

# ACTIVE YEASTS IMPROVE SELECTIVE INSECTICIDES FOR CODLING MOTH CONTROL IN PEARS

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## ABSTRACT

Studies conducted in 2015 examined the use of bread yeast (RedStar's, *Saccharomyces cerevisiae* [BY]) and sugar (S), and pear ester (Trécé's, DAMEC [PE]) as additives to improve the efficacy of conventional and organic insecticides used in pear to manage codling moth (CM). Field trials in pear found that PE can be used to enhance insecticides such as the spinosyn, Entrust and the diamide, Altacor. The addition of BY+S improved the performance of Altacor but not Entrust. The combination of PE and BY/S did not further improve the use of PE alone.

## OBJECTIVES

1. Evaluate the efficacy of adding either yeast (BY) with sugar (S) alone or in combination with microencapsulated pear ester (PE) to two classes of insecticides in field bioassays.

## PROCEDURES

**Field Trial 2015:** Studies were conducted at the USDA Farm with both Altacor and Entrust applied to Bartlett pears. Five treatments were evaluated in both studies: water only, insecticide alone, and insecticide with either DAMEC (12 ml/ 100 gallons) or BY+S (3/1 lb per 100 gallons) added alone and both added together. Eight single-tree replicates were randomly selected and flagged in each study. Altacor was sprayed at 3 oz/100 gallons and Entrust was sprayed at 6.0 oz/ 100 gallons. Pears were sprayed on 29 May, 12 and 26 June, 13 and 27 July and 13 August. All trees were sprayed with ½ gallon using a handgun sprayer at 100 psi and equipped with a D5 nozzle. Pears were sampled by inspecting all fruit per tree on 27 August to 2 September. The proportion of fruit injured by CM was subjected to an angular

transformation and differences among treatments were tested with ANOVA. Means were separated at  $P < 0.05$ .

## RESULTS

**Field trial.** The addition of DAMEC or BY/S significantly reduced CM fruit injury when added to sprays of Altacor (Table 1). Fruit injury was not further reduced when the two adjuvants were combined with Altacor. Only the addition of DAMEC significantly reduced fruit injury when added to Entrust. Both BY/S or the two adjuvants together had lower mean injury than the insecticide alone, but these were not significantly different from the insecticide alone.

## DISCUSSION

Progress has been achieved during this three year project to evaluate the potential use of attractants to improve codling moth management in pear. Field data has suggested that pear ester (DAMEC) is probably the best material that can be added to either organic or conventional insecticides that target CM larva. Also, DAMEC can synergize the use of sex pheromones if dispensers are already deployed in the orchard. DAMEC was registered outside of CA in 2014 and labelled for use in CA and as organic in 2015. Use of DAMEC in Washington State is increasing as growers target problem areas in orchards and also periods of peak larval densities. Pear ester affects larval host searching behaviors and has been shown to cause female moths to lay eggs farther from pear fruits requiring larvae to traverse longer routes across insecticide residues.

Our studies have also found that yeasts such as common brewing yeast can be added with sugar to significantly reduce pear injury. The use of Monterey Insect Bait in 2014 did not show consistent positive benefits across the two insecticide classes and further work with this material was discontinued last year. Also, we have not found any improvement by combining DAMEC with a feeding attractant such as yeast or MIB.

It appears that CA pear growers can use DAMEC to build more effective management programs for CM in their orchards. Pest managers will have to decide

where, when, and how best to incorporate DAMEC into their seasonal programs. Because DAMEC can improve both insecticides and mating disruption and gives growers flexibility to target specific hot spots or seasonal pest periods, CA growers are likely to develop a variety of unique programs.



**Table 1. Pear fruit injury in six-spray treatment programs for codling moth using the insecticides Altacor or Entrust alone or with the addition of Pear ester (PE) and/or bread yeast and sugar (BY/S) in Bartlett pear, N = 8, 2015.**

Treatment	Mean (SE) proportion fruit injury
UTC	0.401 (0.032)a
Altacor	0.041 (0.008)b
Altacor + DAMEC	0.011 (0.003)c
Altacor + BY/S	0.013 (0.004)c
Altacor + Both	0.011 (0.004)c
ANOVA	$F_{4,35} = 102.28, P < 0.0001$
UTC	0.518 (0.103)a
Entrust	0.049 (0.022)b
Entrust + DAMEC	0.017 (0.006)c
Entrust + BY/S	0.026 (0.013)bc
Entrust + Both	0.030 (0.009)bc
ANOVA	$F_{4,35} = 199.83, P < 0.0001$