful to the environment	165	62%	25	12%	0	0%
I don't like this type of control	18	7%	9	4%	4	3%
Other	20	8%	28	13%	25	19%
Don't know	1	0%	1	0%	0	0%
Total	266	100%	217	100%	135	100%

Finally, respondents who were undecided about supporting a given pest control program as a special property tax assessment vote were asked to state why (Table 17). A few people stated that not enough information was provided in order to make a decision. Most others who were undecided were not sure whether they could afford to pay the cost stated in the program description.

Table 17: Reason Respondent Is Undecided About Support for Each Pest Control Method

Program	Spray Carbaryl		Spray Btt		Release Wasp	
Reason	Number	Percent	Number	Percent	Number	Percent
Not enough information provided	3	37.5%	0	0%	1	10%
Other	5	62.5%	11	100%	9	90%
Total	8	100%	11	100%	10	100%

### IX. Private Biological Control Program

The survey asked respondents whether they would purchase the wasp, *Anaphes nitens*, if it was available for private purchases. A price was stated which varied across households and respondents were given the opportunity to accept or reject purchasing the stingless wasp at that price. If the respondent said that they would purchase the wasp colony, a higher price was stated and respondents could either accept or reject purchasing the wasp colony at that price. Conversely, if the respondent rejected purchasing the wasp at the original price, a lower price was offered. If the respondent still rejected purchasing a wasp colony, she or he was offered a price of one dollar. The responses are from those respondents who said yes to purchasing a wasp colony at any one of the prices offered.

82% of respondents said that they would purchase a wasp colony while 18% would not even if the cost of the program was only \$1 (Table 18).

Table 18: Private Purchase of Parasitic Wasp

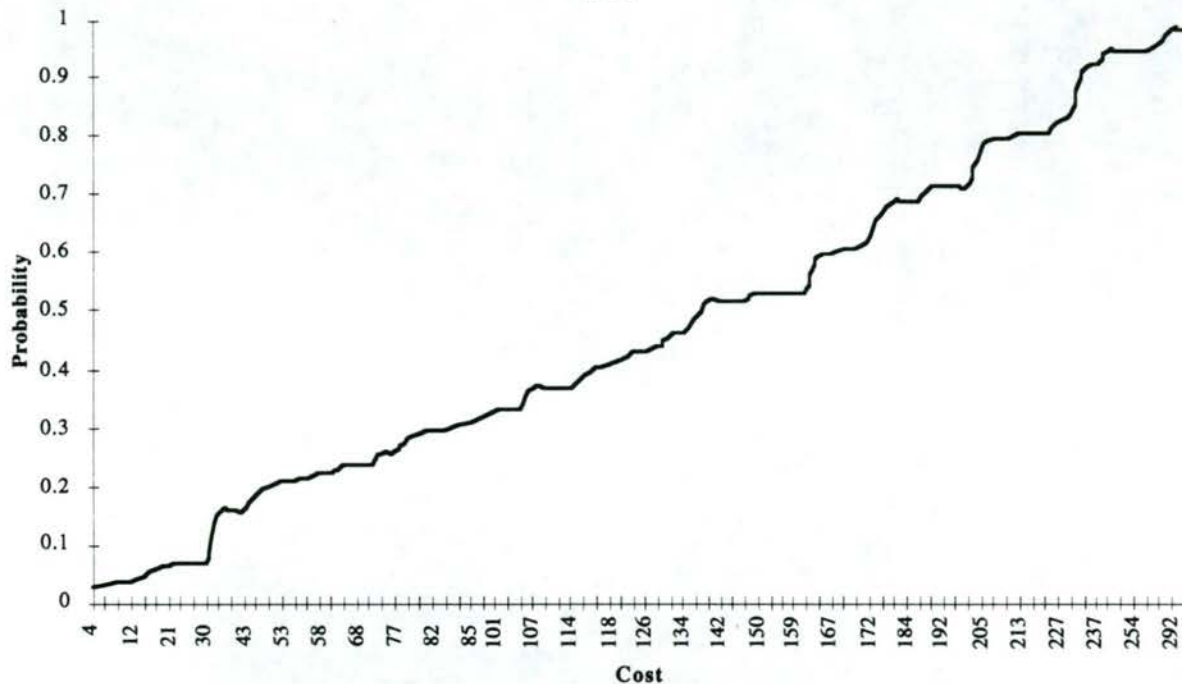
Response	Number	Percent
Yes	222	82%
No	48	18%
Total	270	100%

As with the public control programs, when the price of the wasp colony is low, there is a small probability that the respondent would not purchase a colony. As the price rises, the probability that



the respondent would not purchase the wasp colony for private use also increases (Figure 5). The median cost at which 50% of the respondents would choose to support this program is \$137.

**Figure 5: Probability the Respondent Would Not Privately Purchase the Wasp at the Stated Cost**



Respondents again were asked why they would or would not purchase a wasp colony at the stated price. The main reason, 22%, respondents gave for purchasing the parasitic wasp was to preserve the quality of neighborhood eucalyptus trees (Table 19).

**Table 19: Reason Respondents Would Buy The Parasitic Wasp Privately**

Reason	Number	Percent
To preserve the quality of my yard	38	17%
To preserve the quality of my neighborhood	48	22%
Environmentally sound/less damaging to environment	42	19%
Non-toxic	29	13%
I prefer biological controls	14	6%
This is the best value for my money	13	6%
If I had trees I would purchase it	18	8%
Other	20	9%
Total	222	100%

Other reasons are because respondents want to use a pest control method which is environmental sound, 19%, or non-toxic, 13. Seventeen percent want to preserve the quality of their yard, 6% prefer biological controls, and 6% think that it is the best value for their money.

The main reason, 38%, given by respondents who would not purchase the wasp privately was because they did not have eucalyptus trees in their yards (Table 20). Ten percent felt that the program was not worth the money, 6% stated that eucalyptus pests are not a problem where they live and 40% gave some other response. Some of the other responses reflected concern with having to release the wasps themselves, uncertainty over the use of natural enemies and the hypothetical nature of the question.

Table 20: Reason Respondents Would Not Buy The Parasitic Wasp Privately

Reason	Number	Percent
Too expensive, not worth the money	5	10%
Eucalyptus pest are not a problem where I live	3	6%
Eucalyptus trees are not native to Calif.	1	2%
This should be a public program, not paid for privately	2	4%
I don't have eucalyptus trees	18	38%
Want to see it actually work before purchase it	0	0%
Other	19	40%
Don't Know	0	0%
Refused	0	0%
Total	48	100%

#### X. Household Socio-Economic Characteristics

The survey ended with some general questions for classification purposes. These questions were on the respondents' gender, age, years of education, the number of people in their household, the number of hours spent taking care of their yards, whether they were homeowners or renters, their voting behavior, environmental group affiliations and income.



Female respondents made up 55% of the survey and male respondents 45% (Table 21).

Table 21: Gender of Respondent

Gender	Number	Percent
Female	284	55%
Male	237	45%
Total	521	100%

The average age of a respondent was 43.2 years (Table 22). The ages ranged from a low of 18 to a high of 91. On average, the respondents had 14.9 years of education. The fewest number of years of education a respondent had was 4 and the highest was 30. About three people lived in each household surveyed and the households each had about 1 child (Table 22). As many as 15 people lived in a household with up to seven children. The weekly average number of hours spent in yard care by the respondent or someone else was 4.6 hours with a low of 1 hour a week and a high of 20 hours a week (Table 22).

Table 22: Household Demographics

Statistic	How old are you?	How many years education have you had?	How many people live in your household?	How many children under the age of 18	How many hours per week are spent taking care of your yard?
Mean	43.2	14.9	3.0	1.0	4.6
Standard Deviation	14.7	3.0	1.7	1.3	4.8
Median	42.0	15.0	3.0	1.0	3.0
Low	18	4	1	0	1
High	91	30	15	7	20

Thirty-four percent of the respondents did not own their own home. 65% either rented or lived with other family members (Table 23).

Table 23: Homeowner Status of Respondents

Homeowner	Number	Percent
Yes	179	34%
No	338	65%
Don't know	1	0%
Refused	3	1%
Total	521	100%

83% of respondents are registered to vote and 57% exercised that privilege and voted during the last elections (Table 24).

Table 24: Voting Behavior of Respondents

Response	Are you a registered Voter?		Did you vote in the last election?	
	Number	Percent	Number	Percent
Yes	435	83%	295	57%
No	82	16%	221	42%
Don't know	1	0%	2	0%
Refused	3	1%	3	1%
Total	521	100%	521	100%

Only 13% of the respondents are a member of an environmental group. However, 37% have made donations to environmental groups (Table 25).

Table 25: Environmental Group Affiliations of Respondents

Response	Are you a member of an environmental group?		Donations to environmental groups?	
	Number	Percent	Number	Percent
Yes	66	13%	192	37%
No	449	86%	312	60%
Don't know	1	0%	12	2%
Refused	5	1%	5	1%
Total	521	100%	521	100%



Finally, respondents were asked to state which income category their yearly income fell into (Table 26). The highest percent of respondents, 22%, fall into the \$35,000 to \$50,000 range. Twelve percent have incomes under \$20,000, 17% have incomes between \$20,000 and \$35,000, 11% have incomes between \$50,000 to \$65,000, 11% have incomes between \$65,000 and \$80,000, 8% of respondents have incomes between \$80,000 and \$100,000, and 12% have incomes over \$100,000.

Table 26: Income Distribution of Survey Respondents

Annual Household Income	Number	Percent
less than \$20,000	64	12%
\$20,000 to \$35,000	87	17%
\$35,000 to \$50,000	116	22%
\$50,000 - \$65,000	58	11%
\$65,000 - \$80,000	58	11%
\$80,000 - \$100,000	41	8%
over \$100,000	61	12%
don't know	7	1%
refused	29	6%
Total	521	100%

