

## FINAL REPORT

**Project title:** Cherry Fruit Fly Control Options

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### Objectives

1. Identify new conventional and organic CFF control products and methods.
2. Assess efficacy of new insecticides and control methods for cherry fruit fly.
3. To work with industry toward the registration of effective new CFF control products.

### Significant findings:

**Objective 1:** Product included in this project included Provado, Entrust, GF-120NF Bait, Assail, Calypso, and a numbered product. Actara was identified as a soon-to-be-registered option, but not included due to non-interest by the registrant.

**Objective 2:** All products, rates and timings (listed below) were tested under pest pressure conditions far in excess of what would be expected in commercial orchards. All products tested proved highly effective, did not damage the fruit or foliage, did not appear to induce excessive mite damage, and some of the products appeared to control other important pests. Bait and Entrust applications proved to be effective, practical options for organic and conventional growers.

**Objective 3:** There are three or four new, effective products available for management of cherry fruit fly. It is likely that an additional three or four will be labeled in the next few years, some aided by the research funded through this project. These new products are in three different classes of insecticide.

### Methods and materials:

**Test sites:** Two relatively small sweet cherry orchards documented as infested in 2002 were used as sites for replicated trials, with four to six single-tree replicates used for each timing and rate. One of these small orchards was utilized for the seven-day spray intervals with generally lower product rates, the other for ten-day spray intervals and higher product rates. Sixteen “back-yard situations,” with a total of 61 infested trees, trapped and heavily infested in 2002, were included as rate and timing efficacy trials. Six of these highly infested sites, selected as most difficult spray application situations, were treated with GF-120NF bait only. Two relatively large commercial organic cherry orchards with a history of CFF infestation were included for demonstrations of newly registered, but untested, organically acceptable materials and application methods. Untreated check trees were left in both of the replicated trials and two of the “Backyard” trials. An isolated single abandoned cherry tree with the lowest documented 2002 trap catch (11) was left unsprayed to document the trap-catch increase potential (to 90+ in 2003) in other test sites. At the end of the test period, unsprayed trees were either stripped of fruit or sprayed with dimethoate to reduce or eliminate infestations.

**Materials** included in research: Acetamiprid (Assail) 1.7, 2.4 and 3.4 ounces product/A, 7 or 10 day spray intervals, thiacloprid (Calypso) 2, 4 and 6 fl ounces product/A, 7 or 10 day spray intervals, imidacloprid (Provado) 4 fl. oz. product/A, 7 day intervals, spinosad (GF-120NF Bait), 20 fl. ounces 0.02% ai product/A (about 0.13 grams active ingredient spinosad per acre), 7 day intervals, spinosad

(Entrust) 1.25 ounces product/A, 7 day intervals, and a confidential numbered product, rate and other details a deep secret.

**Application:** All materials except bait were applied by a “Solo” backpack air-blast/mist sprayer at about 100 gallons per acre. The GF-120NF bait was applied in 2 – 17 acre test orchards with a 12 volt, electric pump, auxiliary sprayer strapped to the back of a “four-wheel” ATV motorcycle. Two adjustable-angle D3 disc nozzles directed streams of the bait/water mix across the middle of the tree. Calibration was somewhat difficult due to low application volumes, and as 10-12 MPH is not a traditional application speed. Generally, the 20 ounces per acre of bait was applied diluted in 1.75 to 2 gallons of water per acre to one side of every tree (alternate rows). Application time was about 2 minutes per acre. The side of the trees treated was alternated weekly. The six single to fifteen tree bait plots were baited with a 1:5 bait to water mix applied with hand-held “window washer” squirt bottles. One ounce of the mixture was applied to each test tree (1/5 ounce product per tree). Most of the bait test trees were significantly taller than those in a commercial orchard, so bait was applied no higher the lower 1/3 of the tree. No significant rainfall occurred during the bait application trials.

**Results and discussion:**

**Objective 1:** Product included in this project that is newly registered but not extensively tested in Washington: Provado. Products included in this project that are newly registered but not tested on cherry fruit fly: Entrust and GF-120NF Bait (organic options). Products included in this trial screening at the request of the registrant: Assail, Calypso, and a numbered product. Products not tested in this trial, soon to be registered, but not extensively tested: Actara.

**Objective 2:** All products, rates and timings (see tables below) were tested under pest population conditions far in excess of what would be expected in commercial orchards. As adults emerge daily during the season, spraying does not prevent adult trap catch on infested trees. However, effective control products protect the fruit from larval infestation by controlling adults prior to their maturation and egg deposition. Trap catch numbers tend to be suppressed on infested trees by residual control products. See table 1 for a contrast between the trap catch numbers and year to year increase on treated and untreated trees.

**In the “conventional” product tests,** zero larval infestation was found in 9,600 fruit sampled from treated trees on 10 infested sites. Untreated trees had 4 to 9 percent of fruit infested.

**Table 1. Conventional Product Results Summary:**

Product	Ai/A	Product Rate/A	Spray Interval	# of Trees	# of Sites	# Fruit	Larvae Found	Adults Trapped in 2002	Adults Trapped in 2003
Untreated	0	0	NA	4	3	1100	64	44	102
Assail 70WP	33.7 g	1.7 oz	7	10	2	800	0	39	34
Assail 70WP	67.4 g	3.4 oz.	7	4	1	800	0	21	1
Assail 70WP	47.5 g	2.4 oz.	10	4	2	800	0	61	48
Assail 70WP	67.4 g	3.4 oz.	10	6	1	1200	0	12	3
Calypso 4F	28.3 g	2 fl. oz.	7	4	1	800	0	21	1
Calypso 4F	56.7 g	4 fl. oz.	7	4	1	800	0	21	1
Calypso 4F	85.0 g	6 fl. oz.	7	4	1	800	0	30	3
Calypso 4F	28.3 g	2 fl. oz.	10	3	2	800	0	40	13
Calypso 4F	85.0 g	6 fl. oz.	10	6	1	1200	0	12	3
Provado 1.6	22.7 g	4 fl. oz.	7	4	1	800	0	21	1
Numbered	NA	NA	7	5	1	800	0	30	3

Despite as many as five weekly applications at higher than necessary rates, no treatment resulted in leaf marking, yellowing or shedding, fruit marking, or excessive mite damage. Some moderate leaf

symptoms induced by mite feeding were observable by late summer on the trees treated with Provado, Assail, and Calypso.

Assail 3.4 oz/A, Calypso 4 and 6 oz./A, and Provado 4 oz./A applied at CFF control timing greatly suppressed well-developed black cherry aphid colonies. The lower rates of Assail and Calypso were less effective. As would be expected, Entrust and GF-120NF had no effect on black cherry aphid.

**In organic product trials**, no larvae were found in 2,400 fruit treated weekly with Entrust on “high pressure” sites, while untreated checks were 4 to 9 percent infested. GF-120NF bait application proved to be quite practical in both large acreage and single-tree applications. Of the six highly infested “backyard” situations treated weekly with the bait, one larva was found on the most “difficult” treatment site in a 700 fruit sample taken 10 days after the normal harvest date. On the five other bait treatment sites where an average of 50 adults were caught per trap in 2002, no larvae were found in 1,800 fruit following 2003 treatments.

**Demonstration of effective commercial-scale organic CFF control** was carried out in two orchards. One of the orchards had larvae found in the fruit in both 2001 and 2002, despite alternate day, maximum rate pyrethrum spray applications. Adults were trapped in this orchard each of the three weeks leading up to harvest in 2002. In 2003, the grower switched to weekly applications of 1.25 ounces per acre of Entrust starting four days after regional trap catches and the CFF model (Jones) indicated first adult emergence. Three weekly Entrust sprays were applied. As harvest neared, starting two days after the final Entrust application, 20 fl. oz./A GF-120NF bait mixed in 0.9 GPA water was applied weekly through harvest (three applications). A final “clean-up” Entrust spray was applied immediately post-harvest. No adults were caught on traps in the orchard and no larvae were found in fruit this year. The number of CFF spray applications by the grower dropped from sixteen in 2002 to seven in 2003. Material and application costs for CFF control were reduced from \$1788/A in 2002 to \$332/A in 2003.

A second organic orchard was involved to demonstrate the practicality of bait application to larger orchards. The bait was applied through the sprayer described above to a relatively steep, seventeen-acre orchard with various tree sizes and row spacings. Application took about 2 to 2.5 minutes per acre, and was completed on the 17 acres in about an hour, including mixing and loading. The applicator reported no problems during the five weekly applications.

The most significant application observations and suggestions resulting from the bait application demonstrations include:

1. The bait must be completely mixed with the water before it is placed into the spray tank.
2. The ATV should have a speedometer to aid evenness of application.
3. The two D3 nozzles at 10-12 mph, on alternate rows apply about 0.8 to 1.0 GPA of spray mix.
4. The spray stream travels as far as 22 feet, and can easily reach any portion of the tree.
5. Moderate wind does not affect application.
6. The sprayer driver should wear a safety helmet for protection against low hanging limbs.
7. This new technology is a great excuse to buy an ATV.

**Table 2. Organic Product Results Summary:**

Product	Ai/A	Product Rate/A	Spray Interval	# of Trees	# Fruit	Larvae Found	Adults Trapped in 2002	Adults Trapped in 2003
Entrust	28.3 g	1.25 oz.	7	4	1000	0	30	0
Entrust	28.3 g	1.25 oz.	7	5	1000	0	40	10
Entrust	28.3 g	1.25 oz.	7	1	400	0	16	4
Entr. Check	0	0	NA	1	400	16	40	10
GF-120NF	.005 oz.	20 fl.oz.	7	1	400	0	15	3
GF-120NF	.005 oz.	20 fl.oz.	7	15	700	1	90	12
GF-120NF	.005 oz.	20 fl.oz.	7	3	200	0	60	3
GF-120NF	.005 oz.	20 fl.oz.	7	1	400	0	14	23
GF-120NF	.005 oz.	20 fl.oz.	7	1	600	0	25	15
GF-120NF	.005 oz.	20 fl.oz.	7	1	200	0	150	13
GF Check	0	0	NA	1	300	28	11	90

**Objective 3:** Numerous “stone fruit” labels for products that are effective on CFF are recently approved or will be likely over the next two to four years. Highly effective spray material options including at least three new (not organophosphate or carbamate) classes of insecticide will be available to growers. The research carried out in this project will be used toward registration of at least three products, and will greatly advance the rate of adoption of two others.

**Budget:**

**Project duration:** 2003  
**Current year:** 2003  
**Project total (1 year):** \$9,054

Item	Year 1 (2003)
Salaries <sup>1</sup>	\$6,264
Benefits (34%)	2,130
Wages	0
Benefits (16%)	0
Equipment	0
Supplies <sup>2</sup>	400
Travel <sup>3</sup>	260
Miscellaneous	0
<b>Total</b>	<b>\$9,054</b>

<sup>1</sup> Technician – three months salary – to find and secure test trees, assist application and assess infestation levels.

<sup>2</sup> Supplies include spray materials, traps, lab supplies and sprayer fuel.

<sup>3</sup> Travel – technician use of own vehicle at 250 miles per month reimbursed at .34/mile.