

Pest Control Practices in North Carolina Public Schools

A Report compiled by

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Summary

This report presents the results of a survey conducted to discover the important pests found in public schools of North Carolina and how they are controlled by the contracted pest control companies. Also reported are the attitudes of pest management professionals (PMPs) towards Integrated Pest Management (IPM) and the extent to which they use IPM in schools.

Ants, cockroaches, rats and mice, respectively, were considered to be important pests. Ants and cockroaches mainly controlled using scheduled pesticide applications, while rats and mice are controlled by trapping. Our findings also show that PMPs and their company's standard operating procedures determine whether or not to use pesticides to control pests and how frequently they are applied in schools. Sixty two percent of the companies defined IPM correctly, but very few companies practice IPM in strict sense. Although IPM is not practiced a majority of companies incorporate some IPM procedures into their pest control operations.

To reduce frequency of pesticide application and increase adoption of IPM in schools, pest management professionals (PMPs)/technicians should be targeted with a convincing IPM educational program. The program should clarify and distinguish IPM from conventional pest control, and provide information and resources that can be used by PMPs to formulate and implement IPM programs in North Carolina schools.

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Introduction

Pest management in public schools is an issue of nationwide concern to parents, school occupants and environmental groups. According to recent research, children are especially at risk to pests and the pesticides used in school pest control programs. To safeguard the health of children and school occupants, parents' organizations and environmental groups have pressured schools to control pests using alternatives that are effective and safer around children.

Integrated Pest Management (IPM) is a proven approach that can effectively control pests and also minimize the risk of pesticide exposure to school occupants. IPM is a comprehensive pest management approach that combines multiple control methods e.g. biological, physical, mechanical, cultural and chemical tactics that are effective, economical, environmentally sound, and socially acceptable in a comprehensive plan to prevent and solve pest problems. IPM emphasizes the use of non-chemical control methods but reduced-risk pesticides and/or formulations can be applied when necessary. Other components of IPM include routine inspections, regular monitoring, pest identification, identifying conditions that contribute to pest problems, record-keeping (to track problems and prevent recurrence) and evaluation of pest management actions.

A 1999 survey of facilities managers of North Carolina public schools revealed that licensed pest control companies have contracts to perform some level of pest control in 96% of the school units that were surveyed (Lilley, 1999). The facilities managers were however generally unaware of the pest control practices of contracted Pest Management Professionals (PMPs). It is clear that PMPs play a very important role of controlling pests in schools however the lack of information on their current pest management practices hinders the assessment of their educational needs and ultimately the successful implementation of IPM. The goal of this survey was to investigate the current practices of pest control companies that contract public schools in North Carolina and to provide information that can be used to guide outreach activities aimed at promoting the adoption and implementation of IPM by PMPs and schools.

Objectives

1. To identify the important pests in schools and the current pest control practices.
2. a.) To find out how PMPs define IPM and assess their attitudes towards IPM.
b.) To investigate the extent to which IPM has been adopted by PMPs.
c.) To discover the constraints to adoption or implementation of IPM in schools.

Methodology

A pre-survey was conducted in January, 2002 to identify pest control companies that contract with public schools in North Carolina. County school board offices were contacted to provide similar information where the pre-survey was unsuccessful. Eighty four companies or company branches enlisted for this survey.

The survey instrument was formulated and it adapted some questions from previous surveys by the North Carolina Cooperative Extension Service (NCCES) to Interior-scape operators in Southern United States (Prichard 1999) and to Maintenance supervisors of public schools in North Carolina (Lilley 1999). A pretest was done to correct any flaws in the questionnaire. Thereafter, telephone interviews were conducted during regular work hours in April, 2002 by the Center for Urban Studies at North Carolina State University. The respondents were company owners or managers with various levels of education: 40% had a high school or some college education, 52% had a 2-year and 4-year college education while 8% held masters level education. The response rate was 87% (n = 84). The responses to survey questions are presented as percentages where the list of options was read to the respondents and as number of companies where the choice probable responses were not read (Appendix I).

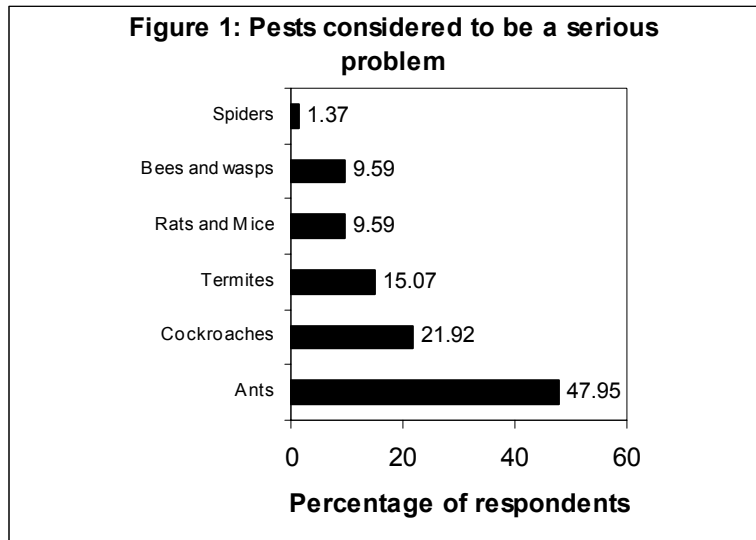
Results

Pests and Pest Control Practices

Serious Pests: The pests considered to be a serious problem in public schools of North Carolina are ants, cockroaches, termites, rats and mice, flies and spiders respectively in the order of importance (Fig. 1). A majority of responding companies (73 %) are required to control pests only in specific areas of the school buildings mainly cafeterias (49 companies), bathrooms (29 companies), stores and mechanical rooms (12 companies) and rooms with complaints (10 companies). Other areas include administrative offices, classrooms, gyms, science and computer rooms and entryways.

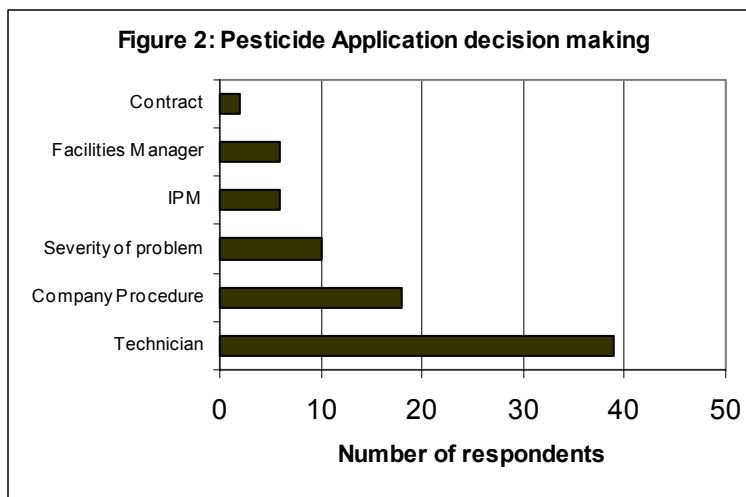
Current Pest Control Methods: Pests are controlled predominantly using pesticides. Ants are controlled using pesticides by 94% of the respondents who consider ants to be a serious problem. One hundred percent of the companies that consider cockroaches, wasps and bees a serious problem use pesticides. The pesticide application methods that were commonly used include baiting (73.97%), crack and crevice treatments (43.84 %), baseboard sprays (12.33 %), dusts (4.11 %) and space sprays (1.37 %) respectively. Trapping was mainly used to control spiders

(100 %), flies (100 %) and rats and mice (57.14 %). In addition, >70% of the companies recommend structural repairs, screening, sanitation and proper food storage to improve the effectiveness of pest control efforts.



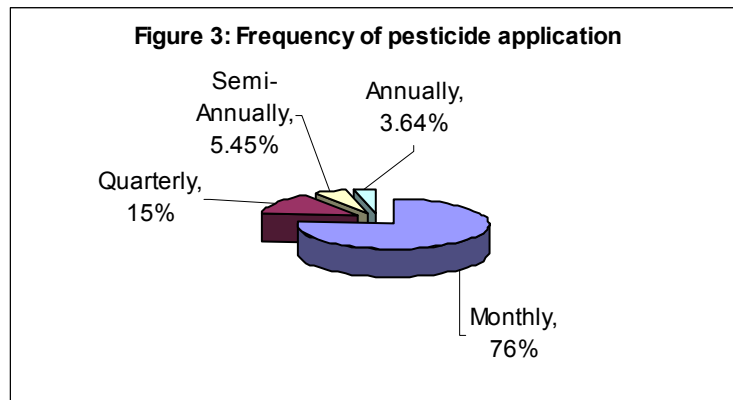
Decision-making for Pest Control

Pesticide Application Procedures: It is evident from this survey that the PMPs or technicians (39 companies) and the company’s standard operating procedures (18 companies) determine whether or not to control pests in a school using pesticides. The recommendations of facilities managers, contract requirements and the level of pest infestation also play an important role in deciding whether or not to use a pesticide (Fig. 2).



But once a decision is reached to apply pesticides in the school, 100% of the companies base their selection of pesticide product on safety to children, 86% on effectiveness and 81 % on formulation. Contract requirements (68.5%), ease of application (51%) and price are less important criteria in the selection process.

Seventy five percent of the respondents apply pesticides on a regular schedule. Of the respondents that apply pesticides on a schedule, 76% of the companies apply pesticides monthly, 15% apply quarterly and 9% applying semi-annually and annually (Fig. 3).



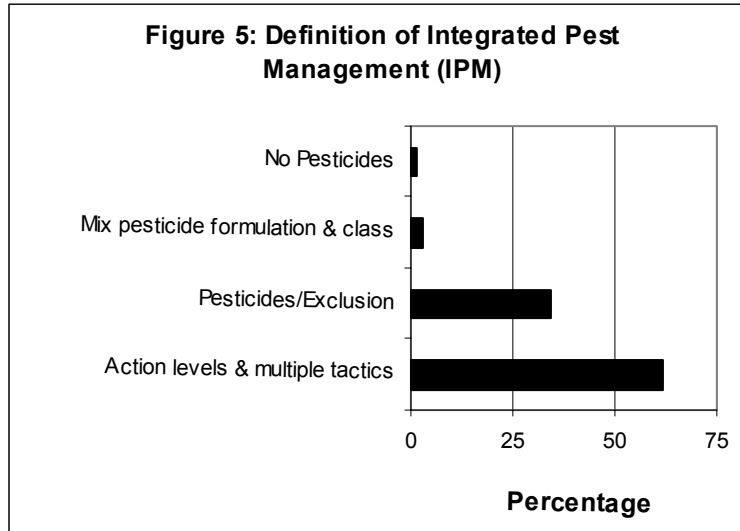
In order to safeguard the health of school occupants, pesticides especially sprays should be applied when the structures are unoccupied. Eighty five percent of the respondents apply pesticides on school days. Of the companies that apply pesticides on school days, 98 % treat after school hours when the school buildings are unoccupied while 2% treat school buildings at anytime whether the buildings are occupied or not.

Integrated Pest Management (IPM) definition and Use

IPM definition: Sixty two percent (62%) of the respondents defined IPM as the practice of controlling pests based on action levels and using a combination of pest control tactics. Thirty four percent of the respondents defined IPM as the combination of pesticides (including baits) and pest exclusion measures to solve pest problems, 3% described IPM as mixing or rotation of pesticide formulations and classes, while 1% of the respondents thought IPM was pest management with absolutely no use of pesticides (Fig. 5).

IPM use: Eighty nine percent of the respondents claimed to use IPM in schools. IPM was said to be very effective in solving pest problems by 69% of the companies that presumably use IPM but

only somewhat effective to 31% of the companies.



According to 47 respondents, the main reason for adopting IPM in the schools was child safety, while 33 companies adopted IPM because it is very effective. Of the 10 companies that do not use IPM in the schools, 4 claimed that their current methods are effective and 3 that IPM was time consuming. The other reasons given for not adopting IPM include no demand for IPM, lack of information on IPM and that IPM is not needed because baits are effective and available.

Eighty nine percent of the companies that correctly defined IPM also reported that they use IPM in the schools they service however they also apply pesticides on a calendar schedule. Only 7% of the respondents that reported use IPM defined IPM correctly and do not use pesticides on a calendar schedule. This shows that PMPs do not practice IPM but use IPM type practices in their operations e.g. recordkeeping, notification, regular training, inspection and monitoring, pest ID, sanitation and structural modifications.

Notification and Record-keeping

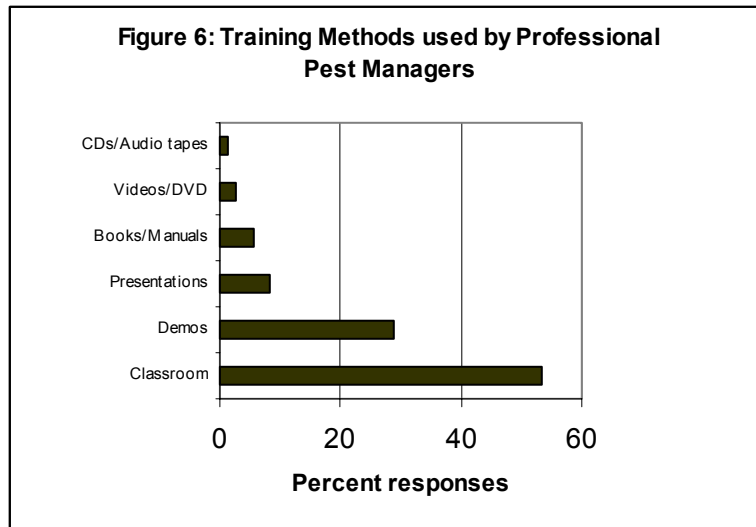
Notification: Although the structural pest control law of North Carolina does not require pest control companies or pesticide applicators to notify schools when pesticides are/will be applied, 81% of the respondents provide notice before or after applying pesticide. They notify the school Principal/Assistant Principal (34 companies) or the Maintenance supervisor (34 companies) or the Cafeteria manager (8 companies) before or after pesticide application. Why do they choose to provide notice of pesticide application? Sixty four percent of the respondents provide notice to safeguard the health of children, 10% to reduce the liability to the company and 9% because they

are required county regulations. Five percent of the companies notify schools because it is a component of a school IPM program.

Record-Keeping: Most companies maintain various kinds of records of pest control activities in schools. Ninety nine percent of the respondents maintain records of pesticide applications because they are required by the structural pest control law of North Carolina. In addition, they maintain records of regular inspections (83%), monitoring (76%), pest sighting (72%), and records of recommendations for sanitation improvements and structural repairs (69%).

Training and Pest control Information Sources

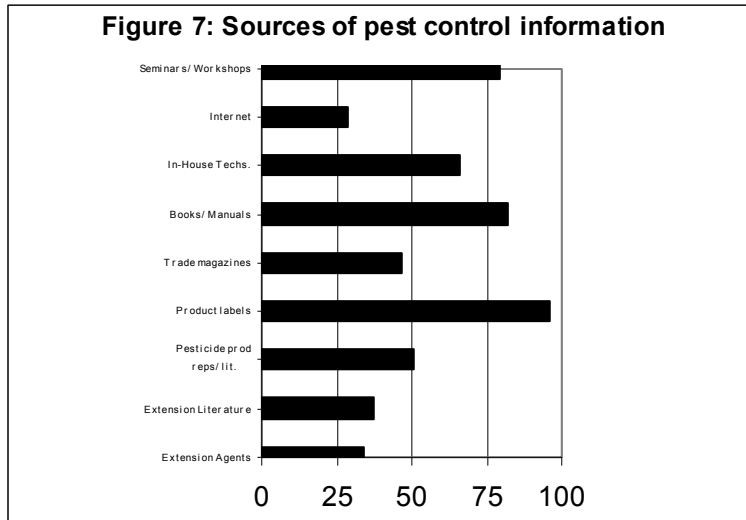
Training schedule and Preferred Methods: The employees/employers of pest control companies are trained in pest management monthly by 45% of the respondents, weekly by 29%, bi-monthly, semi-annually and annually collectively by 26% of the respondents. Classroom type teaching (53%) and hands-on demonstrations (29%) are the preferred methods of training (Fig. 6).



More than 95% of the respondents highly emphasized training in pest identification, inspection and monitoring, chemical control, tools and equipment, and regulations and liability. Ninety percent of the respondents highly emphasize IPM and record keeping, while 75% and 60% emphasize non-chemical control and sales and marketing respectively.

Sources of Pest Control Information

The three most important sources of pest control information to PMPs are pesticide product labels (96%), books and manuals (82%) and seminars/workshops (79%), the three least important are extension literature (37%), extension agents (34%) and the internet (28%) while in-house technicians (66%), product representatives and literature (51%) and trade journals (46%) are of moderate importance (Fig. 7).



Conclusions

The survey data indicate that PMPs are extremely important in the decision making process for pest control and are relied upon by school administrators to control pests in schools. Pest control companies and their technicians decide the pest control methods to use, whether or not to apply pesticides, what pest control products to use and how frequently to apply pesticides in school buildings. Pest Management Professionals (PMPs) supposedly use IPM in schools but at the same time apply pesticides on a predetermined schedule, contrary to the principles of IPM. Many companies however apply some IPM procedures in their operations.

Pest control companies rely on their standard operating procedures and technician's evaluations of pest situations to determine whether or not to use pesticides in the schools. According to this survey, contract requirements do not significantly affect the frequency of pesticide applications in schools, neither do contracts appear to determine whether or not pesticides will be used, but contracts determine the choice of pesticide products to apply.

There is need for education to clarify the definition of IPM and to distinguish IPM from conventional pesticide-based pest control. Pest Management Professionals should be targeted

with a convincing educational program to effectively increase the adoption of IPM and reduce the frequency of pesticide use in North Carolina schools.

Recommendations

Based on the findings of this survey we recommend:

- That training programs consisting of workshops/seminars and hands-on demonstrations be formulated to train PMPs in the principles and practices of IPM. The program should present information targeting important pests (ants, cockroaches, termites, bees & wasps, rats & mice and flies) and problem areas e.g. cafeterias, bathrooms, stores, etc.
- Pest control companies should be provided with information on IPM in the form of manuals, books/booklets, fact sheets and other printed material that can be readily implemented to reduce the frequency of pesticide applications in school buildings.

References

Lilley, S. J. 1999. North Carolina Public Schools Pest Management Survey. N.C. Coop. Ext. Serv. N.C. State Univ., Raleigh, NC. 14p.

Pritchard, P. 1999. A survey of Interior-scape firms in the southeastern united sates. Urban IPM Crop Science Department, NCSU. 15p.

Appendix I

Tabulation of survey results

1. Which of the following pests do you consider to be a serious problem, somewhat a problem or not a problem in the schools that you are serving this year (N = 73)?

Pest	Serious (number/73)	Somewhat	Not a problem
Cockroaches	21.92 (16)	49.32	28.77
Ants	47.95 (35)	39.73	12.33
Termites	15.07 (11)	57.53	27.40
Bees & Wasps	9.59 (7)	42.47	47.95
Pantry pests	0	24.66	75.34
Flies	4.11 (3)	35.62	60.27
Ticks	0	9.59	90.41
Spiders	1.37 (1)	53.42	45.21
Rats & Mice	9.59 (7)	65.75	24.66
Pigeons & birds	0	23.29	76.71
Other (Paper mites, Bats Snakes, Millipedes)	0	87.5	12.5

2. If a serious problem what primary method does your company use to control the pest? (Percentage of companies that use vacuuming, trapping, caulking, heating, screening or Pesticides).

Pest	Pesticides	Caulking	Trapping	Vacuuming
Cockroaches	100			
Ants	94.29	2.86		2.86
Termites	90.91	9.09		
Bees & Wasps	100			
Flies			100	
Spiders			100	
Rats & Mice	28.57	14.29	57.14	

3. With so many options available for solving pest problems, how do you decide whether or not to use a pesticide at a school site?

	Number of companies
Contract requirement	2
Company Standard procedure	18
Technician evaluates need	39
Facilities manager recommendation	6
Other	
Survey & monitor IPM	6
Severity of pest problem	10
Last resort	4

4. How often do you use the following pesticide application methods in school buildings (N=73)?

	Most of the time	Some of the time	Never
Baits	73.97	23.29	2.74
Baseboard/surface sprays	12.33	26.03	61.64
Crack/Crevice treatments	43.84	49.32	6.85
Space sprays	1.37	20.57	78.08
Dusts	4.11	42.47	53.42
Tracking powders	0	8.22	91.78
Other pesticide application methods			
Thermo traps?	58.33	41.67	0
Glue-boards	58.33	41.67	0

5. How important are the following factors when selecting pesticides for use in school buildings (N=73)?

	Very important	Somewhat important	Not important
Effectiveness	86.30	13.70	0
Formulation	80.82	15.07	4.11
Price	16.44	39.73	43.84
Safety to children	100	0	0
Contract requirements	68.49	23.29	8.22
Ease of application	50.68	34.25	15.07

6. Does your company service all or only specific areas (N=73)?

All areas	27.4
Specific areas only	72.6

7. What specific areas do you service?

	No. of companies
Cafeterias	49
Science rooms	3
Computer labs	2
Bathrooms	29
Gymnasiums	5
Administration offices	8
Classrooms	7
Other areas (N=35)	
Entryways	3
Teacher lounge	3
Storerooms	3
Lockers	1
Storage/Mech. Rooms	12
Rooms with complaints	10
Exterior grounds/perimeter	1

8. Do you follow a regular schedule of pesticide application (N=73)?

Yes	75.34
No	24.66

9. How frequently are pesticides applied in school buildings (N=55)?

Monthly	76.36
Quarterly	14.55
Semi-annually	5.45
Annually	3.64

10. Do you apply pesticides on school days, weekends or holidays (N=55)?

School days	84.93
Weekends/holidays	15.07

11. When during a school day are pesticides applied (N=73)?

Anytime during the day	1.61
Before school begins	1.61
After school hours	97.77

12. Do you provide notice to the school when pesticides will be applied (N=62)?

Yes	80.82
No	19.18

13. Do you provide notice before or after applying the pesticide (N=59)?

Before	88.14
After	1.69
Both before and after	10.17

14. Who do you notify when pesticides applications are to be made?

	Number of companies
Principal/Assistant principal	34
Maintenance supervisor	34
Students, parents, school personnel	2
Other	
Cafeteria Manager/Food Serv. Dir.	8

15. What is your company's primary reason for providing notice of pesticide applications since it is not required by the law (N=59)?

Reduces liability to our company	11.86
Safeguards health of children	64.41
County requires notification	9
Other (Part of IPM)	5

16. Do you maintain records of pest control activities in schools (N=73)?

Yes	95.89
No	4.11

17. Do you maintain any of the following records (N=70)?

	Yes	No
Pest sightings	72.86	27.14
Inspection records	82.86	17.14
Monitoring records	75.71	14.29
Pesticide applications	98.57	1.43
Recomm.for repairs, etc.	68.57	31.43
Other		
Termite contracts	25 (1)	
Sanitation records	50 (2)	
Notes from monthly visits	25 (1)	

18. How do you describe IPM (N=73)?

Pesticides + pest exclusion	34.25
Mix or rotate pesticides formulations and classes	2.74
Absolutely no pesticides	1.37
Action levels and combination of tactics	61.64

19. Does your company use IPM in schools (N=73)?

Yes	89.04
No	10.96

20. How effective is IPM in solving pest problems (N=65)?

Very effective	69.23
Somewhat effective	30.77

21. Why has your company adopted IPM (Number of companies)?

Profitable	3
Child safety	47
Pesticide resistance	2
Less Liability	5
Mandate by school	6
Info available	2
Effective	33
Good knowledge	7
Other reasons:	
Minimize pesticide use	2
Environmental safety	6
NCSU faculty	2

22. Why has your company not adopted IPM (N=10)?

Too costly for schools	0
Too complicated to do	0
Time consuming	3
Current methods work OK	4
No demand for IPM	1
Lack of Information	1
IPM is not Effective	0
Other reasons	
Not needed (only termites)	1
Not needed, only bait	1

23. Which areas of training are highly emphasized in formal training (N=73)?

	Yes	No
Pest ID	97.26	2.74
Inspection and Monitoring	95.89	4.11
Non-Chemical control	75.34	24.66
Chemical control	94.52	5.48
Tools and Equipment	94.52	5.48
Building and construction	84.93	15.07
Recordkeeping	89.04	10.96
Sales and marketing	60.27	39.73
Regulations and Liability	97.26	2.74
IPM	90.41	9.59
Safety	1 (25%)	
Customer relations/comm./satisfaction	3 (75%)	

24. In what primary way do your employees receive training (N=73)?

Presentations	8.22
Hand-on demos	28.77
Videos/DVDs	2.74
CDs/Audio tapes	1.37
Books/Manuals	5.48
Classroom	53.42

25. How frequently do you or your employees receive training (N=73)?

Weekly	28.77
Monthly	45.21
Bi-monthly	1.37
Quarterly	6.85
Semiannually	8.22
Annually	9.59

26. How important are the following sources of pest control information to your company (N=73)?

Information source	Important	Somewhat	Not important
Extension agents	34.00	42.47	23.29
Extension Literature	36.99	36.99	26.03
Prod. Reps./Lit.	50.68	42.47	6.85
Product Labels	95.89	4.11	0
Trade magazines	46.58	50.68	2.74
Books/Manuals	82.19	17.81	0
In-House Techs.	65.75	27.4	6.85
Internet	28.77	46.58	24.66
Seminars/Workshops	79.45	19.18	1.37
NCDA	1 (Freq)		

27 Does the bidding process favor the lowest bidder (N=73)?

Yes	80.52
No	17.81
Do not Know	1.37

28. For the purposes of pest control, have you recommended any of the following (N=73)?

Recommendation	Yes	No
Structural repairs	71.23	28.77
Screening	76.71	23.29
Sanitation	93.15	6.85
Proper food storage	87.67	12.33
Other		
More education about pest control	4	
Exterior landscape	3	
Equipment replacement	1	

29. How cooperative are school in making the recommended changes (N=73)?

Very cooperative	38.36
Somewhat cooperative	53.42
Not cooperative	8.22

30. What is the highest level of education you have completed (N=73)?

High School	26.03
Some college	13.70
Two-year college/Vocational degree	28.77
Four-year College degree	23.29
Masters degree	8.22
Ph.D.	0