

# Education, Information Transfer, and Information Exchange

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The field of urban pest management is as much people oriented as it is pest oriented (National Research Council, 1980; Extension Committee on Organization and Policy [ECOP], 1981; Frankie and Ehler, 1978; Frankie and Koehler, 1983; Frankie, Fraser, and Lewis, 1982; Frankie et al., 1981; Sawyer and Casagrande, 1983). Although most pest organisms are easily identified, there are often human constraints associated with pest infestations that are not easily recognized, much less dealt with in an effective manner. Most of these constraints can be traced to relevant human attitudes and actions, and to identify and address these constraints represents a major step toward dealing with the people problems of urban pest management (UPM).

Effective education and information transfer are logically the principal means for dealing with people problems, and both processes are often acknowledged to be important components of UPM (National Research Council, 1980; Extension Committee on Organization and Policy, 1981; Todaro, 1984). Yet the literature reveals that very little has been written

about these components (Farace, 1980; National Research Council, 1980; Worf, 1981). Further, with few exceptions (Fear et al., 1983) little effort has been made to develop fundamental approaches and tools for dealing with education and technology transfer needs in UPM. One notable example of this kind of deficiency is found in a recent UPM report developed by a special committee of the National Research Council (1980). In this 273-page document, only 4 pages directly addressed the issues of education and technology transfer.

Selected processes and channels that provide for the practical and theoretical transfer of UPM technology from research and extension specialist to practitioner to urbanite are examined and evaluated in this chapter. Much of our discussion centers on the potential for using a marketing approach for new education and information transfer efforts in UPM. In adopting a marketing framework, we recognize that information transfer involves more than a simple unidirectional movement process. It also involves an exchange relationship among those who develop and distribute the information and those who ultimately use it.

The paper is divided into four sections: (1) descriptions of terms used in the paper, (2) application of marketing principles and practices for transferring/exchanging UPM information, with descriptions of relevant case histories, (3) traditional and possible future educational approaches in client and practitioner education, and (4) a set of specific recommendations.

## DESCRIPTION OF TERMS

For our purposes here, we view UPM broadly as the management of pest populations at levels that are acceptable to particular urban groups. The methods employed for management may be simple and unilateral (such as the one-time application of a pesticide); they may involve a combination of chemical or nonchemical means or both; or they may be fashioned into an integrated program. Regardless of the direct methods employed, to be characterized as management we maintain that thought and planning must predate the decision to take action against a given pest. A "thoughtful" program includes understanding the biology, behavior, and ecology of the target species and the nature of its negative impact on the clientele.

Effective education and communication (here considered to be nearly synonymous) use organized, deliberate, and sustained processes to transmit information to bring about changes in attitudes and practices (Cremin, 1978; Schramm, 1973). At the core of this definition is the concept of transmission or transfer. A transfer approach to education emphasizes the unidirectional movement of a product (such as UPM information) from a source (the UPM practitioner) to a receiver (the audience or client). In the commercial field this approach corresponds to selling. In contrast, commercial

marketing and marketers advocate a broader view: the marketer sells a product and analyzes what the marketplace is ready to absorb. In this view, emphasis shifts from production to marketing (Kotler, 1984).

Marketing is the exchange of goods and services for other goods, services, or money. Marketing management is the "analysis, planning, implementation and control of programs developed to bring about desired exchange with target audiences" (Kotler, 1984). Such management occurs when people become conscious of opportunities to gain from a more careful planning of exchange relationships. Using the above distinctions, education, including UPM education, can thus be specified as "education as selling" and "education as marketing." In the former, an educator tries to "peddle the output of the factory." Regarding "education as marketing," an educator tries to understand the needs and wants of the market (the users).

## **UPM EDUCATION AS MARKETING**

### **Application of Marketing Theory to Education**

Education (as an exchange process and not simply a transfer process) and educational management (as analysis, planning, implementation, and control of programs) are analogous to marketing and marketing management. The UPM educator/marketer, in our view, must actively engage in exchange relationships, with an eye to what the user/audience wants. Education becomes less a matter of transfer and more a matter of exchange of information and products: for UPM marketers and educators it is vital to understand the audience if they are to develop appropriate educational and technical information (Peters and Waterman, 1982).

There are two principal urban UPM audiences: the urban public in general; and the specific and private audience composed of owners of pest management firms, managers of restaurants and other businesses, as well as institutional agencies, such as hospitals, military bases, and schools. Within each of these audiences there is variation in the type of information needed (or sought) and the ways in which this information is used. Whereas some members of an audience want information to solve immediate problems, others accumulate information they think may later be useful. It is important to become sensitive to the user and the need for information exchange (Peters and Waterman, 1982). To know the audience is a basic marketing principle.

Marketers use the concept of "audience segmentation" as a means for understanding the audience. Audience segmentation is a recognition that a given audience is usually not monolithic but consists of a series of subaudiences that must be reached or educated with different approaches (Kotler and

Zaltman, 1971). Marketing audience segmentation traditionally focuses on demographic factors such as age, sex, and residence. However, it is now widely acknowledged that effective segmentation also requires input from the psychological and behavioral sciences. More specifically, markets are known to be influenced by differences in buyer attitudes, motivations, values, usage patterns, aesthetic preferences, and degree of susceptibility (Yankelovich, 1964).

Within UPM, audience segmentation can lead to improved understanding of the two major audience categories, their motives, how they operate, act and react, variations within audience type, and so on. In short, "know thy audience" is advice to be followed—by educators as well as by marketers.

Marketers view their problem as one of developing the right *product*, backed by the right *promotion*, put in the right *place*, and at the right *price* (Kotler, 1972). UPM promoters and practitioners must also be concerned with these marketing principles. What is the product in UPM? It is not always a management technique; it can also be knowledge. In some cases, the product might be an educational campaign providing advice on how to avoid pest problems in the home or hospital. UPM educators must try to create specific tangible products and services that can be marketed and purchased. UPM practitioners also must be concerned with promotion. In many cases, a communication/persuasion strategy, using a variety of promotional tools such as advertising, publicity, and personal selling, can be utilized. Place is the third element of the marketing approach. There must be adequate and compatible distribution and response channels so that those who want to purchase the educational materials or services have a way to obtain them. Outlets accessible to general and specific audiences must be arranged. Price represents the cost that the target consumer will accept to obtain the product. Price does not necessarily always refer to monetary cost; it can also include opportunity, energy, and psychological costs. Price in UPM education is clearly an issue for those responsible to the public, such as Cooperative Extension workers.

## Marketing UPM

The marketing approach has been used extensively by the corporate UPM sector. UPM-related commercial products are routinely tested before they are released to consumers. Information associated with product development and testing usually bears a proprietary stamp and is therefore unavailable for use by other concerns, private or public. Although use of marketing techniques has been demonstrated in the corporate UPM arena, these techniques have received relatively little attention by workers in public institutions. Given the potential of this approach and the need to more effectively

educate and transfer and exchange UPM technology to wider audiences, it seems only logical that public institutions, especially land grant universities, should explore the use and application of marketing techniques.

In the following sections we review two current marketing research studies in UPM that are being supported by public institutions. These case histories reveal the diverse techniques available in marketing, all of which are designed to improve the process of transferring and exchanging technology. Two extension studies, an extension/commercial endeavor and a public health project that partially reflect the marketing approach are examined in later sections.

**California Consumers and Pesticide Information.** Several U.S. national surveys of public attitudes and practices toward pests and pesticides (referenced in Frankie et al., 1981) indicate that most urbanites (47-55%) who buy pesticides purchase them in grocery stores. Using this information as a base, Frankie, Koehler, Grace, and Hesketh (in prep.) entered into a cooperative arrangement with the Safeway grocery chain to advertise a free University of California publication on pesticides in selected stores in northern California. The goals of this pilot project were twofold: to use an in-place corporate structure to advertise (promote) Cooperative Extension information (the product); and to survey, via a questionnaire (the place), the recipients of the free information (price) to assess their reactions to the publication.

The pilot study was conducted in 26 Safeway stores in the San Francisco Bay area during the months of July and August 1983. Postage-paid coupons were placed on pesticide shelves to advertise the free Extension publication. Almost 400 requests were received; 210 people returned the questionnaire that accompanied the request form and publication. Requests and returned questionnaires were viewed as a clear demonstration of the feasibility of using this outreach method.

Regarding the second goal, a great deal of information was generated by the survey: the ways people generally acquire information about pests and pesticides and ways they transfer it to others; why people send for the information; topics not adequately covered in the publication; and specific shortcomings. These data are currently being used to construct a more comprehensive questionnaire that will be used in a future and larger program to distribute and assess the same information, with the ultimate goal of producing consumer-tested information on pesticides. Both the completed and planned studies actively use marketing principles to exchange information concerning urban pesticide use.

**California Freeways: Iceplant Scales and UPM.** Another type of UPM marketing approach is currently being tested by Peter Wilton and his colleagues

at the University of California, Berkeley. Using a large data base on the biology, ecology, and management of two scale species on iceplant along California freeways (Tassan, Hagen, and Cassidy, 1983; Washburn and Frankie, 1985), Wilton and colleagues have developed a marketing scheme to test and deliver a package of tailor-made UPM information on scale identification, monitoring, and management to freeway workers and their supervisors in the California Department of Transportation (Caltrans). The initial phase of the research consisted of a survey designed to assess needs, interests, knowledge, expertise, and competing priorities of selected decision makers in the Caltrans organization (a form of audience segmentation and analysis). The descriptive survey provided information on the kinds and amount of UPM information needed by the various employee levels. It also allowed for an assessment of the mode of packaging the UPM information. (Initially, top level administrators of Caltrans and the university had decided to package the UPM information in a pocket brochure. The subsequent survey clearly demonstrated this was a relatively unpopular mode. Rather, a cassette-narrated slide show was the overwhelming choice of Caltrans personnel.)

The second phase of the marketing research, currently underway, is designed to test the following questions: how Caltrans staff members form their initial expectations of the usefulness of information; how to measure the effects of individual biases, training and beliefs on the search for, and use of, available information; what impact exposure to different types of information will have on the policymaker's evaluation of additional information of this type, and on the policymaker's performance of the tasks assigned. In the second phase, selected policymakers in Caltrans will be exposed to relevant UPM information and questions via a computer-interactive data-collection and information-exposure system on video display terminals. This will allow controlled measurements of individual judgments of the usefulness of information for particular task assignments, both before and after exposure to the iceplant scale-related information, with a view toward identifying the type of information most useful and appropriate to particular work assignments.

In this study again, marketing principles such as audience segmentation and design of product and place have become integral and indispensable to the design of an active educational UPM program.

## **Cooperative Extension and Marketing**

Extension education in and of itself refers to reaching out from some organization, institution, group, or individual to some audience. As such, the Cooperative Extension Service must obviously be included among those groups that practice extension (including the extension of UPM). The methods currently employed by cooperative extension illustrate traditional educational

practices, that is, "education as selling." However, cooperative extension can also serve as a model for exploring the potential for pursuing the "education as marketing" approach to UPM.

Since 1914, with the Smith-Lever legislation, the Cooperative (or Agricultural) Extension Service has become the major extender of land grant university information throughout the nation and its territories. The educational philosophy of extension is based on the principle that educational activities should meet the problems, needs, and interests of those for whom they are planned (Seay, 1983; Harrington, 1977). Traditionally, extension personnel, particularly county-based agents, not only deliver information (an education as selling function) but also try to determine the needs and wants of the users (an education as marketing function). All too frequently, however, the former approaches are much better represented than the latter. Koehler (1983), in addressing the topic of information transfer in UPM from a perspective broader than cooperative extension, reinforces the reality that most extension work to date has been from an "education as selling" position.

**Minnesota Program.** Ascerno's work (1981 and pers. comm. [1984]) is moving in the direction of "education as marketing." Over a period of six years, Ascerno and his associates at the University of Minnesota Cooperative Extension Service have used computers and telephones for managing information on urban pest problems in that state. To date the system has been adapted to receive and respond to inquiries about pests from individual clients (homeowners and agency representatives) and store this information for future analysis. The system also allows for immediate public feedback on its information. For example, some urbanites may experience difficulty in locating a recommended product or may not be completely satisfied with the outcome of a particular control recommendation. Call-backs from enough urbanites provide the incentive for an immediate revision of the recommendations. Thus, in a sense extension information is being tested by the public. Currently, the information is used in a predictive manner to develop extension information releases (e.g., early warning pest alerts) and to plan special information sessions with pest control operators and arborists. In 1983 the computer-based system was modified for the purposes of predicting expected daily pest problems, which were then disseminated (or marketed) to specific audiences.

**Michigan Program.** Michigan State University's Project Pest is a second example of the use of marketing approaches to extend UPM information. Project Pest, viewed by its authors as a community development program in integrated pest management (IPM), was conducted during 1980-1982 in a suburban community in Michigan. Specialists in the fields of entomology,

forestry, and community development joined with citizen representatives of a local township to increase awareness of alternatives to pesticides for management of pest problems in the yard (Fear et al., 1983). The first part of the program consisted of administering a questionnaire to assess the relevant needs of suburban homeowners in the township. The second phase involved community residents in the process of designing and implementing an education program for alternative approaches in UPM. It was assumed that resident involvement would eventually lead to a more realistic program based on existing community attitudes and practices. A pest management manual and a demonstration walking tour were developed to inform residents of their pest problems and ways to deal with them within an IPM framework. In the final phase, survey methods were used to evaluate the education effort. In general, most participating residents expressed overwhelming satisfaction with all project activities (Lambur et al., 1982; Lambur, 1983).

There is a basic compatibility between the philosophy of extension (programs based on obvious user needs and wants, close proximity of the user and the educator) and marketing principles (audience segmentation, determination of what the audience needs and wants). Conceptually, it should be but a short step for extension professionals to efficiently move to better utilize marketing approaches for UPM. Practically, the step will be much larger. Tradition and organizational constraints oftentimes work against such gains. For example, the notion that extension, because of its limited resources, must maintain a low profile in disseminating urban information is a strong deterrent to innovative extension UPM efforts. We maintain that extension personnel must adopt a more aggressive attitude toward outreach as an initial step for more effective and widespread information transfer. The marketing approach offers extension an opportunity for taking this first step.

## **CLIENT AND PRACTITIONER EDUCATION**

Among the potential audiences for UPM are the urban public in general and specific public and private audiences such as managers and employees of public hospitals, schools, parks, military bases, restaurants, and other businesses. Furthermore, the practitioners of UPM, particularly pest control operators (PCOs), constitute another significant audience. At the same time, practitioners may also serve as providers of UPM education to their clients. This dual role and responsibility creates particular challenges.

### **Client Education: Residential**

PCOs are often, if not generally, perceived as chemical vendors. Clients, such as homeowners, merchants, and hospitals who call for pest control,



usually expect the PCO to treat the problem with chemicals. This image developed after World War II as synthetic organic pesticides became the solution to most pest problems. Although tactics used by PCOs have evolved into a complex set of procedures, including the use of chemicals, the public has retained the antiquated image of the PCO (Levenson and Frankie, 1983). Few homedwellers, commercial clients or PCOs expect the PCO to be an educator.

The role of a PCO as an educator provides advantages for clients and the PCO. If the client comprehends the need for sanitation, mechanical exclusion, and habitat modification, then a pest management program has a better chance of success (Frankie, Granovsky, and Magowan, 1981; Todaro, 1984). Even the best conceived pest management program can be ineffective if a client does not understand that the client's role in a program makes a difference.

Client cooperation leading to more effective pest control translates into fewer complaints and call-backs for the PCO. Levenson and Frankie (1981) report that when Texas homedwellers received appropriate education about the habits of cockroaches, they accepted that occasional cockroaches in their homes did not necessarily constitute a breeding infestation. Instead of spraying immediately, homedwellers were advised to modify their personal habits related to food handling, storage, and disposal, make sanitation improvements, use boric acid selectively, and in some cases set out additional cockroach traps (Piper and Frankie, 1979). These homedwellers were also less likely to attribute such occasional intrusions to inadequate PCO service. An additional, but less obvious benefit to PCOs is the enhancement of their professional image associated with their educational role.

In general, client education can be accomplished directly through (1) individual personal contact (with sales or service personnel) or (2) organized seminars or workshops, and indirectly through (3) distribution of informational written material and (4) advertising. The first two items tend to be the most influential techniques; the third is a useful complement to the first two; and the fourth is important in introducing the company and its concepts to potential clients. Advertising can also be used to publicize the concept of the PCO as a professional pest manager selling expertise and informed service rather than solely chemical applications. The PCO should be portrayed as a consultant as well as a service person (Anon., 1981).

A new and relevant educational service to homeowners for the care and maintenance of ornamental and turf problems has been evolving on an experimental basis at the University of Maryland over the past several years. Under the direction of John Davidson, horticultural students are hired as scouts for detecting, diagnosing, and making corrective recommendations on yard pest problems. The service, which is conducted on a frequent basis during the growing season, is designed to provide homeowners with written

and graphic materials (e.g., yard maps of vegetation) for ongoing detections and suggested remedial actions where necessary. The homeowner is obliged to take care of the actual treatments. A general overview and assessment of the information transfer and exchange program is provided in Davidson, Hellman, and Holmes (1981) and in Holmes and Davidson (1984). (See also *J. Arboriculture*, vol. 10, no. 3, 1984).

More recently, John Holmes has moved the research effort into the commercial arena by offering private practitioners software packages for computerized detection, diagnosis, and recommendations. Although this new commercial service offers the latest in technology for ongoing assessment of pest problems and exchange of UPM information, the question of wide acceptance among current practitioners remains an open question (Raupp and Noland, 1984).

The idea that PCOs must play some educational role is, of course, not new. However, education of clients has received insufficient emphasis. One particular difficulty concerns the recognition of clients who will most likely respond to education. Some clients care little about participating in a UPM program, and this kind of attitude does not encourage the PCO to attempt client education, but there are sufficient responsive clients to make education a useful aspect of PCO programs. The PCO must set the tone for this educational exchange as clients tend to be more receptive to service representatives who present a professional appearance and attitude and can intelligently answer questions and provide solutions.

## **Client Education: Commercial**

In dealing with commercial accounts, the PCO has a double problem: he must contact both hourly workers and administrators. No matter how well informed, subordinate individuals usually follow a manager's lead. On the other hand, uninformed workers are unable to successfully implement the policies of knowledgeable managers. Therefore, the success of an effective UPM program can be impeded by either employees or management. Education must occur throughout the chain of command.

Some pest control companies organize seminars and workshops for their clients' employees. Unfortunately, these seminars may involve only lower-level employees and may not be given very high priority by clients. Ideally, workshops should involve all levels of management and should be held regularly. Indeed, it would be appropriate for cities, counties, or states to require employees in certain industries (such as those involving food handling) to participate in approved pest management courses. In this case, cooperative extension, health departments, and other public agencies should take an active role in providing or approving such instruction.

As an adjunct to personal contacts and informational workshops or as part of an advertising campaign, written material can be useful. Currently, a large body of brochures and pamphlets produced by the federal government, cooperative extension, PCO organizations, and manufacturers and distributors of pest control products already exists. Some of these materials are in the public domain and can be freely duplicated and others can be purchased at nominal cost. One PCO in the San Francisco Bay area (Grace, unpub.) has found his customers to be very receptive to a booklet distributed by Cooperative Extension titled "So, you've just had a structural pest control inspection" (Wilcox and Wood, 1980).

A classic example of effective education at the commercial (and residential) levels was recently reported by William Todaro (1984) for an IPM cockroach program in a Pennsylvania public housing project. In this program, Todaro placed considerable emphasis on educating PCOs, managers, and tenants of the project, in addition to testing new insecticides, modifying habitats (cockroach) within units, and developing a routine surveillance schedule. In one phase of the educational program, a booklet on cockroaches received testing (marketing) for effectiveness by the tenants. Todaro summarized the program by stating, "In public housing, pest management is a more realistic goal than pest extermination. But insecticides alone will not control cockroaches. The real key to pest management in these complexes is an involved manager and an aware, informed tenant who knows his responsibilities and who is obliged to be involved in the program." Gene Wood used a similar approach for managing cockroaches in urban housing developments in Maryland (National Research Council, 1980).

### **Client Education: Retail Sales**

Retail distributors of pesticides are in a somewhat different position than PCOs. Usually, a one-time sale of goods is involved rather than a continuing service. However, retail distributors also benefit from consumer education. Informed consumers appear to discriminate in the short term among pest control products, choosing those best suited to certain pests or situations and thus purchasing a greater variety of products (Davidson, Hellman, and Holmes, 1981). More effective pest management and reduced toxicant exposure due to limited and specific pesticide applications are the concomitant benefits to the educated client and to the general public.

### **Practitioner Education: Initial Certification**

Urban pest control has traditionally required little formal education of its practitioners. PCOs commonly entered the field with few skills and received

their training on the job. Several texts are available to assist those in the industry with insect identification and choice of control methods (Cornwell, 1973; Ebeling, 1975; Mallis, 1982; Truman, Bennett, and Butts, 1976; Young, 1983), and new information is disseminated through journals, technical bulletins from trade associations, and annual conferences sponsored by the industry or universities.

Increased regulation of the pest control industry has created the need for more formalized approaches to education and training. PCOs in all 50 states are now required to pass written examinations to be certified to commercially apply pesticides. With two current exceptions, these certification programs are administered by state agencies and meet or exceed standards established by the U.S. Environmental Protection Agency (C.F.R., 1982a). In Nebraska and Colorado, the U.S. EPA currently examines and certifies PCOs and will continue to do so into 1985, although Colorado recently enacted appropriate regulatory legislation.

Minimum EPA examination standards require aspiring PCOs to demonstrate a broad knowledge of pests; label comprehension; pesticide safety; pest control chemicals, equipment, and application techniques; environmental protection; and applicable state and federal laws and regulations. Some state-administered examinations also require knowledge of business law. Obviously some amount of formal preparation is necessary to pass such a comprehensive examination. It is a rare individual who could acquire all the required knowledge from practical experience alone.

If practical experience alone is no longer sufficient, then where are the employees of today obtaining the training necessary to become the certified PCOs of tomorrow? In a more general sense, where is anyone interested in a career involving urban pest management—whether as a PCO, consultant, employee of a public agency, or even an architect or builder—able to obtain the necessary background?

We addressed this question in a recent study involving state pest control regulatory officials. Although other studies in recent years have queried industry representatives (Frankie, Granovsky, and Magowan, 1981) and the public at large (Frankie and Levenson, 1978; Robinson, 1980; Frankie et al., 1981; NPCA, 1982; Bennett, Runstrom, and Wieland, 1983; Levenson and Frankie, 1981; Byrne et al., 1984) about pest control practices and attitudes, none has collected comprehensive information on state policies and regulations since 1974 (Smythe and Williams, 1974; U.S. Environmental Protection Agency, 1974).

Using the membership list of the Association of Structural Pest Control Regulatory Officials (ASPCRO), a letter of inquiry was sent in February 1984 to the agency in each state charged with regulating structural pest control practices. This letter asked what education and experience were required

for PCO licensing or certification, whether education could substitute for any required practical experience, whether continuing education was required for license renewal (recertification), and what sources of instruction were available to potential and established PCOs in that state. This initial inquiry was followed by additional letter and telephone contacts to achieve 100% response (50 states). Some results from this survey are presented in Tables 8-1 and 8-2; others are discussed elsewhere by Grace and Frankie (1985).

There appears to be an assumption among those who regulate the industry that training in UPM can be obtained at colleges and universities. The 23 states that require industry experience of applicants for PCO licensure will accept college-level courses in entomology or related fields in lieu of at least part of that experience (see Table 8-1). Unfortunately, there is currently little justification for this assumption of equivalence, given the lack of urban emphasis in most university pest management curricula. Of ten major U.S. universities (Arizona, Cornell, Louisiana State, Michigan State, North Carolina State, Purdue, Rutgers, Texas A&M, University of California at Berkeley, and University of California at Riverside) censused by us in 1984, only Purdue currently offers a complete pest management program with an urban, rather than agricultural emphasis. Several universities currently are developing curricula with an urban orientation; but most commonly, either a single course in urban pest problems is offered on a regular basis (Arizona, University of California, Riverside) or on an irregular basis (Louisiana State University) or no urban-oriented course is offered (Texas A&M University). However, some of these same universities (Texas A&M University) offer extensive and well-developed curricula in agricultural pest management. The University of California, Berkeley, has taken an intermediate position: although only one regular class in UPM is offered, relevant electives are suggested for interested students. It would appear that those regulating the pest control industry are unaware of the dearth of information on UPM currently offered at the university level, or they might not so readily equate a course in entomology with professional experience.

The educational background necessary for a career in UPM simply cannot be satisfied solely by exposure to courses in agricultural pest management. Although the pest management principles are the same, the ecosystems are different (c.f. Gill and Bonnett, 1973; Stearns and Montag, 1974; Frankie and Ehler, 1978; National Research Council, 1980; Sawyer and Casagrande, 1983). The UPM curriculum of Purdue University recognizes this difference and provides a background in technical and in business areas (accounting and economics). However, even this well-developed curriculum places little emphasis on the distinguishing feature of UPM: the human element. We maintain that UPM students should also be exposed to course work in urban planning and development, public policy, business and marketing, landscape

**Table 8-1. Number of states (50 respondents) with specific requirements for licensing/certification of urban pest control operators.**

<i>Requirement</i>	<i>Number of states</i>
Examination	50 <sup>a</sup>
Completion of specific state-approved training	3 <sup>b</sup>
Experience	23 <sup>c</sup>
Continuing education/retraining required for license renewal or recertification	40 <sup>d</sup>

<sup>a</sup>Currently administered by U.S. Environmental Protection Agency in Colorado and Nebraska.

<sup>b</sup>California and Rhode Island (all categories), New Mexico (termite only).

<sup>c</sup>Education accepted in place of at least some experience in all states.

<sup>d</sup>Alaska requires re-examination.

architecture, and communications. These social-oriented courses provide the necessary background for dealing professionally with at least some of the human aspects of pest problems. To be aware at the outset of the need for appropriate social input may also provide for substantial long-term savings in dollars and time on the part of all concerned parties (Merritt, Kennedy, and Gersabeck, 1983; Roberts and Dill, 1983).

Extension programs, considered bridges between the university and the public, are sources of training in UPM. Indeed, 13 of the states responding to our ASPCRO survey did specifically mention the Cooperative Extension Service as a source of training materials or courses on pest control practices for those entering the field (see Table 8-2). On the other hand, 5 of those responding specifically mentioned that the Extension Service does not offer any training in UPM in their state. Is this disparity another manifestation of confusion over the nature of the Extension Service commitment to the urban public?

Closer ties between experiment stations and extension personnel and the state agencies regulating urban pest control practices would be of mutual benefit. Effective training can only be provided if regulatory officials communicate their goals for the industry to educators. This relationship could readily be formalized by officially designating specific extension personnel as advisers to state agencies and contact persons for the urban pest control industry. Such an arrangement might necessitate the creation of new extension positions in some states, but perhaps expenses could be shared among the entities involved in this collaborative effort. Realistically, the pest control industry must be expected to assume part of the financial burden, perhaps through their state and national trade associations.

On a brighter note, it should be mentioned that the pest control industry itself has taken the initiative in creating training programs. Industry training efforts can be categorized as: (1) in-house training programs organized by

**Table 8-2. Number of state pest control regulatory officials (50 respondents) mentioning specific sources of initial training and retraining materials/courses.**

Training source	Number of states	
	Initial licensing/ certification	License renewal/ recertification
Cooperative extension	13 <sup>a</sup>	16
Pest control industry	3	7
Purdue University		
correspondence course	2	1
Colleges	1 <sup>b</sup>	1 <sup>c</sup>
State regulatory agency	3	7

<sup>a</sup>Five regulatory officials specifically mentioned that the cooperative extension service does not offer training in their states.

<sup>b</sup>Community colleges in New York State.

<sup>c</sup>University of Kentucky.

pest control companies for their own employees; (2) training seminars or materials prepared by manufacturers and distributors of pest control chemicals and supplies; (3) training seminars or materials sponsored by trade associations; and (4) courses offered to the industry at large by private purveyors of educational materials.

In an industry consisting of many small businesses, only the larger pest control companies can justify the expense of organizing thorough in-house training programs. Many smaller companies, however, are able to take advantage of the programs prepared by distributors of pest control supplies. These educational programs, originally initiated as a service to their customers, appear to have grown into a minor industry of their own. For example, at least one western distributor (Van Waters and Rogers) now offers a separate catalogue of 35mm slides of urban pests and their biology. In several states, this "minor industry" has advanced a step further with the appearance of private businesses devoted exclusively to presenting courses and distributing educational materials.

New Mexico, Rhode Island, and California are the only states currently requiring that applicants for PCO licensure complete specific state-approved training courses regardless of their experience or educational background. In New Mexico eight hours of approved training are required for those wishing to become certified in termite control, while in Rhode Island all applicants must complete a one and a half day workshop in conjunction with the required examination. California PCO license applicants must complete state-approved courses in pesticides, pest identification and biology, contract law, rules and regulations, business practices, and (depending upon the type of license desired) fumigation safety or construction repair.

The intent of the strict educational requirements in California is to estab-

lish a common information base and to ensure that all PCO license applicants have a minimum amount of appropriate training (W. W. Wilcox, pers. comm.). Along with the materials available from private suppliers, self-paced extension courses have been developed to meet state criteria. However, since the Structural Pest Control Board of the state of California has no formal advisory relationship with professional educators, a quality control problem exists. It is difficult to ensure effectiveness and uniformity among the available training programs. In fact, there may be basic differences in the precepts of those providing training: the self-paced extension courses were created independently on a contract basis by university personnel, while private providers of educational materials are usually associated with the pest control industry. The former may be overly academic, and the latter excessively concerned with practical and business aspects. A formal coordinator (possibly an extension employee) is needed to provide structure to this rather chaotic situation, to match the needs of the industry and regulatory agency with the facilities of the university.

### **Practitioner Education: Recertification**

In establishing criteria for federal approval of state regulatory programs, the U.S. EPA (C.F.R., 1982*b*) states that "the state plan should include ... provisions to ensure that certified applicators continue to meet the requirements of changing technology and to assure a continuing level of competency and ability to use pesticides safely and properly." Currently, 40 states require individuals applying pesticides commercially to attend periodic retraining sessions (variously designated as courses, seminars, or workshops) or to be re-examined to renew their certification. This general requirement conforms to EPA guidelines for the recertification of pesticide applicators at the federal level (on federal property). However, rigor and renewal periods vary substantially from state to state. Maryland, for example, requires attendance at one training seminar annually; Michigan requires attendance at one seminar every 3 years; Alabama requires attendance at two training sessions every 3 years; New Mexico requires completion of 8 hours of training every 5 years; and Maine requires 15 hours of training every 5 years.

Although continuing education (or re-examination) is required by most states, federal regulations do leave open the possibility of other options. For example, Tennessee offers PCOs three recertification choices—attendance at a workshop, re-examination, or presentation of an affidavit stating that the individual has received and is familiar with current informational material issued by the state Department of Agriculture. Since recertification procedures are suggested by the EPA rather than mandated, we would expect to see even more liberal alternatives in states traditionally wary of over-regulation.



Of course, the value of even the strictest educational regulations will depend entirely on the effectiveness of the educational programs offered.

Programs intended to meet recertification criteria are offered by the same variety of public and private sources as offer initial training (see Table 8-2). Once again, coordinators with a background in education could play a valuable role in maintaining the quality of these various educational efforts.

### **Practitioner Education: the Future**

If stricter educational requirements and continuing education in UPM are to realize their potential as dynamic educational processes rather than simply as static bureaucratic requirements, university-based educators must take a leadership role. Cooperative extension (or other university) professionals should be specifically designated as advisers/consultants to the urban pest management industry, advisers/consultants to state (and federal) regulatory agencies, and coordinators on a state-wide basis of UPM educational efforts.

University UPM programs must be developed that focus on the diversity of urban ecosystems and recognition of UPM's unique socioeconomic and psychological elements. Universities have traditionally led the way in the development and promotion of new technologies. However, educational programs tailored to fit legislated regulations are inherently static, with the aim of maintaining the status quo at a certain acceptable level. If UPM is recognized as a dynamic and changing field, then educational programs should lead, rather than follow, industry trends and legislative regulatory efforts. This outcome can only be accomplished through marketing management approaches to analysis of industry and regulatory needs, implementation of appropriate educational "answers" to these needs, and continual reassessment of all factors impinging on the resultant educational exchange.

### **SUMMARY RECOMMENDATIONS**

1. Research specialists developing urban pest management programs should make an active effort to include education and information exchange components into their management schemes. These components, which should be planned at the outset of the research program, should be built around an understanding of the needs, wants, expertise, limitations, and competing priorities of the relevant audiences. In the few urban IPM programs where this approach was adopted, the results were highly satisfactory (Fear et al., 1983; Todaro, 1984). In some cases where these components were not planned and developed at the outset, final implementation of research results was significantly impaired (Merriitt, Kennedy, and Gersabeck, 1983).

2. New ways of aggressively reaching the public with UPM information should be researched and implemented by the Cooperative Extension Service. It has been clear for many years that current methods are not adequate for the task of effectively transferring and exchanging extension information (Kielbaso and Kennedy, 1983). Extension services interested in exploring the marketing approach for developing new UPM educational materials should seriously consider contracting with or hiring marketing specialists. Cooperative arrangements with marketing faculty at universities also offer a viable means for entering this field.

3. Appropriate curricula should be developed at land grant institutions offering UPM as one track of specialization in their pest management programs. Modern curricula in UPM are needed to better prepare university-trained practitioners for dealing with urban pests and the people-oriented environment the pests occupy. One additional benefit of such training may be the preparedness for dealing with pest problems before they occur, that is, by participation in the urban planning and development process. Excellent examples of how well-trained UPM practitioners may become involved as consultants to urban development projects are presented in Roberts and Dill (1983) with regard to mosquito and forest pest problems.

4. Professional urban pest managers should be encouraged to assume a greater role as educators as part of their general pest control service. Educational materials for distribution to clients and, more important, training in effective communication and application of educational principles should be provided to practitioners by both public institutions (e.g., land grant universities and cooperative extension) and industry associations. Agencies licensing PCOs should credit and, ideally, require such training as part of the continuing education needed for renewal of certifications and licenses.

5. In states where land grant university personnel do not already have formal and well-defined relationships with state regulatory agencies and the UPM industry, formal liaison positions should be developed. These should be permanent faculty or extension positions with specific responsibilities extending beyond occasional consultation services. Where new positions must be created, financing could be arranged jointly by the parties involved, possibly through allocation of a portion of professional licensing fees. Responsibilities would include: development and regular review of certification and recertification educational (and examination) criteria; development and critical review of curricula and educational materials intended to satisfy these criteria; coordination of university UPM curricula with industry (and public) needs by means such as the development of UPM student intern programs; and development of programs and materials to foster and facilitate client education by PCOs and other urban pest managers.

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