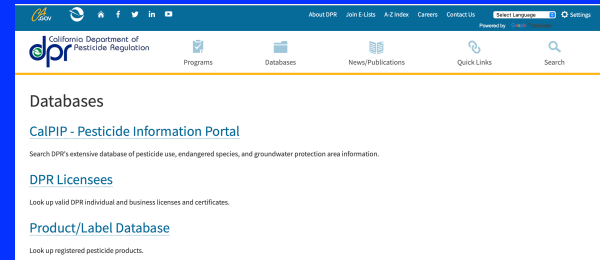


USE OF BIOLOGICAL NEMATOCIDES ON THE MARKET TODAY



Department of Pesticide Regulation
 (https://www.cdpr.ca.gov/database_menu.htm).



Yearly data for date of application, county, crop, active ingredient, product name, weight of product applied, weight of chemical applied, and area treated.

1	A	B	C	D	E	F	G	H	I	J	K	L	M		
2	YEAR	DATE	COUNTY	COMPTS	SITE	PRODUCT	CHEMICAL	POUNDS	APPLIED	WEIGHT	AMOUNT	TREATED	UNIT	AREA	INDICATOR
3	NO	2011	01-Jan-11	KERN	11M2721000	CARBOXY	GENERAL	775.8887		86.390250		81.4	D		
4	NO	2011	10-Dec-11	KERN	11M2721000	CARBOXY	GENERAL	257.2396		22.121766		27.4	D		
5	NO	2011	01-Jan-11	KERN	11M2721000	CARBOXY	GENERAL	226.1528		42.288699		39.4	D		
6	NO	2011	10-Dec-11	KERN	11M2721000	CARBOXY	GENERAL	406.4165		16.891151		21.4	D		
7	NO	2011	01-Jan-11	KERN	11M2721000	CARBOXY	GENERAL	276.2555		42.288699		39.4	D		
8	NO	2011	11-Dec-11	KERN	11M2721000	CARBOXY	GENERAL	406.2125		16.177739		21.4	D		
9	NO	2011	11-Dec-11	KERN	11M2721000	CARBOXY	GENERAL	676.4385		58.171991		71.4	D		
10	NO	2011	01-Jan-11	KERN	11M2721000	CARBOXY	GENERAL	776.1566		61.492791		71.4	D		
11	NO	2011	4-May-11	LAKE	17M1607010	GRAPES	WINE	77.9961		1.397146		15.0	A		
12	NO	2011	4-May-11	LAKE	17M1607010	GRAPES	WINE	323.5777		20.791231		20.1	A		
13	NO	2011	4-May-11	LAKE	17M1607010	GRAPES	WINE	265.127		22.80922		34.1	A		
14	NO	2011	4-May-11	LAKE	17M1607010	GRAPES	WINE	139.462		18.80929		20.1	A		
15	NO	2011	4-May-11	LAKE	17M1607010	GRAPES	WINE	646.1573		55.587778		131.9	A		
16	NO	2011	11-Jun-11	MERCED	11M2721000	CARBOXY	GENERAL	126.2929		10.811384		20.1	A		
17	NO	2011	1-Jun-11	NAVAJO	18M0909010	GRAPES	WINE	1.2781		0.1099346		13.4	S		
18	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1347		0.0113662		1.0	A		
19	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.8398		0.071468		8.4	A		
20	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1884		0.00511		0.8	A		
21	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	77.2062		4.897712		7.8	A		
22	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1928		0.001348		1.0	A		
23	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	1.597		0.108892		13.0	A		
24	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1928		0.001348		1.0	A		
25	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	2.738		0.180248		26.0	A		
26	NO	2011	10-May-11	NAVAJO	18M0909010	GRAPES	WINE	8.0284		2.181138		6.9	A		
27	NO	2011	10-Oct-11	NAVAJO	18M0909010	GRAPES	WINE	0.1888		0.0113381		1.0	A		
28	NO	2011	10-Oct-11	NAVAJO	18M0909010	GRAPES	WINE	0.1849		0.009234		3.4	A		
29	NO	2011	10-Oct-11	NAVAJO	18M0909010	GRAPES	WINE	0.1846		0.011338		4.8	A		
30	NO	2011	8-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.1072		0.001132		1.0	A		
31	NO	2011	8-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.492		0.30053		4.0	A		
32	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.7265		0.062979		7.0	A		
33	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.2997		0.197354		2.0	A		
34	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.6345		0.026297		6.2	A		
35	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	2.4264		0.109684		24.0	A		
36	NO	2011	5-Oct-11	NAVAJO	18M0909010	GRAPES	WINE	0.1421		0.026296		3.8	A		
37	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
38	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	1.488		0.103348		14.0	A		
39	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
40	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
41	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.8889		0.007734		6.8	A		
42	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.8887		0.00824		49.4	A		
43	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.7138		0.025244		7.0	A		
44	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
45	NO	2011	22-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	37.6231		1.296038		7.0	A		
46	NO	2011	22-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	4.2864		0.166616		10.4	A		
47	NO	2011	22-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
48	NO	2011	22-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
49	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	1.1847		0.104882		13.0	A		
50	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.1882		0.009234		1.0	A		
51	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	1.1847		0.104882		13.0	A		
52	NO	2011	7-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	11.8889		0.936454		112.9	A		
53	NO	2011	30-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	1.1514		0.104882		10.4	A		
54	NO	2011	30-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.1441		0.009234		1.0	A		
55	NO	2011	30-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	1.4882		0.104882		11.4	A		
56	NO	2011	30-Apr-11	NAVAJO	18M0909010	GRAPES	WINE	0.719		0.06274		7.0	A		
57	NO	2011	22-May-11	NAVAJO	18M0909010	GRAPES	WINE	1.4882		0.104882		11.4	A		
58	NO	2011	20-May-11	NAVAJO	18M0909010	GRAPES	WINE	896.3855		77.28873		44.0	A		
59	NO	2011	20-May-11	NAVAJO	18M0909010	GRAPES	WINE	276.2826		21.709259		24.0	A		
60	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	696.8123		17.82069		39.4	A		
61	NO	2011	12-May-11	NAVAJO	18M0909010	GRAPES	WINE	119.1763		11.470018		7.4	A		

Six biological nematocides have registered active ingredients:

Myrothecium verrucariae strain AARC-0255 (Ditera DF)

Quillaja (an extract of the Soapbark tree, Nema-Q, Nemomex)

Purpureocillium lilacinum strain 251 (Melocon WG)


Abamectin (Divanem)

Burkholderia sp. strain A396 (Majestene)

Azadirachtin (Extract from Neem tree, 29 different brand names).

2021 USE DATA FOR BIOLOGICAL NEMATOCIDES

Product	Pounds of Product	Pounds of Active	Acres Treated	Number of Counties	Number of Crops	Number of Applications
Azadirachtin	426,864	6,647	134,153,125	Most	Many	28,431
Ditera DF	24,508	22,057	3,720	13	14	353
Melocon WG	56,507	3,390	2,726	12	22	373
Majestene	16,593	15,674	1,559	3	2	41
Quillaja	11,217	965	1,797	6	5	79
Divanem	546	44	188	13		132



DiTera® DF
BIOLOGICAL NEMATOCIDE
DRY FLOWABLE

ACTIVE INGREDIENT: *Myrothecium verrucaria* strain AARC-0255 fermentation solids and solubles 90% w/w
OTHER INGREDIENTS 10% w/w
TOTAL 100% w/w
*Non-viable/"killed" microbial composition
POTENCY: 91,800 IRU (Root-knot Units) per gram of product.
Potency units should not be used to adjust use rates.

KEEP OUT OF REACH OF CHILDREN
CAUTION
See succeeding panel for First Aid, additional Precautionary Statements, Directions for Use and Storage/Disposal Statements.
EPA Reg. No. 72849-07
EPA Est. No. 33762-0A-001

Net Contents: 10 Pounds

Registrant:
VALENT BIOSCIENCES
Valent BioSciences LLC
870 Technology Way
Libertyville, IL 60048 U.S.A.
800-G-VALENT (682-5388)

DiTera® is a registered trademark of Valent BioSciences LLC.

CROP	COUNTIES	MONTHS
Bok Choy	San Luis Obispo	September to November
	Santa Barbara	January to May
	Santa Barbara	August to September
	Santa Barbara	November to December
Broccoli		February to March
		June, August
Brussels Sprouts	San Luis Obispo	June to September
	Santa Barbara	January to February
		April to July
		September
		November to December
Cabbage	Santa Barbara	August
Cauliflower	San Luis Obispo	April to May
		August to September
		February 7
Celery	San Luis Obispo	July
Chinese Cabbage	San Luis Obispo	May to July
		September to November
	Santa Barbara	January to May
		July to December
Grapes	Mendocino	May, October
	Marysville	May
	Napa	April to October
	San Luis Obispo	May
	Sonoma	April to May
		August to October
Onion	Butte	August
	Ervene	October
Lettuce	San Luis Obispo	October
Orange	France	September
	Tulare	May to June
Peanut	Glenn	April
Spinach	San Luis Obispo	April
		August to September
	Santa Barbara	January to March
		June to October
Walnut	Butte	June to July
	Colusa	April to May
	Glenn	April to May
	Lake	June
	Tahama	March, May
		June, September

2021 USE DATA FOR DITERA



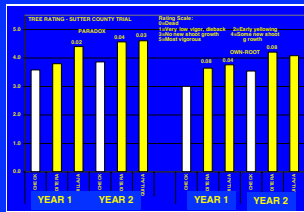
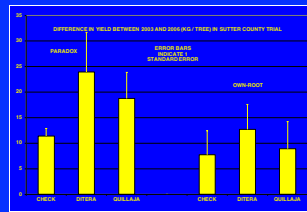
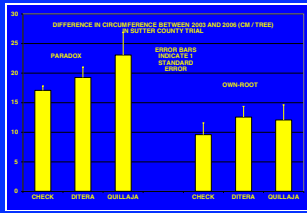
2021 USE DATA FOR QUILLAJA

CROP	COUNTIES	MONTHS
Carrots	Kern	July December
Grapes	Lake Mendocino Napa Sonoma	May January April to August October April to May October

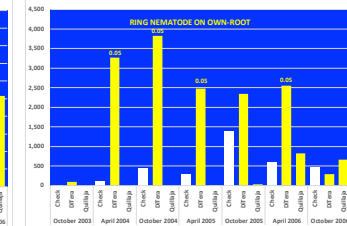
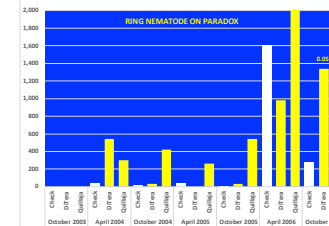
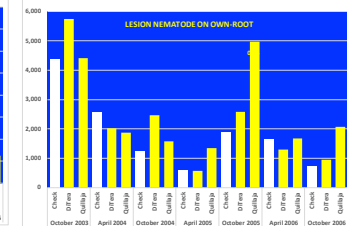
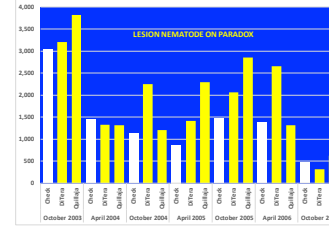
PERFORMANCE OF DITERA AND NEMA-Q (QUILLAJA) IN A SUTTER / YUBA COUNTY WALNUT ORCHARD (FARM ADVISOR JANINE HASEY)

OWN-ROOTED AND PARADOX ROOTSTOCKS
5 REPS PER TREATMENT / ROOTSTOCK
RANDOMIZED COMPLETE BLOCK DESIGN
UNTREATED
DITERA (23 KG/HA, TREATING HALF OF AREA)
QUILLAJA 35% (21.5 L/HA, TREATING HALF OF AREA)
MONITOR TRUNK CIRCUMFERENCE, YIELD, YIELD EFFICIENCY, SOIL AND ROOT SAMPLES
SOIL EXTRACTION VIA ELUTRIATION / SUGAR CENTRIFUGATION
ROOT EXTRACTION IN MIST CHAMBER

INCREASES IN TRUNK CIRCUMFERENCE, YIELD AND VIGOR



APPARENT INCREASE IN NEMATODE POPULATIONS



2021 USE DATA FOR DIVANEM ON TURF-GRASS



COUNTIES	MONTH
Contra Costa	May
Los Angeles	February to December
Monterey	February to September
Orange	January to October
Riverside	March, May, August
Sacramento	September, December
San Bernardino	May, July, September
San Diego	April to June
San Mateo	August, October
Santa Clara	March to October
Sonoma	March to June
Ventura	September to December
Yolo	April to July
	October to December
	June, August
	September

SEED AND LEAF GALL NEMATODE (ANGUINA PACIFICAE) ON TURF



ANNUAL BLUEGRASS WITH *ANGUINA PACIFICA* (CALIFORNIA)



• UNTREATED • ABAMECTIN • FLUOPYRAM

FIELD ASSESSMENT OF THE NEMATICIDAL PROPERTIES OF NEEM (*AZADIRACHTA INDICA*) AGAINST THE ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA* ON INFECTED TOMATO (*LYCOPERSICON ESCULENTUM*)

ABOLUSORO S.A.¹ and OYEDUNMADE E.E.A.²

1. Department of Crop Production Technology, DAC/ABU, Kabba, Kogi State
2. Department of Crop Protection, University of Ilorin, Ilorin, Kwara State



Table 2: Effect of neem fruit powder on the yield component of tomato Var Roma uf infected with the root knot nematode, *M. incognita*

Neem concentration (t/ha)	Average number of fruit	Average weight of a fruit (g)	Yield (t/ha)
0.5	12.0 ^b	23.4 ^b	9.40 ^d
1.0	12.6 ^{ab}	24.8 ^{ab}	10.63 ^c
1.5	12.9 ^{ab}	25.3 ^a	12.33 ^b
2.0	13.1 ^a	26.0 ^a	13.18 ^a
0 (control)	5.2 ^c	15.8 ^c	2.77 ^e

Means with the same letter in the same column do not differ significantly at P = 0.05 according to Duncan's multiple range test.

Table 3: Initial root-knot nematode population and effect of different levels of neem fruit powder on final nematode population, nematode multiplication and gall index of tomato root

Neem concentration (t/ha)	Initial nematode population	Final nematode population in 200g soil	Nematode multiplication rate (pf / pi x 100)	Root gall index	No. of juveniles/ 5g root
0.5	2043	835 ^d	40.9 ^d	3.0 ^c	16.2 ^b
1.0	2046	761 ^c	37.2 ^c	2.75 ^b	13.6 ^b
1.5	2033	667 ^b	32.8 ^b	2.60 ^{ab}	10.3 ^a
2.0	2039	547 ^a	26.8 ^a	2.40 ^a	8.7 ^a
0 (control)	2050	2472 ^e	120 ^e	4.85 ^d	26.0 ^c
		*NS			

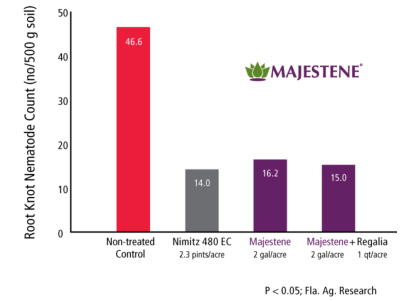
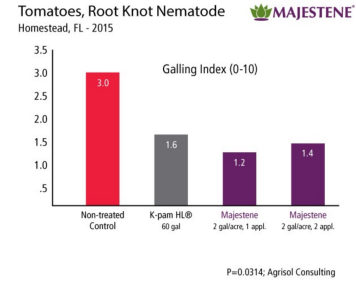
Means with the same letter in the same column do not differ significantly at P = 0.05 according to Duncan's multiple range test.

*NS = Not Significant



2021 USE DATA FOR MAJESTENE

CROP COUNTRIES MONTHS
Sweet Potato Merced June to August
Potato Modoc May



CROPS	COUNTRIES	MONTHS
Almond	Tulare	April
Artichoke	Riverside	November
Avocado	Ventura	August
Basil	Ventura	August
Beets	Santa Barbara	January to November
	Ventura	March to April
Cantaloupe	Imperial	January
Carrots	Imperial	September to December
	Kern	May
	Santa Barbara	December
	Santa Cruz	February to March
		May to March
Grapes	Kern	April to May
		September to October
	San Luis Obispo	August to September
		December
Guava	San Diego	April
Landscape	Orange	April
Lemon	Ventura	June to October
Lettuce	Monterey	December
Melons	Merced	June
	Riverside	March to May
Onion	Imperial	September to December
Orange	Ventura	July
Parsnip	Imperial	September
Peppers	Kern	May
Rutabaga	Imperial	September to November
Squash	Kern	May
Tomato	Santa Barbara	February to March
		August to September
Watermelons	Imperial	February
	Kern	April

INCREASE IN USE OF DITERA 1997 TO 2021

Year	Pounds of Product	Pounds of Active	Acres Treated	Number of Counties	Number of Crops	Number of Applications
1997	3,988	1,097	104	3	5	33
2021	24,508	22,057	3,720	13	14	353

CROPS	COUNTRIES	MONTHS
Bok Choy	San Luis Obispo	October
Broccoli	Monterey	October to December
	San Luis Obispo	November
	Santa Barbara	October to December
Cauliflower	Monterey	October
	San Luis Obispo	October
	Santa Barbara	October
Chinese Cabbage	San Luis Obispo	October
Grapes	Fresno	August

CROP	COUNTRIES	MONTHS
Bok Choy	San Luis Obispo	May to July
	Santa Barbara	September to November
Broccoli		January to May
		August to September
		November to December
Brussels Sprouts	San Luis Obispo	February to March
	Santa Barbara	June, August
		January to February
		April to July
		September
		November to December
Cabbage	Santa Barbara	August
Cauliflower	San Luis Obispo	April to May
		August to September
		February
Celery	San Luis Obispo	July
Chinese Cabbage	San Luis Obispo	May to July
		September to November
	Santa Barbara	February to May
		July to December
Grapes	Merced	May, October
	Monterey	May
	Napa	April to October
	San Luis Obispo	May
	Tulare	April to May
	Yuba	August to October
Kiwi	Rutte	August
	Fresno	October
Lettuce	San Luis Obispo	October
Orange	Fresno	September
	Tulare	October
Pears	Glenn	May to June
Spinach	San Luis Obispo	April
		August to September
	Santa Barbara	January to March
		June to October
Walnut	Rutte	June to July
	Colusa	April to May
	Glenn	April to May
	Lake	June
	Yuba	March, May
		June, September

Costs and Label Rates

DiTera \$235.95 for 10 lbs - 0.31 to 2.4 lbs/1000 feet of row

Quillaja \$600 for 5 gallons - 1.5 to 3 gallons/acre

AzaGuard \$267.84 for 1 quart - 15 fluid oz/acre

Majestene \$268.90 for 2.5 gallons - 4 to 8 quarts/acre

Abamectin 0.15EC \$239.95 for 1 gallon – 8 to 16 fl oz/acre

Melocon LC \$320 for 35 oz. - 10.25 fluid oz/acre

Melocon WG 2 to 4 lbs/acre