

PMTP Newsletter – Sterile Insect Release (SIR)

Use of Sterile Insects to Control Pests

The use of sterile insects for control of pests was developed in the 1930s but was first applied in 1953 to control screwworm, a parasite of mammals (Fig. 1). Releasing sterile insects controls pests by introducing large numbers of sterile males into an area where they mate with wild females preventing production of viable offspring. The 1953 project was successful in eradicating screwworm in the United States and later in latin American countries.

Many pests of agricultural or human health importance have been eradicated or controlled using the Sterile Insect Release (SIR) approach. These include the Mediterranean Fruit Fly, Melon Fly, Pink Bollworm, Oriental Fruit Fly, Tsetse Fly, Boll Weevil, Mexican Fruit Fly, Gypsy Moth, Stable Fly, Horn Fly, Corn Earworm, and Tobacco Hornworm.



Figure 1. The screwworm is a species of parasitic fly that is well known for the way in which its larvae eat the living tissue of warm-blooded animals. The screwworm was eradicated in the US and latin America through the use of a sterile insect release program.

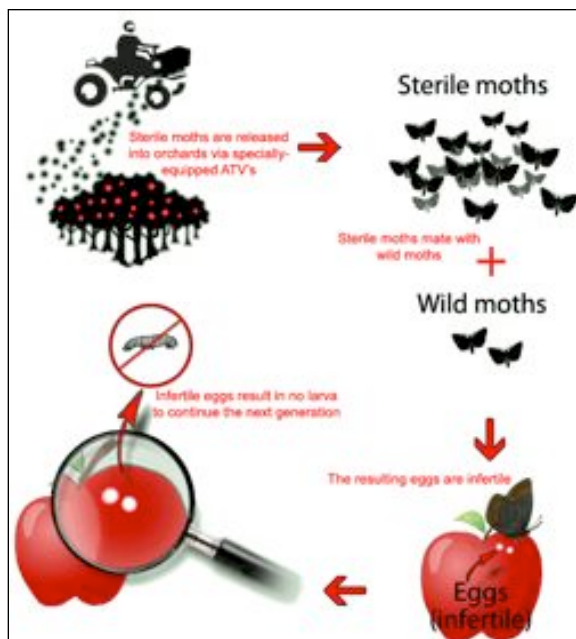


Figure 2. 4-wheel ATVs release the moths into orchards in the service area on a weekly basis during the growing season. The moths fly into the nearby host trees. Over 200 million sterile moths are released per year (www.oksir.org).

British Columbia Sterile Insect Release Program (SIRP)

The British Columbia Sterile Insect Release Program (SIRP) was launched in 1992 with the goal of complete eradication of codling moth from the fruit growing regions of eastern British Columbia. It became clear by the late 1990s that complete eradication of this pest would not be possible. The British Columbia SIRP produces millions of codling moth weekly, sterilizes them using radiation, and releases them throughout the Okanogan and Kootenay valley fruit growing regions. Though complete eradication has not been achieved, the SIRP has successfully functioned as a management program to keep codling moth populations low and to reduce the use of pesticides in orchards. More information about the SIRP can be found at: <http://www.oksir.org>.

WSU Research with Selected Release of Sterile Insects

Based on the success of the British Columbia Areawide SIR program, the SIR approach is being evaluated in research trials in Washington State for control of specific problematic situations. The four potential uses for the SIR technique that are being evaluated in 2011 research trials include: 1) bin piles; 2) orchard borders that are adjacent to external codling moth populations; 3) internal orchard hot spots; and 4) late season codling moth control. All four of these scenarios represent challenging situations for control of codling moth that lend themselves to the SIR method.

Bin Piles: Bin piles (Fig. 3) are notorious for causing problems for nearby orchards. Moths that emerge from bin piles are often not on the same cycle as native moths, making control treatments less effective. While border sprays around bin piles can help minimize the problem, if rows are oriented the wrong way it can be very difficult or costly to achieve good control. Three SIR treatment approaches are being evaluated for use around bin piles. The first is to treat the bin pile by releasing moths adjacent to it, the second is to treat the orchard border closest to the bin piles. And the third is to treat both locations, bin pile and orchard border.

Orchard Borders: Orchard borders can be a problem when an orchard is being invaded by moths immigrating from an outside source, causing injury and/or necessitating increased control activities. It is often difficult to spray adequately to achieve acceptable control in these situations, making SIR an attractive option. To evaluate the effectiveness of this type of treatment, sterile moths are released in the affected orchard borders.

Internal Hot Spots: Many orchardists complain about constant in-orchard hot spots that are hard to clean up. The source of these problems is not always clear and it requires additional sprays to achieve acceptable control. SIR could provide a potential solution to these hot spots. In this situation, sterile moths would be released in and around the problem area.



Figure 3. Bin piles are notorious for causing CM problems for nearby orchards. CM that emerge from bin piles may be on a different cycle than native moths making control programs less effective.

Late Season Treatments: Codling moth problems that arise late in the season are a common problem. These situations can be difficult to manage, in part because increasing concerns with MRLs for export markets make growers reticent to apply pesticides and also because it can be difficult to get a sprayer through the orchard late in the season. SIR could mitigate this problem.



Figure 4. SIR moth release device used in research trials. Moth are dumped into a release cup and allowed to exit through holes in the sides of the cup.

Release Mechanisms

The SIR project in British Columbia delivers moths from the back of a 4 wheel ATV, blowing them into the ground as it moves through the orchard. WSU research project includes evaluations of different release mechanisms, such as the single-point release container shown in Figure 4, to determine which provides the best method for moth dispersal.

Moths that have been received from the British Columbia SIRP over the past two years have been very active and are strong fliers if handled properly. SIRP moths are also being used in research trials to test pheromone mating disruption technologies.

Differentiating SIRP Moths from “Wild” Moths

Sterile moths can influence trap catch in areas where they are released, as they are attracted to pheromone lures that are used for monitoring codling moth. The advantage to using SIRP moths is that they can be differentiated from “wild” moths because they contain an internal mark. The codling moth larvae are reared on a diet with a red dye and the adults carry this mark, which is readily observed by looking at their abdomen or smashing the moth when in a trap (Fig. 5).



Figure 5. Sterile codling moth are easily distinguished from natives by the red coloring in their abdomen.