

**THE EIQ  
in  
Sustainable  
le IPM**

TEXAS A&M  
**AGRI**LIFE  
EXTENSION

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EIQ

# EIQ

Environmental  
Impact  
Quotient



Who

# The EIQ Equation

## A method for evaluating environmental impact of pesticides

Initially Developed by Drs. Joe Kovach and Jim Tette (Cornell IPM) to evaluate pesticides by providing an average of the impact on Farm Workers, Consumers, and Ecological Components. (1992)

Provides a means to fairly compare and evaluate pesticides based on their Environmental Impact and make the most sustainable choice when faced with multiple product options.

Currently Maintained and Updated by:  
New York State Integrated Pest Management Program, Cornell  
Cooperative Extension, Cornell University.



# IPM

...pesticides are selected and applied in a way that minimizes their possible harm to people, nontarget organisms, and the environment.

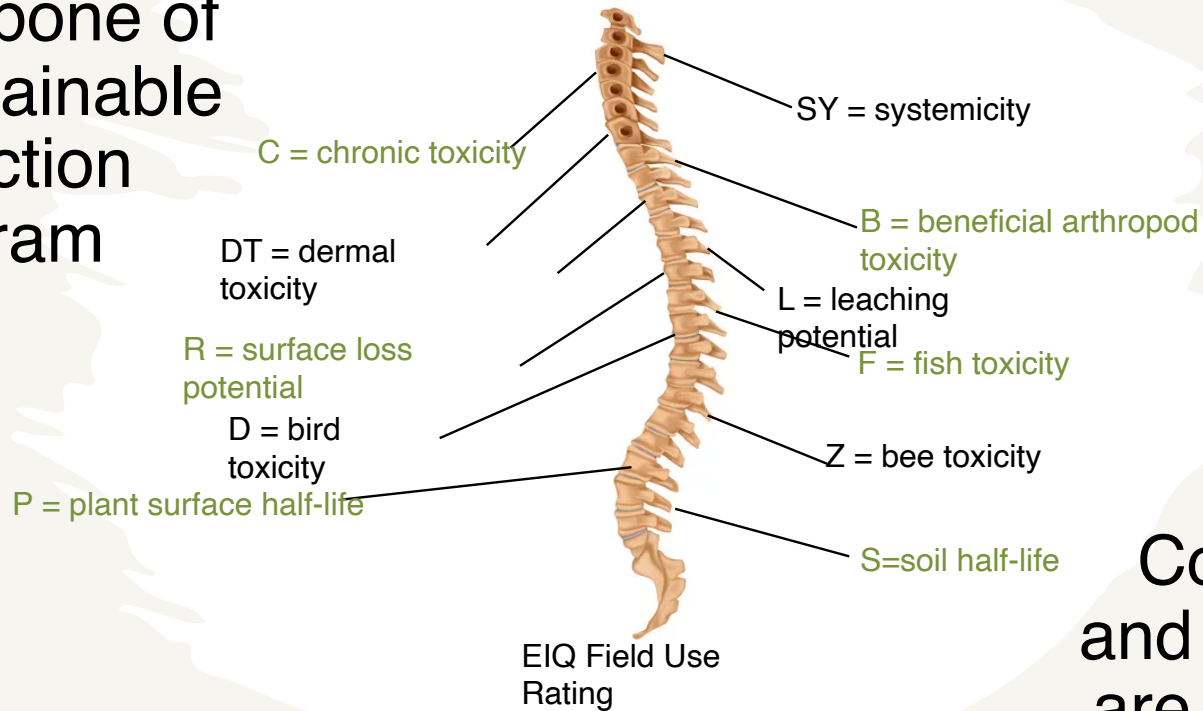
# The EIQ Equation

**EIQ is a quantified summation  
of Impact or (Risk) to  
Farm Workers + Consumers +  
Environment**

# Sustainable Production Planning

Irrigation/Water Management  
Weed/Vegetation Management  
Pest Management  
Soil and Fertility Management  
Harvest and Pruning

# IPM should be the Backbone of your sustainable production Program



**EIQ**  
Components and Calculations are some of the Vertebrae

# New York State Integrated Pest Management

[- RISK ASSESSMENT](#) - [RESEARCH & INITIATIVES](#) - [OUTREACH & EDUCATION](#) - [ECO RESILIENCE](#) - [ABOUT US](#)



# Risk Assessment

Where

## Environmental Impact Quotient

## A Method to Measure the Environmental Impact of Pesticides

The Environmental Impact Quotient (EIQ) is a formula created to provide growers with data regarding the environmental and health impacts of their pesticide options so they can make better-informed decisions regarding their pesticide selection.

Pesticide Active Ingredient  
EIQ values



EIQ Calculator



# A Method to Measure the Environmental Impact of Pesticides, Table 2: List of Pesticides 2019

Action: IGR = insect growth regulator, PGR = plant growth regulator, PA = plant activator, CP = crop protectant, BP = biopesticides, B = bactericide, AC = acaricide, I = insecticide,  
 F = fungicide, H = herbicide, Fum = Soil fumigant  
 EIQ Revision Date: Date of latest revision. Original = EIQ value from 1992 bulletin  
 Old EIQ Rating: EIQ value from original 1992 bulletin or from previous revision.  
 Missing Data: None=no missing data values, B= toxicity to beneficial insects, P=plant surface half life, Z= toxicity to bees, C=chronic health effects, R=runoff potential, L=leaching potential, S=soil residue half life  
 Formula Symbols: DT = Acute dermal toxicity D = Toxicity to birds F = Toxicity to fish Z = Toxicity to bees L = Leaching potential R = Runoff potential S = Soil residue half life SY = Mode of action C = Chronic health effects  
 P = Plant surface health effects B = Toxicity to beneficials

	CAS RN #	Common Name	Trade Name	Action	EIQ Value	EIQ Rev Date	Old EIQ Rating	Missing Data	Applicator Effects	Picker Effects	Farm Worker	Consumer Exposure Potential	Consumer	Fish	Birds
9					(Farm Worker+ Consumer+ Ecological)/3				C(DT*5)	C(DT*P)	C(DT*5) +C(DT*P)	C* ((S+P)/2) *SY	C* ((S+P)/2) *SY)+L	(F*R)	(D*((S+P)/2*3)
10															
11	542-75-6	1,3-dichloropropene	Telone	H	27.75	Mar-09	35.7		30.00	11.40	41.40	2.90	7.90	3.00	4.35
12	86-87-3	1-naphthylacetic acid		PGR	17.77	Mar-20	New		11.00	4.62	15.62	10.23	13.23	3.00	4.65
13	1929-73-3	2,4-D butyl or butoxyethyl ester	Tufon, Weedone	H	15.33	Apr-04	17.33		5.00	3.00	8.00	2.00	5.00	3.00	6.00
14	1928-43-4	2,4-D 2-ethylhexyl ester	various	H	15.33	Apr-04	17.33	none	5.00	3.00	8.00	2.00	3.00	5.00	6.00
15	94-75-7	2,4-D dichlorophenoxyacetic	various	H	16.67	Apr-08	18.67	P	5.00	3.00	8.00	3.00	8.00	1.00	9.00
16	2008-39-1	2,4-D dimethylamine	Dacamine	H	20.67	Apr-04	22.67	none	15.00	9.00	24.00	2.00	7.00	1.00	6.00
17	120-36-5	2,4-DP, azin	Weedone	H	12.40	Jan-04	15.33	B	5.00	1.00	6.00	1.00	2.00	15.00	3.00
18	1214-39-7	6-benzylaminopurine		PGR	17.83	Mar-20	New	L, R	10.00	4.20	14.20	4.90	8.00	7.14	7.35
19	71751-41-2	abamectin, avermectin	Agri-mek	I	34.68	Mar-08	38.00	P	10.00	3.80	13.80	2.90	3.90	25.00	4.35
20	30560-19-1	acephate	Orthene	I	24.88	Mar-09	23.38		12.50	2.50	15.00	7.50	12.50	1.00	9.00
21	57960-19-7	acequinocyl	Kanemite, Shuttle	AC	11.33	Jan-05	Original	C	5.00	1.00	6.00	1.00	2.00	15.00	3.00
22	135410-20-7	acetamiprid	Assail	I	28.73	Mar-09	26.90	P	5.00	1.90	6.90	4.35	7.35	3.00	4.35
23	64-19-7	acetic acid	vinegar	H	12.23	May-15	New	D	30.00	0.00	30.00	1.00	3.00	1.70	0.00

Active Ingredients

	A	B	C	D	E	F	G
86	2939-80-2	captafol	Captafol	F	29.73	Mar-09	17.30
87	133-06-2	captan	Captan	F	15.77	Jan-03	15.80
88	63-25-2	carbaryl	Sevin	I	22.73	Mar-09	21.70
89	10605-21-7	carbendazim	Fungisol	F	50.50	Apr-04	Original
90	1563-66-2	carbofuran	Chlordane, Furadan	I	50.67	Apr-04	50.67
91	55285-14-8	carbosulfan	Posse	I	47.33	Mar-09	New
92	5234-68-4	carboxin	Vitavax	F	18.71	Jan-03	Original
93	128639-02-1	carfentrazone	SpeedZone	H	20.18	Mar-08	21.52
94	15263-52-2	cartap-hydrochloride	Suntap	I	47.17	Mar-09	47.17
95	2439-01-2	chinomethionat (formerly oxythioquinox)	Joust	AC, F	29.44	Mar-09	44.40



# New York State Integrated Pest Management

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EIQ values



EIQ Calculator



# Powdery Mite Control in Pecans

## EIQ COMPARISON

### SEASONAL FIELD USE RATING

#### EIQ Calculator Output for: Etoxazole

 Use the Field Use EIQ for comparisons, not the base EIQ

##### User input

Active ingredient (AI) information

31.7% AI (w/w) etoxazole

Application details

3.000 oz of product applied per acre

Reference value

EIQ base value for etoxazole equals 13.4

*Do not compare EIQ base values. Use the field use EIQ value calculated below.*

##### Calculated results

Field Use EIQ equals **0.8** when standardized to a rate of 0.059 lbs AI/acre.

##### Field Use EIQ components

Consumer EIQ equals **0.1** per acre.

Worker EIQ equals **0.4** per acre.

Ecological EIQ equals **1.8** per acre.

#### EIQ Calculator Output for: Sulfur

 Use the Field Use EIQ for comparisons, not the base EIQ

##### User input

Active ingredient (AI) information

80.0% AI (w/w) sulfur

Application details

10.000 lb of product applied per acre

Reference value

EIQ base value for sulfur equals 32.7

*Do not compare EIQ base values. Use the field use EIQ value calculated below.*

##### Calculated results

Field Use EIQ equals **261.3** when standardized to a rate of 8.000 lbs AI/acre.

##### Field Use EIQ components

Consumer EIQ equals **66.3** per acre.

Worker EIQ equals **175.0** per acre.

Ecological EIQ equals **542.6** per acre.

For On-Farm IPM Decision Making  
YOU MUST USE THE EIQ TO OBTAIN THE

**EIQ FIELD USE RATING**

# EIQ FIELD USE RATING

EIQ Field Use Rating=

EIQ x % active ingredient x  
Rate

[nysipm.cornell.edu/eiq/calculator-field-use-eiq/](https://nysipm.cornell.edu/eiq/calculator-field-use-eiq/)



# Hypothetical Decision Matrix

Material	EIQ	ai	Rate	#Apps	EIQ field use rating
Sevin 50WP (carbaryl)	22.6	0.50	6.0	?	67.8
Thiodan 50WP (endosulfan)	40.5	0.50	3.0	?	60.8
Guthion 35WP (azinphos- methyl)	43.1	0.35	2.2	?	33.2

Material	EIQ	ai	Rate	#Apps	EIQ field use rating
Sevin 50WP (carbaryl)	22.6	0.50	6.0	1	67.8
Thiodan 50WP (endosulfan)	40.5	0.50	3.0	1	60.75
Guthion 35WP (azinphos- methyl)	43.1	0.35	2.2	3	99.56

# A Word About



Why

# Hypothetical Decision Matrix

Material	EIQ	ai	Rate	#Apps	EIQ field use rating
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Material	EIQ	ai	Rate	#Apps	EIQ field use rating
Sevin 50WP (carbaryl)	22.6	0.50	6.0	1	67.8
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Guthion 35WP (azinphos- methyl)	43.1	0.35	2.2	3	99.56



# Quantitative



# Comprehensive



# Transparent

# Show Me The Numbers

- ❖ Using Vague Generalizations About Impact is a Dangerous Practice



Why

## Field Use Seasonal EIQ

Values for 3 Different  
Management Strategies for  
Seasonal Disease  
Management for Red Delicious  
Apples

Conventional  
I- 938

Organic-  
1799

IPM-  
167



# TAKE HOME POINTS

- ❖ GENERALIZATIONS ARE DANGEROUS
- ❖ NATURAL ≠ GENTLE
- ❖ NOT EFFECTIVE ≠ BENIGN
- ❖ EFFECTIVE AND SUSTAINABLE IPM TAKES KNOWLEDGE AND PLANNING

# TAKE HOME POINTS

The Least Sustainable  
Pest Management Plan is  
an Ineffective One.



Thank

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