

UNIVERSITY-BASED INSTRUCTION FOR GENERAL PEST CONTROL TECHNICIANS

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Abstract In 1999, the Master Pest Control Technician (MPCT) course was created at Clemson University, (USA: Clemson, South Carolina 29634) to provide training for general pest control technicians. The course was designed to provide detailed, practical instruction about household and structural pest control in private and commercial accounts using an integrated pest management (IPM) model. Initially the MPCT course was taught in a distance-learning format over ten weeks. The course evolved into an intensive five-day course on the campus of Clemson University. The intensive program provided more contact hours and provided more face-to-face lectures and hands-on laboratory exercises, including insect identification, insect collecting, inspection procedures, application technology, safety measures and regulatory requirements. Based on our experience with the MPCT course, we concluded that on-campus traditional university Extension programming with face-to-face interactions provided the best educational atmosphere for pest control technicians, the instructors, and the participants.

Key Words pest management training

INTRODUCTION

Planning, organizing, coordinating and conducting training programs for pest management professionals in South Carolina are major components of the Urban Entomology program at Clemson University in Clemson, South Carolina 29634, USA. Programs are designed to fulfill the education needs of pest management professionals who approach control solutions with an integrated pest management (IPM) mindset. Adopted from agriculture in the 1980s, IPM practices for household and structural pest control has evolved slowly but has become an integral part of professional pest management (Kramer, 2004). Integrated pest management is multifaceted and may rely on both chemical and non-chemical common-sense measures to control pests in any situations (Hedges, 1995). In addition, the development of baits and other targeted treatments requires technicians to understand the biology and behavior of the pests they are hired to control (Appel and Benson, 1995; Benson and Zungoli, 1989; Kramer, 2004; Paysen et al., 2004; Smith et al., 1997). This means the pest control technician in the field must have an in-depth understanding of the pests and pesticides available, and also the decision-making skills to know when pesticide application is necessary and when other IPM techniques should be used. The need for this knowledge requires that the modern pest control technician engages in an on-going, life-long learning (Lupo, 2005).

Many entomology departments at land-grant universities in the United States have a unique capacity to provide training to pest management professionals, often through Cooperative Extension programs. A trend over the last ten years has been to provide university-based programs via distance education often by modern electronic technologies such as the Internet or satellite communication systems (Moore and Kearsley, 1996). In addition to having the capabilities to provide distance learning, university entomology programs often have insect collections, insectaries, laboratory equipment and classrooms available during the summer months for instructional purposes.

In 1999, the Master Pest Control Technician (MPCT) course was developed by the Urban Entomology program at Clemson University to provide training for pest control technicians working in the field. Initially, the MPCT course was designed as a distance education program with a focus on IPM using a series of satellite-uplink video lectures, enhanced with one-on-one laboratory sessions and a course web site. However, based on evaluations by participants, the MPCT course developed into a one-week intensive summer program on the campus of Clemson University. This paper discusses the development, evolution and impact of the MPCT course.

MATERIALS AND METHODS

Though the MPCT course was created mainly for the general control technician, pest control company owners and managers, sanitarians, and in-house pest control professionals for the military, schools and industrial sites were also invited to enroll. For the first two years (1999 and 2000), the course was conducted over a ten-week period from September to November. Seven, two-hour lectures were delivered to participants by satellite-video link from the Clemson campus to three county Extension offices located in the Upstate, Midlands and Coastal regions of South Carolina. The lectures were presented live from 14:30 to 16:30 on Wednesday afternoons, with the participants traveling to the closest office to watch the lectures. Attendees were generally no more than one hour away from a viewing location. Most lectures were presented by Clemson entomologists, but the lecture on pest control regulations was presented by a South Carolina regulatory specialist and the lecture on providing service was presented by a pest management professional (Table 1). In addition to satellite lectures, all participants met for three face-to-face laboratory sessions at the Clemson University Sandhills Research and Education Center, centrally located in Columbia (Midlands region), South Carolina. The laboratory sessions were held at the beginning, midpoint and final session of the course. Laboratory sessions were conducted for six hours, from 9:30 to 15:30 (Table 1). To enhance communications between the instructors and participants in between lectures and laboratory sessions, a web site was developed using WebCT (Blackboard Inc., 1889 L Street NW, 11th Floor, Washington, DC 20036, USA). The web site provided chat rooms for the participants and means for instructors and participants to exchange course information.

Table 1. Week and topic for sessions offered during the Master Pest Control Technician course by Clemson University, Clemson, South Carolina 29634, USA during 1999 and 2000. The three, six-hour laboratory sessions were held face-to-face with participants in Columbia (Midlands region), South Carolina and the seven, two-hour lectures were delivered to participants by satellite-video link from the Clemson campus to three county Extension offices located in the Upstate, Midlands and Coastal regions of South Carolina.

| Week | Topics |
|------|--|
| 1 | Laboratory Session: Introduction; Pretest; Basic Entomology; Urban Pest Management Literature, Concepts and Programs; Homework I Assigned |
| 2 | Satellite Lecture: Cockroaches |
| 3 | Satellite Lecture: Ants |
| 4 | Satellite Lecture: Stored Product Pests and Rodents |
| 5 | Laboratory Session: Cockroaches; Ants; Stored Product Pests and Rodents; Termites and other Wood Destroying Organisms (brief overview); Homework I Review; Homework II Assigned |
| 6 | Satellite Lecture: Stinging Insects, Spiders |
| 7 | Satellite Lecture: Nuisance and Biting Flies |
| 8 | Satellite Lecture: Fleas, Other Ectoparasites and Entomophobia |
| 9 | Satellite Lecture: Pest Control Regulations; Providing Service |
| 10 | Laboratory Session: Application Equipment; Inspection Techniques; Identification of Fleas and Other Ectoparasites; Stinging Insects and Spiders; Homework II Review and Final Exam |

Initially the MPCT course cost \$425 USD. Each student received a National Pest Management Field Guide which served as the text book, a laboratory notebook containing pest control publications, resource materials, keys to pests, and a 16x power hand lens for field identifications. To provide quality training, enrollment for each MPCT class was capped at 20 participants. For the satellite lectures, additional participants were allowed to view the lectures for \$20 USD per lecture but these additional participants were not considered part of the MPCT class and did not attend laboratory sessions.

All MPCT participants who attended the entire program received recertification credits toward their South Carolina pest control license. To be considered a Master Pest Control Technician at the end of the course and receive a Clemson University certificate and a MPCT patch, students had to earn an average grade of 70% or higher on two homework assignments and a final exam. The homework assignments required the participants to (I) develop an IPM program for a problem account at their work and (II) inspect a structure and properly collect a pest, identify the species if possible, and recommend proper control measures for the pests collected. The final lecture and laboratory exam involved a written test of multiple choice questions and a practical component of pest identification for all the lectures and laboratory sessions. Grades were compiled as follows: 20% for homework assignment I, 30% for homework assignment II and 50% for the final lecture and laboratory exam.

In 2001, the delivery of the MPCT course changed. Based on evaluations by participants from the 1999 and 2000 classes, the MPCT course became a five-day intensive course on the campus of Clemson University. In 2001 and 2002, participants arrived on the Clemson campus on a Monday morning and stayed until the following Friday afternoon. Starting in 2003, to allow more time for instruction, MPCT participants arrived on the Clemson campus on Sunday afternoon began started class work early on Monday and continued until Friday afternoon. In general, the on-campus format provided over 40 hours of training, contained more subject content than the distance-education course, and allowed participants more opportunities for hands-on experiences (Table 2).

Table 2. Day and topic for sessions offered during the Master Pest Control Technician course by Clemson University, Clemson, South Carolina 29634, USA from 2001 through 2007. The course was held on the campus of Clemson University.

| Day | Topics |
|-----|--|
| 1 | Registration; Welcome/Objectives/Participant Survey; Pretest; Basic Entomology; Literature/Resources; Urban Pest Management; Computer Laboratory/Finding Information on the Internet; Homework Assignment I |
| 2 | Homework I Review; Ant Lecture and Identification Laboratory; Cockroach Lecture and Identification Laboratory; Homework Assignment II |
| 3 | Tour and Inspection of Campus Buildings for Pest Problems; Rodent Lecture and Identification Laboratory; Pest Control Regulations; Stored Product Pest Lecture and Identification Laboratory; Application Technology and Equipment; Evening Urban Entomology Research Laboratory Tour |
| 4 | Homework II Review; Wood Destroying Organisms; Stinging Insects and Spiders; Wood Destroying Organisms, Stinging Insects and Spider Identification Laboratory; Nuisance and Biting Flies; Fleas and Other Ectoparasites and Entomophobia; Flies, Fleas and Ectoparasite Identification Laboratory; Evening Review for the Final Exam |
| 5 | Insecticides; Providing Service; Final Review; Final Exam, Laboratory Practical and Program Evaluation |

The on-campus MPCT course was conducted in June or July when space in Clemson dormitories was available. Participants stayed in private dorm rooms with semi-private bathrooms and had meals provided by the campus dining halls. For 2001 and 2002, registration cost for the MPCT remained at \$425 USD with all the same course materials provided and with the cost of the dormitory and meals for the week included. In 2003 registration for the MPCT increased to \$500 USD and in 2007 the cost for the MPCT course increased to \$750 USD to help cover the sharply increasing costs of providing the program.

At the end of each MPCT course, participants were provided an opportunity to critique the program with an evaluation of open-ended questions and a series of statements to which they responded using a five-level Likert scale (Babbie, 1990). The Likert scale used was: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree. Where appropriate, the mean Likert score of the statements pertaining to the overall content of the MPCT course and the corresponding standard deviations

were calculated. Questions that dealt with the program facilities, such as the dorms or dining halls are not reported. Not all questions were asked every year because changes were made to the evaluations as the course changed. The MPCT course was not taught in 2006 due to low enrollment.

RESULTS AND DISCUSSION

Between 1999 and 2007, 124 individuals took the MPCT course. Based on participant feedback and performance, we feel the MPCT course has been a success. Many participants were from mid-size to small pest control companies that do not have the resources and technical staff of large companies. The MPCT course provided in-dept training for technicians on IPM practices, safety and regulatory requirements. Though not all questions from the evaluations are presented, the most pertinent questions to the overall impacts of the course are presented in Table 3. For example, when asked "I am pleased that I participated in this course," participants since 1999 have given an overall mean score of 4.96 ± 0.06 . When asked "I think this course should be continued," participants have given a mean overall score of 4.93 ± 0.08 .

Table 3. Selected statements from the evaluations of the Master Pest Control Technician course at Clemson University, Clemson, South Carolina 2964, USA, between 1999 and 2007. Participants were asked to respond to each statement using a Likert scale with: 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree.

| Evaluation Statements | Mean Likert Score (\pm st. dev.) |
|--|--|
| I am pleased that I participated in this course. | 4.96 (0.06) |
| I think this course should be continued. | 4.93 (0.08) |
| Overall, this course provided useful information. | 4.94 (0.06) |
| My knowledge of chemical control strategies for general pests has increased. | 4.54 (0.27) |
| My knowledge of non-chemical control strategies for general pests has increased. | 4.53 (0.23) |
| I expect to adopt new control practices as a result of attending this course. | 4.47 (0.31) |
| My knowledge of safety for those involved in handling, storage, delivering and applying chemicals has increased. | 4.12 (0.33) |
| My knowledge of regulatory issues relating to chemicals and their uses has increased. | 4.20 (0.24) |
| I am better prepared to comply with regulations related to chemicals and their uses. | 4.27 (0.32) |

Even though participants liked the MPCT course throughout the years, the first two classes in 1999 and 2000 preferred the face-to-face laboratory sessions over the satellite-video lectures. In 1999 and 2000 participants were provided the following statement on their evaluations: "Three-hour video lectures would be acceptable if lab materials were offered at the same time, deleting the need for face-to-face labs." Participants gave a mean response of 1.74 ± 0.91 . Initially we found this response surprising. We thought participants would prefer a distance learning course that would allow them to stay at home and work over the duration of the program. However, that was not the case. Participants felt travel time to a satellite-video location was too time consuming and the original MPCT course was disruptive to their weekly work schedules over the ten-week period. Participants found the web site for the course helpful, but it did not offer most benefits they sought from the program. The 1999 and 2000 participants preferred the face-to-face labs, the amount of material and the interchange with their colleagues and the instructors during the three, six-hour labs. In at least two cases, participants went into business together after the MPCT course based on their interactions during the laboratory sessions. In addition, the pest control technicians in the MPCT course seemed to retain

information more readily from hands-on training, especially with insect identification, than via the remote training. Based on this experience and the recommendations of the participants, the MPCT course was changed to the five-day, intensive program on the campus of Clemson University in 2001.

Even though participants were away from their homes and work for almost a week, most attendees preferred being on the Clemson campus. Outside of the intensive classroom and laboratory sessions, the participants were able to eat together, use the library and the university computer system. Participants were graded independently and did separate projects; however they also tended to help one another with their practical homework assignments. When presented with the statement, "I think the homework assignments were valuable exercises," participants gave a mean response of 4.26 ± 0.91 . Socializing and working closely together on homework assignments and studying, they benefitted from new found friendships in addition to the knowledge they gained.

For unknown reasons, fewer than ten individuals registered for the MPCT course in 2006. We speculate that rising gasoline prices, an increase in the cost of doing business for pest management companies and a need for more promotional materials to better advertise the MPCT course were some of the factors contributing to the low enrollment. The MPCT was not conducted in 2006, as low enrollment would have made the time, effort and finances for the course too costly. After 2006, we increased our advertisement for the program, and for the 2007 MPCT course it became necessary to increase the registration fee to \$750 due to rising costs. After not having the course in 2006, we were concerned the fee increase would negatively affect enrollment in 2007, but 17 individuals registered for the 2007 course and there were no complaints about the cost. For many technicians, their employers paid the registration fees. Some companies made technicians initially pay the cost of the program, but reimbursed them if they passed the course. One company had technicians initially pay for the cost of the MPCT course but paid them double the registration fee if they passed. These individuals were highly motivated to learn.

The MPCT course was a challenge for the participants. However, all 124 participants since 1999 passed the course with a final grade of 70% or higher. Every effort was made to help attendees learn the material and know where to find information to help them with their daily jobs. It has become an honor in South Carolina for a technician to have the MPCT certificate and patch from Clemson University on their uniform. In turn, the MPCT course has created a cadre of pest control technicians in South Carolina that are great resource who are supporters of the Urban Entomology program at Clemson. Though distance education has a place in higher education, especially in reaching large audiences, our experience with the MPCT course found that on-campus, traditional university, Extension programming with face-to-face interactions provided the best educational atmosphere for pest control technicians and forged strong relationships between the instructors and the participants.

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REFERENCES CITED

- Appel A.G. and E.P. Benson. 1995.** Performance of Abamectin Bait Formulations Against German Cockroaches (Dictyoptera: Blattellidae). *J. Econ. Entomol.* 88(4): 924-931.
- Babbie, E. 1990.** Survey Research Methods. Second Edition. Wadsworth Publishing Company. Belmont, California, USA
- Benson, E.P. and P.A. Zungoli. 1989.** Smoking Out the Smokybrown. *Pest Control.* 57(11): 38-40.
- Hedges, S.A., 1995.** Entomo-Logical Solutions. *Pest Control Technology.* 23(7): 84, 88, 92-93.
- Kramer, R. 2004.** Integrated Pest Management. In: Hedges, S.A. and Moreland, D., eds. *A. Mallis Handbook or Pest Control*, Ninth Edition. GIE Media Inc., Cleveland. OH.
- Lupo, L. 2005.** The Technician of the Future. *Pest Control Technology* 33 (9): 29, 32, 34-36.

- Moore, M.G. and G. Kearsley. 1996.** Distance Education, A Systems View. Belmont, California: Wadsworth Publishing Company.
- Paysen, E.S., P.A. Zungoli, E.P. Benson and J.J. Demark. 2004.** Impact of Auxiliary Stations in a Baiting Program for Subterranean Termites (Isoptera: Rhinotermitidae). Florida Entomologist. 87(4): 623-624.
- Smith, L.M., A.G. Appel, T.P. Mack, G.J. Keever and E.P. Benson. 1997.** Evaluation of Methods of Insecticide Application for Control of Smokybrown Cockroaches (Dictyoptera: Blattidae). J. Econ. Entomol. 90(5): 1232-1242.