Nova Law Review

Volume 4, *Issue* 1 | 1980 | *Article* 6

David's Copperfield And FIFRA's Labelling Misadventures

Copyright ©1980 by the authors. *Nova Law Review* is produced by The Berkeley Electronic Press (bepress). https://nsuworks.nova.edu/nlr

David's Copperfield And FIFRA's Labelling Misadventures

Abstract

Compounding the American farmer's struggle for existence is a myriad of federal pesticide regulations.

KEYWORDS: misadvantures, farmer, enviromental

David's Copperfield And FIFRA's Labelling Misadventures

I. INTRODUCTION

Compounding the American farmer's struggle for existence is a myriad of federal pesticide regulations. Although formulated with the intent to benefit both the farmer and the public through the protection of environmental quality, such regulations too often place the farmer under a hodgepodge of federal red tape. The resulting effect of such regulation often increases rather than decreases environmental pollution and subsequently places the small crop producer and pesticide manufacturer in a legally precarious position. Nowhere is this more apparent than in the results of across the board compliance with the Environmental Protection Agency's (hereinafter referred to as EPA) pesticide registration policies pursuant to the Federal Insecticide, Fungicide and Rodenticide Act (hereinafter referred to as FIFRA or the Act)[1] and specifically section 12(a)(2)(G).[2]

Strict compliance raises serious questions of diminished minor crop[3] production and resulting environmental and agricultural ecosystem deterioration. Scientifically viewed, fallout, resulting from strict compliance, subjects these ecosystems to long term or perhaps irreversible pesticide damage. Ironically, EPA's enforcement pursuant to the Act may be creating the very pesticide pollution problems it has so earnestly sought, and is presently seeking, to prevent.

It is the objective of this article to present examples where compliance with EPA pesticide registration and section 12(a)(2)(G) of the Act produce dysfunctional results and to review the impact of such compli-

1. 7 U.S.C. §§ 136-136y (1976 & Supp. II 1978).

2. Section 12(a)(2)(G) reads: "It shall be unlawful for any person . . . to use any registered pesticide in a manner inconsistent with its labeling." Codified at 7 U.S.C. § 136j(a)(2)(G)(1976).

3. As used herein, minor crops are those other than corn, cotton, rice, soybeans and wheat. H. HUGHES & D. METCALFE, CROP PRODUCTION 16, 23 (1st ed. 1972).

ance upon minor crop production and environmental quality. In addition, the author recommends:

(1) Accelerated development and relaxation of FIFRA laws in the manufacture of environmentally sound pesticides.

(2) Increased implementation of integrated pest management programs to minimize the adverse effects of pesticide pollution.

(3) Further FIFRA amendment to permit minor crop growers the benefit of interchange of pesticides with substantially similar or identical chemical composition and usages.

(4) Increased scientific and legal interaction in future formulation of FIFRA laws.

II. EVOLUTION OF REGULATION AND REGISTRATION PROVISIONS

A. *Early Perspectives and Authority of the USDA*

Federal regulations and registration provisions find their roots early in the twentieth century. Pesticides[4] were first subject to federal regulations through the Insecticide Act of 1910.[5] Briefly, this act prevented the manufacture, sale or transportation of adulterated or misbranded pesticides and established minimal regulation of fungicide and insecticide sale. Following a surge in the development and usage of pesticides during and after the Second World War, Congress reexamined and repealed the Act of 1910 and enacted the Federal Insecticide, Fungicide and Rodenticide Act of 1947.[6] Under this forerunner of the present day FIFRA, the United States Department of Agriculture (hereinafter referred to as USDA) was charged with the promulgation of registration and labeling regulations of pesticides prior to their introduction into interstate commerce. USDA efforts at registration and labeling regulation commenced with the signing of that Act.

---

4. As used herein, pesticide as defined pursuant to § 136(u) of the Act is "any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, ..."

5. Pub. L. No. 61-152, § 1-13, 36 Stat. 335 (1910).

6. Pub. L. No. 80-104, § 16, 61 Stat. 163 (1947).

B. *USDA Under Criticism and EPA Entrance*

Opposition to the USDA's role in pesticide regulation first occurred in 1959 when the organization came under sharp criticism for its fire ant eradication program.[7] Criticism continued in Rachel Carson's highly popular *The Silent Spring*.[8] As public awareness of pesticide usage increased, there followed, in 1964, an amendment of FIFRA[9] which gave the Secretary of Agriculture authority to refuse to register new pesticides and authorized him to "remove from the market any product whose safety or effectiveness was doubtful."[10] Shortly thereafter, the USDA again came under criticism, this time from the General Accounting Office for lax enforcement of the Act.[11] Pressures exerted by both governmental agencies and the environmental movement of the mid and late sixties over widespread pesticide usage and lax enforcement served as the catalyst for the establishment of the Environmental Protection Agency in 1970.[12] Enforcement of FIFRA was subsequently transferred to the EPA whose primary function was "protection and enhancement of environmental quality."[13] Continued public concern of pesticide usage resulted in yet further amendment of the Act in 1972.[14] Through the Federal Environmental Pesticide Control Act of 1972 (hereinafter referred to as FEPCA) Congress emphasized protection via federally controlled use, manufacture, and distribution of pesticides.[15] Two of FEPCA's provisions central to the theme of this paper included: 1. Registration of pesticides, and 2. EPA's authority to prevent use of a pesticide inconsistent with its labeling. The regulations and procedures for implementation of the Act became effective on August 4, 1975.[16] Additional amendments affecting "use inconsistent with

7. Clement, *The Pesticide Problem,* 8 NATURAL RESOURCES JOURNAL 11 (1968).

8. R. CARSON, THE SILENT SPRING 162 (1st ed. 1962).

9. Act of May 12, 1964, Pub. L. No. 88-305, § 3, 78 Stat. 190.

10. A. Lovins, *Pesticide Regulation: Risk Assessment and Burden of Proof,* 45 GEO. WASH. L. REV. 1066, 1068-69 (1977).

11. E. Megysey, *Governmental Authority to Regulate the Use and Application of Pesticides: State v. Federal,* 21 S. DAK. L. REV. 653 (1976).

12. Reorg. Plan of 1970, 35 Fed. Reg. 15, 623 (1970).

13. Lovins, *supra* note 10, at 1069.

14. Federal Environmental Pesticide Control Act of 1972, Pub. L. No. 92-516, 86 Stat. 973.

15. Codified at 7 U.S.C. § 136a(a),(d)(1976).

16. 40 Fed. Reg. 28, 285 (1975).

the label" were signed into law in 1978 and became known as the Federal Pesticide Act of 1978.[17] The provisions of this latest amendment and their relation to minor crop production and environmental quality will be discussed in the text of the paper.

III. THE PROBLEMS OF STRICT COMPLIANCE WITH FIFRA REGISTRATION AS IT AFFECTS MINOR PESTICIDE PRODUCTION AND ENVIRONMENTAL QUALITY

A. *The Registration Process In Review*

Development of an effective yet environmentally safe pesticide which is in compliance with EPA registration is a time-consuming and costly enterprise. Basic tests required for registration of a newly developed pesticide include mammalian toxicity, carcenogenicity,[18] teratogenicity,[19] mutagenicity,[20] fetotoxicity,[21] and adverse effects on wildlife, particularly endangered species.[22] When EPA scientists determine through nomination[23] that, on the basis of a single study, the pesticide meets the risk criteria,[24] a rebuttable presumption arises.[25] Issuance of

17. Pub. L. No. 95-396, § 136, 92 Stat. 819 (1978) (codified in scattered sections of 7 U.S.C. §§ 136a-136y).

18. The ability of an agent to incite development of a carcinoma or any other sort of malignancy. McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS 247 (2d ed. 1978) (hereinafter cited as McGRAW-HILL).

19. The ability of an agent to cause formation of a congenital anomaly or monstrosity. *Id.* at 1606.

20. The ability of an agent to raise the frequency of mutation above the spontaneous rate. *Id.* at 1062.

21. Fetotoxicity refers to poisoning of the fetus. *Id.*

22. 36 Fed. Reg. 22, 496 (1971).

23. Nomination refers to the procedure whereby once the compound is determined to possess a potential hazard on the basis of a single study which indicates that it may be a carcinogen, teratogen, mutagen, fetotoxin, or mammalian toxin, it is submitted for review by either the Office of Special Pesticide Reviews, EPA Registration Division or Reregistration Task Force, an environmental group, Congressional committee or other interested parties.

24. If a compound is found to be a mammalian toxin, carcinogen, teratogen, mutagen, fetotoxin or adversely affects wildlife on the basis of a single study, then its risk criteria or potential for initiating these effects is said to have been reached.

25. 7 U.S.C. § 136a (1976).

a rebuttable presumption against registration is not, however, notification of the pesticide's cancellation. Once the presumption is raised, a four stage procedure ensues as follows:

I. Investigation of the risk.
II. Rebuttal of the risk.
III. Risk/benefit analysis.
IV. Review of outside recommendation.[26]

During the first phase, the information implicating the pesticide as a potential hazard is reviewed within the Office of Special Pesticide Reviews. Here, the scientific methods employed, as well as conclusions reached during the investigation of the pesticide, are examined by a project manager.

During the rebuttal stage, registrants, envoronmental groups, and interested parties may submit data to the Agency which either supports or refutes the presumption of risk. The presumption is rebutted either 1) by a demonstration that the research utilized to establish the presumption is not scientifically valid; or, 2) by proof that exposure to the pesticide will not produce the adverse effects as described in the study. For example, the manufacturer must demonstrate that exposure which is most probable to occur is not sufficient to produce the described effects of test exposure.

In the third phase, public participation is encouraged in submitting risk/benefit data. Benefit analysis is confined only to those aspects which are of prime importance among which is the value of the crop.[27] Producers of minor crops are especially concerned with this aspect of the risk/benefit analysis, for if registration is denied on the basis of a crop's limited marketability, the grower could be faced with little if any pesticide protection against disease outbreak.

Several aspects of risk/benefit assessment have been subject to criticism.[28] Arguments have been made that greater scientific input and

---

26. IFAS/FARI Pesticide Workshop, The New Federal Pesticide Law, 1978 (Univ. of Fla., 1979).

27. Here the author wishes to convey the thought that the collective value of the crop is considered in assessing the pesticide's benefit to agriculture as balanced against its toxic detriments.

28. J. Wilkes, *Pesticide Regulation: Why Not Preventative Legislation,* 2 NOVA L. J. 93, 115 (1978).

less risk/benefit analysis should be accorded this third phase. It is further contended that the balancing test is not rational in that human safety is placed second to that of crop economics. In addition, some lawmakers criticize court use of the risk/benefit analysis, contending that Agency review is far more effective in examining available alternatives.[29]

Finally, following a review of the important aspects of the pesticide's use, conclusions are submitted to the USDA for review.[30] After additional study of important uses the data is submitted to the EPA where it is decided whether the pesticide will be reviewed further.[31]

B. *Research and Developmental Costs*

Estimates of expenditures for such registration vary somewhat with the source. The EPA, in citing the National Agricultural Chemical Association regarding research and development expenditures (hereinafter referred to as R & D) notes that these expenses alone have increased from an estimated 70 million dollars in 1970 to an estimated 195 million dollars in 1976.[32] These estimates are believed to be accurate representations of the pesticide industry's expenditures for those respective years and are thought to be a reliable indication of the R & D expenditures of the industry.[33]

Additionally, EPA estimates that such expenditures per company nearly tripled from 2.1 million dollars in 1970 to 5.9 million in 1976.[34] This in itself represents an increase of 68 percent which exceeds other

29. *Id.*

30. IFAS/FARI Pesticide Workshop, *supra* note 26. The EPA submits a list of specific questions for USDA assessment teams. Questions may center on the total acreage treated with the pesticide in question, the occurrence of pest outbreaks, environmental residue data, the effect of the pesticide on crop yield, and conditions for the pesticide's usage.

31. *Id.* The EPA decides whether all or some of the pesticide's uses should be cancelled, registered or reregistered, and whether the pesticide should be restricted.

32. ECONOMIC ANALYSIS BRANCH OFFICE OF PESTICIDE PROGRAMS, ENVIRONMENTAL PROTECTION AGENCY. ECONOMIC TRENDS AND OUTLOOK OF THE PESTICIDE INDUSTRY: WITH SPECIAL REFERENCE TO THE NEED FOR EXCLUSIVE USE AMENDMENTS TO FIFRA (1978) (hereinafter cited as ECONOMIC TRENDS.)

33. *Id.* at 32.

34. *Id.*

industrial R & D expenditures in the U.S. in general.[35] Some estimate the cost required from discovery of a pesticide to its registration to be approximately 20 million dollars.[36] Others place the cost average between 2.1 and 4.0 million dollars.[37] Additionally, time from discovery to registration alone exceeds six years.[38] Paul F. Oreffice, Dow president and chief executive officer recently stated that "there is no faster rising costs of business than expense related to government regulations."[39]

C. *The Manufacturer's Liability*

In addition to R & D costs, pesticide producers are continually faced with the impending thought of legal liability and excessive expenditures in the forecast development of new pesticides.[40] In his article *The Law of Pesticides,*[41] Rohrmann notes that "A duty of care binds manufacturers and sellers of pesticides. This duty includes a duty to warn of product connected dangers, a duty on the part of the manufacturer to subject the compound to reasonable tests and a duty on the part of the seller to subject the product to reasonable inspection."[42] In addition, the extent of the manufacturers liability often extends to the unforeseeable.

Hubbard-Hall Chemical Co. v. Silverman[43] epitomizes this aspect of unforeseen liability. Here, the manufacturer's pesticide label adequately warned of the dangers of the insecticide in accordance with existing laws. Following an application of the pesticide two workers died. Although the company complied with the labeling laws, the court noted that the jury could have found the manufacturer liable on the premise that the pesticide would be used by illiterates; and therefore,

---

35. *Id.*

36. INSTITUTE OF FOOD AND AGRICULTURAL SCIENCES, UNIVERSITY OF FLORIDA, CHEMICALLY SPEAKING (October 1978).

37. Wilkes, *supra* note 28, at 98.

38. ECONOMIC TRENDS, *supra* note 32.

39. Letter from Paul F. Oreffice, Dow Today News (Feb. 5, 1979).

40. J. Gross, *Pesticide Use and Liability in North Dakota,* 47 N. DAK. L. REV. 335 (1971).

41. Rhormann, *The Law of Pesticides,* 17 J. PUBL. LAW 351 (1968).

42. *Id.* at 369.

43. 349 F. 2d 402 (1st Cir. 1965).

the label should have included the skull and crossbones.[44] This poses a question as to the extent the manufacturer of newly developed pesticides must be held accountable. Are the present legal sanctions of strick liability and negligence appropriate in view of the massive number of uses and unforeseeable accidents which could occur through such usage?

Ironically, in *Edwards v. California Chemical Co.*,[45] the skull and crossbones were adequately displayed, but the appellate court sided with the plaintiff applicator. Plaintiff, an illiterate, was employed as a groundskeeper in Boca Raton, Florida. After an application of lead arsenate, the laborer became ill. Counsel for the manufacturer brought the court's attention to the skull and crossbones broadly displayed on the label adjacent to the word poison. In addition, the label contained a warning for its use and application. While reversing the lower court's decision, the appellate court noted that a manufacturer of inherently dangerous products has a duty to inform applicators of the product's dangerous potentialities.[46] The court further stated that the applicator was within a class which the manufacturer should have foreseen would be using the product.[47]

Such decisions place the manufacturer in the precarious position of uncertainty even when following legal dictates. In essence, the producer is placed in a legal vice. In one grip is the compliance with existing law, while in the other looms the infinite possibilities of liability through unforeseeable accidents.

In yet another case, a manufacturer was found liable for an accident incurred days after the use of an arsenic compound.[48] Here, the plaintiff had taken a sunbath on a grassy site onto which she had previously discarded rinse water from a tank containing sodium arsenite. Suffering from "physical malfunction" she brought suit against the producer California Chemical. In noting the producer's negligence, the court stated that it was the manufacturer's duty to warn not only of the dangers related to the purpose for which the pesticide was produced,

44. *Id.* at 405.
45. 245 So. 2d 259 (Fla. 4th Dist. Ct. App. 1971).
46. *Id.* at 263.
47. *Id.*
48. *Boyl v. California Chem. Co.*, 221 F. Supp. 669 (D. Oregon 1963).

but also all other necessarily incidental and attendant uses.[49] The court made mention of the manufacturer's duty to reasonably warn of the "lingering dangers not known or reasonably to be expected by the ordinary user, but which was *foreseeably probable* to the manufacture with his expertise."[50] Thus, courts frequently follow the rational of Harper and James in noting that a manufacturer must warn *not only* of the purposes for which the pesticide was intended, but also all other necessary and attendant uses.[51] Such logic is ill founded if not impractical in light of the costs of production and registration of minor pesticides. Courts and legislators must realize the impact of such litigation and act accordingly. Litigation costs and penalties far too often direct pesticide development toward the major crop area, since these expenses can be absorbed far more easily by the widely manufactured and marketed pesticides than by the pesticides directed toward a small and select market. As a result of such shifting pesticide production and development trends fostered by compliance with FIFRA dictates and the threat of legal liability, minor pesticide shortages appear imminent. Such shortages present a dilemma for the minor crop producer who is dependent upon the use of such pesticides for the control of rampant pest outbreaks.

D. *Ramification of Pesticide Production Resulting from Compliance with EPA Standards Pursuant to FIFRA*

The cost of litigation, research, recall and registration of a pesticide is by no means designed to depict a struggling pesticide industry. Quite to the contrary, the industry's outlook is far from bleak. Pesticide manufacturing is "slightly more profitable than chemical manufacturing"[52] and has collectively enjoyed higher profits over the past five years than the average industry.[53] The EPA notes that "leading pesticide manufacturers are among the largest industrial corporations in the U.S. and generally have fared well compared with the other corpora-

---

49. *Id.* at 674.
50. *Id.*
51. F. HARPER & F. JAMES, THE LAW OF TORTS 1541 (4th ed. 1974).
52. ECONOMIC TRENDS, supra note 32, at 25.
53. *Id.*

tions on basis of sales and profits."[54] Nevertheless, corporate incentive towards development of those pesticides with "inherent limitations on market size,"[55] that is minor crop pesticides, is influenced by the inescapable realities of skyrocketing R & D costs coupled with litigation costs and minimal foreseeable profits. Future growth trends in the pesticide market thus appear to be directed toward the development of existing markets of major crop usages.[56] Such developmental trends generate serious concern among agricultural extension agents[57] and small crop producers.[58] The EPA has gone so far as to indirectly recognize this problem by defining a minor pesticide as one "in which its market potential is insufficient to economically justify the development of needed data required for registration by the manufacturer."[59] Shortages of minor pesticides are thus foreseeable. Faced with the probability of such shortages, the minor crop grower can either lose his crop through pest damage and consequently lose the "back forty"[60] or resort to broad spectrum[61] pesticide usage to accomplish satisfactory pest control. Implementation of the second alternative far too often results in an adverse effect upon environmental quality.[62] Nowhere are environmental pollution problems as complex than in areas where broad spectrum pesticides are used,[63] many of which have been approved for usage by the EPA.

54. *Id.* at 16.

55. *Id.* at 26.

56. *Id.* at 38.

57. Those individuals who convey applied agricultural expertise to members of the agricultural community.

58. IFAS/FARI Workshop, *supra* note 26.

59. ECONOMIC TRENDS, *supra* note 32, at 34.

60. A colloquial term which refers to the farmer's collective holdings.

61. A broad spectrum pesticide is one which has no specificity and is designed to kill a wide range of insects or insect like species and not a specific target organism. R. METCALF & W. LUCKMAN, INTRODUCTION TO INSECT PEST MANAGEMENT 17 (1st ed. 1975).

62. *See* Sec. III, D-1, Shift to Broad Spectrum Pesticide Usage—The Copper Dilemma, this text.

63. *Id.*

1. Shift to Broad Spectrum Pesticide Usage—The Copper Dilemma

Prior to the development of large numbers of organic fungicides[64] following World War II, inorganic fungicides[65] were extensively used in plant disease control.[66] Low soluble or neutral coppers were one such group of inorganics widely accepted for the prevention of vegetable diseases.[67] Today, development of the organics has not completely eliminated the vegetable grower's reliance on low soluble coppers[68] and limited supplies of minor crop pesticides will no doubt increase this reliance.

Copper fungicides are "characterized" by a copper molecule securely fixed chemically.[69] The effectiveness of these inorganics rest with the copper. Copper is non-specific[70] in its fungicidal properties and consequently can protect the host plant from a large number of disease causing organisms.[71] Copper acts as a protectant in the case of some fungal diseases in that it prevents the germinating fungal spore[72] from entering the plant tissue. Subsequently, to maximize the fungicide's protective action, the crops must be consistently sprayed to protect new growth and replace the fungicide lost to weathering. In the environment, copper fungicides persist indefinitely or breakdown leaving copper residues.[73] Herein lies the problem. Often many such fungicides find

---

64. That is, those fungicides containing carbon in their molecules. Those containing no carbon, are termed inorganic compounds. G. Ware, Pesticides, An Auto-Tutorial Approach 13 (1st ed. 1975).

65. *Id.*

66. E. Sharvelle, The Nature and Uses of Modern Fungicides 62 (2d ed. 1961).

67. *Id.* at 69.

68. Interview with Dr. James Stranberg, Plant Pathologist, Univ. of Fla., Zellwood Experiment Station, Zellwood, Fla. (Mar. 8, 1979).

69. E. Sharvelle, *supra* note 66, at 59.

70. *Id.* at 62.

71.
> Since the introduction of copper sulfate as a fungicide by Prevost in 1807 for treatment of wheat, coppers have acquired the status of highly important and dependable fungicides for the prevention and control of a large number of plant diseases. Coppers have assumed an important role for combatting major diseases of vegetables and are also important in protecting ornamental and flowering plants from injury, or destruction by fungus diseases.

Bacterial diseases are also included. E. Sharvelle, *supra* note 66, at 62.

72. A spore is defined as the reproductive unit of fungi consisting of one or more

their way through irrigation systems into adjacent aquatic "ecosystems"[74] or persist in the immediate application area.[75]

In entering the aquatic ecosystem, the copper residues move rapidly from the water to sediments and are taken up by aquatic plants, algae and numerous marine organisms.[76] Toxicity of such heavy metals in the aquatic environment has been well established. For example, some coppers are excellent molluscides[77] and consequently are used to control those transmitters of schistosomiosis.[78] Inshore marine environments near intensified agricultural areas in South Florida have been found to have excessively high copper concentrations.[79] Copper concentrations in these areas have approached values which have been shown in laboratory experiments to reduce the survival of newly hatched amphipods[80] and to inhibit photosynthesis in phytoplankton.[81] Field studies in the area indicate that such heavy metal pollutants lower levels of foliar disease incidence[82] in mangrove communities thereby affecting

---

cells; it is analogous to the seed of green plants. G. AGRIOS, PLANT PATHOLOGY 607 (1st ed. 1969).

73. C. EDWARDS, PERSISTENT PESTICIDES IN THE ENVIRONMENT 109 (2d ed. 1973).

74. An ecosystem is defined as a functional system which includes the organisms of a natural community together with their environment. MCGRAW-HILL, *supra* note 18, at 507.

75. H. Mattraw, Jr., *Occurrence of Chlorinated·Hydrocarbon Insecticides, Southern Florida—1968-72,* 9 PESTICIDES MONITORING JOURNAL 106 (1975).

76. A. McIntosh, *Fate of Copper in Ponds,* 8 PESTICIDES MONITORING JOURNAL 225 (1975).

77. Molluscides are agents which kill mollusks or members of the divisions of phyla of the animal kingdom containing snails, slugs, octopuses, squids, mussels, and oysters, characterized by a shell-secreting organ, the mantle, and a radula, a food-rasping organ located in the forward area of the mouth. MCGRAW-HILL, *supra* note 18, at 1043.

78. A disease in which humans are parasitized by any of three species of blood flukes: Schistosoma mansoni, S. haematobium, and S. japonicum; adult worms inhabit the blood vessels. Also known as snail fever. MCGRAW-HILL, *supra* note 18, at 1411.

79. G. Horvath, et. al., *Land Development and Heavy Metal Distribution in the Florida Everglades,* 3 MARINE POLLUTION BULL. 183 (1972).

80. A small crustacean of the order Amphipoda in which there is no distinct carapace and the first thoracic somite is coalesced with the head. This group contains those forms commonly known as sand fleas, sand hoppers, and scuds or side swimmers. THE DICTIONARY OF THE BIOLOGICAL SCIENCES 13 (1st ed. 1967).

81. Horvath, *supra* note 79, at 182.

the role of nutrient cycling and food chain stabilization.[83] This in turn generates ecological and economic problems resulting from decreased marine populations.[84]

Copper accumulation and persistence in intensified agricultural areas is astounding. Researchers have been able to plate copper onto electrodes immersed in water collected from these soils.[85] In essence, these soils can literally be "mined." Such concentrations of copper can negatively affect the successful implementation of ecologically oriented integrated pest management programs by inhibiting or eliminating the establishment of desirable microflora.[86]

2. Ecologically Oriented Integrated Pest Management As Detrimentally Affected By Copper Usage

Integrated pest management (IPM) serves to alleviate possible overuse of agricultural pesticides with resulting protection of the environment.[87] Originally, the term "integrated control" encompassed insecticide utilization in such manner as to permit predators and parasite of insect pests to function in support with the pesticide.[88] As the concept evolved, it encompassed all techniques to improve increased production of food and fiber with a minimal detriment to the environment.[89] It further evolved to include not only insect pests, but weed pests as well as plant diseases.[90]

The EPA sanctions and fully supports the utilization of IPM pro-

---

82. The number of plant units (leaves) infected, expressed as a percentage of the total number of units assessed. W. James, *Assessment of Plant Diseases and Losses*, 12 Ann. Rev. Phytopath 27, 48 (1974).

83. M. Olexa, The Distribution, Etiology, and Importance of Red Mangrove Diseases in Florida 70 (Ph.D. Dissertation, Univ. of Fla., 1976).

84. Id.

85. Interview with Dr. James Stranberg, *supra* note 68.

86. Microscopic plants. The flora of a microhabitat. McGraw-Hill, supra note 18, at 1020.

87. C. Huttaker, et. al., *Integrated Pest Management in the U.S.: Progress and Promise*, 14 Environmental Health Perspectives 168 (1976).

88. *Integrated Control of Pests and Diseases*, Symposium of the Co-operative Programme of Agro-Allied Industries with F.A.O. and Other U.N. Organizations 53 (1972).

89. J. Strayer, *The Pest Management Concept: The Extension Entomologist's View*, Proceedings Tall Timbers Conference on Ecological Animal Control by Habitat Management 21 (1971).

grams.[91] In its definition and encouragement of IPM the EPA states:

> Integrated pest management is a continual process of blending the most feasible management practices which will maximize yield of food and fiber in a socially acceptable manner. It is an interdisciplinary approach to pest problems based upon the knowledge of each pest, its environment and its natural enemies. The concept includes appropriate combinations of pesticides, natural enemies, insect pathogens and cultural treatments. The total effect of these combined methods is synergestic rather than additive. Not only does it reduce the pesticide pollution problem, but the control may be more effective.[92]

The report continues,

> IPM is based on the entire ecosystem, that is the complex of organisms, the culture of the crop or animal and the environment. It identifies action thresholds—the population levels at which the pest species cause harm, damage or constitute a nuisance—as a basis for determining the proper timing and method of approaching a pest problem. Thus by using measures only as needed, IPM may obtain adequate control in a manner which is less likely to upset part of the ecosystem.[93]

Some IPM programs are also dependent upon disease control in the soil environment through the utilization of various beneficial bacterial and fungal microorganisms.[94] Growth of such beneficial microorganisms are encouraged in efforts to control soil borne diseases.[95] Herein lies the problem of IPM introduction into areas in which large amounts of heavy metals have accumulated. Beneficial as well as harmful microorganisms are eliminated from the soil biota due to the nonspecificity of copper fungicides.[96] With disease control through the use

---

90. SYMPOSIUM, supra note 88, at 53.

91. C. Reese, *The Role of the Environmental Protection Agency in Integrated Pest Management.* OFFICE OF PESTICIDE PROGRAMS, ENVIRONMENTAL PROTECTION AGENCY 20 (1977).

92. *Id.*

93. *Id.*

94. K. Baker, *Elucidation and Exploitation of Naturally Occurring Biological Control: An Introduction,* BIOLOGY AND CONTROL OF SOIL-BORNE PLANT PATHOGENS, PROCEEDINGS OF THE AMERICAN PHYTOPATHOLOGICAL SOCIETY 136 (Univ. of Minn. ed. 1975).

95. *Id.* at 191.

of beneficial microorganisms no longer possible, the grower must resort to pesticides. The agricultural system then becomes totally pesticide dependent, and the grower is forced, through fear of crop loss, to continue on this "pesticidal treadmill."[97] Although the growers immediate goals of food and fiber production are satisfied, the further accumulation of pesticide residues from the broad spectrums undermines the effectiveness of implementing the IPM concept. Environmental harm necessarily results from such pesticide accumulation, yet; the harm is directly brought about by strict compliance with FIFRA and represents an unintended result of the original regulations.

This raises the complex question of whether the small crop producer faced with a pesticide shortage indirectly created by the Act, who is unable to implement an effective IPM program, can resort to other minor crop pesticides which are equally effective and essentially of the same composition? This is answered with an emphatic no, unless the pesticide is used consistent with its labeling pursuant to 12(a)(2)(G) of FIFRA.

IV. THE PROBLEM OF STRICT COMPLIANCE WITH SECTION 12(a)(2)(G) AS IT AFFECTS MINOR CROP PRODUCTION AND ENVIRONMENTAL QUALITY

A. *Interpretation and Litigation*

The EPA, pursuant to Section 12(a)(2)(G) of FIFRA prohibits the use of any registered pesticide in a manner not permitted by the labeling.[98] This section, however, has undergone considerable change since it was first signed into law. Initially, because of its safety oriented concepts, 12(a)(2)(G) appeared to be excellent legislation. Application of a pesticide to a crop for which it had not been cleared could result in severe health consequences. Yet, as the courts were to find, there were many instances in which a chemical could be used quite effectively and safely, but in a manner inconsistent with labeling requirements as dictated by the laws. In short, the legislation prior to the 1978 amend-

96. E. SHARVELLE, *supra* note 66, at 59.

97. Van Den Bosch, *Insecticides and the Law*, 22 HASTINGS L. J. 615, 618 (1970).

ments did not encompass many use ramifications which, although unlawful pursuant to FIFRA, would be practical and safe.[99] Such use ambiguities were manifested in *Kelly v. Butz.*[100] Here, Kelley, the Attorney General of the State of Michigan brought suit against Secretary of Agriculture, Earl Butz in an effort to prevent the United States Forest Service from applying a mixture of herbicides to a national forest in Michigan. During the proceedings, numerous ambiguities surrounding strict compliance with each of the herbicide's labeling requirements were brought into testimony. The State of Michigan sought to prevent spraying of the forest by noting that use of the herbicide mixture was a use inconsistent with the labeling of each herbicide. Inconsistencies with this FIFRA requirement were all too obvious. It soon became apparent to the court that the problems arising from strict compliance with 12(a)(2)(G) were not adequately reviewed by framers of the section. This was affirmed in expert scientific testimony. Recognizing these problems, Congress once again set out to amend the Act in 1978.

B. *Passage of the 1978 Federal Pesticide Act As An Effort To Ease 12 (a) (2) (G) Restrictions—An Interpretation*

The Federal Pesticide Act of 1978,[101] also known as the amendments to FIFRA, provided sweeping changes over prior FIFRA legislation. One of the most important changes involved the incorporation of exceptions to strict compliance with 12(a)(2)(G). These exceptions provided the farmer with workable and practical laws. These, as noted in the amendment, include:

> (1) Applying a pesticide at any dosage concentration or frequency less than that specified on the labeling.
> (2) Applying a pesticide against any target pest not specified on the labeling if the application is to the crop, animal or site specified on the labeling unless the Administrator has required that the labeling specifically state that the pesticide may be used only for pests specified on the labeling after the Administrator has determined that the use of the pesticide against other pests would cause an unreasonable adverse effect on

98. 7 U.S.C. § 136j(a)(2)(G)(1976).

99. *See* Sec. IV, B-3, The Lannate-Nudrin 1.8 Controversy and Resulting Ramifications—The Pink Bollworm, this text.

100. 404 F. Supp. 925 (W.D. Mich. 1975).

the environment.
(3) Employing any method of application not prohibited by the lableing, or
(4) Mixing a pesticide or pesticides with a fertilizer when such mixture is not prohibited by the labeling.[102]

The second exception is of considerable significance to the minor crop producer. Prior to the amendment, it was unlawful to spray a pest unless the target organism and the crop were both specified on the label.[103] Briefly, if a pesticide was cleared for usage on a particular crop which was infested with Pest A which was not cleared on the label, the farmer could not, under the penalty of law, spray his crop. The farmer was thus subjected to a legal straight jacket while the pests devoured his crops. Today, section two provides the farmer with much needed relief through a relaxation of the target pest labeling criteria.[104] Now, target pests not listed on the label of a pesticide known to be effective in their control may be sprayed with the pesticide. The pesticide, however, must be cleared for the crop onto which it is to be applied. For the grower, this relaxation provides an expansion of pest control.

1. SECTION 12(a)(2)(G)'S INCORPORATION OF SECTION 18 AND AMENDED SECTIONS 5 AND 24—BENEFITS AND SHORTCOMINGS

Congressional wisdom also implemented additional beneficial exemptions through incorporation of section 18 and amended sections 5 and 24 of the 1978 Act into the definitional concept of 12(a)(2)(G).[105] Viewed collectively, these sections provide an effective practical implementation of the labeling restrictions. This practicality is of special benefit for the minor crop producer.

Section 5 provides for waiver of the 12(a)(2)(G) stipulation in the issuance of experimental use permits.[106] Pursuant to subsection (d) of

---

101. Pub. L. No. 95-396, § 136, 92 Stat. 819 (1978) (codified in scattered sections of 7 U.S.C. 136a-136y).
102. 7 U.S.C. § 136(ee)(Supp. II 1978).
103. 7 U.S.C. § 136j(1)(2)(G)(1976).
104. 7 U.S.C. § 136(ee)(Supp. II 1978).
105. Section 5 reads:

Any person may apply to the Administrator for an experimental use permit for a pesticide. The Administrator shall review the application. After completion of the review, but not later than one hundred and twenty days after receipt of the section 5, the Administrator may require preliminary studies be conducted prior to field tests of any chemical not included in a previously registered pesticide.[107] Environmentally sound, section 5, also provides an outlet for public and private agricultural research agencies or educational institutions to conduct pesticide experiments without strict compliance to 12(a)(2)(G).[108] The ramifications of such research projects afford an ongoing element of minor pesticide research in a market which is persistently shifting towards major crop emphasis.

Emergency conditions also provide an exemption to strict compliance with 12(a)(2)(G).[109] Under this broadly sweeping section, any federal or state agency may be exempt from compliance with any provisions of the Act if the Administrator determines that such conditions exist.[110] The Administrator must first, however, determine if an emergency condition does indeed exist, and then, only upon request of the

---

> application and all required supporting data, the Administrator shall either issue the permit or notify the applicant of the Administrator's determination not to issue the permit and the reasons therefore. The applicant may correct the application or request a waiver of the conditions for such permit within thirty days of receipt of the applicant of such notification. The Administrator may issue an experimental use permit only if the Administrator determines that the applicant needs such permit in order to accumulate information necessary to register a pesticide under Section 3 of this Act. An application for an experimental use permit may be filed at any time.

Codified at 7 U.S.C. § 136c(a) (Supp. II 1978).

Section 18 reads:

> The Administrator may, at his discretion, exempt any Federal or State agency from any provision of this act if he determines that the emergency conditions exist which require such exemption.
>
> The Administration, in determining whether or not such emergency conditions exist, shall consult with the Secretary of Agriculture and the Governor of any state concerned if they request such determination.

Codified at 7 U.S.C. § 136p (Supp. II 1978).

Section 24 reads:

> A state may provide registration for additional uses of federally registered pesticides formulated for distribution and use within that state to meet special local needs in accord with the purposes of this Act and if registration for such use has not previously been denied, disapproved, or cancelled by the Administrator. Such registration shall be deemed registration under Section 3 for all purposes of this Act, but shall authorize distribution and use only within such state.

Codified at 7 U.S.C. § 136v(c)(1)(Supp. II 1978).

106. 7 U.S.C. § 136c(a)(Supp. II 1978).
107. 7 U.S.C. § 136(d)(1976).
108. 7 U.S.C. § 136c(g)(1976).
109. 7 U.S.C. § 136p (1976).

Secretary of Agriculture and the governor of the state.[111] This may not be feasible in situations which involve small crop producers faced with specific disease problems for which minor pesticides are not readily available. The problem manifests itself with the nature of pest outbreaks of plant disease and the size of the producers operation.[112] For example, it would appear that an independent south Florida grower of watercress or malanga would have greater difficulty in acquiring a minor pesticide in an emergency situation than would a grower in a minor crop co-op.[113] Additionally, the sheer rapidity of some plant disease epidemics could easily ruin the grower before governmental operation brought effective relief.[114]

Section 24 deals explicitly with the "Authority of States."[115] Exemptions provided under section 24(c) are received with favor among agricultural extension agents and farmers alike. Of particular interest to the minor crop producer is section 24(c)(1).[116] Under this section, a "state may provide registration for additional uses of federally registered pesticides formulated for distribution and use within that State to meet special local needs . . ."[117] At first, 24(c)(1) would appear to be the panecea for the minor crop producer faced with pesticide shortage. This section, however, is not without its reservation. In 24(c)(3),[118] emphasis is drawn to those registrations which are inconsistent with the Federal Food, Drug and Cosmetic Act.[119] Pursuant to 24(c)(3) those products not in compliance with food and feed tolerances are immediately subject to disapproval of registration by the Administrator. Since disapproval can result in prevention of the pesticide's usage, section 24(c)(1) is therefore not a complete solution for the grower faced with

110. *Id.*

111. *Id.*

112. The phenomenon referred to herein is the rapidity of the disease or pest outbreak under optimum conditions for proliferation. For instance, it has been estimated that a single bacterium under optimum growth conditions can produce about 300 billion individuals within a 24 hour period. E. STAKMAN & J. HARRAR, PRINCIPLES OF PLANT PATHOLOGY 180 (2d ed. 1957).

113. This is to suggest that a smaller grower might not have the co-op's collective expertise in dealing with the situation or in procuring the needed pesticide.

114. STAKMAN & HARRAR, *supra* note 112.

115. 7 U.S.C. § 136v (1976 & Supp. II 1978).

116. 7 U.S.C. § 136v(c)(1)(Supp. II 1978).

117. *Id.*

118. 7 U.S.C. § 136v(c)(3)(Supp. II 1978).

a severe pest outbreak.

2. A Major Shortcoming of the 1978 Amendment.

The preceding amendments do provide progressive legislation. However, as noted earlier, the minor crop producer is still prevented from interchanging two pesticides of the same or similar generic formulation, but marketed under different trade names during field applications.[120] These chemically similar pesticides cannot be interchanged unless the crop upon which they are to be applied is specifically listed on each label.[121] Interchange of two such pesticides would again result in violation of 12(a)(2)(G) and subsequent civil or criminal penalties pursuant to Section 14 of the Act.[122]

3. The Lannate—Nudrin 1.8 Controversy and Resulting Ramifications.—The Pink Bollworm

Civil penalties for violation of the law can be as high as $5,000.00 for each offense, and at the minimum, the issuance of a warning depending upon the classification of the individual in violation and the discretion of the Administrator.[123] Severe criminal penalties can result in fines of $25,000.00, imprisonment for not more than one year, or both.[124] Private applicators can be subjected to criminal sanctions not exceeding $1,000.00, imprisonment for not more than 30 days or both.[125] As such, many pesticide applicators refuse to interchange chemically similar pesticides and question the practicality of the law on this point. Nowhere is this impracticality more blatantly obvious than in the LANNATE L[126] and NUDRIN 1.8[127] comparison. As used in this comparison, active ingredient as defined pursuant to section 2(a)(1) of the act is "an ingredient which will prevent, destroy, repel or mitigate any pest."[128]

119. 21 U.S.C. §§ 301-381 (1976 & Supp. I 1977).
120. 7 U.S.C. § 136j(a)(2)(G)(1976).
121. *Id.*
122. 7 U.S.C. § 136*l*(b)(1976).
123. 7 U.S.C. § 136*l*(a)(1976).
124. 7 U.S.C. § 136*l*(b)(1)(1976).
125. 7 U.S.C. § 136*l*(b)(2)(1976).
126. DuPont Chemical, Lannate L Insecticide (product brochure 1977).
127. Shell Chemical Co., Nudrin 1.8 Insecticide (product brochure 1977).

Lannate L produced by DuPont Chemical contains:
ACTIVE INGREDIENT
Methomyl
S-methyl-N(methylcarbamoyl)oxy)
thioacetimidate
....24%
INERT INGREDIENTS
.... 76%[129]

while NUDRIN 1.8 manufactured by Shell Chemical contains:
ACTIVE INGREDIENT
Methomyl
S-methyl-N-(methylcarbamoyl)oxy)
thioacetimidate
.... 24.1%
INERT INGREDIENTS
....75.9%[130]

Both chemicals are jointly listed in the *Farm Chemical Handbook* and are described under the common name methomyl.[131] Also listed are the exact handling and storage cautions, antidote, applications, toxicity and formulations.[132] Entomologists note that if both pesticides were mixed, it would be difficult if not impossible to distinguish the two.[133] LANNATE L has been cleared by the EPA for usage against beet army worm on alfalfa and asparagus.[134] Nudrin 1.8 does not however have EPA clearance for application to asparagus but has been cleared for alfalfa.[135] The interchange problem can best be illustrated through the following hypothetical. Assuume a minor crop producer has a field of alfalfa and an adjacent field of asparagus, and both are heavily infested with beet army worm. Faced with crop loss, the grower consults

128. 7 U.S.C. § 136(a)(1)(1976).

129. DuPont Chemical, *supra* note 126, at 92.

130. Shell Chemical, *supra* note 127.

131. Chemical properties listed for lannate and nudrin include: white crystaline solid, with slightly sucturous odor, melting point 78-79°C, solubility in water, 5.8g 100g; in ethanol, 42 g, in methanol, 100g. Farm Chemical Handbook D180 (1979).

132. *Id.*

133. Interview with Dr. Fred Johnson, Entomologist with the Institute of Food and Agricultural Sciences, Gainesville, Florida (Mar. 6 & 7, 1979).

134. DuPont Chemical, *supra* note 126, at 92.

the agricultural extension agent who naturally recommends LANNATE L. Assume also that local supplies of LANNATE L are exhausted, and only NUDRIN 1.8 appears available. Nudrin as with Lannate is cleared for usage in the control of beet army worm. However, as noted, it is not cleared for application to asparagus. Its use on asparagus would be unlawful pursuant to 12(a)(2)(G). In an effort to save his asparagus crop, the grower can now either unlawfully apply Nudrin 1.8 or use an alternative insecticide, which might be of greater expense, environmentally less beneficial, or not readily available.

Of environmental significance are LANNATE L and Nudrin's absorption potential. Unlike some other broad spectrum substitutes, LANNATE L and Nudrin are absorbed into the host crop.[136] As such, beneficial insects are spared and only those target organisms feeding on the crop are destroyed. Resort to a broad spectrum pesticide cleared by EPA which is not immediately absorbed will result in destruction of both the target insect as well as its predators and parasites.[137] What follows then has been described by one commentator as "a dangerous biotic vacuum in which either target species can resurge explosively or the unleased non-target species can erupt abundantly."[138] In addition, the explosive populations may create a greater pest problem than previously encountered.[139] Thus, the grower is forced to use greater and greater amounts of pesticide to control the situation. Again the insecticidal treadmill emerges.

An excellent example of just such an effect of broad spectrum usage can be seen in the pink bollworm outbreak in California's Imperial Valley.[140] Here, what had been originally planned as an integrated pest managment concept evolved into a massive pesticide application program, and subsequently a grower's nightmare. Over opposition of the valley's cotton growers, the California Department of Agriculture conducted an extended broad spectrum spray program. Large quantities of pesticides were applied by aerial applicators. In all, twice the number of anticipated treatments were applied.[141] Ramifications of such pesti-

135. SHELL CHEMICAL, *supra* note 127.
136. Interview with Dr. Fred Johnson, *supra* note 133.
137. *Id.*
138. Van Den Bosch, *supra* note 97, at 618.
139. *Id.*
140. H. Dunning, *Pests, Poisons, and the Living Law: The Control of Pesticides*

cide usage were astounding. Secondary outbreaks of previously minor pests skyrocketed. The situation was further complicated by subsequent outbreaks of beet army worms which caused havoc for the sugar beet growers. Populations of the pink bollworm reached such proportions that cotton growers actually contemplated cessation of planting in an effort to dwindle pest populations.[142] As illustrated, the negative impact of massive pesticide usage in fragile environmental ecosystems is too evident. In addition, environmental effects are frequently noted in the phenomenon known as biomagnification. This phenomenon first involves entrance of the pesticide into the environment and its ingestion by lower members of the food chain. As each organism is itself ingested, the pesticide's concentration increases progressively up the food chain.[143] Humans form the last link in the chain. The phenomenon is classically noted in the aquatic system. Pesticides carried through drainage canals and water runoff from agricultural areas are accumulated in high concentrations in the fatty tissues of marine organisms. Oysters are extremely efficient in removing and concentrating pesticides from water. Other organisms such as shrimp and plankton have this same chemical concentrating ability.[144]

Biomagnification is not the only problem associated with specified broad spectrum pesticides. Treatment with various broad spectrum pesticides frequently poses a field reentry danger to both humans and animals.[145] In addition, accelerated usage of such pesticides can increase resistance in various strains of pest species. It has been estimated that at least 268 species of pests have developed resistance to numerous pesticides.[146] Prohibition of LANNATE L and Nudrin interchange and the possible resulting environmental and agricultural ramification thereof clearly demonstrates the need for further amendment to the Act in guide with scientific and legalistic practicality.[147]

---

in California's Imperial Valley, 2 ECOL. L. QUARTERLY 668 (1972).

141. *Id.* at 673.

142. *Id.* at 678.

143. J. DuVall, *Pesticides: The Problem and the Solution,* 7 TEXAS TECH. L. REV. 79, 80 (1975).

144. U.S. DEPT. OF AGRICULTURE, A REPORT TO THE PRESIDENT—CONTROL OF AGRICULTURAL-RELATED POLLUTION 70 (1974).

145. Interview with Dr. Fred Johnson, *supra* note 133.

146. D. WATSON, et. al., PEST MANAGEMENT AND INSECTICIDE RESISTANCE 323 (1st ed. 1977).

Due to the monoculture[148] aspect of the agricultural ecosystem, minor crop producers generally need some type of chemical control to minimize their losses. Increasingly, however, minor crop growers as well as pesticide manufacturers feel the legal consequence of strict compliance with registration and section 12(a)(2)(G). In the end, the environment suffers from laws originally directed toward its preservation. What are the solutions? Can these solutions be implemented without further federal regulations pursuant to the Act?

V. SOLUTIONS TO THE PROBLEM

Many of the problems faced by the small crop grower and the environment can be eliminated through the development and use of "bio-rational pesticides,"[149] proper use of those existing pesticides and trends toward effective utilization of biological control and IPM. The threat of a world overrun with pesticide pollution need not occur if these programs are properly initiated.

A. *Emphasis Towards Governmental Incentives Rather Than Hindrance In the Production of "Bio-Rational Pesticides"*

Perhaps one of the most dynamic areas of pesticide development lies in the utilization of bio-rational pesticides. Encompassed within this group are insect hormones, insect attractants and their analogs. Plant metabolites having insect-repelling, insecticidal, anti-hormonal or anti-feeding characteristics are also included.[150] An example of such

147. J. Street, *Agriculture and the Pollution Problem 1970,* UTAH L. REV. 395, 398 (1970).

148. Monoculture in "[t]he agricultural system refers to the replacement of a diversified natural vegetation, having many component species, with uniform stands made up of a single species. In such stands each species is generally represented by a single variety or, for some crops, by a single clone composed of genetically identical individuals. In some parts of the world the scale of this replacement is enormous and a contiguous stand of a single variety may cover areas measured in millions of hectares or thousands of square miles." J. Horsfall and E. Cowling, *The Genetic Basis of Epidemics,* 2 PLANT DISEASE: AN ADVANCED TREATISE, HOW DISEASE DEVELOPS IN POPULATIONS 263 (1st ed. 1978).

149. As utilized herein, a bio-rational pesticide is one which is primarily directed toward insect control by selectively destroying specific pests through destruction of specific physiological functions. However, this group of pesticides does not rule out those

pesticides is pyrethrins.[151] Extracted from a variety of perennial chrysanthemums found in areas of the equatorial world, these pesticides present an exciting future in pest control. Their advantages are many.[152] Pyrethrins are environmentally non-persistent, and degrade rapidly in the presence of sunlight into innocuous organic compounds. Pyrethrin residues on crops pose little to no hazard to wildlife, people or to soils and other parts of the environment. Additionally, they are extremely low in mammalian toxicity. This in itself is of considerable legal importance for they provide no serious dangers to applicators or field hands. Entomologists find this unique group of pesticides to be fast acting, and possessing no time restriction from last application to harvest.[153] They can also be effectively utilized in post harvest application, and have been evaluated as mosquito larvacides.[154] Other similar pesticides have been discovered, and the possibility of new discovery here and abroad seems quite possible.[155]

Development of insect attractants and biological controls such as insect bacterial and viral diseases also pose a promising future in pesticide research.[156] Laboratories are presently gaining increased knowledge of insect endrocrinology, defense and communication.[157] Additionally, investigation of plant metabolites that have insect-repelling, insecticidal, anti-hormonal or anti-feeding characteristics "on which insect behavior or development may be based," poses an interesting future in insect control.[158] Pesticides could literally be developed for spe-

---

pesticides such as pyrethrins, which, although function in controlling a broad group of insect pests, if properly used minimize loss of non-target organisms, leave no harmful residues, and dissipate within a matter of hours following introduction into the environment. The emphasis of such pesticides is thus one of maximizing pest control while minimizing environmental damage.

150. J. Meinwold, et. al., *Chemical Ecology: Studies from East Africa,* 199 SCIENCE 1167 (1978).

151. J. CASIDA, PYRETHRUM FROM THE NATURAL INSECTICIDE 311 (1st ed. 1973).

152. *Id.*

153. Agriculturalists are prohibited from applying some pesticides immediately before harvest for fear that the pesticide's residue, if ingested, could result in mammalian toxicity.

154. J. CASIDA, *supra* note 151.

155. W. Tucker, *Of Mites and Men,* HARPERS, Aug. 1978, at 43.

156. *Id.*

157. Meinwald, et. al., *supra* note 150, at 1167.

cific pests on specific minor crops. The possibilities for selected minor pesticide development are phenomenal. Bio-rational pesticides have generated such interest that their further investigation was an important motive for founding the International Center of Insect Physiology and Ecology.[159] This center is pursuing numerous avenues of novel approaches to insect control. Should such pesticides be developed for widespread usage, the environmental impact through their utilization would be minimized. There looms however the omnipresent threat of research expenditures, registration costs and possible recall by the EPA pursuant to FIFRA. Bio-rational pesticides, as with other pesticides, must be subjected to identical registration processes.[160] Therefore, the development of these specific pesticides would require expenditures similar to those of the major pesticides. To alleviate some of the problems, the EPA is permitted to waive all or part of the tolerance petition fee if the pesticide producer "can show financial hardship or if waiving the fee would be in the public interest."[161] The EPA itself notes that in considering the enormous cost of pesticide research and development such waiver cannot be "much of an inducement to potential developments of such products."[162] EPA clearance of the bio-rational pesticides for agricultural production has been found to be a frustrating, if not abandoning, experience. In his exposé on the conflicts between scientist developing the bio-rationals and the EPA registration requirement, William Tucker notes specifically the problem encountered by Zoecon Corporation.[163] Zoecon was formed by a nucleus of outstanding scientists whose research goals were directed solely toward the development of bio-rational pest control.[164] Ironically, Zoecon found the greatest obstacle in the development of such materials was the EPA. Tucker further notes that the company has only registered one insect growth regulator after more than ten years of intensive research.[165] The company spent half of a million dollars and three years to register "methoprene." The frustrations encountered by the firm are

---

158. *Id.*
159. *Id.*
160. 7 U.S.C. § 136a (1976 & Supp. II 1978).
161. Office of Pesticide Programs, Environmental Protection Agency, FIFRA: Impact on the Industry 24 (Mar. 7, 1977).
162. *Id.*
163. Tucker, *supra* note 155.
164. That is, maximizing pest control while minimizing environmental damage.

exemplified by Dr. Djerossi:

> The EPA is still trying to change the label to say that it can't be sprayed where it could get into shrimp beds. It's not that they say it *does* harm shrimp, it's just that we haven't been able to generate the data yet to show it can't. Methoprene has a half-life of one day and breaks down entirely after seven days, yet they still require 900 pages of data to show how it might affect non-target organisms. The whole thing was enormously expensive and completely unnecessary. As far as we're concerned, these environmental concerns have become completely counterproductive.[166]

If this situation continues, development of environmentally safe pesticides by many private firms may be discouraged altogether.

B. *Relaxation of FIFRA Registration In The Production of "Bio-Rational Pesticides"*

Lawmakers must and should consider the distinctness between bio-rational and nonbio-rational pesticides. Both groups of pesticides should not be subjected to the same system of registration. Unless this is done, development of bio-rational pesticides which are usually directed towards a limited market cannot possibly prove economically feasible. The registration system must be eased and governmental incentives must be initiated for production of these environmentally safer pesticides for use in pest management systems.

Pursuant to section 3(2)(A)[167] of the Act, the Administrator has, however, provided some incentives for the registration of minor use pesticides. Incentives for registration standards are made commensurate with the extent and pattern of use and the level and degree of potential human exposure as well as that of the environment.[168] Such standards are based on the national volume of use, distribution, and cost of meeting registration requirements.[169] Nevertheless, the cost of present registration procedures are excessively expensive, and as noted, but one factor in the consideration of minor pesticide development.

165. Tucker, *supra* note 155.
166. *Id.*
167. 7 U.S.C. § 136a(c)(A)(Supp. II 1978).
168. *Id.*

The culmination of these costs and concerns have forced industry to question continued development of minor pesticides. Incentives for minor use production pursuant to section 3(2)(A) provide not emphasis towards this uniquely beneficial class of pesticides. Such incentives should be implemented.

Solutions to the liability problems faced by manufacturers and users of pesticides perplex lawmakers.[170] Some have suggested the concept of shared liability by arguing that, since governmental agencies register pesticides, the burden of compensation for damages caused by these chemicals should be shared by the government. They further contend that the responsibility of such an important aspect of food producing technology which is of benefit to the public and certified through public agents should have shared public responsibility.[171] Many of the consequences of usage are unknown at the time of certification and to subject to innovator to the possibility of infinite liability can only harm the market.[172] This is especially apparent with small manufacturers who cannot absorb the cost of lawsuits and litigation, but are engaged in valuable environmentally oriented research. Liability imposed upon manufacturers for unforseen pesticide accidents should be reassessed in a light favorable for the minor crop market. Pollution could be curtailed through subsidies and tax incentives directed toward the development of efficient and safe pesticide waste disposal, and the utilization of these wastes in other marketing areas. These incentives should be especially directed toward development and marketing of bio-rational pesticides by small private firms.

Production of environmentally sound pesticides would doubtfully decrease across the board corporate pesticide profits if such corporations directed their development in this area. Many corporations could eventually realize greater profits by recognizing the public's desire to purchase environmentally safe pesticides. In addition, it is quite doubtful that the need for broad spectrum pesticides would completely dissipate. Such pesticides are essential for effective control in many pest management systems.

---

169. *Id.*
170. Street, *supra* note 147, at 401.
171. *Id.*
172. *Id.*

VI. CONCLUSIONS

It has been the objective of this article to present examples where strict compliance with EPA dictates pursuant to FIFRA can result in an impact on minor crop production and environmental quality. This article is not a condemnation of the EPA.

The accomplishments of the EPA in the curtailment of pesticide pollution pursuant to FIFRA are indeed impressive. Through legally constructive action, the agency has removed from the market many potentially harmful pesticides. Unfortunately, some aspects of strict compliance with the Act have created questionable ramifications. Realizing some of the Act's shortcomings, legislators, through amendment, have attempted to alleviate the hardships incurred by the small crop producer and the pollution rendered the environment. Yet, more needs to be done. The Act must be again amended to permit interchange of similar pesticides with agricultural extension approval. More immediate aid must be accorded the small grower in the event of pest outbreaks, coupled with Act created pesticide shortages. Additionally, the registration of bio-rational pesticides must be subjected to further legislative scrutiny in an effort to stimulate rather than discourage their production and development. Further, there must be greater scientific-legal interaction in future formulation and implementation of FIFRA. Nowhere is this more acutely expressed than on the field level. Nowhere is this more noticeably apparent than in the environment. The time has arrived when these two different, yet socially oriented disciplines can no longer "go it alone."

The pesticidal triangle of minor crop producer, FIFRA, and environmental quality portrays a complex matrix of law, liability, science and dilemma. The immediate solutions proposed for these complex interactions can only be solved with an objective overview of the entire system, and then only through scientific-legal cooperation.

*Michael T. Olexa**

* Ph.D. Plant Pathology, with minors in Entomology and Mycology, University of Florida 1976. The author does not advocate the use, nor does he endorse any pesticide noted in the text of this paper.