

<i>DESCRIPTION:</i>	Control of Codling Moth and True Bugs by Reducing Risk Insecticides - North Coast
<i>PROJECT LEADER:</i>	Lucia Varela, UC North Coast IPM Advisor
<i>2002 FUNDING:</i>	\$8,500
<i>FUNDING SOURCE:</i>	Pear Pest Management Research Fund

Title: Control of Secondary Pests in Codling Moth Mating Disrupted Orchards

Principal Investigator:

Lucia G. Varela, North Coast IPM Advisor
University of California Cooperative Extension &
Statewide IPM Project, Santa Rosa, CA 95403

Abstract:

A replicated trial was conducted for boxelder bug control in Mendocino County. Provado, Danitol applied at three different timings were compared against an untreated control. Danitol applied in May significantly reduced damage. Boxelder bug seasonal presence and damage were investigated. Boxelder bug population and damage decrease with increasing distance from the riparian corridor. True bug damage occurred early in the spring (prior to May 25), remained constant through late May and early June and then increased 1 to 2% every week from late June until harvest.

Introduction:

As mating disruption has been successfully implemented throughout the state, two secondary pests are of increasing concern: oblique-banded leafrollers (OBLR) and true bugs. In the North Coast the true bug of major concern is boxelder bug.

Boxelder bug (BB) is a consistent secondary pest in orchards under mating disruption next to riparian areas. The most severely affected area is the first 25 to 30 rows next to the river, with up to 10% damage in the first row and an average of 1 to 2 % throughout this area. We do not know when the damage occurs or if both nymphs and adults are responsible for the damage. Thus, we are unclear as to the best timing for control. In addition the use of the OP's Cygon and Carzol will likely be eliminated or face severe restrictions with the implementation of FQPA.

Objectives:

- 1) To test efficacy and timing of new reduced-risk insecticide for BB control.
- 2) To determine seasonal susceptibility of pear to damage by BB nymphs and adults.

Plans and Procedures:

Insecticide Efficacy Trial

We determined the efficacy of Provado (Imidacloprid) and the pyrethroid Danitol (fenpropathrin) for BB control. We also tested Danitol at three different timings. Timing was intended to be applied against the overwintering BB adults (May 15), nymphal stages (May 30) and summer adults (July 5). We conducted the trial in an orchard next to the Russian River that had BB damage in the last several years. The experiment was a randomized, complete block design, with five treatments and four replications. Each treatment was half a tank, split into four replications of 0.5 acre each. All treatments were placed in the first nine rows from the river.

Insecticide	Rate/acre	Spray Timing		
		May 15	May 30	July 3
Provado	10 oz			√
Danitol 1 st timing	16 oz	√		
Danitol 2 nd timing	16 oz		√	
Danitol 3 rd timing	16 oz			√
Untreated control				

BB adults and nymphs were sampled every other week with beating trays. A beating tray sample consists of beating a limb three times. Ten trees per row in five rows per replicate were sampled, for a total of 50 samples per replicate. True bug damage was evaluated by examining 100 fruit per replicate two weeks before harvest.

Seasonal Susceptibility

Two sampling procedures were conducted: 1) to determine populations levels beating tray samples were conducted bi-weekly and 2) to determine when damage occurs during the season we bagged pears throughout the season to exclude insects.

Beating tray samples: Beating tray samples were performed every other week in different rows away from the river. A beating sample consists of beating a limb three times and counting the number of adults and nymphs that fell onto the tray. We sampled ten trees per row. Rows selected for sampling were 1, 2, 3, 5, 10, 15, 20, 40, 60, and 80 away from the river. Beating tray samples started after petal fall and continued until harvest. At harvest those rows were sampled for fruit damage. Twenty fruit per tree in 25 trees per row were sampled.

Exclusion by bagging: To determine when damage occurs during the season, we excluded the insects by covering two hundred fruit with brown paper bags every week (four fruit per tree in 50 trees weekly) in the first row adjacent to the riparian corridor. The riparian corridor is where BB overwinter and where the first row has the highest percent of damage. Bagging fruit protects them from insect feeding from the time of bagging until harvest. Thus, when the bags are removed damage present occurred before the fruit was bagged. The first 200 bags were placed after complete petal fall and we continued bagging 200 fruit weekly throughout the season. All bags were removed

before harvest and the fruit inspected for damage.

Results and Discussion:

Insecticide Efficacy Trial: Danitol applied in mid- and late-May gave significantly better control than Danitol applied in July or Provado (see figure 1). During May the majority of the population is in the nymphal stages (see Figure 2). In late June to early July the next generation adults begin to appear.

Seasonal Susceptibility:

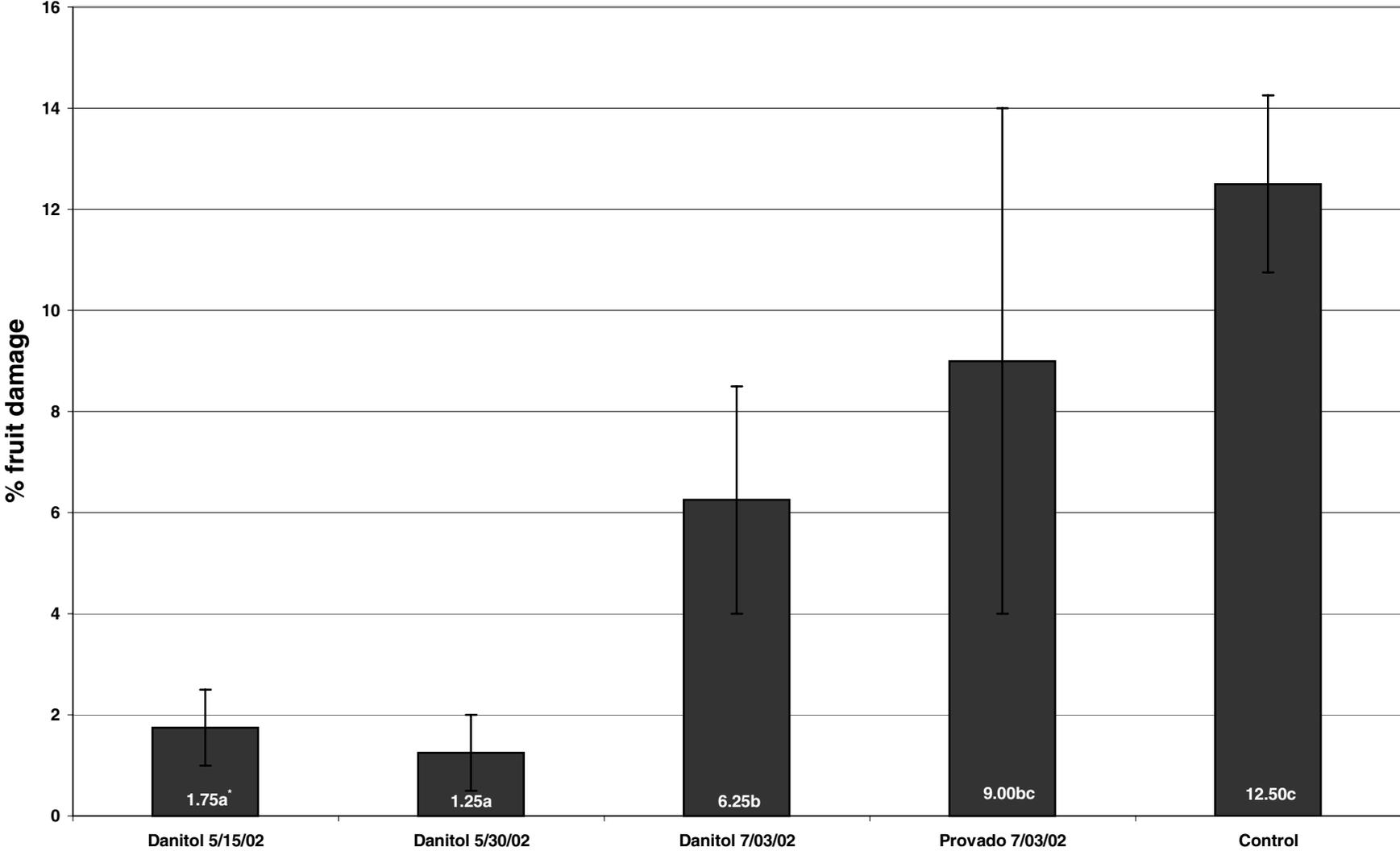
The distribution of boxelder bug adults and nymphs obtained with the beating tray samples in the rows adjacent to the riparian corridor are presented in Figure 3. Higher populations of both adults and nymphs were found in the row next to the river and decreased in rows further from the river. This coincided with damage that was 18% in the first row, 10% in the second row adjacent to the river and decreased to less than 1% by row 10 (Figure 4).

Overwintering adults were active early in the spring and started laying eggs by the last week of April. Egg laying continued through early June. The first nymph was recorded on May 14. The overwintering adults decreased in number throughout May. The next generation adults began to appear in late June to early July (see Figure 2). There is only one generation of boxelder bug a year.

On a weekly basis, we bagged fruit in trees in the first row from the river, to exclude insects from damaging the fruit. This allowed us to determine the amount of damage of fruit exposed to feeding through the season. We started the experiment on April 23 and some damage had already occurred from feeding prior to that date. Feeding damage did not increase (2 to 3%) from April 30 to June 4 (see figure 5). From June 11 to June 25 damage increased to between 4 to 6%. After July 2, damage increased by approximately 2% each week reaching 11% shortly before harvest. The experiment was conducted in the first row from the riparian corridor in an orchard with a history of high boxelder bug populations and damage. In beating tray samples boxelder bug was the predominant true bug found. We speculate that the overwintering adults caused the damage that occurred prior to May 27. The lack of increase in damage through May and early June could be due to the decrease in adults in the field. The increase in damage after early July might coincide with an increase of the next generation of adults. It is also possible that, as the fruit softens in July, feeding on the fruit by both nymphs and adults increases.

The seasonal susceptibility data is similar to the data obtained in 2000 (see 2000 California Pear Research Reports pp. 81-90) where damage remained constant until mid-June and increased thereafter 2 to 3% per week until harvest. The insecticide efficacy trials showed that the best timing for control was in mid- to late-May when the population is primarily in the early nymphal stages. Thus, controlling early instar nymphs attenuates the increase in damage that occurs beginning in July.

Fig. 1 - Percent Fruit Damage in Plots Treated with Danitol at Three Different Timings and Provado for Boxelder Bug Control.



* Values followed by the same letter are not significantly different

Fig. 2 - Number of Adult and Nymph Boxelder Bugs Sampled with Beating Trays from April until Harvest.

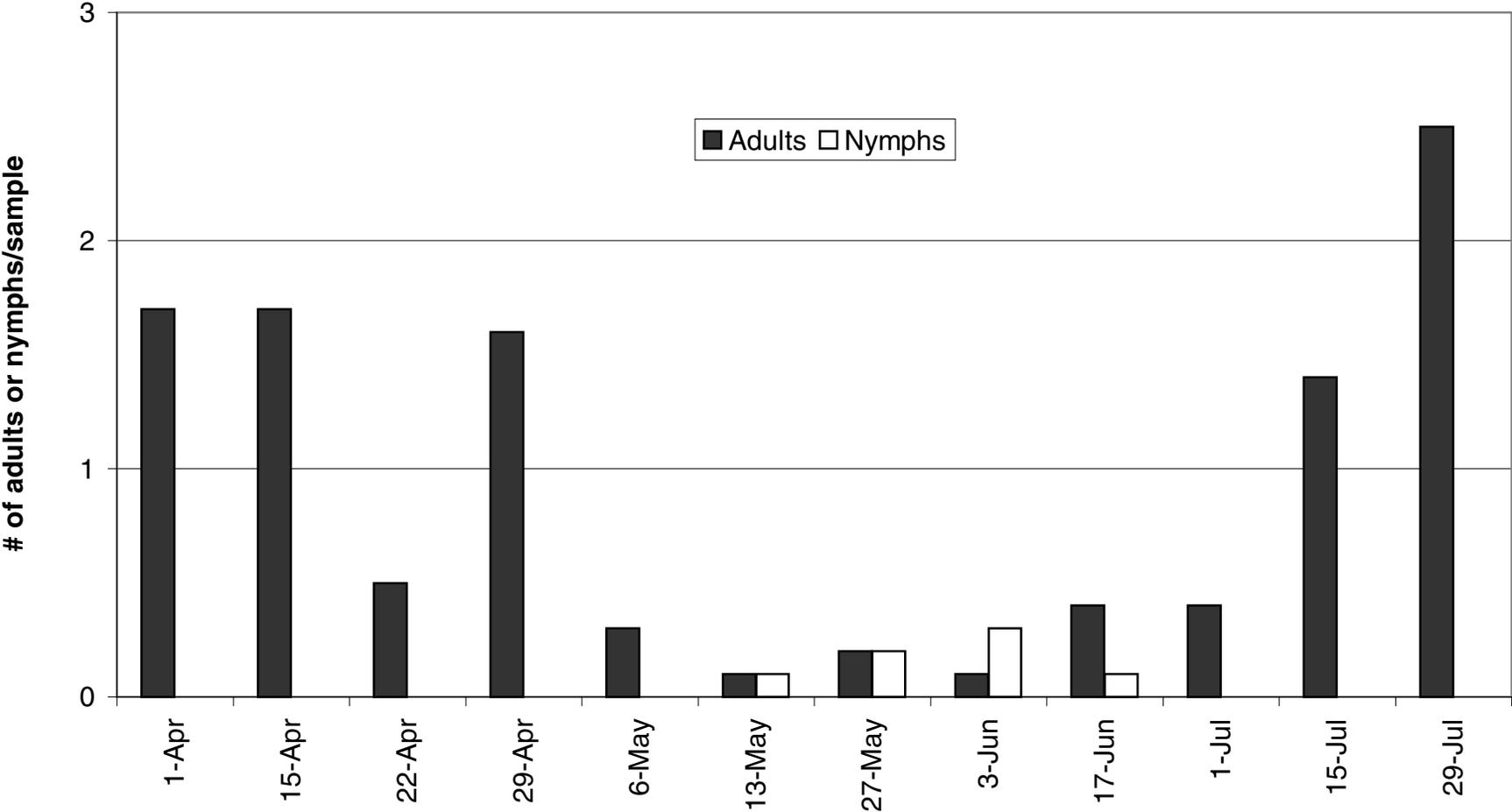


Fig. 3 - Number of Adult and Nymph Boxelder Bugs Sampled with Beating Trays by Proximity to the River.

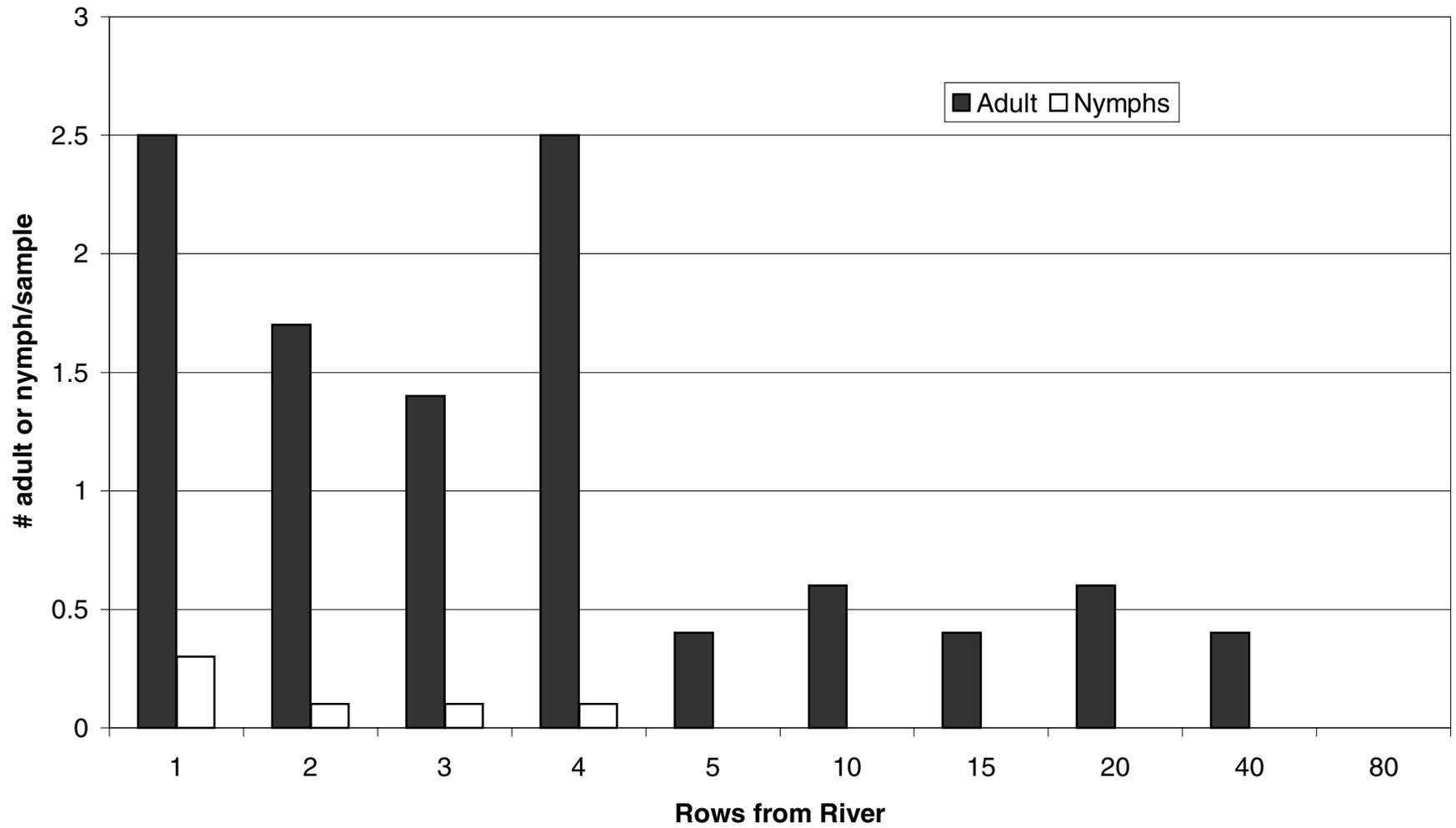


Fig. 4 - Percent Fruit Damage on Trees in Rows 1 to 80 from the River.

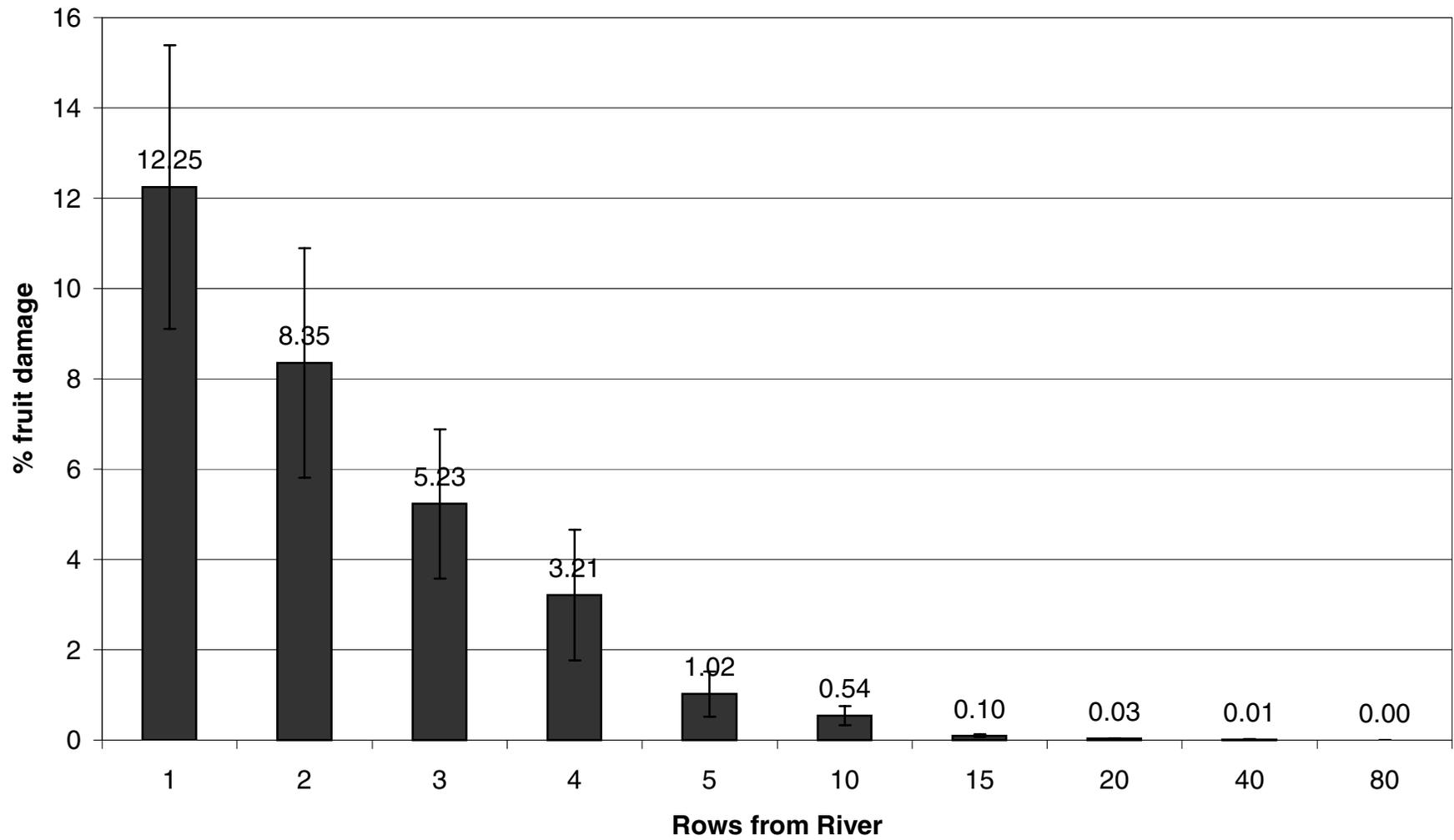


Fig 5. - Increase in Percent True Bug Damage through the Season Determined by Excluding Insects with Paper Bags.

