

Julius E. Fajardo, Ph.D.
Plant Pathologist
USDA-Office of Pest Management Policy
1400 Independence Avenue SW
Room 3861 - South Bldg. (MS 0314)
Washington, DC 20250

RE: Fenhexamid Review
DATE: August 26, 2013

The following comment is provided by the Western Integrated Pest Management Center in response to your request for information regarding fenhexamid use. The response covers California, Oregon, Washington, and Utah.

California

Fenhexamid is used to control *Botrytis* spp. (grey mold) diseases in grapes, strawberries, caneberries, soft stone fruits, pistachios, and ornamental crops and to control *Monilinia* spp. (blossom blight and brown rot) diseases in soft stone fruits (peaches, nectarines, apricots, plums, cherries). A summary of California fenhexamid use is in Table 1, which shows significant use in grapes, soft stone fruits, and strawberries.

Fenhexamid is typically applied at bloom to protect flowers or during fruit ripening to protect soft fruits. Both pathogens are heavily dependent on surface moisture for infection so use depends on surface moisture (rain, dew, fog) during spring bloom and later during fruit ripening, except in strawberry. The main strawberry production areas are in more coastal regions where fog is a source of surface moisture throughout the production season. Fenhexamid also has a post-harvest label (trade name Judge) for control of post-harvest fruit rots. Fenhexamid is used in ornamental plants for control of grey mold which can occur in crowded, high relative humidity conditions of nursery and greenhouse plant production.

The following is a long quote from correspondence with Paul Giboney, Ranch Agronomist/Pest Control Advisor at M. Caratan, Inc, a table grape company in Delano, CA. "Fenhexamid or Elevate, is an extremely important component of a good fungicide program. It is rated by University of California pathologists as one of the best *Botrytis* materials currently available. It has a unique resistance grouping, FRAC #17, which is different than any of the other registered grape bunch rot materials. We have a short list of different chemistries available which are effective against bunch rot. We need as many rotational materials as possible to prevent the development of resistance. In addition to *Botrytis*, there is a wide array of other fungal and bacterial pathogens (*Aspergillus*, *Cladosprium*, *Penicilium*, etc.) which are responsible for the development of bunch rot. Different fungicides have varying levels

of activity against the array of pathogens which are responsible for causing bunch rot. This is another reason why variety of materials is used to suppress the many rot diseases which threaten the crop.

Fenhexamid has an advantage that the other chemical bunch rot fungicides do not have, and that is a Pre-Harvest Interval of 12 hours. COCS dust has a PHI of 3 days. Switch and Scala have a PHI of 7 days and all of the other chemicals are 14 day materials. Serenade, a biological, which is not as active against rot as the chemicals, is also a 12 hour material. It is not the first choice as a stand-alone material. A critical advantage that Elevate provides is allowing us to treat the fruit in between picks, without having to wait for an extended period of time. This is especially important in the fall when we are dealing with dew, rain and damp conditions which are conducive to the development of bunch rot disease.

The foreign tolerances for Fenhexamid are at a level which presents no problem when exporting the fruit. There have a couple of newer chemistries (only one new FRAC#) to enter the market, but their use is limited due to the lack of a tolerance in most countries."

Based on correspondence with Bob Klein at the California Pistachio Research Board, fenhexamid is used to control Botrytis blossom and shoot blight in pistachios. Applications typically occur if there is rain during bloom and early shoot growth so there is little application in years with dry springs. Fenhexamid is an important tool for pistachio growers in orchards with thiophanate-methyl resistant Botrytis strains.

Oregon

Jay Pscheidt, Extension Plant Pathology Specialist, Oregon State University wrote, "Fenhexamid tends to be a key player in our management of Botrytis diseases on many crops including grape, blueberry, raspberry, blackberry and then in many greenhouse and nursery ornamental crops throughout the PNW. There is also postharvest use in pome fruit. Then we have brown rot issues (Monilinia) on our stone fruit crops at bloom, at harvest and also post harvest.

Use is dictated by markets so if fruit is going to countries that do not like captan then we do not see a lot of Captivate being used.

A big issue popped up in Washington last year when Botrytis resistant to fenhexamid was discovered. The growers were heavily concerned as it was their workhorse material. This year they have gotten back a more balanced program where it is used less often but still perceived as key tool for managing this disease.

Bottom line, fenhexamid is a key management tool for a few difficult to manage diseases on many different crops important to the PNW."

Joe DeFrancesco, from the Integrated Plant Protection Center at Oregon State University wrote, "Blueberry and caneberry growers in Oregon do, indeed, use fenhexamid (Elevate) for control of Botrytis blight (blueberries) and Botrytis fruit rot (caneberries). Both diseases have the same causal agent, *Botrytis cinerea*.

Since fenhexamid controls Botrytis and no other diseases, it is used by berry growers early in the bloom stage (~ 5-10% bloom). They use the full, 1.5 lb ai/A application rate, via ground application (boom or airblast sprayer). Growers rotate fungicides for resistance management so they may make only one application of fenhexamid and use other fungicides, from a different FRAC class, later on. Unless disease pressure is particularly high, they generally make three applications of a fungicide for Botrytis control (all during bloom period; some growers apply Pristine or Switch 1-day PHI to help keep fruit from rotting while in transit or storage). Growers tend to not use the pre-mix product, Captivate, but they may use Captan alone at a different time for other diseases."

Washington

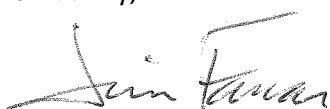
Brian Cieslar, Agronomist, Enfield Farms, Lynden, WA wrote, "We use Elevate in strawberries, raspberries, and blueberries, in rotation with Switch and Pristine and Rovral, and tank mixed with captan. We don't use Captevate because the proportion of captan is too high for our situation. The rate is 1.5 lb per acre, and the timing is late bloom on all three crops. We have very high Botrytis disease pressure here in NW Washington, so it is important to use as many fungicides as possible over the course of the season to delay/prevent resistance."

Michelle Moyer, Assistant Professor/Extension Viticulturist, Washington State University, Prosser IAREC. Fenhexamid is recommended for Botrytis bunch rot in the "Pest Management Guide for Grapes in Washington" but has not been used in the last couple years because of dry grape ripening and harvest seasons. Fenhexamid use could increase in future years if wet summer to early fall conditions occur. Grape growers in the wetter, coastal areas of Washington have not used much fenhexamid to date since they are smaller scale or organic.

Utah

Claudia Nischwitz, Plant Pathology Specialist, Utah State University, No use known in fruit production.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jim Farrar".

Jim Farrar, Director
Western IPM Center

Table 1. Summary of fenhexamid use in California in 2011.

SITE NAME	PRODUCT NAME	SUM LBS			SUM AMT		UNIT	TREATED	INDICATOR	AERIAL
		PRODUCT	CHEMICAL	SUM LBS	TREATED	UNIT				
APRICOT	ELEVATE 50 WDG FUNGICIDE	180.00	90.00	120	A	G				
BLACKBERRY	ELEVATE 50 WDG FUNGICIDE	34.00	17.00	23	A	G				
BLUEBERRY	CAPTEVATE 68 WDG FUNGICIDE	662.80	94.78	144	A	G				
BLUEBERRY	ELEVATE 50 WDG FUNGICIDE	2371.77	1185.89	1582.48	A	G				
CHERRY	ELEVATE 50 WDG FUNGICIDE	1691.80	845.90	1438.47	A	G				
GRAPES	ELEVATE 50 WDG FUNGICIDE	32019.93	16009.96	33387.04	A	G				
GRAPES, WINE	DEGREE 50 WDG FUNGICIDE	9.00	4.50	9	A	G				
GRAPES, WINE	ELEVATE 50 WDG FUNGICIDE	11.50	5.75	11.5	?	G				
GRAPES, WINE	ELEVATE 50 WDG FUNGICIDE	209.50	104.75	210.9	A	A				
GRAPES, WINE	ELEVATE 50 WDG FUNGICIDE	53020.24	26510.12	53597.4	A	G				
GRAPES, WINE	ELEVATE 50 WDG FUNGICIDE	8.00	4.00	22.4	A					
LANDSCAPE MAINTENANCE	DEGREE 50 WDG FUNGICIDE	4.00	2.00							
LANDSCAPE MAINTENANCE	ELEVATE 50 WDG FUNGICIDE	3.12	1.56							
N-GRNHS GRWN CUT FLWRS OR GREENS	DEGREE 50 WDG FUNGICIDE	857.98	428.99	919.27	A	G				
N-GRNHS GRWN CUT FLWRS OR GREENS	DEGREE 50 WDG FUNGICIDE	8.34	4.17	345240	S	G				
N-GRNHS GRWN CUT FLWRS OR GREENS	ELEVATE 50 WDG FUNGICIDE	21.15	10.58	22.15	A	G				
N-GRNHS GRWN PLANTS IN CONTAINERS	DEGREE 50 WDG FUNGICIDE	30.36	15.18	79.25	A	A				
N-GRNHS GRWN PLANTS IN CONTAINERS	DEGREE 50 WDG FUNGICIDE	352.05	176.02	286.92	A	G				
N-GRNHS GRWN PLANTS IN CONTAINERS	DEGREE 50 WDG FUNGICIDE	1.20	0.60	98132	S	A				
N-GRNHS GRWN PLANTS IN CONTAINERS	DEGREE 50 WDG FUNGICIDE	442.02	221.01	16725461	S	G				
N-GRNHS GRWN PLANTS IN CONTAINERS	ELEVATE 50 WDG FUNGICIDE	25.53	12.76	9.63	A	G				
N-GRNHS GRWN PLANTS IN CONTAINERS	ELEVATE 50 WDG FUNGICIDE	7.50	3.75	30	A					
N-GRNHS GRWN PLANTS IN CONTAINERS	ELEVATE 50 WDG FUNGICIDE	0.75	0.38	32670	S	G				
N-GRNHS GRWN PLANTS IN CONTAINERS	DEGREE 50 WDG FUNGICIDE	229.00	114.50	244.53	A	G				
N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	DEGREE 50 WDG FUNGICIDE	18.00	9.00	1.5	A	O				
N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	DEGREE 50 WDG FUNGICIDE	0.23	0.12	42000	S	A				
N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	DEGREE 50 WDG FUNGICIDE	48.53	24.27	1251260	S	G				
N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	ELEVATE 50 WDG FUNGICIDE	0.50	0.25	0.5	A	G				
N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	ELEVATE 50 WDG FUNGICIDE	0.82	0.41	51100	S	G				

N-GRNHS GRWN TRNSPLNT/PRPGTV MTRL	JUDGE 50 WDG	1.39	0.70	69500 S	G
N-OUTDR CONTAINER/FLD GRWN PLANTS	DECREE 50 WDG FUNGICIDE	22.61	11.31	150.25 A	A
N-OUTDR CONTAINER/FLD GRWN PLANTS	DECREE 50 WDG FUNGICIDE	452.72	226.36	310.87 A	G
N-OUTDR CONTAINER/FLD GRWN PLANTS	DECREE 50 WDG FUNGICIDE	109.35	54.67	1027939 S	G
N-OUTDR CONTAINER/FLD GRWN PLANTS	ELEVATE 50 WDG FUNGICIDE	33.00	16.50	33.2 A	G
N-OUTDR CONTAINER/FLD GRWN PLANTS	ELEVATE 50 WDG FUNGICIDE	2.30	1.15	82000 S	G
N-OUTDR CONTAINER/FLD GRWN PLANTS	FENHEXAMID TECHNICAL	0.15	0.15	0.2 A	G
N-OUTDR GRWN CUT FLWRS OR GREENS	DECREE 50 WDG FUNGICIDE	733.44	366.72	615.67 A	G
N-OUTDR GRWN CUT FLWRS OR GREENS	DECREE 50 WDG FUNGICIDE	4.64	2.32	119386 S	G
N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	DECREE 50 WDG FUNGICIDE	12.07	6.04	21.66 A	G
N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	DECREE 50 WDG FUNGICIDE	0.03	0.02	2000 S	G
N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	ELEVATE 50 WDG FUNGICIDE	1.50	0.75	0.5 A	G
NECTARINE	ELEVATE 50 WDG FUNGICIDE	1.00	0.50	134.82 A	G
NECTARINE	JUDGE 50 WDG	136.00	68.00	8501 T	G
PEACH	ELEVATE 50 WDG FUNGICIDE	2.00	1.00	2 A	G
PEACH	ELEVATE 50 WDG FUNGICIDE	44.81	22.41	2800 T	G
PEACH	JUDGE 50 WDG	108.81	54.41	6800 T	G
PISTACHIO (PISTACHE NUT)	ELEVATE 50 WDG FUNGICIDE	464.20	232.10	385 A	G
PLUM (INCLUDES WILD PLUMS FOR HUMAN CONS	ELEVATE 50 WDG FUNGICIDE	7.50	3.75	5 A	G
PLUM (INCLUDES WILD PLUMS FOR HUMAN CONS	ELEVATE 50 WDG FUNGICIDE	67.19	33.59	4200 T	G
PLUM (INCLUDES WILD PLUMS FOR HUMAN CONS	JUDGE 50 WDG	27.19	13.59	1701 T	G
PLUM (INCLUDES WILD PLUMS FOR HUMAN CONS	JUDGE 50 WDG	0.88	0.44	102600 U	G
RASPBERRY (ALL OR UNSPEC)	ELEVATE 50 WDG FUNGICIDE	39.00	19.50	26 A	G
RESEARCH COMMODITY	DECREE 50 WDG FUNGICIDE	7.29	3.65	7.18 A	G
RESEARCH COMMODITY	DECREE 50 WDG FUNGICIDE	3.26	1.63		G
STRAWBERRY (ALL OR UNSPEC)	CAPEVATE 68 WDG FUNGICIDE	7123.86	1018.71	1936.68 A	G
STRAWBERRY (ALL OR UNSPEC)	ELEVATE 50 WDG FUNGICIDE	55.00	27.50	55 ?	G
STRAWBERRY (ALL OR UNSPEC)	ELEVATE 50 WDG FUNGICIDE	127.50	63.75	85 A	A
STRAWBERRY (ALL OR UNSPEC)	ELEVATE 50 WDG FUNGICIDE	67911.63	33955.81	54784.55 A	G
STRAWBERRY (ALL OR UNSPEC)	ELEVATE 50 WDG FUNGICIDE	6.75	3.38	294030 S	G
TOMATO	DECREE 50 WDG FUNGICIDE	143.25	71.63	194.05 A	G
TOMATO	DECREE 50 WDG FUNGICIDE	1.25	0.63	16920 S	G
	ELEVATE 50 WDG FUNGICIDE	108.40	54.20	107.73 A	G