



## Apple Pest Management Transition Project

Progress Report June 2008

## **Apple Pest Management Transition Project Progress Report June 2008**

### ***Executive Summary***

The Pest Management Transition Project (PMTP) was funded by the State Legislature for two years (\$550,000 for 07-09 biennium) to accomplish three objectives:

1. To enhance understanding of new IPM technologies through educational programs and communication of research-based knowledge.
2. To increase adoption of new IPM technologies through sharing information on successes and failures and communicating with all stakeholders on project progress.
3. To document changes in practices, attitudes, and perceptions of growers, farm workers, and stakeholders.

All three objectives have been addressed in the first reporting period and all activity milestones met. An Executive Committee was formed to provide administrative oversight. A broad-based Advisory Committee was formed and met twice during the first reporting period. Representatives from the PMTP presented research-based knowledge relating to new IPM technologies and their implementation, explained how the PMTP could help with the transition of pest management programs, and encouraged industry involvement in the PMTP through Implementation Unit (IU) sign-ups at nineteen industry meetings (over 3000 contact hours) in the winter of 2008. A group of early IPM adopters was assembled in January of 2008 to identify potential barriers to adoption of new IPM technologies and develop strategies for working with IU groups to increase adoption.

Educational efforts have been conducted through IU meetings, printed materials, and web-based products. Fourteen IUs, distributed geographically across the principal apple production regions of Washington State, have been established. The IUs involve 192 participants representing over 42,600 Washington apple acres. Based on responses from an informal survey, 87% of IU participants were using some form of pheromone mating disruption for codling moth control and 73% were using azinphos-methyl (AZM) in their apple pest management programs. Forty-two IU meetings were held in the spring and early summer of 2008. A PMTP handbook was developed to provide reference and support at the educational and informational events and IU meetings. Over 400 IU handbooks have been distributed. Three field days were held in June to share the PMTP knowledge and experiences with a broader audience of the tree fruit industry. The PMTP web site (<http://pmtip.wsu.edu>) has been operational for more than six months and contains populated links for: General Information; Administration; Education and Communication; Implementation; EQIP Program; Assessment and Documentation; Events Calendar; Public Input (also available in Spanish); Email Contact; and Site Search. Six PMTP newsletters were distributed via mail and email to 375 recipients between March 15 and June 15. The PMTP has worked with WSU's Department of Community and Rural Sociology to hire a post-doctorial associate to manage the PMTP assessment and documentation efforts. The first assessment and documentation project will be to survey crop consultants and growers/managers to document baseline pest management practices for the 2007 season. Follow-up surveys, combined with NASS survey data, will be compared with these baseline surveys to document the changes in insecticide and IPM practices occurring over the life of the PMTP.

### ***History of PMTP***

Apple producers are under substantial pressure to maintain profitability in the face of escalating global competition, consumer expectations, and regulatory requirements. To remain globally competitive, agriculture must continually adopt new technologies to meet regulatory, market, and consumer demands. Significant regulatory concern over pesticides focuses on organophosphate insecticides (OPs). A regulatory action coupled with grower adoption of Integrated Pest Management (IPM) practices has resulted in a 59% reduction in OP use since 1995. However, a National Agricultural Statistics Service survey (NAAS 2006) reported that Washington apple growers applied 483,500 pounds of OPs in 2005. Two chemicals, azinphos-methyl (AZM = Guthion) and chlorpyrifos, comprise 80% of that total. Most Washington apple growers have based control of the key pest, the codling moth (CM), on AZM. The Environmental Protection Agency (EPA) has announced the phase-out of AZM by 2012. This regulatory action marks a new era for the apple industry, which must control CM while transitioning from AZM to new IPM-based strategies.

Reducing the use of OPs would reduce exposure risks to the environment and the work force. The EPA classifies many recently registered insecticides as reduced risk and OP alternatives. While these alternatives are safer, they are in many cases more costly, less efficacious, and used with different timing and application requirements than OPs they replace. In reality, transitioning from OPs will increase apple pest control costs and require significantly more sophisticated management. Fortunately, existing research-based knowledge on new technologies is available to help with the transition of IPM programs.

IPM is an ecologically based approach to managing pests in agriculture and urban environments. Washington's tree fruit industry is recognized internationally as a leader in tree fruit IPM. Research has developed new technologies (softer chemistries, more precise predictive models, improved spray delivery systems) and strategies for incorporating them into commercially relevant programs, and yet many tree fruit producers have not fully embraced new IPM practices. Some advocacy groups in Washington remain harshly critical of the tree fruit industry for what they perceive to be stubborn reliance on pest control practices that endanger both the environment and work force. Even the EPA's recent AZM decision has been attacked as an unacceptable delay, and a lawsuit has been brought against the EPA to ban chlorpyrifos. Finally, few Washington citizens are aware of the progress to date or of ongoing research that is leading to even safer and more sustainable IPM programs in the state's apple production.

Recognizing an opportunity to move proactively and transition to new technologies that would not only meet but surpass EPA regulations, apple industry leadership sought and received funding (\$550,000 for 07-09 biennium) through the State Legislature for the Pest Management Transition Project (PMTP). These funds were allocated through the Washington State Department of Agriculture (WSDA) with specific reporting requirements set forth in an agreement between the WSDA and the Washington Tree Fruit Research Commission (WTFRC), the industry vehicle to receive funds from the WSDA to execute the project. The WTFRC provided a grant to the WSU Tree Fruit Research and Extension Center to meet the objectives of the PMTP.

The PMTP will change practices, attitudes and perceptions of IPM while maintaining acceptable crop protection, sustaining grower profitability, reducing pesticide exposure risks of farm labor, and enhancing environmental health.

The PMTP recognizes barriers to the adoption of new pest control technologies in IPM. It proposes to overcome these barriers through a program of education, training, and assessment. Research-based knowledge and technology is available and adoption of new IPM transition programs is occurring within a segment of the apple industry. Understanding the benefits and problems faced by these growers will help others hasten the adoption process.

**Table 1. Summary of Benchmark and Accomplishments**

Activity Milestones	Time-line	Accomplishments
<b>Form Executive Committee:</b>	Summer 2007	The PMTP Executive Committee was formed in the summer of 2007 (see <i>Executive Committee</i> below).
<b>Form Advisory Committee:</b>	Summer 2007	The PMTP Advisory Committee was formed in the fall of 2007 (see <i>Advisory Committee</i> below).
<b>Establish baseline:</b> Conduct surveys of IPM practices used by growers and perceptions of farm labor and environmental communities about IPM technologies.	Winter of 2007 and spring of 2008.	An ‘apple consultant survey’ was sent out in June (08) and the ‘apple grower survey’ will be sent out in late June or July of 2008 (see <i>Documentation and Assessment</i> below).
<b>IPM Adoption working group:</b> Establish a working group of successful early adopters of IPM. Identify essential activities, pitfalls, and future needs to sustain such programs.	Winter of 2007 and continuing to add new participants as adoption increases.	A group of early IPM adopters was assembled in January of 2008 to identify barriers to adoption of new IPM technologies and develop strategies for working with IU groups to increase adoption.
<b>Education efforts:</b> Conduct intensive, focused educational workshops on tools and methods to implement OP transition pest management programs.	Winters of 2007, 2008 and 2009 and continuing in off-season as needed.	Educational efforts have been conducted through Implementation Unit (IU) meetings – Forty-two IU meetings averaging 1.5 hours in length were held in the Spring of 2008. (See <i>Implementation Units</i> below)

**Table 1. Summary of Benchmark and Accomplishments - Continued**

Activity Milestones	Time-line	Accomplishments
Education products: Develop educational materials (manuals, web-based products, etc.) that support the implementation of OP transition programs for all Washington fruit crops.	Initial efforts in winter of 2007-08 with revisions updated and new information added as it becomes available in next two years.	Over 400 IU handbooks have been distributed (see <b>Implementation Unit handbook</b> below).  Six PMTP newsletters were distributed between March 15 and June 15. (See <b>Newsletters</b> below).  The PMTP web page was developed in December of 2007 and continues to be the most up to date source for PMTP information (see <b>Web Page</b> below).
Implementation: Carry out an action plan for the pest management transition program.	Establish IUs - winter 2007-08. Expand IUs in second season.	Fourteen IUs, distributed geographically across Washington State, were formed in the winter/spring of 2008. (See <b>Implementation Units</b> below)
Assessment: Document change in practices using TEAM assessment, environmental indices, and surveys of farm labor and environmental partners about changes in the apple IPM system.	2008 production season and subsequently until transition goals are achieved.	Dr. Nadine Lehrer was hired in May of 2008 to work on assessment of PMTP objectives (See <b>Documentation and Assessment</b> below).
Reporting:	Report at the end of each production season. Final report at project end.	The first PMTP interim report was submitted to WSDA in June of 2008.

***Pest Management Transition Project Organizational Structure (Fig. 1)***

***Executive Committee*** – The PMTP Executive Committee (EC) is composed of five individuals. These five people worked to develop the original concept of the project. Jim Hazen left his position with the Washington Horticultural Association in May of 2008 and his replacement has yet to be determined. However, he continues to work with the PMTP EC until a replacement is named. Dr. Chris Fiese, Director of the WSU Center for Sustaining Agriculture and Natural Resources (CSANR), retired in March (2008) and Dr. Marcia Ostrom has taken his place on the EC until a new Director is named.

***PMTP Executive Committee Members***

**Dr. Jay Brunner**, WSU Tree Fruit Research & Extension Center, 1100 N. Western Ave., Wenatchee, WA 98801 Office: 509-663-8181 x238; Email: jfb@wsu.edu

**Jim Hazen**, Executive Director, Washington State Horticultural Association, P. O. Box 136, Wenatchee, WA 98807-0136; Office: 509-665-9641; E-mail: hazen@wahort.org

**Dr. Jim McFerson**, Manager, Wash. Tree Fruit Research Commission, 1719 Springwater Ave., Wenatchee, WA 98801; Office: 509-665-8271 x1; Email: mcferson@tree fruit research.com

**Dr. Marcy Ostrom**, Director, WSU Small Farms Program, CAHNRS, 1100 N Western Ave., Wenatchee, WA 98801; Office: 509-663-8181 x263; Email: mrostrom@wsu.edu

**Karen Lewis**, Washington State University Extension, P.O. Box 37-Courthouse, Ephrata, WA 98823; Office: 509-754-2011 ext 411; Email: kmlewis@wsu.edu

**Advisory Committee** – The Advisory Committee (AC) provides a vital broad base of perceptions, experiences, and knowledge to improve the effectiveness of the PMTP from planning stages through the life of the project. Essentially, the AC is a credible, representative source of concerns, ideas, and input serving to help shape and reshape the project. Current members of the PMTP AC are listed below. Additional members of the AC will be added as the PMTP matures and the need for input from additional stakeholder groups is identified.

***Table 2. PMTP Advisory Committee Members***

<b>Name</b>	<b>Organization</b>	<b>Name</b>	<b>Organization</b>
Jim Cowin	Yakima POM Club	Ofelio Borges	WSDA
Orlin Knutson	Alamo Organic	Nick Stephens	Columbia IPM
Byron McDougall	McDougall & Sons	Frank Alvarez	Dovex
Steve Zediker	WA Hort. Assoc.	Edilberto Garcia	Sagemoor Farms
Kevin Knight	Growers Clearinghouse	Jose Ramirez	Stein Manzana
Keith Mathews	Yakima Valley Growers & Shippers	Alberto Roman	Larson Fruit
Charlie Pomianek	Wenatchee Valley Traffic	Ellen Gray	WA Sustn. Food & Farming
Rich Fenske	UW Occupational Health	Lisa Pelly	WA Rivers Conservancy
Leo Garcia	Wenatchee Valley College	Travis Schoenwald	Gebbers Farms
Gwen-Alyn Hoheisel	WSU Extension	Sandy Halstead	EPA Region 10
Dave Gleason	Yakima POM Club	Cynthia Lopez	WSDH
Doug Walsh	WSU IPM Coordinator	Mike Willett	Northwest Hort. Council
Lee Gale	NCW Fieldmen	Aaron Avila	GS Long Co.
Greg Pickel	Wilbur-Ellis Co.		

**Advisory Committee Meetings** – Two meetings of the PMTP AC are scheduled each year, spring and fall. The first organizational meeting was held on November 7, 2007 at the Wild Horse Wind Project meeting facility in Ellensburg, WA. Twenty members of the AC and the EC participated in this meeting. The second meeting was held in Ellensburg, WA at the Hal Holmes Center on February 29, 2008. Eighteen members of the AC and the EC participated in this meeting plus two participants who provided public input. The next AC meeting is scheduled for early November 2008 at a place and time to be determined. Minutes of the AC meetings can be found on the PMTP web site and are appended on the CD accompanying this report.

**PMTP Staff**

**Keith Granger** was hired as the PMTP manager in January of 2008. Keith will direct education and communication activities, oversee implementation efforts, and work with the assessment specialist on documentation.

**Nadine Lehrer** was hired to work as the assessment specialist in May of 2008. Nadine will work to review project needs, assess and document changes in IPM practices, and spearhead education and communication efforts involving environmental groups, farm workers, and policy makers.

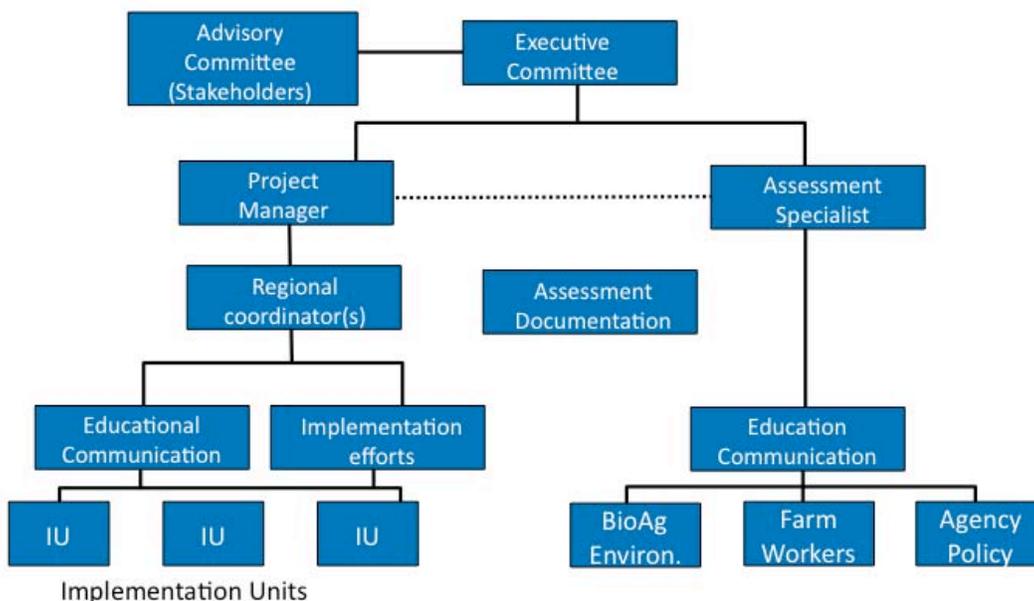
**Wendy Jones** was hired in December of 2007 to work as a web and communication specialist. Wendy will work to develop and update the PMTP web site, develop web-based educational products, and organize communication efforts for the PMTP.

**Nana Simone** was hired in January of 2008 to work as the EQIP director. Nana will also work as a regional coordinator for PMTP educational efforts.

**Nick Stephens** was hired in January of 2008 to work as a regional coordinator for PMTP educational efforts.

**Figure 1. PMTP Organization Structure**

## Pest Management Transition Project Organization Structure



### ***Outreach and Communication***

Outreach and communication efforts of the PMTP occurred in several different venues during the winter and spring of 2008. Representatives from the PMTP presented the concept, structure, and objectives of the PMTP at various extension, fruit warehouse/packinghouse, agricultural chemical distribution company, and public meetings. The primary educational efforts were carried out through PMTP IU meetings, which occurred at regular intervals before and during the 2008 field season with local groups made up of growers, managers, and crop consultants. PMTP newsletters, addressing seasonal IPM topics, have been distributed via mail, email, and website beginning in March 2008. The PMTP website was developed in December 2007 and continues to be the most up to date source of information about PMTP events, meetings, and other topics relevant to transitioning pest management programs away from the use of organophosphates to new IPM technologies.

***WA Horticultural Association Annual Meeting*** – The PMTP was introduced to the Washington apple industry at the 103<sup>rd</sup> annual meeting of the Washington State Horticultural Association held in Wenatchee on December 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> of 2007. The PMTP session on December 3<sup>rd</sup> included presentations on: History of apple IPM Transition Program funding, structure and goals - **Jim McFerson**; New insecticides that will help with the successful transition of apple IPM programs - **Mike Doerr**; Making the complex simpler: IPM Decision Aids System - **Vince Jones**; Reaching beyond traditional clientele with the IPM Transition message - **Karen Lewis**; Environmental Quality Incentives Program (EQIP): an opportunity to capture financial help for IPM programs - **Nana Simone**; How to get involved in the apple IPM Transition Project - **Jay Brunner**; and, Challenges facing the IPM Transition Program - **Jay Brunner**. Two hundred people attended the two-hour PMTP session.

***Winter Meetings*** – Winter ‘grower’ meetings sponsored by WSU extension, fruit warehouses/packinghouses, and agricultural chemical distribution companies are a standard channel for transmitting information to the Washington tree fruit industry. Representatives from the PMTP presented research-based knowledge relating to new IPM technologies and their implementation, explained how the PMTP could help with the transition of pest management programs, and encouraged industry involvement in the PMTP through Implementation Unit (IU) sign-ups at nineteen industry meetings (over 3000 contact hours) in the winter of 2008. Informative brochures, which explained the concept and structure of the PMTP and included an IU sign-up form, were distributed at each of these meetings.

***Public Meetings*** – The PMTP executive committee members gave presentations at two public meetings during the winter of 2008. Jim McFerson and Karen Lewis presented an overview of the PMTP at a public WSDA meeting in Yakima, WA on January 9. Thirty people were in attendance for the one-hour PMTP presentation at the WSDA meeting. Jay Brunner and Jim McFerson introduced the PMTP at the Ruckelshaus Center meeting held in Pullman, WA on May 15. Twenty people were in attendance for the half-hour PMTP presentation at the Ruckelshaus Center meeting. In addition, the AC meeting on February 29 was open to the public and two participants provided public input.

***Implementation Units (IUs)*** – Primary educational efforts in the winter and spring of 2008 were carried out through IU meetings. An IU was defined as a group of growers, managers, and crop

consultants from the same general area who were willing to meet regularly for the purpose of sharing information and experiences as new IPM technologies were implemented. The IUs were patterned after the ‘education and information sharing’ model that was successful in previous ‘areawide’ projects that facilitated the adoption of pheromone technology (Codling Moth Areawide Management Project (CAMP) – 1995-1999 (Calkins 1998, Alway 1998); IFAFS grant #00.52103-9657, “Building a multi-tactic pheromone-based pest management system in western orchards”; RAMP grant #00.51101-9673, “Enhancing pheromone mating disruption programs for lepidopterous pests in western orchards”). There were no prescribed programs, insecticide or mating disruption use requirements, or monetary incentives given to IU participants. Instead, regular local meetings were conducted, which allowed the opportunity to share research-based knowledge relating to new IPM technologies and their implementation and gave IU participants a chance to share practical experiences pertaining to successes and failures that had occurred in the process of adopting these same technologies. Participation in the IUs was voluntary. Participants were asked to sign up to become a part of an IU in one of three ways:

1. Fill out a sign-up form in the PMTP brochure that was distributed at winter meetings.
2. Visit the web site to fill out an online sing-up form.
3. Call the WSU TFREC and request to participate in the PMTP.

After signing up, participants were contacted about IUs that were forming in their area and sent information via email and regular mail about local events and meetings being held by the PMTP.

Fourteen IUs were established in the winter/spring of 2008. The IUs were distributed geographically across the principal fruit growing regions of Washington State (Figs. 2-4) in order to accommodate as many interested people as possible. In total, approximately 192 participants were directly involved in IU meetings. Based on responses from the informal survey that was included in the IU handbook (68% of IU participants responded to survey questions about IPM practices), 87% of the IU participants were using some form of pheromone mating disruption for codling moth control and 73% were using azinphos-methyl (AZM) in their apple pest management programs. IU participants represented over 42,600 Washington apple acres (54% of IU participants responded to survey questions about acreage, Table 3). Each IU group met approximately once per month (2-4 times) in the winter/spring of 2008 (Figs. 2 and 3). IU meetings averaged 1.5 hours in length. The IU Handbook (described below, appended on the CD accompanying this report) was used to lead the discussion at each IU meeting; however, each group was encouraged to actively participate in sharing information and concerns about topics relevant to apple pest management, which made the agenda for discussion at each meeting specific to the concerns and interests of the particular group at that time.

**Table 3. PMTP Implementation Units**

<b>Implementation Unit (IU)</b>	<b>Number of IU Meetings</b>	<b>Number Acres (Apple) Represented</b>	<b>Number of Participants</b>	<b>Number Not Responding</b>
<b>Okanogan County 1</b>	3	508	27	11
<b>Okanogan County 2</b>	3	12614	15	8
<b>Chelan County 1</b>	3	815	12	5
<b>Chelan County 2</b>	2	493	12	8
<b>Chelan County 3</b>	3	1965	13	6
<b>Chelan County 4</b>	3	4590	11	5
<b>Grant County 1</b>	4	2322	19	7
<b>Grant County 2</b>	2	2270	8	4
<b>Grant County 3</b>	3	6905	15	8
<b>Yakima County 1</b>	3	3000	8	0
<b>Yakima County 2</b>	4	3100	6	0
<b>Yakima County 3</b>	3	2043	20	10
<b>Yakima County 4</b>	3	70	8	6
<b>Benton County 1</b>	3	1943	18	10
<b>Totals</b>	<b>42</b>	<b>42638</b>	<b>192</b>	<b>88</b>

**Figure 2.** Keith Granger (PMTP manager) demonstrated the web-based speed sprayer worksheet at this IU meeting.



**Figure 3.** Nana Simone (PMTP regional coordinator) conducted IU meetings in Spanish with this IU in Yakima County.



**Figure 4.** 2008 PMTP IU Geographic Distribution



**PMTP Newsletters** – Six PMTP newsletters were distributed between March 15 and June 15. The newsletters were sent via mail and email as per request of recipients (approximately 250 email/125 regular mail). The newsletters were sent to all IU participants, PMTP EC members, PMTP AC members, Washington State Pest Board members, Washington State Pesticide Registration Board members, Washington State Tree Fruit Research Commission commissioners, Washington State University Tree Fruit Extension agents, Washington State Horticultural Association officers and directors, and Washington State University administration.

Each newsletter addressed topics that were important to integrated pest management at that particular time of the season. Topics for newsletters distributed between March 15 and June 15 were:

1. March 15 – PMTP Introduction and Overview
2. April 1 – Airblast Sprayer Calibration
3. April 15 – Codling Moth Mating Disruption
4. May 1 – Petal Fall Codling Moth and Leafroller Control Strategies
5. June 1 – PMTP Field Days
6. June 15 – Environmental Quality Incentives Program (EQIP)

Current and archived editions of the PMTP newsletter are available on the web at: <http://pmtip.wsu.edu/newsletters.html>, and are appended on the CD accompanying this report.

**PMTP Web Site** – The PMTP web site is made up of twenty-eight pages starting with a Home page (<http://pmtip.wsu.edu>) that gives a brief overview of the project. The Home page also provides relevant news links, quick links to other sites of direct interest, alert message links (as needed), and an events calendar link. The main heading links for the PMTP web pages are: General Information; Administration; Education and Communication; Implementation; EQIP Program; and Assessment and Documentation. Additional site links found on all pages are: Events Calendar; Public Input (also available in Spanish); email contact; and a site search field.

- **General Information** – This section of the site has three subsections. The first page, Background, gives a background summary for why the project was developed. The next page, Mission & Goals Statement, briefly explains the purpose of the project. The final page, Milestones, tracks the progress of the project goals.
- **Administration** – This section provides a list of the people associated with the project as well as contact information for key individuals. The Organizational Chart shows the structure of the project and responsibilities of each facet. The final page in this section, Meeting Minutes and Agenda, lists AC meetings and includes links for documents associated with each meeting.
- **Education and Communication** – The subsections under this heading include: Public Input, Newsletters, Articles, and Handbook. There are several links on the web site for public input but the primary link is located here. There is also a mirrored page, Comentarios del Público, in Spanish. The Newsletters page displays the current newsletter issue with links to archived issues. The Articles page contains several

published articles pertaining to implementing IPM in apple systems. The last page, Handbook, allows the site visitor to download the IU handbook.

- **Implementation** – This section provides a summary of the action plan and an explanation of what an IU is and how to sign up to participate. The first sublink, How to Get Involved, is an IU sign-up form that can be submitted. The Events Calendar provides information about all scheduled IU workshops, committee meetings, Newsletter dates, and special events. The Handbook page contains PDF files of the IU handbook. The Reference Tools subsection contains an interactive worksheet on airblast sprayer use, a page on identification of adult codling moth, and information about maximum residue levels (MRLs). The Implementation section also contains a map showing the general geographic location of current IUs.
- **EQIP Program** – This section provides reference information on the EQIP program. In this section, web visitors will find an Application Guide, Updates, and Frequently Asked Questions.
- **Assessment and Documentation** – This section contains a summary of the target areas for assessment efforts. The first sublink, Project Milestones, shows the PMTP progress as it meets stated goals. The next three sublinks are where specific reports will be located as work is completed. The final link in the section is for Field Tours organized by the PMTP.

### ***Educational Activities***

***Implementation Unit Handbook*** – The IU Handbook (appended on the CD accompanying this report) was used as a guide for discussion at IU meetings. The handbook contains information on many subjects that are important to implementing integrated pest management strategies in apple systems. New pages for the handbook will continue to be added as new information becomes available. Over 400 handbooks were distributed in the spring of 2008. The handbook was given to all IU participants, PMTP AC and EC members, warehouse/packinghouse crop consultants, agricultural chemical distribution company crop consultants, and private crop consultants who requested a handbook, as well as other growers, managers, and consultants who were not able to participate in an IU but requested a handbook. The handbook is divided into ten sections, each of which is briefly described below.

1. **PMPT Overview** – The PMTP overview includes an IU sign-up form, a list of contact information for the PMTP EC members and staff, an overview of the EPA phase-out schedule for azinphos-methyl, and a list of the PMTP objectives.
2. **Mating Disruption** – Mating disruption is presented as the foundation of an apple pest management program. This section explains the value of using mating disruption, provides information about the various mating disruption dispenser types that are available commercially, and identifies the best use practices for these dispensers based on research knowledge.
3. **Using OP Replacements** – There are many new insecticides that have been registered as OP replacements. This section presents an overview of the new insecticide options that are available for control of CM and LR in apple, best use information based on research conducted at the WSU TFREC, and several programmatic approaches for controlling CM and LR without the use of organophosphates.

4. **Resistance Management** – Resistance management is an important concept to consider as new insecticides are introduced into pest management programs. This section defines the concept of resistance management, explains the importance of implementing a sound resistance management plan, and provides information on how to plan pest management programs that incorporate a resistance management strategy.
5. **Monitoring** – A good monitoring program should be multifaceted and make best use of degree day models to identify insect phenology (when the pest is present), trapping technologies to identify population densities and distribution (how many are present), and visual inspections to identify hotspots and give confidence in the other facets of the program. The monitoring section provides an overview of the different aspects of a robust monitoring system and provides basic information about the different monitoring tools available.
6. **Secondary Pests/Biological Control** – Secondary pests have become an important issue as new insecticides are introduced into our orchard systems. This section provides an overview of current secondary pest issues and some things to consider, relevant to secondary pests and biological control, when planning a pest management program.
7. **Clean-up Programs** – This section gives two examples (organic and conventional) of pest management programs that were struggling, but were able to reestablish control by implementing some of the IPM practices presented in the handbook.
8. **Cultural Practices** – Thoroughness of spray coverage is very important when using new insecticides that must be consumed by feeding larvae or come into direct contact with the egg to be effective. This section provides basic information on calibrating an airblast sprayer.
9. **Web Resources** – The WSU TFREC has many web resources that provide information about the orchard pest complex and materials used for control. The Decision Aid System (DAS) is one example. The DAS uses weather data from AgWeatherNet (AWN) to run insect and disease models. This section provides an overview of using the DAS.
10. **Appendices** – This section contains two previously published papers, which tie together the IPM principals presented in the handbook.

***PMTP Field Days*** – Three Field Days were conducted by the PMTP in June 2008 (Figs. 5-12).

1. Tuesday, June 10<sup>th</sup>, 3-5 pm, Morgan Orchards, Quincy
2. Wednesday, June 11<sup>th</sup>, 3-5 pm, Oasis Farms, Prosser
3. Thursday, June 12<sup>th</sup>, 3-5 pm, Crane & Crane Orchards, Brewster

PMTP Field Days addressed four topics pertaining to implementing new IPM technologies:

1. Codling moth and leafroller control strategies.
2. Secondary pest issues.
3. Implementing the Decision Aid System (DAS).
4. Horticultural practices and sprayer technologies to improve pest management.

The Field Days were planned in cooperation with the WSU Tree Fruit Extension Team, were open to the public, and were attended by approximately 120 people. Handouts provided at the field days are appended on the CD accompanying this report.

**Figure 5.** Keith Granger (PMTP Manager) explained how to get involved with a PMTP Implementation Unit at PMTP Field Days.



**Figure 6.** Dr. Jay Brunner (PMTP EC) helped Field Day participants sign-up to join a PMTP Implementation Unit.



**Figure 7.** Nick Stephens (PMTP Regional Coordinator) talked about his experiences using new IPM technologies at this PMTP Field Day in Grant County.



**Figure 8.** Travis Schoenwald (PMTP AC) talked about his experiences using new insecticides and application strategies at this PMTP Field Day in Okanogan County.



**Figure 9.** Dr. Betsy Beers (WSU TFREC) presented current research relevant to secondary pest issues at PMTP Field Days in Grant and Okanogan Counties.



**Figure 10.** Dr. Vince Jones (WSU TFREC) talked about implementing the Decision Aid System (DAS) at this PMTP Field Day in Benton County.



**Figure 11.** Tim Smith (WSU Extension) shared information about using phenology models to predict biological events at this PMTP Field Day in Okanogan County.



**Figure 12.** Tom Auvil (WTFRC) and Karen Lewis (WSU Extension) talked with PMTP Field Day participants about the importance of spray coverage.



### ***Assessment and Documentation***

***Hiring of Nadine Lehrer, post-doctoral associate*** – Nadine Lehrer, the PMTP’s post-doctoral associate for assessment and documentation, began with the PMTP in May 2008. The assessment and documentation efforts currently being developed include:

1. **IPM adoption assessment:** measuring changes in pesticide and IPM use over time; evaluating effectiveness of PMTP educational efforts and IUs in promoting adoption of new IPM technologies; (assessment tools include IU surveys and baseline/follow-up surveys of crop consultants and growers/managers – see below for details).
2. **Farm worker perceptions and needs assessment:** surveying concerns and knowledge of farm worker community on new insecticides; establishing key points of trust for outreach to farm worker community; developing farm worker educational programs on risks and benefits of new insecticides.
3. **Non-agricultural sector perceptions assessment:** establishing points of contact within environmental, sustainable agriculture, and bio-ag communities for exchange of ideas on impacts and implications of pesticide transition; documenting changes in groups’ attitudes and policies, as well as those of government agencies concerned with pesticide practices.

***Surveys (crop consultant survey and grower/manager survey)*** – The PMTP has established a relationship with Dr. Jessica Goldberger and Dr. Raymond Jussaume in WSU’s Department of Community and Rural Sociology to collaborate on the project’s documentation and assessment efforts. The first project of this group has been to develop crop consultant and grower/manager surveys that document baseline pest management practices throughout the industry for the 2007 season. Future follow-up surveys, combined with NASS survey data, will be compared with these baseline surveys to document the changes in insecticide and IPM practices occurring over the life of the PMTP. The first consultant and grower surveys were sent out in June 2008 (a copy is appended on the CD accompanying this report).

### ***Environmental Quality Incentives Program (EQIP)***

The 2002 Farm Bill created the Environmental Quality Incentives Program (EQIP) to address natural resource concerns in all land use sectors, including specialty crops. EQIP is administered by the USDA Natural Resources Conservation Service (NRCS). In 2008, over \$500,000 in pest management assistance was obligated by NRCS in contracts with tree fruit growers and this level of funding is expected to increase in 2009. Prior to 2008, some Washington tree fruit growers obtained EQIP contracts, but the focus was on irrigation system improvements with pest management assistance as an additional, but not primary, focus. For future contracts, NRCS will consider assistance to growers who wish to make the transition away from AZM and other organophosphate insecticides to mating disruption and new chemistries. This new focus for NRCS will be a means for some growers to afford the expense of adopting new IPM strategies and goes hand-in-hand with the educational efforts of the PMTP.

PMTP Regional Coordinator Naná Simone has spearheaded the tree fruit industry access to EQIP assistance by:

1. Working with NRCS on the state and local level (in 3 NRCS geographic areas) to create a suite of appropriate pest management practices to facilitate the transition

- from organophosphate insecticides, a ranking system for applicants, and documentation procedures for producers who obtain contracts.
2. Informing the tree fruit industry about EQIP through industry newsletters, magazine articles, websites, workshops and individual consultations.
  3. Following up with those who obtain contracts to assist them with pest management planning and documentation.

Those receiving contracts through EQIP have been encouraged to participate in the PMTP by joining an IU. The education and sharing of information that is accessible through the PMTP IUs will help EQIP growers by fostering a better understanding of new IPM technologies that are available and identifying strategies for implementing these technologies. This type of education and information sharing will better facilitate the successful transition away from organophosphates to new IPM technologies.