

FINAL REPORT ~ FHWA-OK-18-01

IMPLEMENTATION OF PESTICIDE APPLICATOR CERTIFICATION SCHOOLS AND CONTINUING EDUCATION WORKSHOPS

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January 2018



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IMPLEMENTATION OF PESTICIDE APPLICATOR CERTIFICATION SCHOOLS AND CONTINUING EDUCATION WORKSHOPS

FINAL REPORT ~ FHWA-OK-18-01
ODOT SP&R ITEM NUMBER 2156 TASK 1

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16. ABSTRACT The herbicide applicator training program of the Oklahoma Department of Transportation (ODOT) consists of initial pesticide applicator training schools, certification testing, sprayer calibration workshops and on-going yearly continuing education sessions. Four pesticide applicator certification schools were conducted by Oklahoma State University (OSU) extension staff in fall of 2016 to train a total of 84 ODOT participants. Eighty-three of the attendees at these workshops took the Core exam with 60 people eventually passing for a 72.3% overall success rate in passing the core exam. Sixty-three people tested for certification in category 6 (right of way) while 53 people passed that exam yielding an eventual 84.1% pass rate. Overall, 53 of 83 people eventually passed both the core and category 6 exams yielding a 63.9% overall success rate in producing category 6 certified applicators in 2016. In 2017, 665 Certified Applicators were providing with certified pesticide applicator continuing education training. Records of participation in ODAFF approved CEU programs by ODOT personnel were furnished to ODAFF as well as the ODOT Field Divisions, the Maintenance Division Headquarters and the Materials and Research Division. Participants gained CEU credits and knowledge on various Integrated Pest Management (IPM) and Integrated Vegetation Management (IVM) products, topics and techniques. This increase or maintained operational knowledge of the participants should insure continued effective vegetation management skills.			
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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
meters NOTE: volumes greater than 1000 L shall be				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa

APPROXIMATE CONVERSIONS FROM SI UNITS

SYMBOL	WHEN YOU KNOW	MULTIPLY BY	TO FIND	SYMBOL
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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1.0 INTRODUCTION

The Oklahoma Department of Transportation (ODOT) continues use of an integrated roadside vegetation management (IRVM) program to provide cost-effective management of vegetation on roadside right-of-way [7]. This effort involves proper vegetation selection, installation and post-installation management. After vegetation installment, management involves selective mowing and weed control [7] and occasional re-establishment on a limited basis. The ability to properly select and apply herbicides for right-of-way weed control is a technical skill that is not taught in primary or secondary school. This specialized training is not otherwise available to ODOT through any current in-house training, nor through the normal non-contractual services provided by the Oklahoma Cooperative Extension Service.

In 1995 ODOT developed the Herbicide Program Policy Directive D-504-1 [9]. The Directive includes requirements that all personnel applying herbicides must be Certified Pesticide Applicators under the requirements administered by the Oklahoma Department of Agriculture, Food and Forestry (ODAFF). The Directive [9] also requires anyone involved in herbicide application attend an annual training program pertinent to vegetation management.

Because of Directive D-504-1 and the fact that there is some turnover in ODOT roadside vegetation management field staff each year, an on-going pesticide applicator training and certification effort is necessary for new applicators. The annual continuing education workshops are necessary not only due to this directive but also due to changes in state and federal rules/regulations, new herbicide product development, new pesticide application equipment, product patent expiration and subsequent generic product offerings, changes in industry product marketing agreements, changes in products being awarded the state competitive bid contract, and lastly, evolving weed problems.

2.0 OBJECTIVES

1. To conduct yearly herbicide applicator certification schools that will help prepare new ODOT personnel for subsequent pesticide applicator testing and certification.
2. To incorporate a testing date by ODAFF at the end of each certification school or as soon as is feasible.
3. To provide each of the eight ODOT Field Divisions with yearly herbicide applicator continuing education (CEU) workshops.

3.0 BACKGROUND AND SIGNIFICANCE OF WORK

For the past 31 years, annual pesticide applicator certification schools have been conducted on an “as-needed” basis as a part of the joint roadside vegetation management and training projects between ODOT and Oklahoma State University (OSU). These schools provide timely initial training of ODOT personnel attempting to become Oklahoma Certified Pesticide Applicators.

Under Task 1 in our FY2017 Joint Project Proposal covering *Roadside Vegetation Management Training and Consultation*, we proposed to continue to offer these schools which help prepare ODOT personnel for the rigors of two 100 question exams that must be passed for ODOT personnel to become certified in Oklahoma Category 6 (Right-of-Way). Certification in Category 6 (Right-of-Way) qualifies the applicator for use of pesticides for public road maintenance, power line maintenance, railroad right-of-way, storage tank areas, and other similar areas [8]. Certification in Category 5 (Aquatic) qualifies the applicator for treatment of weeds in standing or running water in man-made and/or natural impoundments, streams, etc. [8]. Category 6 certification excludes public health activities (e.g. mosquito control) and water in totally closed systems.

ODOT Field Divisions have hosted yearly CEU workshops in Category 6 (Right-of-Way) for the last 31 years. We proposed and were contracted to conduct these continuing education (CEU) workshops under Task 1 in our FY2017 Joint Project Proposal covering *Roadside Vegetation Management Training and Consultation*. These workshops have annually supplied current and vital information to approximately 656 Certified Applicators in ODOT each year. There may continue to be a need for some applicators to also obtain training in Oklahoma Category 5 (Aquatic Pest Control). This is due to the fact that some applicators need to treat aquatic sites located on lands managed by ODOT.

4.0 PURPOSE

The purpose of the Pesticide Applicator Certification schools was to train participants to understand the basics of integrated pest management (IPM) as well as to become Certified Applicators by passing the designated tests. After gaining a fundamental understanding of IPM and becoming a Certified Applicator, the individual is usually ready to be given specific assignments by in-house ODOT mentors. Trainees are prepared to be successful at managing vegetation and weeds on Oklahoma roadsides. The initial Pesticide Applicator Certification prepares the new Certified Applicators for participation in annual pesticide applicator continuing education (CEU Workshops) so that they can comply with ODOT policy as well as maintain their certification in Oklahoma. Also, the initial training prepares the new applicator for herbicide application equipment calibration workshops offered by the OSU RVM program under Task 4 of the Project 2156 proposal.

5.0 IMPLEMENTATION OF PESTICIDE APPLICATOR CERTIFICATION SCHOOLS AND TESTING

5.1 PREPARATIONS FOR FEDERAL FY2017 CERTIFIED APPLICATOR SCHOOLS

Division and Maintenance Engineers were contacted by phone and email in spring through fall of 2016 to estimate i) the number of participants for fall 2016 certification schools as well as ii) determine suitability of proposed specific training dates and locations of training. During this same time period ODAFF was contacted to determine the availability of personnel to administer the Oklahoma Certified Pesticide Applicator core and category specific applicator exams. Upon obtaining this information from all parties, the dates, times and locations of the four certification schools were set and the necessary information was provided in emails sent in late-summer and fall of 2016 to ODOT Division and Maintenance Engineers and ODAFF. Additionally, in those emails the Division and Maintenance leaders were asked to secure two training documents for their participants using the 2017 order form for Pesticide Applicator Certification Manuals from Oklahoma State University Central Mailing Services via the internet at: <http://pested.okstate.edu>. The email also contained information explaining the *Oklahoma Pesticide Laws & Rules* manual is no longer available for order and must now be downloaded and printed from the following website <http://www.oda.state.ok.us/forms/cps/cpl.pdf> or picked up at the ODAFF Headquarters in Oklahoma City. The specific training materials to be acquired by the Divisions for their personnel were i) *Applying Pesticides Correctly* (Revised November 2012), ii) the Category 6: *Right-of-Way Study Guide* (Revised July 2009) and iii) the *Oklahoma Pesticide Laws & Rules* (Revised September 11, 2017).

5.2 PESTICIDE APPLICATOR CERTIFICATION SCHOOLS

Four Pesticide Applicator Certification Schools were presented to ODOT staff in fall of 2016. These Federal FY 2017 Schools were conducted on October 25-27 at the Division 4 Headquarters (Perry); November 15-17 at Division 5 Headquarters (Clinton), November 29 – December 1 at the Kiamichi Technology Center (Atoka) and December 6 – 8 at ODOT Division 1 Headquarters (Muskogee). The number of participating ODOT staff at the certification school locations were 16, 29, 20, and 19, respectively, for a total of 84 participants. The 84 ODOT staff trained in the initial certification schools in FY2016 compares with a total of 100 ODOT participants in Federal FY2016 [6], 79 in FY2015 [5], 103 in FY2014 [4], and 128 in FY2013 [3].

The first and second day of each of the three schools were conducted from 8:30 a.m. to 3:30 p.m. The schools were held using a classroom-style set up. Presentation of information was via an oral lecture using Smart Board peripheral display technology (SMART Technologies, Calgary, AB T2L 1Y1, Canada), Microsoft Power Point visual aids, and printed handouts. Participants were encouraged to ask questions during the lecture. A question and answer segment was provided immediately following each topic

lecture. Instructors for the schools were Mr. Clayton Hurst, B.S., Extension Associate, and Mrs. Lydia Calhoun, B.S., Extension Assistant.

5.3 SPECIFIC TOPICS OF PESTICIDE APPLICATOR CERTIFICATION SCHOOLS

Topics included in each of the three ODOT Certified Applicator Schools were: integrated pest management (IPM), IPM terminology, state and federal rules and regulations, pest identification, mechanical and cultural pest management strategies, understanding pesticide labels and safety data sheets (SDS), personal protective equipment (PPE), pesticide selection, pesticide application techniques, spray system technologies, environmental protection, application recordkeeping, proper pesticide storage and disposal and how to obtain pesticide applicator continuing education. These topics were drawn from the three key training manuals that Division and/or Maintenance Engineers had acquired for their employees in advance of the training. The training included and was consistent with the information in the three training manuals discussed under section 5.1 of this report. OSU personnel also handed out copies of supplemental information that would be useful to ODOT personnel as they assumed their roll in ODOT vegetation management activities following initial certification as Oklahoma Pesticide Applicators.

5.4 APPLICATOR TESTING AND ACHIEVEMENT OF CERTIFICATION

On the third day of each of four FY2017 schools, pesticide applicator testing was conducted from 9:00 a.m. - 12:00 p.m. by representatives of the Oklahoma Department of Agriculture, Food and Forestry (ODAFF). ODOT personnel first took the core exam [8] which consisted of a multiple choice written exam containing 100 questions. ODAFF representatives then scored the participants' core exam. Personnel that passed the core exam were next allowed to take the 100 question multiple choice written category specific exam [8]. The category specific exam of most interest to ODOT was the Category 6 (Right-of-Way) exam. However, in some years there are ODOT personnel that also take the Category 5 (Aquatic Weed Control) exam.

Passing the core exam and category specific exam is required in order to become a Certified Pesticide Applicator in Oklahoma [8]. Of the 84 participants in the four certification schools conducted in 2016, 83 attendees tested in the core exam and 60 passed the exam for a 72.3% overall pass rate on the core exam. Sixty-three people tested for certification in category 6 (right of way) while 53 people passed that exam yielding an overall 84.1% pass rate. Some of the personnel that took the category 6 exam had passed the core exam but failed their category 6 exam at an earlier workshop and retook the exam at a later workshop during the 2016 schools. Overall, 53 of 83 people eventually passed both the core and category 6 exams yielding an eventual 63.9% overall success rate in producing category 6 right-of-way certified applicators. The 63.9% overall pass rate for those wanting to become certified right-of-way applicators in the FY2017 certification schools compares with 69% in FY2016 [6], 68%

in FY2015 [5], 79% in FY2014 [4], 79% in FY2013 [3], 93% in FY2012 [2], and 86% in FY2011 [1].

Only three attendees at the 2016 certification schools chose to test in category 5 (Aquatic Weed Control), with only one person passing the test, resulting in a 33% success rate. It is important to note that while applicators have access to category 5 training manuals, we did not (nor did we in the past) provide a category 5 overview as was performed for the core and category 6 materials over the two days of the lecture/discussion portion of the 2.5-day school.

5.5 POST-TESTING NOTICE OF CERTIFICATION OF PERSONNEL

Following the testing of ODOT employees, ODAFF provided the test scores and notification of achievement of certification in the Right-of-Way category to OSU RVM program Extension Associate Mr. Clayton Hurst and Mrs. Lydia Calhoun. Mr. Hurst then sent the information on these 84 individuals to their respective ODOT Division Headquarters.

5.6 POST-TESTING RECORDKEEPING AT OKLAHOMA STATE UNIVERSITY

Upon receiving the results of testing and certification from ODAFF for ODOT participants at the four certification schools, Mr. Clayton Hurst, Extension Associate and Mrs. Lydia Calhoun, Extension Assistant in our program, entered the applicator names, ODOT employee number, employee Certified Applicator number, Division of employment, date of testing, testing score and categories of certification into our certified pesticide applicator database. This database is maintained under the Task 2 Objective: *Maintain Pesticide Applicator Training Records for ODOT Certified Pesticide Applicators*, as a part of the Joint Project 2156: *Roadside Vegetation Management Training & Consultation*. Several times per year, ODOT administrative personnel request verification of applicator certification status and the number of CEUs earned by applicators participating in past OSU CEU programs.

6.0 IMPLEMENTATION OF PESTICIDE APPLICATOR CONTINUING EDUCATION (CEU) WORKSHOPS

6.1 PESTICIDE APPLICATOR CONTINUING EDUCATION WORKSHOPS

Fifteen Pesticide Applicator Continuing Education (CEU) Workshops were conducted in FY2017. The locations, dates and attendance at each of the workshops are shown in Table 1. The workshops were approved by ODAFF as program OK-16-213 and awarded up to four pesticide applicator CEUs in Category 6 (Right-of-way). The training agenda for the CEU programs is shown in Table 2. The instructor for the CEU Workshops was Dr. Dennis Martin, Professor & Vegetation Management Extension Specialist.

Participant numbers were anticipated to be high enough that two workshops were conducted in each Division with the exception of Division 6, in which only a single workshop was necessary. A total of 665 ODOT staff and 6 guests of ODOT participated in the 15 Herbicide Applicator CEU workshops offered by ODOT/OSU under FFY 2017 SP&R Project 2156 in 2017. The 665 ODOT staff members represented 83% of ODOT's certified pesticide applicators on record with the OSU RVM Program. The 665 Certified Pesticide Applicators trained in the FY2017 CEU workshops compare with 656 in FY2016, 642 in FY2015 (5), 637 in FY2014 [4], 640 in FY2013 [3], 610 in FY2012 [2], and 605 in FY2011 [1]. The numbers of applicators receiving continuing education in FFY2017 represents a 1.4% increase over FF2016 numbers, which had increased 2% over the FFY2015 attendance.

6.2 CEU AWARDING AND POST WORKSHOP RECORDKEEPING

Attendance records of participants in the ODAFF approved CEU programs were supplied to ODAFF so that attendees could be awarded CEUs by ODAFF. Attendance records were also supplied to the Division Training contacts in each ODOT Division. Our records of attendance maintained under Task 2 of Joint Project 2156 were updated to reflect the participation of the 665 applicators in the 2017 CEU workshops.

7.0 SUMMARY AND CONCLUSIONS

Four pesticide applicator certification schools were conducted during October through December 2016 in order to train a total of 84 participants. Of the 84 people trained at the workshops, 83 people took the core examination with 60 eventually passing the exam (72.3%). Sixty-three attendees tested for certification in right of way at the test sites and 53 of the 60 people taking the category 6 right-of-way test passed, yielding an 84.1% pass rate. Overall 63.9% of the school's attendees passed both the core and right of way exam to become certified applicators in category 6 right of way in Oklahoma. Records of testing and success were provided to each Division's designated training personnel.

Fifteen Pesticide Applicator Continuing Education (CEU) Workshops were conducted across a total of eight ODOT Field Divisions in the months of February through early April of 2017. A total of 665 certified applicators received continuing education training in these workshops. Copies of workshop sign-in sheets for each workshop were furnished to the designated training records contact in each ODOT Field Divisions in the late afternoon following completion of each workshop. CEU credits were granted to ODOT employees that participated in the 2017 CEU Workshops. ODOT participants also gained knowledge on various Integrated Pest Management and Integrated Vegetation Management products, topics and techniques. This increased or maintained operational knowledge of attendees should insure continued effective vegetation management skills. This training is believed to be essential in delivery of cost-effective vegetation management on Oklahoma roadsides.

As of the close of FY2017, the OSU-RVM program maintained records of 800 ODOT staff who are certified pesticide applicators that have attended ODOT/OSU CEU Workshops since the start of the current right-of-way certification period in 2015. These records were carried forward into Federal FY2018 under the terms of the current Joint 2156 ODOT/OSU Project.

Table 1. 2017 ODOT Herbicide Applicator Continuing Education (CEU) Workshop Schedule and Attendance.

CEU Workshop Dates	Day of Week	ODOT Division	Location	Attendance by Division
February 21-22	Tuesday - Wednesday	Div. 2	Antlers HQ	Div. 2 – 37/50
February 23, March 2	Thursday, Thursday	Div. 4	Perry HQ	Div. 4 – 42/40
March 7 and 8	Tuesday and Thursday	Div. 7	Duncan HQ	Div. 7 - 52/36
March 14-15	Tuesday - Wednesday	Div. 5	Clinton HQ	Div. 5 – 57/42
March 16	Thursday	Div. 6	Woodward High Plains Tech Center	Div. 6 - 39
March 21-22	Tuesday - Wednesday	Div. 3	Ada HQ	Div. 3 - 50/41
March 28-29	Tuesday - Wednesday	Div. 1	Muskogee HQ	Div. 1 – 46/46
April 4-5	Tuesday - Wednesday	Div. 8	Tulsa HQ	Div. 8 – 42/46
			Total	665

Total attendance represents the total number of current ODOT employees who participated in 15 pesticide applicator continuing education workshops and that were also Certified Oklahoma Pesticide Applicators. Two retired ODOT employees also attended in 2017 as well as one county government and one Natural Resources Conservation Service (NRCS) staff member who were not reflected in the 665 ODOT staff count.

Table 2. Agenda for the 2017 Annual Oklahoma Department of Transportation Herbicide Applicator Continuing Education Workshops.

8:30 to 9:00 a.m. Registration

9:00 to 10:00 a.m. Applicator Calculation, Calibration, Use Rate and Label Review / Dr. Dennis Martin

Herbicide applicator calculations, calibration, herbicide use rate as well as understanding herbicide labels are the subject of this presentation. These tasks should be performed regularly during the herbicide application season. Basic calculations will be reviewed such as converting gallons to fluid ounces as well as determining how many acres can be treated with one tank size. Also, a review on how calibration should be conducted and why calibration is important for a successful weed control program. This presentation will also review how use rates are determined and a basic label review will be conducted with attendees. The label review should help ODOT employees accurately read and use a label.

10:00 to 10:50 a.m. How Herbicides Work / Dr. Dennis Martin

How herbicides work, and control plants will be the overall topic of this presentation. This presentation will cover contact, translocated and residual types of herbicides. The importance of making correct application timing and knowing if your herbicide is a pre-emergent or post-emergent herbicide will also be covered. Herbicide mode of action will also be covered. Meristem inhibitors, auxin growth regulators, germination inhibitors and photosynthesis inhibitors will be discussed during the presentation.

10:50 to 11:00 a.m. Break

11:00 a.m. to Noon ODOT Herbicide Application / Dr. Dennis Martin

This presentation will discuss important factors dealing with ODOT's late winter/early spring herbicide application programs and the summer broadleaf application programs. The importance of proper application timing to insure successful weed control and to avoid bermudagrass injury will be stressed. Some common cool season broadleaf and grass weeds that are typically targeted in the late winter/early spring time frame will be described. Common warm season broadleaf and grass weeds targeted in the summer application will be covered. Discussion will include physical growth characteristics and life cycles to help applicators enhance their plant identification skill. Improved weed identification will help applicators better select the most effective control options. Improved understanding of plant life cycles will help applicators better target weeds while they are most susceptible to chemical control. Additionally, control options will be discussed with emphasis on proper application rates, use precautions, application techniques and application timing.

Noon to 1:00 p.m. Lunch

1:00 to 1:30 p.m. Monarch Habitat / Dr. Dennis Martin

This presentation will discuss the monarch habitat research that OSU RVM personnel and ODOT personnel have been working upon together. The presentation includes discussion of how different mowing timing and frequencies affect not only monarch butterflies but also their habitat. As herbicides can sometimes negatively impact pollinators such as monarchs, when used incorrectly. Correctly used, herbicides can be an effective tool to create healthy habitat for monarch butterflies.

1:30 to 1:40 p.m. Break

1:40 to 2:30 p.m. Herbicide Record Keeping / Dr. Dennis Martin

Thorough and legible herbicide record keeping is critically important to both the short and long-term success of vegetation management programs. This presentation will discuss the details of proper herbicide application record keeping, duration of record storage (at least two years) and discuss common errors found in records. Additionally, tips on completion of the annual herbicide program survey will be discussed.

8.0 REFERENCES

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