II. Pome Fruits
c. Biological Control
1. Codling Moth, Pears

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Control of codling moth (CM), *Cydia pomonella*, using inundative releases of the egg-parasitoid, *Trichogramma platneri* Fowler Strain (TP), was studied in 3 Bartlett pear orchards in Lake County, California. Commercially-reared pupae of TP were obtained weekly via overnight parcel service from Agricultural Advisors, Inc., P. O. Box 952, Yuba City, CA 95991. Cards containing 3300 TP pupae each were stapled to pear leaves at 110,000 insects/acre/week (1X) beginning at the first visual egg-laying of CM on April 22, 1993 (84 degree days, 88F/50F basis). First egg-laying temperatures occurred April 19, 1993 (64 DD). Releases were repeated weekly for 14 weeks through July 22, 1993 (1469 degree days). Biofix was determined from pheromone trap catches of CM males.

Control of CM was assessed by (1) comparing the % of parasitized wild CM eggs in unsprayed release sites with parasitism rates in unsprayed, no release areas of the same plantings; and (2) comparing the number of infested fruit at harvest time (August 12, 1993; 1930 degree days) in unsprayed release and control areas (and with a standard insecticide-treated area in the case of one of the test orchards). (3) In addition, control was compared in one test block where releases were made in a mating disruption (MD) area (Pacific Biocontrol Isomate dispensers hung twice per season at 400 dispensers/acre/hanging (0 and 980 degree days). (4) In one test area, release of 220,000 parasitoids/acre/week (2X) was also compared.

Using the 1X release rate, the higher the cluster infestation level with CM eggs in May, the lower the percent of CM eggs parasitized by TP. At 50 CM eggs per 100 clusters, less than 30% of the eggs were parasitized by TP. At under 10 CM eggs per 100 clusters, over 70% of the eggs were parasitized. When

CM eggs per 100 clusters were reduced to 2.5 by MD, very high parasitism levels may have been achieved. (However, this is difficult to assess because of small sample size.) When 2X rates of TP were released in one test area, levels of parasitism were only somewhat higher than the level predicted by the regression line describing 1X releases (Figure 1).

At harvest time, the number of CM larval infested fruit was proportional to the number of eggs per 100 clusters in May in the release areas and in the control areas. Although May levels of CM egg parasitism by the 1X release rate of TP were significantly raised in all three plots compared to the controls, (figure 1), measureable CM control at harvest in August occurred only in one plot which had the lowest levels of original CM infestation in May. Use of the 1X TP release rate in a MD area of resulting low cluster infestation by CM was equal to control of CM from MD alone in a replicated harvest fruit sample. Increasing TP release to 2X rates resulted in 50% reduction of CM levels at harvest compared with 1X rates of release in an unreplicated test (Figure 2).