Alternative Pest Management Practices for Fruit

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Introduction

Soft alternative apple pest management tactics:

- Plum curculio (PC) trap crops in edge rows baited with benzoic acid (BA) & aggregation pheromone granulosis acid (GA) attracted more PC than did unbaited trees (Prokopy et al. 2003).
- Bacillus thuringiensis (Bt) killed Oriental fruit moth (OFM) & granulosis virus (CoGV) killing codling moth (CM) (Polesney et al. 2000, Simon et al. 1999, Minarro and Dapena 2000, Rashid et al. 2001).
- Stapling cardboard strips to apple trunks controlled CM making organic apple production viable in British Columbia (Judd et al. 1997).

Objectives

1) To compare PC damage in trees baited with BA & GA to unbaited trees
2) To compare insecticide treatments: soft [Entrust (Spinosad), Javelin (Bt), Cyd-X (CoGV)]; and synthetic [Guthion & Calypso (Thiaclopid)]
3) To compare fruit damage in conventional & alternative spray blocks

Methods

Early April 2004 and 2005 (bloom), every 5th apple tree in the orchard perimeter by the woods was baited with 8 BA & 2 GA lures (5 replicates) (Photo A & B). Fifty fruit per tree were inspected for PC damage in late May (Photo C).

In 2004, one tree plots (5 replicates) in a RCBD were treated with: Guthion or Calypso on 17 & 26 May, 24 June & 8 July; and Cyd-X, Javelin, or Entrust on 17, 26 May, 24 June, 1 & 8 July (Table 2). These treatments were applied weekly to two other blocks from 24 August to 15 September. Fifty fruit per tree were inspected for damage.

Tables 3 & 4 lists sprays applied in 2004 & 2005 to a conventional (1 A) & an alternative (2 A) apple block. Percent CM & OFM larval damaged fruit (Photo D) were recorded for each generation & at harvest. On 8 September 2004, 80% of trees in both blocks had cardboard strips stapled to trunks (Photo E). In late November or early December, strips were removed & dissected to determine the number of overwintering CM larvae.

Results

- PC baited apple trees (Table 1):
  - PC damage in small to intermediate-size baited trees > unbaited trees > baited trees
  - PC damage similar in baited and unbaited standard-size trees
  - Scouting only baited trees in perimeter for new PC damage could aid timing PC sprays

- Alternative sprays (Table 2): Abandoned block in June – OFM larval damage in check, Javelin & Cyd-X trees = Guthion, Calypso & Entrust (779 OFM trap / season) Commercial block in August – CM larval damage in check & Javelin trees = Cyd-X or Cyd-X + Javelin (50 CM & 12 OFM trap / season)
- Cardboard strips - more overwintering CM larvae in check trees than trees treated with Cyd-X or Javelin from 2004 (Fig. 2) to 2005 (Fig. 3):
  - ¾: 33.8 CM
  - ¾: OFM populations were < 1.3
  - ⅔: Number of CM, OFM and RBLR in orchard with 3M Sprayable OFM pheromone (3M) in 2004
  - Guthion and alternative insecticides on apple fruit

- Effects of Guthion and alternative insecticides on apple fruit damage by the codling moth (CM) and Oriental fruit moth (OFM) in Springdale, AR (2004)

- Seasonal total baited trap catch dropped from 2004 (Fig. 2) to 2005 (Fig. 3):
  - ¾: 12.6 OFM; 55.0 CM/trap; 34.9 CM/DA
  - ¾: OFM populations were < 1.3

- Table 4. Insecticides or Isomate-C dispensers applied for mating disruption to two apple blocks in Berryville, AR (2005)

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Table 1. Plum curculio (PC) fruit damage in baited & unbaited apple trees in perimeter by woods

Table 2. Effects of Guthion and alternative insecticides on apple fruit damage by the codling moth (CM) and Oriental fruit moth (OFM) in Springdale, AR (2004)

Table 3. Insecticides & 3M Sprayable OFM applied for mating disruption (MD) to two apple blocks in Berryville, AR (2004)

Table 4. Insecticides or Isomate-C dispensers applied for mating disruption to two apple blocks in Berryville, AR (2005)

Table 5. Percent CM fruit damage & number of live CM larvae per cardboard strip on trunks in conventional & alternative insecticide blocks in Berryville, AR (2004 and 2005)

Fig. 1. Number of CM, OFM & RBLR in orchard with 3M Sprayable OFM pheromone (3M) in 2004

Fig. 2. Number of CM, OFM & RBLR per pheromone or DA trap in abandoned & treated apple blocks = Guthion (G) + 10 Exosex mating disruption dispensers / A (OFM) (CM) (2004)

Fig. 3. Number of CM, OFM, RBLR & European red mites in conventional & alternative blocks with 200+ isomate-C dispensers / A (CM) in 2005