



IPM-CPR



Integrated Pest Management Crop Perimeter Restructuring
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The invasive brown marmorated stink bug (BMSB) has disrupted long-standing tree fruit IPM programs resulting in changing management practices to combat the threat posed by this invasive pest. Current management tools for BMSB rely on weekly, season-long applications of broad-spectrum insecticides that are costly, risk pest resistance, and may cause secondary pest outbreaks. The goal of IPM-CPR is to re-introduce common IPM practices (phenology based, reduce risk insecticide usage, mating disruption, and biological control) back into tree fruit management. The implementation of IPM-CPR for the management of key tree fruit pests may be less costly, more sustainable, enhance biological control, and be just as effective as current standard management methods. IPM-CPR is composed of the following tactics:

IPM-CPR	Phenological Model	+	Insecticide Use	+	Mating Disruption	+	Biological Control
	<ul style="list-style-type: none"> BMSB dispersal into peach at 144-250 DD₅₇ BMSB population peak at 1000-2000 DD₅₇ 	+	<ul style="list-style-type: none"> Insecticide treated orchard borders Include at least 2 insecticide classes 	+	<ul style="list-style-type: none"> Resistance management Lowers population pressure over time No effect on non-targets 	+	<ul style="list-style-type: none"> Natural enemy conservation in orchard interiors

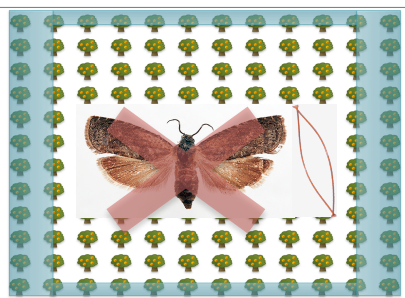
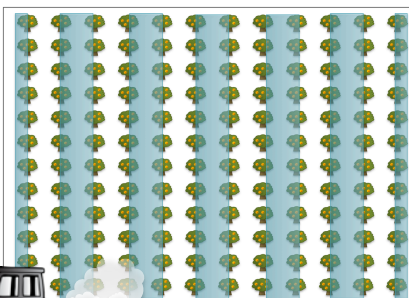


IPM-CPR management is aimed at controlling populations of key orchard pests through the use of common IPM tactics. This strategy reduces the amount of insecticide used while leaving insecticide class usage up to the grower's discretion. IPM-CPR is aimed at controlling the following:

Pest	Management
Tarnished plant bugs and other catfacing insects	Treat the orchard floor with Clopyralid 40.9% during the first week of May at the rate of 4 oz/A to control broad-leaf weeds (i.e. clover)
Oriental fruit moth and codling moth	Deploy mating disruption dispensers (OFM TT at 100/acre or OFM/CM TT at 200/acre) in early May
Brown marmorated stink bug	Insecticide treatment on the outside edge and the first full row of the orchard border (see diagram below)

Standard

IPM-CPR



Comparison of the standard alternate row middle insecticide application with the IPM-CPR orchard layout with ground floor herbicide, mating disruption, and border insecticide application. Border focused insecticide application can reduce insecticide use by 50-75%.



RESULTS FROM IPM-CPR



From Two Years of Implementation

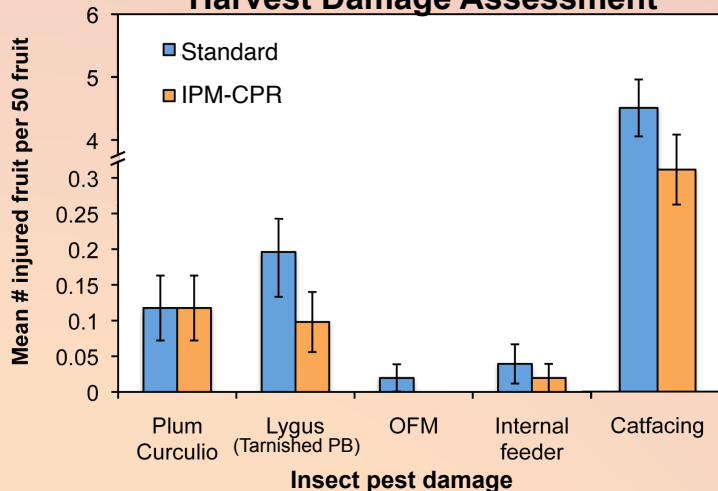


A field trial was implemented at commercial peach orchards in NJ to evaluate the IPM-CPR, utilizing behaviorally-based tactics for management of key orchard pests – BMSB, OFM, and tarnished plant bugs. The following is a summary of the results from two years of implementation of the IPM-CPR strategy at the commercial peach orchards. Depending on the grower practice, border spray application from May through harvest can save up to 50% on insecticide cost and with the inclusion of mating disruption and herbicide use, IPM-CPR is slightly more expensive than the grower standard.

Farm	Border Spray Only	IPM-CPR	ARM	Whole Block
1	\$25	\$75	\$55	\$110
2	\$75	\$130	\$145	\$285
3	\$40	\$95	\$65	\$140



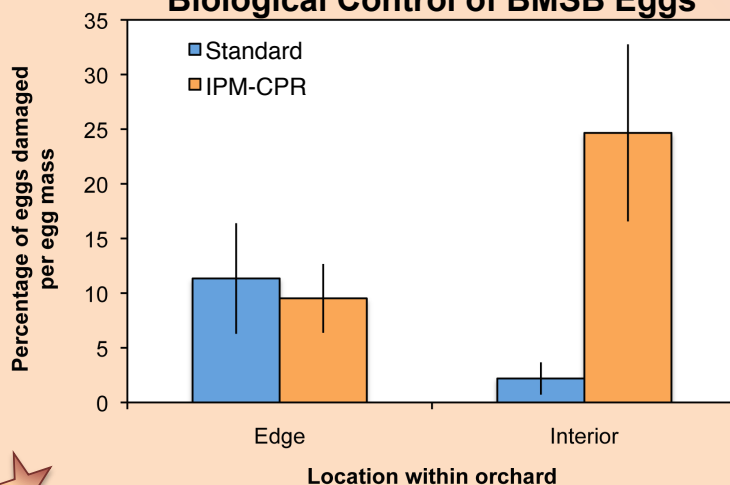
Harvest Damage Assessment



- IPM-CPR provided BMSB and OFM control at levels equal to grower standards in Jerseyqueen and PF-24
 - Potentially better along crop perimeter where insecticide is applied weekly
- Peaches were assessed at harvest for insect injury
 - OFM populations were lower with IPM-CPR and had no live larvae in the fruit
 - Other catfacing was lower with the IPM-CPR



Biological Control of BMSB Eggs



- IPM-CPR reduced insecticide use by 50-75% compared to standard grower practices
 - Less insecticide is better for beneficial insects like natural enemies and pollinators
- Shown in the figure on the left, IPM-CPR orchards had increased levels of biological control of BMSB eggs



IPM-CPR significantly reduced the amount of area managed for control of BMSB, while simultaneously managing these pests at levels equal to current grower standard practices. Thus, this tactic reduces insecticide usage, is comparable in price, and potentially supports beneficial insects for the enhancement of biological control and pollination.

INSECTICIDES FOR BMSB MANAGEMENT

Product Name	BMSB Rating	Peach				Pome fruit				IRAC	Class
		Rate	Seasonal No. apps or material	PHI	Interval (days)	Rate	Seasonal No. apps or material	PHI	Interval (days)		
Actara*	+++	5.5 oz	11 oz	14	7	5.5 oz	16.5 oz	35	10	4A	Neonicotinoid
Perm-up**	+++	10 oz	3	14	10	N/A	N/A	N/A	N/A	3A	Pyrethroid
Asana	++	14.5 oz	5	14	N/A	14.5 oz	7	21	N/A	3A	Pyrethroid
Assail	++	0.15 lbs	4	7	10	0.15 lbs	4	7	12	4A	Neonicotinoid
Azera	++	16-56 oz	10	0	3	16-56 oz	10	0	3		Pyrethrin + neem extract
Baythroid	+++	2.4 oz	5.6 fl oz	7	14	2.4 oz	2.8 oz	7	14	3A	Pyrethroid
Belay	++++	6 fl oz	2	21	10	6-12 oz	12 oz	7	14	4A	Neonicotinoid
Bifenture Brigade Capture (SECTION 18 required for Apples and Peaches)	++++	12.8 oz	28.8 oz after PF, season total 32 oz.	14	30	12.8 oz	28.8 oz after PF, season total 32 oz.	14	30	3A	Pyrethroid
Danitol	+++	21.3 oz	2	3	10	21.3 oz	2	14	10	3A	Pyrethroid
Dimate	+++	1 lb	1	28	N/A	1 lb	1	28	N/A	1B	Organophosphate
Endigo ZC	++++	5.5 oz	19 oz	14	7	6 oz	28 oz	35	10	3A	Pyrethroid
Lannate SP***	++	1 lb	6	4***	7	1 lb	5	14	7	1A	Carbamate
Leverage 2.7	+++	4.4	10.2 oz	7	14	4.4 oz	5.1 oz	7	14	4A + 3A	Neonicotinoid + Pyrethroid
M-Pede	++	2% v/v	3 sequential apps		7	2% v/v	3 sequential apps		7		Potassium salt
Mustang Max	+++	4 oz	24 oz	14	7	4 oz	24 oz	14	7	3A	Pyrethroid
Scorpion	+++	7 oz	10.5 oz	3	7	N/A	N/A	N/A	N/A	4A	Neonicotinoid
Surround****	++	25-50 lb	N/A	1	7	25-50 lb	N/A	1	7		Particle film
Venom	+++	4 oz	8 oz	3	7	N/A	N/A	N/A	N/A	4A	Neonicotinoid
Voliam Flexi	+++	7 oz	14 oz	14	10	7 oz	16 oz	35	10	4A + 28	Neonicotinoid + Diamide
Voliam Xpress	+++	6-12 oz.	31 oz	14	7	6-12 oz	31 oz.	21	10	3A + 28	Pyrethroid + Diamide
Warrior II	+++	2.56 oz	12.8 oz, 10.24 oz post bloom	14	5	2.56 oz	12.8 oz, 10.24 oz post bloom	21	5	3A	Pyrethroid
Lambda-Cy	+++	5.12 oz	25.6 oz 20.48 oz post bloom	14	5	5.12 oz	25.6 oz 20.48 oz post bloom	21	5	3A	Pyrethroid

* If used at ≤ 2.75 oz, PHI is 14 days in pome fruit

** Not allowable after petal fall in pome fruit. We do not recommend applications for BMSB prior to petal fall in apples.

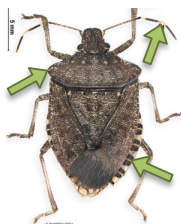
*** PHI in nectarines is 1 day

****May increase efficiency and residual time when mixed at low rates with insecticides

The amount allowable in pre-mixed products holds true for the single compound as well. For example, Actara (thiamethoxam) is limited to 11 oz (0.172 lb a.i.) per season. If using another product, such as Voliam Flexi or Endigo that also contains thiamethoxam, the seasonal limit applies to the use of this material as well.

BMSB and its common lookalikes

Brown marmorated



Brown stink bug



Dusky stink bug



Green stink bug



Spined soldier bug



(predatory)

