PPQ Deputy's Safeguarding Award Submission Form

Project Title:

Biological Control of Cereal Leaf Beetle in Western North America by the Western Cereal Leaf Beetle Team

1. Name, Address, Organization and Job Title, and Phone Number of Nominee (if a group is being submitted, list the members and the Agency, city, and State for each person. Identify the group leader and the leader's contact information.)

NAME	AFFILIATION
Diana Roberts	WSU Extension, 222 N Havana St. Spokane, WA, 509 477-2167, robertsd@wsu.edu **(Group Leader)**
Jay Karren	Utah State University, Logan, UT
Gary W. Brown	USDA, APHIS, PPQ, Portland, OR
Barry Bai	Oregon Dept Agriculture, Salem, OR
Gary D. Adams	USDA, APHIS, PPQ, Helena, MT
Sujaya Rao	Oregon State University, Corvallis, OR
Edward Evans	Utah State University, Logan, UT
Dave Prokrym	USDA, APHIS, PPQ, Raleigh, NC
Ruthann Berry	USDA, APHIS, PPQ, Niles, MI (retired)
Sue Blodgett	Montana State University (now at SDSU), Brookings, SD
Darrin Walenta	Oregon State University Extension, LaGrande, OR
Terry Miller	Washington State University, Pullman, WA
Keith Pike	Washington State University, Prosser, WA
David Bragg	Washington State University Extension, Pomeroy, WA
Glenn Harruff	USDA, APHIS, PPQ, Billings, MT (retired)
Dan Bean	Colorado Department of Agriculture, Palisade, CO
Lloyd M. Dosdall	University of Alberta, Edmonton, AB
Joe Merenz	USDA, APHIS, PPQ, Helena, MT
Mark Hitchcox	USDA, APHIS, PPQ, Portland, OR
Colleen Jandreau	Colorado Department of Agriculture, Palisades, CO
Ben Simko	Idaho State Department of Agriculture, Boise, ID
Bryon Quebbeman	Quebbeman's Crop Monitoring, LaGrande, OR
David Reed	Oregon Hay and Forage Association, Klamath Falls, OR
William Roltsch	California Department of Agriculture, Brawley, CA
Hector Carcamo	Agriculture Canada, Lethbridge, AB
Clinton Campbell	USDA, APHIS, PPQ, Des Moines, WA
Steve Miller	USDA, APHIS, PPQ, Spokane, WA
Colin Park	USDA, APHIS, PPQ, Portland, OR
Mitch Nelson	USDA, APHIS, PPQ, Portland, OR
Ian Foley	Montana Department of Agriculture, Helena,MT
Patty Denke	Montana Department of Agriculture, Helena, MT
Helmuth Rogg	Oregon Department of Agriculture, Salem, OR

Kathleen Johnson	Oregon Department of Agriculture, Salem, OR (retired)
Richard Worth	Oregon Department of Agriculture, Salem, OR
Mike Klaus	Washington State Department of Agriculture, Yakima, WA
George Hoffman	Oregon State University, Corvallis, OR
Juan Alvarez	University of Idaho , Aberdeen, ID
Bruce Shambaugh	USDA, APHIS, PPQ, Cheyenne, WY

2. Describe the action taken.

OVERVIEW:

By the actions of The Western Cereal Leaf Beetle (CLB) Team, grain stakeholders in the Pacific Northwest and rocky mountain region were able to minimize negative impact resulting from the cereal leaf beetle. Oregon documented a 70% reduction in pesticide use against CLB. Through the use of biological control agent release, establishment and redistribution efforts, widespread parasitism levels in CLB exceed 70% and obviate chemical use, saving growers $15/acre/year in insecticides – potentially $6.75 million annually in Washington State alone. Cost savings for the other areas are of similar magnitude. Instead of taking a state by state approach to a pest that crosses borders via natural or human-facilitated spread, this multi-state, international, multi-discipline team worked cooperatively to meet objectives. The team combined limited resources for the common goal of reducing the CLB's negative impact on the grain industry. This Insect Pest Prevention and Management (IPPM) team approach is an example of enhanced universal safeguarding at its best.

DETAILED BACKGROUND AND ACCOMPLISHMENTS:

The cereal leaf beetle (CLB) *Oulema melanopus* (Coleoptera: Chrysomelidae) is a serious pest in cereal crops and forage grasses. It was first detected in the US in Michigan in 1962. It spread throughout the Midwest and the East in the sixties and seventies. It continued to spread westward and reached Montana and Utah in the mid 1980's. It was first reported in Idaho in 1992 and in Oregon and Washington in 1999. The beetle is now also known to be present in western Canada from the Creston Valley of British Columbia to southern Alberta, and southwestern Saskatchewan.

The CLB can cause severe yield loss to cereal crops. A 2002 study by Washington State University recorded 25% yield loss in spring wheat. In Washington State alone, if all the spring wheat acres were sprayed for CLB ($15 per acre) it would cost an estimated $6.75 million per year. Costs in other states are of similar magnitudes. Concerns about further spread of the pest and the economic impacts in states and Provinces where the pest was established, led to discussions between regulatory personnel, extension agents, and researchers.

In an effort to maximize the effectiveness of resources and share information, the Western Cereal Leaf Beetle Team was formally established in 1999. Since then the group has met in person annually to review yearly progress. Members communicate regularly via teleconferences and an email listserv. The team is committed to an integrated approach to CLB management, and to cooperation among diverse agencies and across state and international borders.

The Western Cereal Leaf Beetle Team consists of university and extension faculty, state and federal agency personnel, and private industry representatives from the states

of Montana, Utah, Idaho, Washington, Oregon, Colorado, Wyoming, and California. Colleagues from diverse agencies in Alberta and Saskatchewan, Canada also participate. Personnel from USDA, APHIS, PPQ labs in Niles, MI, and South Carolina provided invaluable support for the project and shared their expertise related to CLB biological control in the Midwest. Personnel from the USDA, ARS in Peoria, IL, provided the CLB aggregation pheromone for the monitoring study.

The combined efforts of the Western Cereal Leaf Beetle Team followed the classic IPM model that included tracking the pest's movement in each state, developing a standardized monitoring tool, evaluating yield loss and the economic threshold, measuring risk to other crops (grasses), studying insecticide efficacy and usage (economic impact), and development of a management strategy. The team initiated biological control using two parasitoids, an egg parasitoid, *Anaphes flavipes* (Förster) (Mymaridae) and a larval parasitoid *Tetrastichus julis* (Walker) (Eulophidae). The coordinated efforts of the Western Cereal Leaf Beetle Team led to successful management of the pest using biological control

The State Departments of Agriculture and APHIS PPQ monitored the pest as it spread in each state. Private industry personnel helped generate valuable financial support, survey assistance, access to infested fields, and assisted in conducting experiments. Personnel from APHIS led the coordination of biological control efforts. In collaboration with university researchers and cooperating grain producers, APHIS established insectaries for CLB parasitoids from which the agents were established, collected and redistributed. University personnel conducted a range of experiments and collaborated with state and federal agencies to enhance the Team's goal of implementing biological control of CLB. Team personnel disseminated results of experiments through Extension newsletters, web pages, organized field days and workshops to enhance grower awareness about the IPM efforts and the need to minimize insecticide sprays for maximizing parasitism effectiveness. Information on spread of the pest, its identification and damage, economic thresholds, insecticide options, and resources for biological control were also provided.

Studies carried out by members of the team resulted in economic threshold data in Montana, yield loss information from Washington, CLB and *T. julis* phenology models from Utah and Oregon, hay compression and fumigation for CLB quarantine in California, CLB aggregation pheromone information from Oregon, refined parasitoid rearing techniques from Colorado, foreign exploration, importation and testing of an alternative egg parasitoid, *A. nipponicus* by Oregon and Washington, trap crop studies in Washington, economic impact data from Oregon, and selective aphidicide studies in Washington. Grain farmers across the Pacific Northwest and rocky mountain region cooperated with the Western CLB Team. They contributed land, tillage, and planting in field insectaries where biological control agents were managed. These farmers also served as an informal advisory group for the CLB biocontrol project.

3. How did the action enhance safeguarding?

One of the cornerstones of the safeguarding review is the need for greater Pest Detection and Response by APHIS. The use of Biological Control via an integrated team approach encompasses all aspects of pest detection and integrated response primarily using standard agency and stakeholder resources. Besides the unique aspect of

teaming up with state and university scientists, this program received a large amount of support from the affected community, the growers themselves, and reached across several political boundaries.

The Western CLB Team has successfully established an effective biological control program across the western USA and Canada for the cereal leaf beetle. Consequently, in most cereal-producing regions of Oregon, Washington, Idaho, Montana, Wyoming, and Utah, the larval parasitoid, *Tetrastichus julis*, has attained equilibrium with cereal leaf beetle (CLB) so that management of this pest with insecticides is generally unnecessary. The larval parasitoid has been collected in the U.S. and provided to Canadian cooperators and continues to spread on its own into adjacent regions in Canada, following the natural spread of CLB. At this time California has not reported CLB infestations in commercial fields.

The successful biological control of CLB in the PNW reduced the potential for insecticide impacts on human health and the environment. For example; in Oregon, 2004 was the peak year for spraying for CLB, when 64,200 acres were treated. By 2007, as the larval parasitoid became abundant and widespread, the treated area was down by 45,058 acres (70%). This reduction is attributed to the successful biocontrol program. In Washington, the successful CLB biocontrol program has the potential to obviate the application of 84,375 lb (3 oz over 450,000 acres) of *Warrior* (lambda-cyhalothrin), the most commonly used insecticide to control CLB, per year. Other areas experienced similar reductions in insecticide use.

The culmination of the efforts of the Western Cereal Leaf Beetle Team is the publishing of an archive of CLB reports and research data on the internet and on DVD. The Team's desire is to provide access to this information for those who need to deal with CLB now and in the future. The archive project is to be completed by the end of 2009. It currently resides at
https://research.wsulibs.wsu.edu:8443/dspace/handle/2376/1928

4. How does it demonstrate innovation or initiative?

We believe the formation of the Western Cereal Leaf Beetle Team for the sharing of information and coordination of efforts towards biological control of CLB in western North America is innovative and unique in the number of people involved and in breadth and extent of the collaboration! The team used available resources and made extensive use of modern communication channels (the web and email).

In 1999 a few individuals from Washington and Oregon were interested in learning about this new pest from counterparts in neighboring states who had already been dealing with it. They wanted to learn what was already known about CLB to determine what research needed to be done or updated, and to develop a coordinated approach to IPM research and biocontrol implementation as CLB spread into their states. They took the initiative to include representatives from all affected states in their early CLB Program meetings.They discover that the interest to share information and learn more about CLB and its control was universal. The group grew to include State Departments of Agriculture, APHIS, University Extension and Research, affected industries in the western U.S., and even Canadian Provinces.

5. What part of the safeguarding continuum did the action address?

The Western CLB Team contributed to the Pest Management and Eradication goal of the Safeguarding Continuum which states that "PPQ shall support and advance the use of environmentally sound and fiscally efficient biological control programs; well coordinated, using state-of-art methodologies, and effective field delivery programs."

The Team's project also addresses the Continuum goal of creating Partnerships through "enhanced collaborative analytical efforts supporting safeguarding with other APHIS program units and other Federal, State, international and non-governmental organizations."

6. Provide any information that demonstrates the outcome/success of the activity.

The larval parasitoid T. julis is now established in all areas where CLB is present in the Western U.S. In areas where it has been established for more than five years and if allowed to prosper (i.e. not impacted by insecticides) it has demonstrated the ability to control CLB which results in less insecticide usage. Reduction in insecticide use is better for humans and the environment and saves money.

PPQ in Oregon tracked the economic impact of CLB as it spread across the state based on the acres treated with insecticides. Union County had by far the most acres treated for this pest after it arrived. In 2003, the peak year, over 22,500 acres were treated. As the population of *T. julis* spread and increased, and the growers became comfortable with its ability to control CLB damage in their fields, insecticide use dropped significantly. In 2008 only 200 acres were treated for CLB.

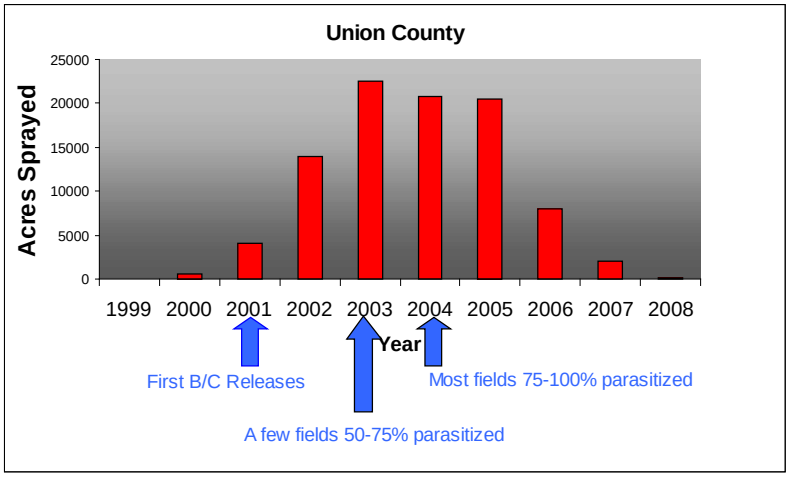

Figure 1: Insecticide use for CLB management and CLB parasitism levels in Union County, OR, from 1999 to 2008.

Scientific studies, individual state program summaries, general project information are compiled in an archive, accessible on the internet, as resource for anyone interested in CLB biology and control. It currently resides at https://research.wsulibs.wsu.edu:8443/dspace/handle/2376/1928