

Award Category: International IPM Award of Excellence

Type of Nomination: Team/Group (Project)

Nominee Name of Individual or Group: Okanagan-Kootenay Sterile Insect Release (OKSIR) Program

Improving economic benefits related to IPM adoption: Checked

Reducing potential human health risks: Checked

Minimizing adverse environmental effects: Checked

Brief Summary of Nominee's or Program's Accomplishments (500 words or less):

The Okanagan-Kootenay Sterile Insect Release (OKSIR) Program (<http://www.oksir.org/>) is a successful area-wide IPM program for codling moth (*Cydia pomonella*) in apple and pear orchards of British Columbia, Canada. First established in 1991 as a jointly supported federal and provincial initiative, the Program is an effective collaboration among regional governments, industry stakeholders and the general public. OKSIR delivers an integrated program for suppression of codling moth in the pome fruit orchards through sterile insect technique (SIT), supplemented with some mating disruption on about 3,416 hectares in the Okanagan, Similkameen and Shuswap Valleys, where residences and orchards are intermingled. As part of the integrated approach, the Program also delivers monitoring, enforcement, and education services for growers, urban tree owners, and residents. Over the last 20 years, OKSIR has made remarkable reductions in the amount of the pesticides being used for codling moth, reducing both human health risks and minimizing adverse environmental effects. The area-wide structure improves the economic benefits of IPM adoption by delivering a more effective IPM program at a fraction of the amount it would cost for individual growers to run their own IPM programs. Additionally, the program has positioned the region for potential low pest prevalence designation, opening new markets that might not otherwise be available.

Program Results:

- A 96% reduction in amount of pesticide use per acre for controlling codling moth. Many of the growers have not sprayed pesticides for codling moth in the last 15 years.
- A 94% reduction in wild codling moth population in the OKSIR program area. The removal of thousands of unmanaged/abandoned host trees reduces the risk of undetected establishment of alien pests. The number of urban sites with *C. pomonella* in orchard buffer zones (potential population sources) dropped by 40% from 2001-2014.
- In the region where the Program has been operating the longest, over 98% of orchards now have less than 0.2% fruit damage due to this pest, which was the desired economic goal.
- A positive cost-benefit ratio: a recent cost-benefit analysis conducted revealed that, on both commercial and non-commercial properties, for every \$1 in cost there was \$2.5 in benefit, both for the producers and for society as a whole (see full report of The Okanagan College School of Business published the Library's open access site http://library-1.okanagan.bc.ca/vwebv/ocir/SIR_B_C_Analysis_Report.pdf).
- Under the current funding structure, with the area-wide approach, producers pay 65% less than they would for the same service without the program.

The OKSIR Program's success is in part due to the unique funding and governance model, and the collaboration among stakeholders. The Program is governed by a Board of Directors that includes representatives from each of the four regional governments that make up the Program's service area, and three grower representatives nominated by industry. Funding is split between local taxpayers (60%) and commercial pome fruit growers (40%). The program's state-of-the-art codling moth rearing and sterilization facility has an annual production capacity of 780 million sterile codling moths, and as part of the area-wide program is a major seasonal employer for the region.

Describe the goals of the program being nominated; why was the program conducted? What condition does this activity address? (250 words or less):

Codling moth is among the most economically devastating pests of pome crops because it directly attacks the fruit. For decades, fruit growers in BC struggled to contain the moth and the damage it caused. Small orchards were interspersed with residential areas containing pome trees, and poorly managed backyard trees and abandoned/feral trees were providing refuges for source populations. Prior to the program, organophosphate insecticides were the main control

method for many years and concerns were growing over the chemical residues in apple and pesticide load in the environment as growers had to spray multiple applications each season. Additionally, the increasing use of chemical pesticides had led to concerns about pesticide resistance building in pest populations. Something needed to change and IPM was seen as a viable alternative solution to chemical-based management strategies.

The operational goal of OKSIR is suppression of codling moth to a level of $\leq 0.2\%$ fruit injury on at least 90% of commercial pome fruit orchards in the Program service area. The use of SIT as the primary control method addressed the concerns of increasing pesticide use, and the area-wide approach and mandatory participation ensure that moth infestation sources were being addressed. Insecticide sprays in the Program area are allowed only if moth population levels exceed the economic threshold. Implementation of such a large program has not been easy, and the initial phases required extensive education and outreach to build stakeholder buy-in, and sanitation blitzes to minimize alternative host sites harboured in abandoned and feral trees.

Describe the level of integration across pests, systems and/or disciplines that was involved. (250 words or less):

OKSIR is a highly collaborative program - four different regional governments must work together with growers, urban host tree owners, fruit handlers, private and co-operative field advisors, fruit tree retailers, and researchers and scientists. Control applications are supported by integrated area-wide trapping and monitoring, education and outreach, and enforcement services.

Although the program's mandate only focuses on codling moth, the area-wide structure that has been put in place has enabled integration of control efforts for other pests including leaf-rollers and eye-spotted bud moth.

Additionally, the Program has:

- collaborated in annual surveys for an emerging new pest in the region, the apple clearwing moth;
- distributed information on the apple maggot that is advancing towards the program's service area;
- facilitated collaboration on development of SIT for as a possible management tool for spotted wing drosophila;
- provided codling moth trapping data to Taiwanese inspectors as part of the systems approach for exporting apples to Taiwan; and
- assisted cherry growers in assessing the threat of codling moth in sweet cherries to satisfy the phyto-sanitary requirements of a potential new export market.

The program also works tirelessly at international outreach, sharing their success and encouraging other areas to consider area-wide approaches and the use of sterile insect technique. The program has undertaken export of sterile moths to the USA, South Africa, and New Zealand for use in IPM pilot projects and research. Program representative(s) have attended and presented at many local, national, and international meetings to promote area-wide approaches and the use of SIT.

Describe the team building process; how did the program being nominated get partners involved? Education and awareness are essential in an IPM program. (250 words or less):

The British Columbia Fruit Growers' Association (BCFGA) championed the establishment of the OKSIR Program after a feasibility study described how such an area-wide program could be affordable and potentially eradicate codling moth. The concept of the Program was based on field research conducted by Dr. Jinx Proverbs (Agriculture and Agri-Food, Summerland, BC) on SIT and codling moth in the 1970's. The BCFGa gained the support of the provincial government to enact legislation creating the authority to deliver area wide services using SIT throughout the region, to define the governance structure, and to allow the funding by local taxation. Both the provincial and federal governments contributed towards the cost of constructing the rearing facility. Agriculture and Agri-Food Canada entomologists provided guidance in the development of moth rearing and disease management, moth release and monitoring.

Extensive education and outreach was done with hundreds of growers and urban tree owners, especially in the first stages of program implementation which required intensive sanitation to reduce the wild populations enough to allow SIT to work. Mail outs, public meetings, and one-on-one visits were all used to build community and grower support for the program. These outreach activities continue today, as well as regular board meetings to keep stakeholders informed and involved. In addition, there is an operations advisory committee that includes local interest groups and researchers, and an IT specialist who maintains a website that provides real-time trapping and phenological data back to growers to help in their orchard management.

What outcome describes the greatest success of the program?:

The greatest success of the program is the 94% reduction in wild codling moths coupled with the 96% reduction in amount of pesticides used per acre to control the pest. Most growers feel there is no longer a “codling moth problem,” and the economic targets of 90% of orchards with fruit damage less than 0.2% have been easily exceeded. The success of the program is due to the stakeholder collaboration, tireless efforts by a dedicated and long-serving core of staff, and importantly, the use of an area-wide approach.

The area-wide approach ensures that codling moths have nowhere to hide. The central administration of the program ensures continuity between areas and allows for the provision of full IPM services, including monitoring, education, and enforcement, all at a cost much less than it would be to have the program operated piecemeal.

The OKSIR program is a shared success for the region. It’s a success for the growers, who no longer have a serious codling moth problem, who save money on chemical sprays, and who can potentially now access new markets. It’s good for the residents, living among and around the orchards, who still get to enjoy the benefits of thriving local agriculture, but with lower exposure to pesticides and healthier produce. The area-wide program is a key support in the local economy, helping the agri-tourism industry as well as agriculture. And, it’s a success for the environment, including the local biodiversity and the interconnected waterways that provide for both people and crops.

Provide evidence of change in knowledge, behavior or condition as a result of the program/individual. (250 words or less):

The most significant change in behaviour is evidenced by the 96% reduction in the amount of pesticides used per acre for codling moth control in the region since the beginning of the program. It was difficult to convince growers, whose livelihoods depend on their crops, to trust in the SIT approach and not apply chemical pesticides “just in case.” The continued real-time communication of trapping and monitoring data, in combination with the declines in codling moth damage and declines in codling moth populations began to win the growers’ trust. Some producers now proudly announce that they haven’t had to spray for codling moth in over 15 years, and others who reported previously using up to 4 cover sprays now spray once every two years. The high number of hits on the website’s real-time data pages shows that growers are checking their monitoring data and watching for thresholds before spraying, rather than simply applying comfort sprays. Spray records show that of the growers who still require occasional sprays, most are timing sprays based on the timing windows provided by the program, rather than applying at the same time each year, showing that understanding of the pest’s life cycle and the influence of weather factors on spray timings is increasing. Growers who were initially against having this program “imposed” on them 20 years ago are now very much in support of the area-wide approach as it protects them from potential infestation from their neighbours’ poor management practices (both commercial and residential).

Who or what should receive the most credit for the success of this program?

The OKSIR Program’s success is due, in part to:

- a) the unique funding and governance model that has the area-wide approach, close collaboration among all stakeholders, and enforcement at the core of its delivery;
- b) a winning business model that allows growers to profit and the environment to benefit;
- c) the longevity of the program which allowed for the operational goals to be achieved and sustained, and prove to stakeholders that IPM can be feasible and good business;
- d) the strong scientific foundation that drives and continuously supports the Program
- e) the initial investment in establishing a codling moth rearing and sterilization facility which secures continued supply of the demand for sterile moths to be released annually in the service area;
- f) excellent leadership and tireless efforts by a dedicated and long-serving core of staff.

If selected, suggested Citation for Award Certificate (40 words or less):

For excellent leadership in establishing and sustaining a successful long-term, area-wide IPM program through effective partnerships with local governments, industry, residents, and researchers, and promoting its adoption in other national and international regions.