Enhancing Biological Control to Stabilize Western Orchard IPM Systems

A collaborative project between Washington State University, University of California at Berkeley, Oregon State University, USDA-ARS, and USDA-NIFA, and the apple, pear, and walnut industries in California, Oregon, and Washington.

SURVEY SUMMARY REPORT:
THE EXPERIENCES AND PERSPECTIVES OF OREGON PEAR GROWERS

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Biological control is a complex, knowledge-intensive practice that requires growers and pest management consultants to learn natural enemy and pest life cycles, toxicity and effectiveness of insecticides at different life cycle stages, strategies for managing insecticide resistance, and maintenance of long-term ecological balance while controlling pests and maximizing production. As part of a large USDA Specialty Crop Research Initiative (SCRI) project, researchers at Washington State University, University of California-Berkeley, and Oregon State University are seeking to better understand apple, pear, and walnut growers' experiences and perspectives related to pest management, in general, and biological control, in particular. This report presents results from a 2011 survey of Oregon pear growers. Survey results will inform future educational and outreach efforts.

Survey Methods

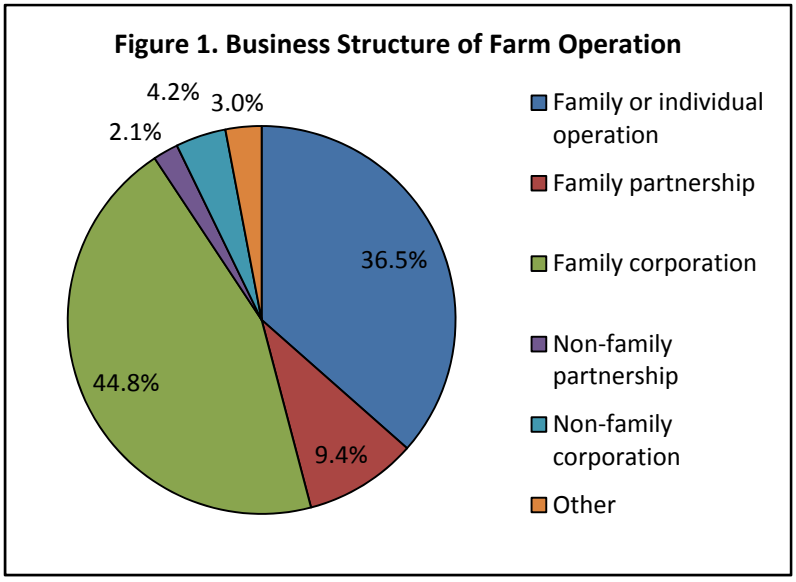
A survey of Oregon and Washington pear growers was conducted from March through May 2011. The survey population included pear orchard owners, managers, and lessees. A list of growers (N=1,001) was compiled by the WSU Tree Fruit Research and Extension Center using mailing list information provided by the Pear Bureau Northwest. Growers were contacted four times by mail: an initial letter with questionnaire, a reminder postcard, a second letter with questionnaire, and a second reminder postcard. A link to an online version of the survey was provided in each mailing. The response rate was 35.5%. This report summarizes the results for the Oregon respondents (N=101).

Grower Demographics

Ninety percent of the survey respondents were male and 10% were female. Most respondents (85%) were Caucasian; 11% were Asian; 2% were Latino; 1% were American Indian, and 1% categorized themselves as "other." Respondents ranged in age from 30 to 81 with a mean age of 56 years. Respondents had spent 23 years, on average, involved in pear production as an orchard owner, manager, or primary decision maker. Two thirds (64%) of respondents had a four-year college degree and 26% had attended graduate school. Twenty eight percent worked at a regular off-farm job.

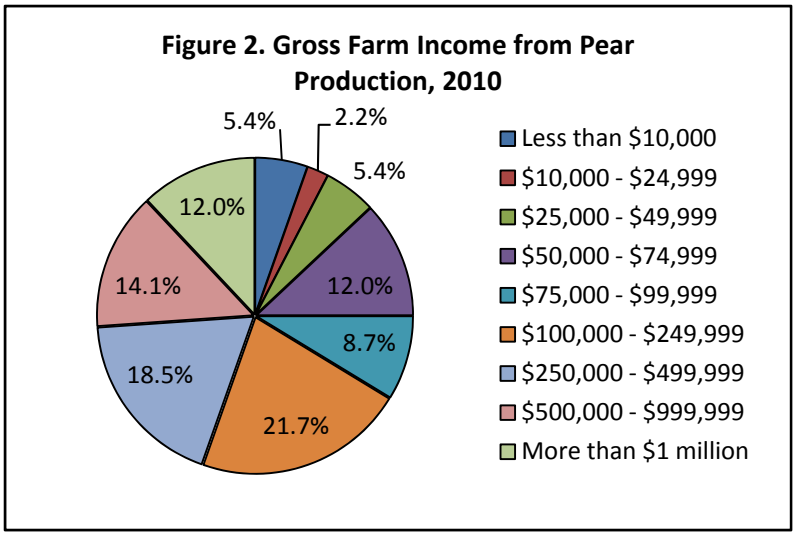
Orchard Characteristics

The majority of survey respondents (89%) were orchard owners, partners, or lessees, while 8% were hired managers. Approximately 37% of respondents described their farm operations as family or individual operations (see Figure 1).



Respondents operated, on average, 154 acres of farm/ranch land in 2010. Two thirds (67%) of respondents produced other agricultural products (e.g., apples, cherries) in addition to pears.

Respondents grew, on average, 77 acres of pears in 2010. The most popular pear varieties (in terms of mean acres) were Green Anjou (25 acres), Comice (19 acres), and Bartlett (15 acres). Five percent of respondents reported some certified organic pear acres (ranging from 1 to 90 acres). Thirteen percent of respondents had less than $50,000 in gross income from pear production, while 26% reported $500,000 or more in gross pear income (see Figure 2).



Pest Management Decision-Making

When making pest management decisions for their pear orchards, survey respondents consider economic cost, environmental impacts, and human health impacts, among other factors. Approximately 76% of respondents believe human health impacts are “very

Table 1. Importance of Selected Factors in Pest Management Decision Making for Pear Orchards

	Not Important (%)	Somewhat Important (%)	Very Important (%)
Human Health Impacts	0.0	23.8	76.2
Economic Cost	5.9	28.7	65.4
Environmental Impacts	2.0	35.6	62.4

important" in pest management decision-making, 65% believe economic cost is "very important," and 62% believe environmental impacts are "very important" (see Table 1).

The most important sources of information for making pest management decisions for pear orchards were agricultural chemical distributor fieldmen; insecticide label information; packing warehouse fieldmen; formal education and continuing education classes; and industry-sponsored conferences, workshops, and seminars. The least important sources of information for making pest management decisions were private pest management consultants, marketing organizations, in-house pest management consultants, pesticide applicators, and immediate neighbors.

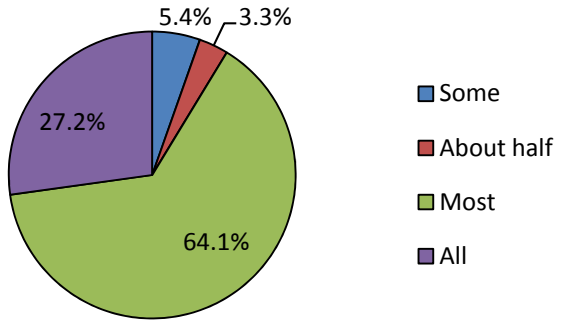
Survey respondents reported varying levels of contact with Oregon State University (OSU) with regard to their pear orchards. The most frequent forms of contact were reading OSU bulletins, using OSU pest management guides, and visiting OSU websites. Research collaborations with OSU scientists, on-farm visits by OSU employees, and visits to OSU offices were less common (see Table 2).

Table 2. Pear Growers' Frequency of Contact with OSU in 2010

	Not At All (%)	Once (%)	Twice (%)	Three Times or More (%)
Read bulletin or report	14.3	9.2	18.4	58.2
Used pest management guide	34.7	10.2	13.3	41.8
Visited website	38.1	15.5	11.3	35.1
Attended meeting, workshop, or field day	24.5	27.6	19.4	28.6
Visited office	46.9	20.4	15.3	17.3
On-farm visit	75.8	6.1	8.1	10.0
Research collaboration	74.5	8.2	11.2	6.1

Most survey respondents (91%) used the services of one or more pest management consultants. Of those respondents, 9% consulted with pest management consultants more than once a week, 43% once a week, 44% every 2 to 3 weeks, and 4% once a month or less. Most respondents (91%) followed either most or all of the advice provided by pest management consultants (see Figure 3).

Figure 3. Amount of Pest Management Consultants' Advice Followed by Pear Growers



Approximately 93% of respondents reported using computers for their farm business, while 34% use smartphones. Nearly 80% of respondents regularly access the Internet for farm information. Respondents were asked about their preferred methods for receiving information on pest management in pears within the next three years. The following methods of information dissemination were most preferred: printed materials, E-mail, Internet, in-person

meetings (large group), and field days. The least preferred methods were social media, online meetings or workshops, online courses, and in-person courses.

General Pest Management

Respondents were asked about changes in their use of selected pest management practices during 2008–2010 (see Table 3). Nearly 59% of respondents decreased their use of insecticides more harmful to non-target species. Over 58% of respondents increased their use of insecticides less harmful to non-target species; 32% increased their use of monitoring for insect pests; 26% increased their use of pheromone or sticky trips; 21% increased their use of monitoring for natural enemies; 17% increased their use of degree day calculations; 17% increased their use of pheromone mating disruption; and 14% increased their use of biological control practices.

Table 3. Pear Growers' Use of Selected Pest Management Practices, 2008–2010

	Decreased (%)	Same (%)	Increased (%)	Did Not Use (%)	Don't Know (%)
Insecticides less harmful to non-target species	5.1	29.3	58.6	1.0	6.1
Monitoring for insect pests	0.0	66.7	32.3	0.0	1.0
Pheromone or sticky traps	1.0	60.8	25.8	11.3	1.0
Monitoring for natural enemies	2.0	64.3	21.4	9.2	3.1
Degree day calculations	1.0	71.9	16.7	7.3	3.1
Pheromone mating disruption	5.2	34.0	16.5	42.3	2.1
Biological control practices	0.0	62.9	14.4	19.6	3.1
Insecticides more harmful to non-target species	58.8	29.9	2.1	5.2	4.1

Insect Monitoring

All survey respondents (100%) reported that they, their employees, agricultural chemical distributor or packing house fieldmen, private consultants, other growers or managers, and/or other individuals monitored their pear orchards for insects in 2010. For most respondents (80%), agricultural chemical distributor fieldmen were responsible for insect monitoring. Sixty two percent of respondents did their own monitoring. Sixteen percent relied on employees, 12% relied on private consultants, and 10% relied on packing house fieldmen.

Primary Pear Pests

Survey respondents were asked about their experiences with two primary pear pests: codling moth and pear psylla. These pests exerted varying degrees of pressure in 2010 (see Table 4).

Table 4. Perceived Degree of Codling Moth and Pear Psylla Pressure, 2010

	No Pressure (%)	Low Pressure (%)	Medium Pressure (%)	High Pressure (%)	Don't Know (%)
Codling moth	7.1	56.1	31.6	2.0	3.1
Pear psylla	5.3	47.9	36.2	7.4	3.2

Respondents were asked to indicate the degree to which they select insecticides and time insecticide applications (for control of primary pear pests) so they are least disruptive to the natural enemies of secondary pests. They were also asked to indicate the degree to which they use spot or border sprays to minimize harm to the natural enemies of secondary pests. Results are reported in Table 5.

Table 5. Use of Selected Pest Management Practices

	Never (%)	Sometimes (%)	Always (%)	Don't Know (%)
Codling Moth				
Select insecticides so they are least disruptive to NEs	1.0	36.5	51.0	11.5
Time insecticide applications so they are least disruptive to NEs	8.1	43.4	30.3	18.2
Use spot or border sprays to minimize harm to NEs	56.6	31.3	10.1	2.0
Pear Psylla				
Select insecticides so they are least disruptive to NEs	4.1	45.4	42.3	8.2
Time insecticide applications so they are least disruptive to NEs	12.5	42.7	30.2	14.6
Use spot or border sprays to minimize harm to NEs	60.8	25.8	8.2	5.2

NEs = natural enemies of secondary pests

Respondents were asked about their use of degree-day calculations to predict codling moth generations, monitor infestation levels, and properly time sprays for different generations. Seventy one percent of respondents reported always using degree-day calculations, while 19% reported occasional use and 2% reported no use of degree-day calculations. Seven percent of respondents did not know if degree-day calculations were used in their pear orchards.

Thirty seven percent of respondents used pheromone mating disruption to control codling moth in their pear orchards in 2010. Of those respondents, 88% used hand-applied dispensers (e.g., Isomate C Plus) and 30% used aerosol puffers (e.g., Puffer CM-O).

Use of Insecticides to Control Codling Moth and Pear Psylla

Survey respondents were asked about their use of selected insecticides to control codling moth and pear psylla in 2010. The most popular insecticides for codling moth were Altacor (74% of respondents), Delegate (64%), Assail (37%), Cyd-X (10%), and Success (10%). The most popular insecticides for pear psylla were horticultural spray oil (74% of respondents), sulfur (71%), Nexter (67%), Esteem (66%), Abamectin (e.g., Agri-Mek) (61%), Ultor (54%), Delegate (49%), Assail (34%), and Pyrethroids (e.g., Warrior) (31%).

Secondary Pear Pests

Survey respondents were asked if certain secondary pear pests required treatment in their pear orchards in 2010. The following pests required treatment by the reported percentages of respondents: rust mite (68%), San Jose scale (58%), spider mite (46%), leafroller (29%), European red mite (18%), pear thrips (13%), green aphid (7%), pear leaf blister mite (7%), and grape mealybug (3%). Ten percent of respondents reported that no secondary pests required treatment; 8% did not know if secondary pests required treatment.

Respondents were also asked about changes in secondary pest problems in their pear orchards during 2008–2010. Most respondents did not face increased secondary pest problems (see Table 6).

Table 6. Pear Growers' Experience with Secondary Pest Problems, 2008–2010

	Decreased (%)	Same (%)	Increased (%)	Not a Problem (%)	Don't Know (%)
San Jose scale	22.5	37.1	10.1	25.8	4.5
Pear thrips	14.6	24.7	4.5	44.9	11.2
Pear leaf blister mite	8.0	19.5	3.4	51.7	17.2
Spider mite	19.8	51.6	2.2	20.9	5.5
Green aphid	12.8	19.8	1.2	52.3	14.0
Rust mite	20.4	54.8	1.1	18.3	5.4
Grape mealybug	8.0	19.5	1.1	57.5	13.8
European red mite	14.8	31.8	1.1	42.0	10.2
Leafroller	12.0	32.6	1.1	44.6	9.8
Pear leaf curling midge	6.9	16.1	0.0	60.9	16.1

Biological Control Practices

Eighty-three percent of survey respondents relied on one or more biological control practices to control for insect pests in their pear orchards in 2010. Of those respondents, 95% minimized factors that harm natural enemies, 24% enhanced natural enemy habitats, and 4% released commercially produced natural enemies. Respondents, on average, had been using "conservation biological control" (i.e., minimizing factors that harm natural enemies and enhancing natural enemy habitats) for 9–10 years and "augmentative biological control" (i.e., releasing commercially produced natural enemies) for 10 years.

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