UPDATE BRIEFING PAPER #11

Use and Usage Information
Crop Matrices

EPA's crop matrices are tables which present, on a crop basis, our best information about organophosphate insecticide usage. The information is largely quantitative, and describes percent crop treated, average and maximum rates of pesticide use and number of applications; they also identify target pests, alternatives to the OP's, and their constraints. Where regional differences in pesticide use patterns can be identified (as well as use on processed or fresh market produce) we split the detailed information for clarity.

The types of information in the matrices are used by EPA in making risk assessment and risk management decisions. Data elements from the matrices are utilized by risk assessors to prepare their risk assessments. These include, but are not limited to, percent crop treated and average application rates, frequency of application, and pre-harvest intervals for use in dietary and drinking water assessments, occupational exposure, and analysis of ecological impacts.

Additionally, as risk assessments are refined and we move toward risk management, we are using the matrices to begin to understand critical needs. As we identify critical needs, we can begin to understand the biology and the economics of the use. It is at this point that this information becomes pivotal for risk management decision making.

Where possible, we have asked growers and others to help us develop these matrices. Much of the information contained in the matrices was supplied by actual users, from publically available sources, and from proprietary references. USDA has supported the effort by distributing the crop matrices to their state contacts for input. Additionally, the recent posting of USDA's crop profiles to the Internet has provided us another source of information for these matrices.

We will be posting ten draft crop matrices to the Internet. We invite and look forward to receiving comments on their content. The initial posting will include ten crop matrices: apples, pears, peaches, Brussels sprouts, soybeans, sorghum, rice, oats/rye, sugarcane, and tomatoes. Additional matrices will be posted as they are completed and have gone through our review process.

CROP SUMMARIES AND PEST SUMMARIES — THE MATRICES

Instructions for Interpreting the Crop Matrices

Examples of the Crop Summary and Pest Summary matrices are provided below. [Apple-growing in the northeast was selected as our example.] The following is a detailed explanation of each field of the matrix (keyed with white-on-black numbers -- ❶).

OP TOLERANCE REASSESSMENT USE/USAGE MATRIX -CROP SUMMARY

❶ The ***site*** is the commodity or crop being addressed, such as apples, corn, or melons.

❷ The ***background*** on the crop summary page describes the total acres grown and other useful information, usually taken from the QUA (see Introduction). For example, the background field may describe information that might be helpful for usage assessments, such as the regional distribution of these crops.

❸ In the first column on the left is a list of the ***organophosphate pesticides*** (OP) used on that crop. EPA's data sources indicate that each of the pesticides listed is actually used on that commodity (and is not merely labeled for that use).

❹ The next two columns show the ***percent of crop treated***. These figures are based on the QUA and other sources as available. The percent of crop treated is presented as maximum and average, representing worst-case and more typical usage years.

❺ The ***number of applications a year*** - the maximum number of applications allowed per year by the label is taken from LUIS. The average, often much less than the maximum, comes from the QUAs, and from the other sources containing information directly from growers (such as the QUA+).

❻ ***Rate of application*** information is much the same - the maximum is the label rate. The more realistic use rate is represented by the average rate (from QUAs and QUA+).

❼ The ***PHI*** (pre-harvest interval) is the time between the last application of that pesticide and the harvest of the crop. The shorter the interval, the less time nature has to reduce the levels of pesticide residue on the harvested component of the crop. In this case, the **minimum** is the worst case and is derived from the product labels, QUA, and state recommendations. The average (or typical) interval is rarely reported, but in some cases it is available from the QUA+, state recommendations, arthropod management tests, or proprietary data. Additional information of this type would be very useful to the Agency.

❽ In the next table, ***Organophosphate Target Pests,*** the pests reported to be targeted are listed in order of importance. More detail about the pests is provided in the pest summary.

❾ The ***Overall Confidence Rating*** is a subjective evaluation by the analyst of the overall quality of the information available for the report. In addition, we have footnoted sources throughout.

To facilitate review of the matrices, you may wish to refer to a crosswalk of the chemical names to some common product trade names.

CROSSWALK

Organophosphate Pesticides: Common Names and Common Trade Names

Active Ingredient	Trade Names
Acephate	Orthene, Payload
Azinphos Methyl	Guthion, Sniper
Bensulide	Betasan, Prefar
Chlorethoxyphos	Fortress
Chlorpyrifos	Lorsban
Coumaphos	Co-Ral
Diazinon	D-Z-N
Dichlorvos	DDVP, Vapona
Dicrotophos	Bidrin
Dimethoate	Cygon
Disulfoton	Di-syston
Ethion	Ethion, Tomahawk
Ethoprop	Mocap
Ethyl-parathion	Orthophos, Phoskil
Fenamiphos	Nemacur
Fenitrothion	Sumithion, Rothion
Fenthion	Baytex, Tiguvon
Fonofos	Dyfonate
Isofenphos	Oftanol, Lighter
Malathion	Cythion
Methamidophos	Monitor
Methidathion	Supracide
Methyl Parathion	Penncap M
Naled	Dibrom, Legion
Oxydemeton Methyl	Metasystox R
Phorate	Thimet
Phosmet	Imidan
Phostebupirim	former comon name for tebupirimiphos
Pirimiphos-Methyl	Silosan
Profenofos	Curacron
Propetamphos	Safrotin
Sulfotepp	Bladafum
Sulprofos	Bolstar
Tebupirimphos	Aztec
Temephos	Abate
Terbufos	Counter
Tetrachlorvinphos	Rabon, Gardona
Tribufos	DEF6, Folex
Trichlorfon	Dylox

US EPA OP Use/Usage Matrix - Crop Summary (DRAFT)

Site: Apples ❶	**Overall Confidence Rating: High** ❾

❷Background: A total of 549,370 acres are planted in apples in the United states.[9] Organophosphate pesticides (OP) represent 68% of all pesticide useage on this crop with an average of 4.62 applications per year. Analysis of OP usage was conducted for the following five major apple regions: New England (CT, MA, ME, RI, NH, NJ, NY, VT) , North Central (MI and OH), Appalachian-Southern (DE, GA, MD, NC, PA, SC, TN, VA, WV), Western (AZ and CA), and Pacific North. (OR and WA). Insecticide use patterns and key pests vary both between and within regions. In the absence of effective controls, key pests can destroy 50-90% of the crop. Due to low damage threshold levels in apples, biological control is limited to indirect pests (non-fruit feeding) with little contribution against direct pests.

Organophosphate Pesticides ❸	% Treated ❹		# Applications ❺		Rate (lb AI/A)❻		PHI (days)❼	
	Max[8]	Avg[8]	Max[6]	Avg[2, 3, 8]	Max[6]	Avg[2, 3, 8]	Min[6]	Avg
azinphos-methyl	80	73	4	2.2	3.1	0.7	7	
chlorpyrifos	63	53	NS	1.7	4	1	30	
diazinon	6	3	NS	1.6	5	1.2	21	
dimethoate	35	27	NS	1	2.0	0.9	28	
malathion	13	9	NS	2.1	2.3	0.7	21	
methyl parathion	26	19	NS		2	1.7	21	
phosmet	34	22	NS	2.9	4	1.1	7	

Confidence Rating:
H= high confidence = data from several confirming sources; confirmed by personal experience
M = medium confidence = data from only a few sources; may be some conflicting or unconfirmed info.
L = low confidence = data from only one unconfirmed source

Organophosphate Target Pests for Apple in New England Region (Primary pests controlled by the OP's)[1-5, 7] ❽	
Major	Bug (Tarnished Plant), Aphids (Rosy Apple, Apple, and Spirea), Apple Maggot, Plum Curculio
Moderate	Leafroller (Oblique banded and Red banded)
Minor	Fruitworm (Green and Sparganothis), Sawfly (European Apple), Leafhopper (White Apple and Potato), Scale (San Jose), Mite (European Red), Leafminer (Spotted Tentiform)

Major = 20+% of all OP usage on pest; Moderate = 5-20% of all OP usage on pest; Minor =<5% of all OP usage on pest

Sources:

1. Proprietary EPA market share information.
2. U.S. Apple QUA+ - New England. 1997.
3. QUA+ - New England Fruit Consultants.
4. Pest Management Recommendations for Commercial Tree Fruit Production. 1997. Cornell University.
5. 1996-1997 New England Apple Pest Management Guide. Cooperative Extension (Universities. of Connecticut, New Hampshire, Maine, Rhode Island, Massachusetts and Vermont)
6. Label Use Information System (LUIS) Version 5.0, EPA.
7. The All-Crop, Quick Reference Insect Control Guide (1997), Meister Publishing Company
8. EPA QUA.
9. Agricultural Statistics 1998. National Agricultural Statistics Service. United States Department of Agriculture.

OP TOLERANCE REASSESSMENT USE/USAGE MATRIX -- PEST SUMMARY

❶ The ***site*** is the commodity or crop being addressed, such as apples, corn, or melons.

❷ The pest summaries are created for distinct ***regions*** when appropriate. In some cases, regional differences for crop growing practices are slight, and the data are then provided for the national level. Where appropriate, information is broken down by crop, then divided further into fresh market and processed.

❸ Because the ***timing*** of application affects residues and thus is an important factor for tolerance reassessment, the analysts further subdivided the information at this level according to the timing of the application (for example, dormant, pre-bloom, at-plant, foliar). This information is available primarily from EPA's proprietary data bases and the State Recommendations.

❹ The ***pest*** and its importance are derived from proprietary data bases and the State Recommendations. Information about pests is key in evaluating the relative importance of each OP. Pest importance is determined by comparing the total amount of OP pesticides used to control **that pest** to the total amount OP pesticides used to control **all pests**. Relative pest importance is represented as follows:

major pest:	more than 20% of all OP usage is to control this pest
moderate pest:	5 to 20% of all OP usage is to control this pest
minor pest:	1 to 5% of all OP usage is to control this pest

❺ The next column lists the ***organophosphate chemicals*** (OP's) most used to control the pest. This information is obtained from several sources: QUAs, LUIS, , NASS data, State Recommendations, OPP's Reference File System (REFs), and the 40 CFR tolerances.

❻ If information is available to us (and it is most often not), the ***efficacy*** of that chemical against that pest is characterized next, based on State Recommendations for fruits, previous EPA analyses, NAPIAP reports, or efficacy reports submitted under FIFRA Section 18 Emergency Exemptions. It is important to note that the Agency is not analyzing the available efficacy information, but is relying on these sources to characterize efficacy. Efficacy is represented according to the following symbols:

=	excellent
=	good
=	fair

❼ For each chemical used to control a given pest, the ***market share*** (when available) is indicated, based on proprietary sources, State Recommendations, NAPIAP reports, or previous EPA benefits assessments. This, unlike the pest importance, is a comparison of each individual chemical's usage (to control that pest) with **all** insecticide usage to control that pest. Market Share is represented as follows: