GRIMM FAMILY CENTER FOR ORGANIC PRODUCTION AND RESEARCH

ORGANIC PESTICIDE EFFICACY TABLES:

Pesticides should be the final step in an organic pest management plan. When selecting an insecticide or fungicide it is important to understand how they work and their relative efficacy on target pests. Entomologists and plant pathologists regularly evaluate plant protectants but often these studies are published in journals behind paywalls Over the last 18 months we have been evaluating 1000s of plant protectant studies to develop easy to read efficacy tables for growers and Pest Control Advisors. Here, we present tables for Organic pesticide efficacy for brassica crops and leafy greens. One of the biggest findings of our study was that many modern active ingredients lack published field studies.

STUDY METHODS AND SOURCES

- We are using a quantitative meta-analysis to summarize efficacy work on insect and disease pests by combining data from multiple studies to understand broader trends.
- To be included a study must be published in an indexed journal, have 3 replicates, and provide field data.

1 Search Literature for Studies

- Papers from Arthropod Management Tests, Plant Disease Management Reports and journals found

2 Quality Control

- Single OMRI AI results
- Untreated control
- At least 3 replicates

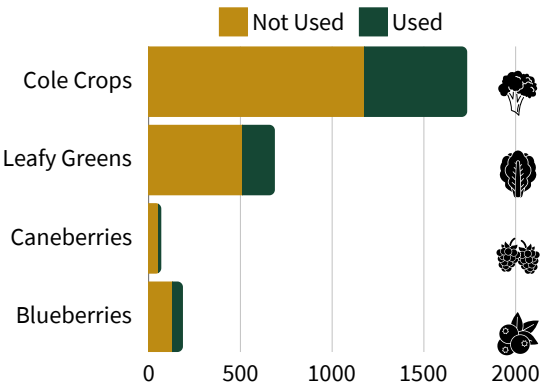
3 Extract Data

- Copied and indexed data tables
- Means and standard errors of "treatments" and controls collected into a database.

4 Combine Data

- Metaanalysis conducted in MetaWin using Hedge's g calculated from extracted data (minimum of 5 studies)
- Metaanalyses run for crop:pest:Active ingredient.
- Product ratings based on size of mean Hedge's g term (0.5-2, 2-6, 6+)

- Project began in Fall 2022
- Cal Poly students have evaluated > 5000 studies!
- ~1000 of the papers evaluated had potentially usable data
- The figure (L) presents the relative number of papers found and further evaluated for use by target crop



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https://organic.calpoly.edu/

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BRASSICA INSECT EFFICACY METANALYSIS

Active Ingredient	Example Products	DBM*	ICW	CL	BAW	CSCW	Aphid	Preda-tors	Parasi-toids	Pollina-tors
Bt Kurstaki	Dipel, Javelin	++	++	++	+	++	NA	☺	☺	☺
Bt Aizawai	Xentari, Agree	+++	++	+	Ins.	+++	NA	☺	☺	☺
Spinosyn	Entrust	+++	++	++	Ins.	Ins.	Ins.	☹	☠	☠
Azadiractin	AZA-direct	++	Ins.	Ins.	Ins.	Ins.	Ins.	☹	☹	☹

DBM = diamondback moth, ICW = imported cabbageworm, CL = cabbage looper, BAW = Beet Army Worm, CSCW = cross-striped cabbageworm
Diamondback moth data **do not reflect insecticide resistance in your area. Check with your PCA or local extension specialist on current local resistance. Table generated on 08/01/2024. Table composed from 481 entries*

LETTUCE INSECT EFFICACY METANALYSIS

Active Ingredient	Example Products	WFT*	BAW	CL	Aphid	Preda-tors	Parasi-toids	Pollina-tors
Bt Kurstaki	Dipel, Javelin	NA	++	++	NA	☺	☺	☺
Bt Aizawai	Xentari, Agree	NA	++	++	NA	☺	☺	☺
Spinosyn	Entrust	++	++	++	Ins.	☹	☠	☠

WFT = Western flower thrips, CL = cabbage looper, BAW = Beet Army Worm,
**Western flower thrips data do not reflect insecticide resistance in your area. Check with your PCA or local extension specialist on current local resistance.Table generated on 08/01/2024. Table Composed from 102 entries*

Table Key:

For Pests: **0** Not effective; **+** Somewhat effective; **++** Effective; **+++** Very effective; **Ins.** Insufficient Data; **NA** Not Applicable

For Beneficials: ☺ Mostly harmless; ☹ Can be harmful; ☠ Often harmful

- **Bt's, spinosyns, and Azadiractin are the most studied AIs**
- **Many common organic AI's are lacking published field studies: e.g., pyrethrin, Beauvaria, soaps**
- **Many key pests lacking published field studies: e.g., Bagrada Bug, Aphids, Lygus bug**

LETTUCE DISEASE EFFICACY METANALYSIS

Active Ingredient	Example Products	Sm	Ss	BLS	PM	DM
G. virens	SoilGard	+	+	Ins.	Ins.	Ins.
T. Asperellum or T. gamsii	Tenet, Biotam, Contans	+	+	Ins.	Ins.	Ins.
B. subtilis	Serenade	+	+	Ins.	+++	Ins.
C. minitans	Contans	++	++	Ins.	Ins.	Ins.
Sulfur	Microthiol	Ins.	Ins.	Ins.	+++	Ins.

Table Key:

- **0** Not effective
- **+** Somewhat effective
- **++** Effective
- **+++** Very effective
- **Ins.** Insufficient Data
- **NA** Not Applicable

Sm = Sclerotinia minor, Ss =Sclerotinia sclerotiorum, BLS = bacterial leaf spot (Xanthomonas campestris pv. vitans), PM = powdery mildew (Golovinomyces cichoracearum), & DM = downy mildew (Bremia lactucae).
**Table generated on 08/01/2024. Table composed from 157 entries*

BRASSICA & BRASSICA + LETTUCE + SPINACH DISEASE EFFICACY METANALYSIS

Brassica Alone

Active Ingredient	Example Products	ALP	DM	BR
B. amyloli-quefaciens	Double Nickel, Serifel	+	Ins.	Ins.
B. subtilis	Serenade	0	Ins.	+
Copper Hydroxide	Kocide, Champ	Ins.	Ins.	++

ALP= alternaria leaf spot (Alternaria brassicae), DM = downy mildew (Hyaloperonospora brassicae), and BR = black rot (Xanthomonas campestris campestris) Table generated on 08/01/2024. Table Composed from 118 entries

Brassica, Lettuce, & Spinach Combined

Active Ingredient	Example Products	DM	BLS
B. subtilis	Serenade	++	+
S. lydicus	Actinovate	0	Ins.
B. pumilus	Sonata	++	Ins.
R. sachalinesis	Regalia	++	Ins.
Copper Hydroxide	Kocide, Champ	Ins.	++

DM = downy mildew (Hyaloperonospora & Bremia spp.), and BLS = black leaf spot (Xanthomonas spp.) Table generated on 08/01/2024. Table Composed from 128 entries

- **B. Subtilis, Copper the most studied fungicides**
- **Many common organic AI's are lacking published field studies: e.g., Neem, Peroxides, Potassium bicarbonate**
- **Many key diseases lacking published field studies: e.g., downy mildews, Xanthomonas,**

NEXT STEPS

- Develop tables for full pest complexes including factsheets on pests and key pesticide active ingredients
- Work with grower collaborators to improve accessibility and relevancy
- Share historical trends on research with policy makers

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