the night (from darkness to 4 a.m.), and that bee mortality would be increased approximately two times if the parathion application was made after 7 a.m. and later into the day (more than 98 percent in the example). Also notice that by reducing the dosage only slightly to .22 lb/acre, the mortality is reduced from 78 percent to 65 percent.

Cooperation and Communication Keys to Bee Protection

In order to adequately protect honey bees from pesticides, there must be a good deal of cooperation between applicators, growers, beekeepers, extension workers and government officials. The key to this cooperation is constant communication fostered by trust on the part of all involved.

It should be realized that protecting honey bees from pesticides is often extremely difficult in spite of the fact that most of these chemicals are not considered hazardous to bees. There are many variables which must be pondered in the decision-making process leading to pesticide use. If those which contribute to honey bee safety are given due consideration, application of pesticides and protection of honey bees are not mutually exclusive. Generally it is only when decisions are based on insufficient information and/or made without regard to the safety of honey bees that they result in damaging bee colonies.

The purpose of this publication is to provide the necessary information to consider when contemplating use of pesticides and the potential effects on honey bees. If it contributes to saving even one bee, which can then expend energy in the service of pollination to agriculture, this effort will not have been wasted.

Table 1—Relative Toxicity of Pesticides to Honey Bees Determined by Laboratory and Field Tests (California, 1950 through 1980.)

(Number keyed notes on their uses can be found at bottom of table)

Group I—highly toxic: Severe losses may be expected if used when bees are present at treatment time or within a day thereafter, except where noted to the contrary.

Pesticide (trade name and/or common name)

aldrin[2]	Dursban®[2], chlorpyrifos	Nemacur®[5], fenamiphos
Ambush®[2,18], permethrin	Ekamet®, etrimfos	Nudrin®[2], methomyl
arsenicals [1,2]	EPN[1,2]	Orthene®[2], acephate
Avermectin®[17]	Ethyl Guthion®, azinphos-ethyl	parathion[1,2]
Azodrin®[1,2], monocrotophos	Famophos®, famphur	Pay-Off®
Baygon®[2], propoxur	Ficam®, bendiocarb	Phosdrin®[1,2,3], mevinphos
Baytex®[2], fenthion	Folithion®, fenitrothion	phosphamidon[2], Dimecron®
Bidrin®[1,2], dicrotophos	Furadan®[2,5], carbofuran	Pounce®[2,18], permethrin
Bux®, bufencarb	Gardona®[1,2], stirofos	Pydrin®[2], fenvalerate
carbosulfan[2], FMC-35001	Guthion®[1,2], azinphos-methyl	resmethrin, Synthrin®
Cygon®[2], dimethoate	heptachlor[1,2]	Sevin®[2], carbaryl
Cythion®[2,4], malathion	Imidan®[2], phosmet	Spectracide®[2], diazinon
Dasanit®[5], fensulfothion	Lannate®[2], methomyl	Sumithion®, fenitrothion
DDVP®[2], dichlorvos	Lorsban®, chlorpyrifos	Sumithrin®, *d*-phenothrin
Dibrom®[2,3], naled	malathion[2,4]	Supracide®[2], methidathion
Decis®[2], decamethrin	Matacil®, aminocarb	Tamaron®[2], methamidophos
De-Fend®[2], dimethoate	Mesurol®, methiocarb	Temik®[1,2,5,7], aldicarb
diazinon[2], Spectracide®	methyl parathion[1,2,11,12]	tepp[1,2,3]
dieldrin[1,2]	Monitor®[2], methamidophos	Vapona®[2], dichlorvos
Dimecron® [2], phosphamidon		

Group II—moderately toxic: Can be used around bees if dosage, timing, and method of application are correct, but should not be applied directly on bees in the field or at the colonies.

Insecticide (trade name and/or common name)

Abate®[2], temephos	DDT[1,2,10]	Pyramat®
Agritox®, trichloronate	Di-Syston®[1,2,6,18], disulfoton	Sevin® 4-Oil[2], carbaryl
Bolstar®, sulprophos	Dyfonate®, fonofos	Sevimol®[2], carbaryl
Carzol®[2], formetanate hydrochloride	endrin[1,2]	Systox®[1,2,18], demeton
chlordane[2]	Korlan®, ronnel	Thimet®[1,2,6], phorate
Ciodrin®, crotoxyphos	Larvin®[2], thiodicarb	Thiodan®[2], endosulfan
Counter®, terbufos	Metasystox-R®[2], oxydemeton-methyl	Trithion®[2], carbophenothion
Croneton®, ethiofencarb	Mocap®, ethoprop	Vydate®[2], oxamyl
Curacron®, profenofos	Perthane®, ethylan	Zolone®, phosalone