ONGOING PROJECT REPORT **YEAR 1/3**
WTFRC Project # CH-06-603

Project title:	Cherry Fruit Fly Control Options
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NOTE: THIS IS A REPORT OF RESEARCH RESULTS. MANY OF THE PRODUCTS DISCUSSED ARE NOT YET LABELED FOR USE IN ORCHARDS. Application of unlabeled products is a serious pesticide mis-use, and would result in crop destruction, as well as other serious penalties. The crop treated MUST be listed on the label.

Introduction and Justification
At the time this project was initiated, cherry fruit fly was identified as the top priority in the TFRC Cherry Research Committee yearly priority setting sessions. The objective of this project is the discovery and demonstration of safe and effective new CFF control materials and methods, as the carbamate and organophosphate class insecticides available at the inception of this work were (and continue to be) under regulatory pressure.

Significant Results Summary:

Objective 1: Identify new conventional and organic cherry fruit fly control products and methods.

- Twelve products have been tested in these trials, most for the first time on cherry fruit fly.

- Two other promising products are proposed for test in 2007.

Objective 2*:* Assess new insecticides and control methods for cherry fruit fly.

- Most of the ten candidate products tested in 2006 were quite effective, especially when applied at "moderate" or "full" proposed label rates and at 7 or 10 day spray intervals. Rate and interval data will be used for future label directions.

- This project first recognized and demonstrated the efficacy of GF-120 Bait as a Cherry Fruit Fly control. Early adoption of this control method is **saving the PNW Cherry growers about $1.5 million each year** by reducing labor, application and material costs. This bait may now be the most commonly used insecticide on Washington cherries.

- Three products were identified as alternatives to dimethoate as post-harvest "clean-up" sprays. The EPA-proposed lower rate of dimethoate was found to be ineffective.

- PNW Organic growers are now fully able to control this pest with the bait and/or Entrust. One organic product was proven ineffective, another product was found to be suppressive, but not entirely effective.

Results and Discussion:
Products included in this project during the 2006 trials included Assail, Provado, Rynaxypyr (an "anthranilic diamide," a new class of insecticide), Entrust, GF-120NF Bait, Delegate (spinetoram, a new synthetic spinosin), Pyganic, Rimon (an IGR, applied as a spray and as a bait), and another numbered product. Most of the products had never been tested in the field for effect on cherry fruit fly when first included in this project. At least two promising new-chemistry products will be included in 2007.

Efficacy Trials: Most tested products controlled CFF very well at moderate or full rates applied at 10 day intervals. As in past trials, effective products became less effective when applied at 14 day intervals, even with full standard rates. This interval and rate information will be used during the development of use directions for these products, and during educational programs. See table 1 for 2006 season result details.

GF-120 bait treatment was applied to four new sites in 2006, and 10 sites previously treated from two to four seasons. All sites were well infested prior to initiation of GF-120 application, and no other control method or material has been applied during the 49 "treatment years." (Treatment year = one site treated for one season.) During the past five years, two larvae were found in 35,400 cherries crushed from these 49 treatment-year sites. No larvae were found after treatment of the four new infested 2006 sites. ***Use in the first three years of registration has saved Washington cherry growers over $2,750,000*** in reduced labor, machinery and material costs, and economic benefits will continue at about $1.5 million per season at current use levels. Adoption of this new technology has essentially eliminated a serious, and increasing problem with cherry fruit fly in organic orchards. Due to use of this product, applicator exposure to products with potential to inhibit cholinesterase was reduced by about 8,000 hours during May, June and July of 2006. Due to the data gathered in this trial, GF-120 was registered in Canada for 2006, and extensively used in their organic orchards. They report excellent control in previously infested orchards.

Three materials were demonstrated as effective for control of cherry fruit fly larvae inside the fruit, as possible alternatives for post-harvest dimethoate. The dimethoate data has been submitted to the EPA by Northwest Hort Council. See the post-harvest section and table 4 for details.

Provado, Assail and Calypso controlled black cherry aphid (Myzus cerasi) when used at rates and application timings intended for cherry fruit fly control.

An insect growth regulator (Rimon), previously untested on CFF, was very suppressive of larval infestation. Test efforts were greatly expanded this season after interesting results in 2005. The product suppressed larva numbers in fruit from highly infested trees, especially when used as an active ingredient in a bait, applied in the same way as GF–120. The single tree treated in 2005 had 110 flies caught in that season, and 14 captured in 2006. Infestation levels on that tree have dropped from nearly 100 percent in 2004, to 1 percent in 2005, and 0.2 percent in 2006.

Table 1. Details of 2006 Trials:

Treatment	Trees / Sites	Days Interval Spray	Flies / Trap 2006	Fruit Sample Number	Larvae Found in Fruit
"Standard" Control. Provado 1.6F, 6 oz/A 1st. Treatment, Carbaryl 4 pints/A 2nd, Provado 6 oz/A 3rd treatment, Success 4 oz/A 4th treatment + GF-120 BAIT weekly during and after harvest.	2/2	10	289 13	1000 1000	0 0
Untreated Check Trees	3/3	na	846 605 275	1000 1000 1000	263 428 131
Table 1, Continued. **Treatment**	**Trees / Sites**	**Days Interval Spray**	**Flies / Trap 2006**	**Fruit Sample Number**	**Larvae Found in Fruit**
Rynaxypyr 2 oz/a + silicone wetter @ 2 fl.oz./100 gal.	4/4	10	57 289 13 515	1000 1000 1000 1000	0 0 0 0
Rynaxypyr 3 oz/a + silicone wetter @ 2 fl.oz./100 gal.	3/3	10	48 15 515	1000 1000 1000	0 0 0
Rynaxypyr 4 oz/a + silicone wetter @ 2 fl.oz./100 gal.	4/4	10	57 289 13 515	1000 1000 1000 1000	0 3* 0 0
Rynaxypyr 2 oz/a, NO wetter	4/4	10	21 535 60 13	1000 1000 1000 1000	0 1* 0 0
Rimon 32 fl.oz/a (An Insect Growth Regulator)	3/3	10	20 2 14	1000 1000 1000	0 0 2
Rimon /Bait 2 fl. oz. Rimon per 20 fl.oz NuLur Bait / Acre. 0.2 fl.oz. Bait mix per tree	3/3	7	62 55 55	1000 1000 1000	0 0 0
Assail 30SG, 5 oz / A 10 day spray + interval	3/3	10	21 289 535	1000 1000 1000	0 0 0

Assail 30SG, 5 oz / A 14 day spray interval	4/4	**14**	19 19 19 19	1000 1000 1000 1000	3 11 0 2
Provado 1.6F 6 fl oz /a	3/3	10	21 289 13	1000 1000 1000	0 1* 0
Provado Pro 192 NT 4 fl oz/a	4/4	10	21 15 535 13	1000 1000 1000 1000	0 0 0 0
Provado Pro 192 NT 6 fl oz/A	4/4	10	21 289 13 515	1000 1000 1000 1000	0 0 0 0
Table 1, Continued. **Treatment**	**Trees / Sites**	**Days Interval Spray**	**Flies / Trap 2006**	**Fruit Sample Number**	**Larvae Found in Fruit**
Delegate (spinetoram / DE-175) **4.5 oz. /a**	4/4	10	21 6 214 535	1000 1000 1000 1000	0 0 0 0
Delegate (spinetoram / DE-175) **3.0 oz. /a**	3/3	10	21 214 535	1000 1000 1000	0 0 0
Entrust **1.9 oz./a**	4/4	10	21 535 6 214	1000 1000 1000 1000	0 0 0 0
Numbered Product Z **Moderate rate**	4/4	10	289 60 214 515	1000 1000 1000 1000	0 0 0 0
Numbered Product Z **Higher rate**	4/4	10	48 535 214 515	1000 1000 1000 1000	0 0 0 0
Pyganic 5 (5% pyrethrum) 12 fl.oz./a **with buffer**	4/4	7	53 53 53 11	1000 1000 1000 1000	0 1 2 2

Pyganic 5 (5% pyrethrum) 12 fl.oz./a **NO buffer**	2/2	7	18 75	1000 1000	3 2
GF-120NF Bait **20 fl.oz./a, 1:3 dilution** **0.20 oz product / tree**	18/14	7	see details in text	14,000	0

*The test tree with this light infestation was adjacent to a tree where control failed. Female CFF were free to fly from the infested tree to the nearby test tree with fully mature eggs. This might explain the control breakdown, as the other three replicates treated with this product and rate were free of larvae, despite high pressure.

Post-harvest Treatments:
Provado, Assail and Calypso applied to severely infested fruit on a tree prevented all or most subsequent larval emergence. As in the 2005 post-harvest trial, Calypso was effective to a practical degree, but did not completely control larva inside the fruit. The lowest effective rate for Provado has not yet been determined. The currently recommended rate of Dimethoate (1.33 lb. ai / A or 4 pints of the 2.67 lb/gal. formulation) was also effective. The lesser rate of Dimethoate, (1.0 lb./ai/A, or three pints of the 2.67), recently proposed by the EPA as the high legal rate during the re-registration process, was not as effective. This research was submitted to the EPA by the Northwest Hort Council and WSU in an effort to persuade them to reconsider the rate reduction.

Methods: Portions of an unharvested CFF infested cherry tree were treated with the various test products on a date that would have been "post-harvest," under normal conditions. The test products were applied in a volume of water that lead to "full drip," which we judged to be equivalent to about 300 gallons per acre. At the treatment date, some of the larvae in the fruit were late in their third (and final) instar, and were soon to emerge, as they had cut the characteristic breathing and emergence holes in some of the fruit. Most of the larvae are in the third and second instar at this stage of population development. One day after treatment, 250 fruit were harvested from each treatment and suspended over sand. The larvae were allowed to emerge at room temperature over the next three weeks. Larvae emerged from the untreated fruit most rapidly during the first five days after treatment, when 72 percent of the total emerged. After that time, emergence rapidly tapered off, and was complete by the 11th day. Judging by the number of larvae that emerged, about 30 percent of the fruit on the test tree were infested.

All products tested appear to be very acceptable replacements for dimethoate, the only product currently recommended for controlling larvae in fruit remaining on harvested trees. This "post-infestation effect" may give products with this chemistry an advantage as a pre-harvest product, as application may control newly hatching eggs or larvae that may have slipped through earlier control programs. At this time, dimethoate is not a popular pre- or post-harvest choice, as it sometimes causes leaf yellowing, necrosis and drop. Many growers avoid using it.

While the post-infestation effect of the materials tested post harvest this season seems relatively certain, it is so significant that further trials to document this effect on larvae inside the fruit will be carried out in 2007, especially with Provado, with even lower rates.

Table 2. Post harvest "Clean-up" Spray Options:

Product	Rate	Fruit Sample	Larvae Emerged
Dimethoate 267	64 oz./300 gal./A 1.33 lb. ai/Acre	250	0
Dimethoate 267	48 oz./300 gal./A 1.0 lb. ai/Acre	250	9
Provado 1.6F	8 oz./300 gal./A	250	0
Provado 1.6F	6 oz./300 gal./A	250	0
Calypso SC 480	8 oz./300 gal./A	250	3
Assail 30 SG	8 oz./300 gal./A	250	1
Untreated	0	250	76

Other effects:

Despite as many as five weekly applications at higher than necessary rates, no treatment in this project has resulted in leaf marking, yellowing or shedding, fruit marking, or excessive mite flare-ups leading to significant leaf damage. Some moderate leaf symptoms induced by mite feeding were observable by late summer on some of the trees treated with up to five weekly applications of Provado, Assail, and Calypso. Many of the candidate products have not yet been tested on all common sweet cherry varieties, so, while there are no indications of these potential problems to date, potential for leaf drop sensitivity in some varieties, or marking of light colored cherries is unknown.