

**Registration form**

**Aerial Application CEU Training \$200.00  
48 HOUR RUSH ORDER PROCESSING FEE ADDITIONAL \$50.00**

**Start and finish dates:** \_\_\_\_\_  
*You will have 90 days from this date in order to complete this course*

**Print Name** \_\_\_\_\_  
I have read and understood the disclaimer notice found on pages 2,5 & 10. Signature is required.  
You can electronically sign with XXX

**Signature** \_\_\_\_\_

**Address:** \_\_\_\_\_

**City** \_\_\_\_\_ **State** \_\_\_\_\_ **Zip** \_\_\_\_\_

**Phone:**  
**Home** (\_\_\_\_\_) \_\_\_\_\_ **Work** (\_\_\_\_\_) \_\_\_\_\_

**Fax** (\_\_\_\_\_) \_\_\_\_\_ **Email** \_\_\_\_\_

**License #** \_\_\_\_\_ **Exp. Date** \_\_\_\_\_

**Please circle/check which certification you are applying the course CEU's.**

Commercial Applicator \_\_\_\_\_ Residential Applicator \_\_\_\_\_ Industrial Applicator \_\_\_\_\_

Pesticide Handler \_\_\_\_\_ Agricultural Applicator \_\_\_\_\_ Adviser \_\_\_\_\_ Other \_\_\_\_\_

**Technical Learning College  
PO Box 3060, Chino Valley, AZ 86323-3060  
Toll Free (866) 557-1746 Fax (928) 272-0747  
info@tlch2o.com www.abctlc.com**

**If you've paid on the Internet, please write your Customer #** \_\_\_\_\_

**We will e-mail you the certificate of completion. Please provide an e-mail address.**

## **DISCLAIMER NOTICE**

I fully understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors, omissions, advice, suggestions or neglect contained in this CEU education training course or for any violation or injury, death, neglect, damage or loss of your license or certification caused in any fashion by this CEU education training or course material suggestion or error. It is my responsibility to call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded. It is my responsibility to ensure all information is correct and to abide with all rules and regulations.

**State Approval Listing Link**, check to see if your State accepts or has pre-approved this course. Not all States are listed. Not all courses are listed. If the course is not accepted for CEU credit, we will give you the course free if you ask your State to accept it for credit.

## **State Approval Listing URL...**

<http://www.tlch2o.com/downloads/PDF/CEU%20State%20Approvals.pdf>

*You can obtain a printed version of the course manual from TLC for an additional \$169.95 plus shipping charges.*

## **AFFIDAVIT OF EXAM COMPLETION**

I affirm that I personally completed the entire text of the course. I also affirm that I completed the exam without assistance from any outside source. I understand that it is my responsibility to file or maintain my certificate of completion as required by the state or by the designation organization.

## **Grading Information**

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

For security purposes, please fax or e-mail a copy of your driver's license and always call us to confirm we've received your assignment and to confirm your identity.

Thank you...

**CUSTOMER SERVICE RESPONSE CARD**

**Aerial Application Training Course**

NAME: \_\_\_\_\_

**PLEASE COMPLETE THIS FORM BY CIRCLING THE NUMBER OF THE APPROPRIATE ANSWER IN THE AREA BELOW.**

1. Please rate the difficulty of your course.

Very Easy      0      1      2      3      4      5      Very Difficult

2. Please rate the difficulty of the testing process.

Very Easy      0      1      2      3      4      5      Very Difficult

3. Please rate the subject matter on the exam to your actual field or work.

Very Similar      0      1      2      3      4      5      Very Different

4. How did you hear about this Course? \_\_\_\_\_

5. What would you do to improve the Course?

\_\_\_\_\_

How about the price of the course?

Poor \_\_\_\_\_ Fair \_\_\_\_\_ Average \_\_\_\_\_ Good \_\_\_\_\_ Great \_\_\_\_\_

How was your customer service?

Poor \_\_\_ Fair \_\_\_\_\_ Average \_\_\_\_\_ Good \_\_\_\_\_ Great \_\_\_\_\_

Any other concerns or comments.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

You are finished with your assignment. Please fax this answer key and your registration page along with the customer survey to TLC.

**We will require a photocopy of your driver's license.**

### **When finished with your assignment.**

Please scan the Registration Page, Answer Key and Driver's License and email it to [info@TLCH2O.com](mailto:info@TLCH2O.com).

If you are unable to scan, take a photo of these documents with your iPhone and send these to TLC, [info@TLCH2O.com](mailto:info@TLCH2O.com).

If you are unable to scan and email, please fax these to TLC,

**(928) 468-0675**

**If you fax, call to confirm that we received your paperwork.**

Always call us after faxing the paperwork to ensure that we've received it. Allow two weeks for processing and for the proper DPR forms to be sent back to you. If you need this course graded and your certificate sooner, add a \$50.00 rush fee. This may not include postage charges. ***Thank you for your business.***

### **California DPR Requirement**

The Assignment must be submitted to TLC by December 27 in order to be submitted to DPR by the 31<sup>st</sup>. If it is late, you will be penalized \$50 per day.

### **Grading Information**

In order to maintain the integrity of our courses we do not distribute test scores, percentages or questions missed. Our exams are based upon pass/fail criteria with the benchmark for successful completion set at 70%. Once you pass the exam, your record will reflect a successful completion and a certificate will be issued to you.

### **Rush Grading Service**

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of \$50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line.

## CERTIFICATION OF COURSE PROCTOR

Technical Learning College requires that our students who takes a correspondence or home study program course must pass a proctored course reading, quiz and final examination. The proctor must complete and provide to the school a certification form approved by the commission for each examination administered by the proctor.

**Instructions.** When a student completes the course work, fill out the blanks in this section and provide the form to the proctor with the examination.

Name of Course: \_\_\_\_\_

Name of Licensee: \_\_\_\_\_

**Instructions to Proctor.** After an examination is administered, complete and return this certification and examination to the school in a sealed exam packet or in pdf format.

I certify that:

1. I am a disinterested third party in the administration of this examination. I am not related by blood, marriage or any other relationship to the licensee which would influence me from properly administering the examination.
2. The licensee showed me positive photo identification prior to completing the examination.
3. The enclosed examination was administered under my supervision on \_\_\_\_\_.  
The licensee received no assistance and had no access to books, notes or reference material.
4. I have not permitted the examination to be compromised, copied, or recorded in any way or by any method.
5. Provide an estimate of the amount of time the student took to complete the assignment.

Time to complete the entire course and final exam. \_\_\_\_\_

Notation of any problem or concerns:

Name and Telephone of Proctor (please print):

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Signature of Proctor

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.
3. If your last name begins with an A to G, you will pick assignment number 1, if your last name begins with the letter H to P, you are to complete assignment number 2 and if your last name begins with the letter Q-R, you will pick assignment number 3, and if your last name begins with the letter S-Z, you will pick assignment number 4, and if your last name begins with the letter S-Z, you will pick assignment number 4.

**Assignment #1** for all pest applicators whose last name begins with **A-G** you will find your assignment on **pages 11-20**.

**Assignment #2** for all pest applicators whose last name starting with the letter **H-P**, your assignment is found on **pages 21-30**.

**Assignment #3** for all pest applicators whose last name starting with the letter **Q-R**, your assignment is found on **pages 31-40**.

**Assignment #4** for all pest applicators whose last name starting with the letter **S-Z**, your assignment is found on **pages 41-50**.

**Alternative Assignment #5** for repeat students - **Pages 51-58**

**These exams are frequently rotated.**

**Complete all topics before submitting the answers key.**

#### **Rush Grading Service**

If you need this assignment graded and the results mailed to you within a 48-hour period, prepare to pay an additional rush service handling fee of \$50.00. This fee may not cover postage costs. If you need this service, simply write RUSH on the top of your Registration Form. We will place you in the front of the grading and processing line.

## Aerial Application Answer Key

Name \_\_\_\_\_

Phone# \_\_\_\_\_

Did you check with your State agency to ensure this course is accepted for credit?  
**No refunds.**

**Method of Course acceptance confirmation. Please fill this section**

Website \_\_ Telephone Call\_\_ Email\_\_\_\_ Spoke to\_\_\_\_\_

Did you receive the approval number, if applicable? \_\_\_\_\_

List amount of Hours Worked on Assignment \_\_\_\_\_

**You are responsible to ensure that TLC receives the Assignment and Registration Key.  
Please call us to ensure that we received it. No refunds.**

*I understand that I am 100 percent responsible to ensure that TLC receives the Assignment and Registration Key. I understand that TLC has a zero tolerance towards not following their rules, cheating or hostility towards staff or instructors. I need to complete the entire assignment for credit. There is no credit for partial assignment completion. My exam was proctored. I will contact TLC if I do not hear back from them within 2 days of assignment submission. I will forfeit my purchase costs and will not receive credit or a refund if I do not abide with TLC's rules. I will comply with TLC's rules on pages 2,5,6, and 10. I will not hold them liable for any misinformation or any injury. Aerial application is very dangerous to myself and the environment. I allow TLC to email me.*

### California DPR Requirement

The Assignment must be submitted to TLC by December 27 in order to be submitted to DPR by the 31<sup>st</sup>. If it is late, you will be penalized \$50 per day.

**Please Sign that you understand and will abide with TLC's Rules.**

---

Signature

**Please write down any questions that cannot be found or has problems**

*Please circle, underline, bold or X only one correct answer*

*A felt tipped pen works best.*

## **Aerial Assignment**

**Multiple Choice. Pick only one answer per question.**

**Circle or Mark off, Underline or Bold the answer. Please circle the number of the assignment version 1 or 2 or 3 or 4 or 5**

### **Topic 1 - Aerial Application Introduction**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 2 - Understanding Hydraulics and Sprayer Principles**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 3 - Understanding Pumps and Aerial Sprayers**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 4 - Aerial Application Assignment and Control Information Section**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 5 - Pesticide Drift Control and Training Requirements**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 6 - Complications/ Limitations / Risk**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

### **Topic 7- Aerial and Agricultural Pesticides**

10 final exam questions. (s) Means answer can be singular or plural.

- |            |            |             |
|------------|------------|-------------|
| 1. A B C D | 5. A B C D | 9. A B C D  |
| 2. A B C D | 6. A B C D | 10. A B C D |
| 3. A B C D | 7. A B C D |             |
| 4. A B C D | 8. A B C D |             |

**Write down any questions which had problems.**

## Important Information about this Course (Disclaimer Notice)

This CEU course has been prepared to educate pesticide applicators and operators in general safety awareness of dealing with the often-complex and various pesticide treatment sprays, devices, methods, and applications. This course (manual) will cover general laws, regulations, required procedures and accepted policies relating to the use of pesticides and herbicides. It should be noted, however, that the regulation of pesticides and hazardous materials is an ongoing process and subject to change over time. For this reason, a list of resources is provided to assist in obtaining the most up-to-date information on various subjects. This manual is not a guidance document for applicators or operators who are involved with pesticides. It is not designed to meet the requirements of the United States Environmental Protection Agency or your local State environmental protection agency or health department. This course manual will provide general pesticide safety awareness and should not be used as a basis for pesticide treatment method/device guidance. This document is not a detailed pesticide informational manual or a source or remedy for poison control.

Technical Learning College or Technical Learning Consultants, Inc. makes no warranty, guarantee or representation as to the absolute correctness or appropriateness of the information in this manual and assumes no responsibility in connection with the implementation of this information. It cannot be assumed that this manual contains all measures and concepts required for specific conditions or circumstances. This document should be used for educational purposes only and is not considered a legal document. Pesticides are poisonous. Always read and carefully follow all precautions and safety recommendations given on the container label. Store all chemicals in the original labeled containers in a locked cabinet or shed, away from food or feeds, and out of the reach of children, unauthorized persons, pets, and livestock.

Confine chemicals to the property or plants being treated. Avoid drift onto neighboring properties, especially gardens containing fruits and/or vegetables ready to be picked. Dispose of empty containers carefully. Follow label instructions for disposal. Never reuse containers. Make sure empty containers are not accessible to children or animals. Never dispose of containers where they may contaminate water supplies or natural waterways. Do not pour down sink or toilet. Consult your county agricultural commissioner for correct ways of disposing of excess pesticides. You should never burn pesticide containers. Individuals who are responsible for pesticide storage, mixing and application should obtain and comply with the most recent federal, state, and local regulations relevant to these sites and are urged to consult with the EPA and other appropriate federal, state and local agencies.

USE PESTICIDES WISELY: ALWAYS READ THE ENTIRE PESTICIDE LABEL CAREFULLY, FOLLOW ALL MIXING AND APPLICATION INSTRUCTIONS AND WEAR ALL RECOMMENDED PERSONAL PROTECTIVE GEAR AND CLOTHING. CONTACT YOUR STATE DEPARTMENT OF AGRICULTURE FOR ANY ADDITIONAL PESTICIDE USE REQUIREMENTS, RESTRICTIONS OR RECOMMENDATIONS.

NOTICE: MENTION OF PESTICIDE PRODUCTS IN THIS COURSE DOES NOT CONSTITUTE ENDORSEMENT OF ANY MATERIAL OR SUPPLEMENT. ALWAYS FOLLOW THE PRODUCT'S LABEL INSTRUCTIONS.

### **NOTICE**

I understand that it is my responsibility to ensure that this CEU course is either approved or accepted in my State for CEU credit. I understand State laws and rules change on a frequent basis and I believe this course is currently accepted in my State for CEU or contact hour credit, if it is not, I will not hold Technical Learning College responsible.

I also understand that this type of study program deals with dangerous conditions and that I will not hold Technical Learning College, Technical Learning Consultants, Inc. (TLC) liable for any errors or omissions or advice contained in this CEU education training course or for any violation or injury caused by this CEU education training course material. I will call or contact TLC if I need help or assistance and double-check to ensure my registration page and assignment has been received and graded.

# Aerial Application CEU Training Assignment #1

## Last Names A-G

You will have 90 days from the start of this course to have successfully passed this assignment with a score of 70 %. You may e mail the answers to TLC, info@tlch2o.com or fax the answers to TLC, (928) 272-0747. This assignment is available to you in a Word Format on TLC's Website. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

**Write your answers on the Answer Key found in the front of this assignment.**

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.
3. If your last name begins with an A to G, you will pick assignment number 1, if your last name begins with the letter H to P, you are to complete assignment number 2 and if your last name begins with the letter Q-R, you will pick assignment number 3, and if your last name begins with the letter S-Z, you will pick assignment number 4, and if your last name begins with the letter S-Z, you will pick assignment number 4.

There are no intention trick questions. All questions require the specific answer as found in the text.

### Topic 1 Aerial Application Introduction

1. Which of the following in dense crop canopies can also be more difficult to achieve with aircraft?

- A. Accurate deposition      C. Spray pressure  
B. Respiratory protection      D. None of the Above

### Ultra-Low Volume (ULV)

2. The term Ultra-Low Volume (ULV) (spraying) is used in the context of \_\_\_\_\_.

- A. Accurate spray timing      C. Pesticide application  
B. Maneuverability      D. None of the Above

### Field Application

3. Adequate pre-preparation will make sure that the actual \_\_\_\_\_ is carried out under the safest conditions and accurate spray timing will help ensure that the product is used to optimum effect.

- A. Spraying      C. Respiratory protection  
B. Positive metering      D. None of the Above

4. Enclosed cabs that provide respiratory protection must have a properly functioning \_\_\_\_\_ that is used and maintained according to the manufacturer's written operating instructions.

- A. Positive metering system(s)      C. Ventilation system  
B. Type of respirator      D. None of the Above

### Advantages of Rotary Wing Aircraft

5. Rotary wing aircraft offers the advantages of extreme maneuverability and \_\_\_\_\_ variation, and may be operated in almost any local area.
- A. Application                      C. Spray pressure  
B. Speed                              D. None of the Above

### Sprayer Field Settings

6. During a flight, spray pressure, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the \_\_\_\_\_.
- A. Application                      C. Venturi spreader(s)  
B. Spraying system                D. None of the Above

### Chemical Handling

7. To help keep sprayer-applicator, worker or handler exposure to a minimum, wherever possible preference must be given to using pesticide packs handled via \_\_\_\_\_.
- A. Secure section                  C. Closed transfer systems  
B. Agitator(s)                      D. None of the Above

### Dry-Material Spreaders

8. Which of the following and rotary-slinger spreaders are used to distribute dry formulations of herbicides, fertilizers, and seed?
- A. Positive metering system(s)    C. Venturi-type  
B. Agitator(s)                      D. None of the Above

### Swath Pattern Application

9. Which of the following can be adjusted to control the, and the pattern should be tested for even distribution of materials upon initial spreader installation?
- A. Agitator(s)                      C. Venturi-type and rotary-slinger spreader(s)  
B. Vanes in the spreader(s)        D. None of the Above
10. Which of the following are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft?
- A. Agitator(s)                      C. Venturi-type and rotary-slinger spreader(s)  
B. Positive metering systems        D. None of the Above

## Topic 2 - Understanding Hydraulics and Sprayer Principles

1. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through \_\_\_\_\_, and the use of hydraulic pressure in machinery.
- A. Nozzle(s)                      C. Relative pressures  
B. Hydraulic lines                D. None of the Above
2. Which of the following are almost incompressible?
- A. Liquid(s)                      C. Air  
B. Hydraulic pressure(s)        D. None of the Above

### **Meteorology**

3. The atmospheric pressure is of great importance in meteorology, since it determines the winds, which generally move at right angles to the direction of the most rapid change of pressure, that is, along the isobars, which are contours of \_\_\_\_\_.

- A. Inconstant pressures
- B. Constant pressure
- C. Relative pressures of the liquid(s)
- D. None of the Above

4. Velocity of flow is an important consideration in sizing the \_\_\_\_\_.

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Relative pressures of the liquid(s)
- D. None of the Above

### **Bernoulli's Principle**

5. Bernoulli's principle thus says that a rise (fall) in pressure in a \_\_\_\_\_ must always be accompanied by a decrease (increase) in the speed, and conversely, if an increase (decrease) in the speed of the fluid results in a decrease (increase) in the pressure.

- A. Liquids
- B. Velocity of pressure
- C. Flowing fluid
- D. None of the Above

### **Boom Sprayers**

6. The most common example of boom sprayer would be wide horizontal booms used on field sprayers to spray field crops.

- A. True
- B. False

7. The full advantages of aerial application are more likely to be realized when its use is preplanned. Development of a planned aerial application program will require good cooperation between pilot and grower.

- A. True
- B. False

### **More on Ultra Low Volume**

8. Ultra-Low Volume (ULV) equipment ranges in capacity from a few ounces to \_\_\_\_\_ gallon per acre.

- A.  $\frac{1}{2}$
- B. .75
- C.  $\frac{1}{3}$
- D. None of the Above

### **Understanding Spray Nozzles**

9. The nozzle type and pressure should be selected for the \_\_\_\_\_ and the atomization required for the job.

- A. Ground temperature
- B. Application rate(s)
- C. Material being used
- D. None of the Above

### **Ultra-Low Volume (ULV) Formulations and Temperature**

10. When using liquid ultra- low volume (ULV) formulations, special consideration **must** be given to monitoring the air and ground temperature difference. This is one of the critical indicators of the time to quit treating for the day. The best weather for spraying treatment is usually from dawn until mid-morning.

- A. True
- B. False

## Topic 3 - Understanding Pumps and Aerial Sprayers

### Spray Nozzle Categorization

#### Application

1. Droplet micron size is determined by the specific nozzle used first and foremost. In general, the larger the orifice tube, the larger the micron size of the droplet produced. The second factor in determining droplet size is the \_\_\_\_\_.

- A. Droplet produced
- B. Aircraft speed
- C. Surface tension of a liquid
- D. None of the Above

#### Distance between Nozzle and Target (Boom Height)

2. Less distance between the droplet release point and the \_\_\_\_\_ will reduce spray drift. Less distance means less time to travel from nozzle to target and therefore less drift occurs.

- A. Target
- B. Sprayer calibration
- C. Droplet release point
- D. None of the Above

#### Drain Valve(s)

3. The drain valve(s) must be located at the lowest point(s) in the system to allow for complete draining of the spray system at the \_\_\_\_\_.

- A. Refilling of chemical
- B. End of the program
- C. Start of the program
- D. None of the Above

#### Emergency Shut-off Valve

4. The emergency shutoff valve should be located between the hopper and nozzles. The valve should be as close to the nozzles as possible to prevent the loss of pesticide and damage to the environment in the event of a minor spray system leak.

- A. True
- B. False

#### Electrostatic Sprayers

5. Electrostatic sprayers which apply \_\_\_\_\_ to the material being sprayed reduce spraying time and improve insect and disease control per unit of chemical applied.

- A. Downward force
- B. Tap water or base oil
- C. An electrical charge
- D. None of the Above

6. Higher amounts of sprays from air-assisted electrostatic units were also found deeper in the crop canopy compared to the amounts delivered by uncharged hydraulic sprayers. These sprayers also deposit more \_\_\_\_\_ on any fruit present in the canopy, however.

- A. Tension
- B. Spray
- C. Droplets per release point
- D. None of the Above

#### Specific Gravity

7. Specific gravity is the ratio of the mass of a given volume of liquid to the mass of the same volume of water. In spraying, the main effect of the specific gravity Sg of a liquid other than water is on the capacity of the spray nozzle. All vendor-supplied performance data for nozzles are based on spraying water.

- A. True
- B. False

### Surface Tension

8. The surface tension of a liquid tends to assume the \_\_\_\_\_, acting as a membrane under tension.

- A. Pressure
- B. Highest droplet size
- C. Smallest possible size
- D. None of the Above

9. Surface tension is more apparent at high operating pressures. A lower surface tension reduces the spray angle, particularly on hollow cone nozzles.

- A. True
- B. False

### Liquid Application and Calculations

10. You should conduct sprayer calibration using hydraulic fluid.

- A. True
- B. False

## Topic 4 - Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. Hard-surfaced runways are desirable when large multi-engine aircraft are used. The contractor/pilot must complete all arrangements necessary to use any airport.

- A. True
- B. False

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and average sod conditions at an elevation of approximately \_\_\_\_\_ feet above sea level. At higher elevations or when fields are soft, longer airstrips will be required. Hard-surfaced runways at lower elevations may be somewhat shorter.

- A. 1,000
- B. 2,500
- C. 4,000
- D. None of the Above

#### Notify Beekeepers

3. Many of the pesticides used in aerial treatments are highly toxic to bees. Notify beekeepers about the meetings. Program operational guidelines, environmental impact statements, \_\_\_\_\_, State laws, and/or pesticide labels may also require that beekeepers in the area be notified of control programs.

- A. Environmental protection
- B. Environmental assessments (EA)
- C. Accurate spraying
- D. None of the Above

#### Spray Block, Sensitive Area, and Buffer Zone Verification

4. After taking a \_\_\_\_\_ flight with each pilot and confirming that everything (buffer zones, spray blocks, and sensitive areas) is recorded on a master program map, then jointly sign and date the map.

- A. Spraying reconnaissance
- B. Test reconnaissance
- C. Pretreatment reconnaissance
- D. None of the Above

### **Spray Deposition Monitoring Dyecard Samplers**

5. Use dyecards to monitor \_\_\_\_\_.
- A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
B. Pesticide absorption                      D. None of the Above

6. Dyecards are made of water- or oil-sensitive paper and are used to provide valuable information on swath width, spray droplet deposition pattern, and droplet size; and to identify leaks in the spray system.
- A. True              B. False

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for booms. For directed and band rigs use the \_\_\_\_\_.
- A. Column spacing                      C. Nozzle or nozzle group output  
B. Row spacing                          D. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.
- A. Spraying                                  C. Accurate output  
B. Extreme maneuverability              D. None of the Above

9. On directed rigs, catch spray from all nozzles per row for noted time. \_\_\_\_\_ output in ounces = gallons/acre actually applied.
- A. Nozzle or nozzle group                  C. Liquid formulation  
B. Uniform distribution                      D. None of the Above

10. Replace any nozzles whose output is greater than \_\_\_\_\_ % of the average of all nozzles.
- A. 25                      C. 10  
B. 40                      D. None of the Above

## **Topic 5 - Pesticide Drift Control and Training Requirements**

### **The EPA defines spray or dust drift as:**

1. "the physical movement of pesticide droplets or particles through the air at the time of pesticide application or soon thereafter from the target site to any non- or off-target site.
- A. True              B. False

### **Pesticide Residues**

2. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.
- A. True              B. False

### **Understanding the Dangers of Drift**

3. Droplet size depends primarily upon the spray pressure, nozzle design and orientation, and the \_\_\_\_\_. The size of granular materials depends upon the particular formulation and can be controlled to some extent by screening. In the case of sprays, droplet size is generally increased by reducing pressures or increasing nozzle size.
- A. Granular material(s)                      C. Surface tension of the spray solution  
B. Pesticide droplets or particles              D. None of the Above

### **Vapor Drift (Volatilization)**

4. Which of the following is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift?
- A. Accurate deposition            C. Most appropriate spraying equipment  
B. Vapor drift                        D. None of the Above

### **Chemical Control in an IPM Program**

5. Regular field scouting, coupled with forecasting pest problems and determining economic thresholds, is used to ensure that pesticides are only applied when pest populations warrant chemical control.
- A. True            B. False

### **Bowen's Disease**

6. Crop dusting involving Organochlorine powders has been implicated in Bowen's disease. Organochlorine has not been used by aerial applicators or in any other form of agriculture for three decades because of the adverse effects to human health that were not as well known when the powder was legal.
- A. True            B. False

### **Environmental Effects**

#### **Effects on Non-target Species**

7. A number of the \_\_\_\_\_ have been banned from most uses worldwide, and globally they are controlled via the Stockholm Convention on persistent organic pollutants. These include: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene.
- A. Granular material(s)            C. Organochlorine pesticide(s)  
B. Volatile herbicide(s)            D. None of the Above

#### **Meteorological Considerations**

8. Vortices created by the aircraft passage will also influence \_\_\_\_\_.
- A. Accurate deposition            C. Ambient conditions  
B. Spray distribution efficiency    D. None of the Above

#### **Sprayer Field Settings**

9. During a flight, \_\_\_\_\_, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the spraying system.
- A. Granular material(s)            C. Ultra-high volume application of pesticide(s)  
B. Spray pressure                    D. None of the Above

#### **Equipment Storage**

10. Refer to the relevant applicator, \_\_\_\_\_ instruction manuals for both the spray equipment and the aircraft. Aircraft mounted spray equipment is often removed after spraying to release the aircraft for other duties.
- A. Handler(s)                        C. Early-entry workers  
B. Worker or handler's            D. None of the Above

## Topic 6 - Complications/ Limitations / Risk

### Specific Restrictions

1. Specific restrictions may include prohibiting the use of certain pesticides under certain conditions, prohibiting certain methods of application, requiring use of a foliage barrier, or requiring a buffer zone distance between the site of \_\_\_\_\_ to be protected.

- A. Application and areas
- B. Uniform distribution
- C. Row spacing
- D. None of the Above

2. The OPP has completed its review of these studies and reached conclusions about the factors that influence drift and the amounts of sprays which can drift from the \_\_\_\_\_.

- A. Spray drift
- B. Uniform distribution
- C. Application site
- D. None of the Above

### Droplet Drift

3. The distance of droplet drift depends upon the size of the droplets, the velocity of the wind and the height above the ground where the herbicide is discharged. In general, larger orifices and lower pressures result in \_\_\_\_\_.

- A. Droplet drift
- B. Larger droplets
- C. Lower pressures
- D. None of the Above

### Vapor Drift

4. Volatile herbicides may produce \_\_\_\_\_ that can be carried great distances from the target area to other crop sites.

- A. The size of the droplet(s)
- B. Mists
- C. Vapors
- D. None of the Above

### Phenoxy Herbicides

5. Which of the following includes 2,4-D, 2,4,5-T, 2,4-DB, 2,4,5-TP (Silvex) and MCPA? These herbicides are most commonly used for the control of broad-leaved weeds in crops and for the control of undesirable woody species.

- A. The phenoxy group
- B. Volatile herbicide(s)
- C. Esters
- D. None of the Above

6. Which of the following in general are formulated in two ways, as esters or amines?

- A. Phenoxy herbicides
- B. Esters or amines
- C. Esters
- D. None of the Above

7. Which of the following are more effective in controlling hard-to-kill weeds but are the most hazardous in terms of volatility and consequent drift to sensitive crops?

- A. Esters
- B. Volatile herbicide(s)
- C. Amines
- D. None of the Above

### Other Components

8. Flow control devices are necessary to make the tank, pump and nozzles work together. Depending on the application system, these devices may include pressure regulators, unloader valves and control valves. Because both the \_\_\_\_\_ and flow rate are determined by operating pressure, each sprayer should be equipped with a pressure gauge.

- A. Spray pattern
- B. Uniform distribution
- C. Flow control devices
- D. None of the Above

9. Strainers are also required for effective treatments. Strainers trap particles and debris in the spray mixture and protect the pump, \_\_\_\_\_ and nozzles from damage.

- A. Nozzle or nozzle group output
- B. Control devices
- C. Strainers
- D. None of the Above

### Dispersal Summary

10. All nozzles produce a range of \_\_\_\_\_. The small, drift-prone particles cannot be eliminated but can be reduced and kept within reasonable limits.

- A. Nozzle or nozzle group output
- B. Droplet sizes
- C. Liquid formulation spray deposition
- D. None of the Above

## Topic 7 - Aerial and Agricultural Pesticides

### Fenthion

1. Fenthion is an organothiophosphate insecticide, avicide, and acaricide. Like most other organophosphates, its mode of action is via \_\_\_\_\_.

- A. Benzamide inhibition
- B. Pyrethroid inhibition
- C. Cholinesterase inhibition
- D. None of the Above

2. Fenthion is a contact and stomach \_\_\_\_\_ used against many sucking, biting pests.

- A. Insecticide
- B. Insect growth regulator
- C. Restricted pesticide
- D. None of the Above

3. \_\_\_\_\_ is a pesticide that is widely used in agriculture, residential landscaping, public recreation areas, and in public health pest control programs such as mosquito eradication. In the US, it is the most commonly used organophosphate insecticide.

- A. Benzamide
- B. Pyrethroid
- C. Malathion
- D. None of the Above

4. \_\_\_\_\_ are a "natural" environmental product that is of low toxicity to mammals. They are highly photolabile and degrade quickly in sunlight, and the cost of reapplying them has limited their widespread agricultural use.

- A. Pyrethroid(s)
- B. Pyrethrin(s)
- C. Organophosphate(s)
- D. None of the Above



## **Aerial Application CEU Training Assignment #2**

### **Last Names H-P**

You will have 90 days from the start of this course to have successfully passed this assignment with a score of 70 %. You may e mail the answers to TLC, info@tlch2o.com or fax the answers to TLC, (928) 272-0747. This assignment is available to you in a Word Format on TLC's Website. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

**Write your answers on the Answer Key found in the front of this assignment.**

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.
3. If your last name begins with an A to G, you will pick assignment number 1, if your last name begins with the letter H to P, you are to complete assignment number 2 and if your last name begins with the letter Q-R, you will pick assignment number 3, and if your last name begins with the letter S-Z, you will pick assignment number 4, and if your last name begins with the letter S-Z, you will pick assignment number 4.

There are no intention trick questions. All questions require the specific answer as found in the text.

### **Topic 1 Aerial Application Introduction**

#### **Field Application**

1. Employers and applicator, worker or handlers must make sure that some safety equipment, clothing and aircraft loading equipment are in a good state of repair.  
A. True      B. False

#### **Enclosed Cabs**

2. Enclosed cabs must have a nonporous barrier that totally surrounds the occupants and prevents contact with \_\_\_\_\_ outside of the cab.  
A. Pesticide(s)      C. Deposition  
B. Atmosphere      D. None of the Above

#### **Advantages of Rotary Wing Aircraft**

3. Rotary wing aircraft offers the advantages of extreme maneuverability and \_\_\_\_\_ variation, and may be operated in almost any local area.  
A. Application      C. Spray pressure  
B. Speed      D. None of the Above
4. \_\_\_\_\_ is relatively easy to achieve with most ground-based directed spraying, but spray application with fixed and rotary wing aircraft presents more complex problems.  
A. Acceptable spray distribution      C. Accurate spray timing  
B. Extreme maneuverability      D. None of the Above

### **Sprayer Field Settings**

5. During a flight, spray pressure, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the \_\_\_\_\_.

- A. Application
- B. Spraying system
- C. Venturi spreader(s)
- D. None of the Above

### **Chemical Handling**

6. To help keep sprayer-applicator, worker or handler exposure to a minimum, wherever possible preference must be given to using pesticide packs handled via \_\_\_\_\_.

- A. Secure section
- B. Closed transfer systems
- C. Venturi spreader(s)
- D. None of the Above

### **Dry-Material Spreaders**

7. \_\_\_\_\_ and rotary-slinger spreaders are used to distribute dry formulations of herbicides, fertilizers, and seed.

- A. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Venturi-type
- D. None of the Above

### **Swath Pattern Application**

8. \_\_\_\_\_ can be adjusted to control the, and the pattern should be tested for even distribution of materials upon initial spreader installation.

- A. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Venturi-type and rotary-slinger spreader(s)
- D. None of the Above

9. Agitators are available to assist the \_\_\_\_\_ from the hopper.

- A. Spraying system
- B. Flow of material
- C. Spray pressure
- D. None of the Above

10. Rice seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.

- A. True
- B. False

## **Topic 2 - Understanding Hydraulics and Sprayer Principles**

1. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through \_\_\_\_\_, and the use of hydraulic pressure in machinery.

- A. Nozzle(s)
- B. Hydraulic line(s)
- C. Relative pressures of the liquid(s)
- D. None of the Above

2. \_\_\_\_\_ are almost incompressible.

- A. Liquid(s)
- B. Velocity(s)
- C. Pressure(s)
- D. None of the Above

### **Meteorology**

3. The atmospheric pressure is of great importance in meteorology, since it determines the winds, which generally move at right angles to the direction of the most rapid change of pressure, that is, along the isobars, which are contours of \_\_\_\_\_.

- A. Relative pressures of the liquid(s)
- B. Constant pressure
- C. Height of liquid column(s)
- D. None of the Above

4. Velocity of flow is an important consideration in sizing the \_\_\_\_\_.

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Relative pressures of the liquid(s)
- D. None of the Above

### **Bernoulli's Principle**

5. Bernoulli's principle thus says that a rise (fall) in pressure in a \_\_\_\_\_ must always be accompanied by a decrease (increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (increase) in the pressure.

- A. Liquid
- B. Velocity
- C. Flowing fluid
- D. None of the Above

### **Boom Sprayers**

6. Most sprayers distribute pesticides using a boom with spray nozzles spaced at regular intervals. The most common example would be wide horizontal booms used on field sprayers to spray field crops.

- A. True
- B. False

7. Development of a planned aerial application program does not require good cooperation between pilot and grower.

- A. True
- B. False

### **More on Ultra Low Volume**

8. \_\_\_\_\_ and atomizing attachments such as Micronair, Mini-spin and Airfoil are frequently used to aid in droplet break-up.

- A. Guessing
- B. Special metering
- C. Electrochromic
- D. None of the Above

### **Understanding Spray Nozzles**

9. Machines should be calibrated often to compensate for wear. The \_\_\_\_\_ (gallons per acre) will be set by the chemical being applied and the crop being treated as listed on the manufacturer's label.

- A. Formulation
- B. Application rate(s)
- C. Material being used
- D. None of the Above

### **Ultra-Low Volume (ULV) Formulations and Temperature**

10. When using dry-granular formulations, special consideration **must** be given to monitoring the air and ground temperature difference.

- A. True
- B. False

## Topic 3 - Understanding Pumps and Aerial Sprayers

### Spray Nozzle Categorization

#### Application

1. Droplet micron size is determined by the specific nozzle used first and foremost. In general, the larger the orifice tube, the larger the micron size of the droplet produced. The second factor in determining droplet size is the \_\_\_\_\_.

- A. Droplet produced
- B. Aircraft speed
- C. Higher amounts of spray
- D. None of the Above

#### Distance between Nozzle and Target (Boom Height)

2. Less distance between the droplet release point and the \_\_\_\_\_ will reduce spray drift. Less distance means less time to travel from nozzle to target and therefore less drift occurs.

- A. Height
- B. Droplet release point
- C. Target
- D. None of the Above

#### Drain Valve(s)

3. The drain valve(s) must be located at the lowest point(s) in the system to allow for complete draining of the spray system at the \_\_\_\_\_.

- A. Refilling of chemical
- B. End of the program
- C. Start of the program
- D. None of the Above

#### Emergency Shut-off Valve

4. The emergency shutoff valve should be located between the hopper and pump. The valve should be as close to the hopper as possible to prevent the loss of pesticide and damage to the environment in the event of a major spray system leak.

- A. True
- B. False

#### Electrostatic Sprayers

5. Electrostatic sprayers which apply \_\_\_\_\_ to the material being sprayed reduce spraying time and improve insect and disease control per unit of chemical applied.

- A. Mist
- B. Tap water or base oil
- C. An electrical charge
- D. None of the Above

6. Higher amounts of sprays from air-assisted electrostatic units were also found deeper in the crop canopy compared to the amounts delivered by uncharged hydraulic sprayers. These sprayers also deposit more \_\_\_\_\_ on any fruit present in the canopy, however.

- A. Tension
- B. Drift
- C. Spray
- D. None of the Above

#### Specific Gravity

7. Specific gravity is the ratio of the mass of a given volume of liquid to the mass of the same volume of water. In spraying, the main effect of the droplet produced of a liquid other than water is on the capacity of the spray nozzle.

- A. True
- B. False

### Surface Tension

8. The surface tension of a liquid tends to assume the \_\_\_\_\_, acting as a membrane under tension.
- A. Droplet position  
B. Higher amounts of spray  
C. Smallest possible size  
D. None of the Above
9. Surface tension is more apparent at high operating pressures.
- A. True  
B. False

### Liquid Application and Calculations

10. After you have properly calibrated your equipment, it is ready to use. The next step is to read the label and find the site and pest which you are treating.
- A. True  
B. False

## Topic 4 - Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. The contractor/pilot is not required for any arrangements necessary to use any airport.
- A. True  
B. False

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and average sod conditions at an elevation of approximately \_\_\_\_\_ feet above sea level. At higher elevations or when fields are soft, longer airstrips will be required. Hard-surfaced runways at lower elevations may be somewhat shorter.
- A. 1,000  
B. 2,500  
C. 4,000  
D. None of the Above

#### Notify Beekeepers

3. Many of the pesticides used in aerial treatments are highly toxic to bees. Notify beekeepers about the meetings. Program operational guidelines, environmental impact statements, \_\_\_\_\_, State laws, and/or pesticide labels may also require that beekeepers in the area be notified of control programs.
- A. Environmental application  
B. Environmental assessments (EA)  
C. Environmental issues  
D. None of the Above

#### Spray Block, Sensitive Area, and Buffer Zone Verification

4. After taking a \_\_\_\_\_ flight with each pilot and confirming that everything (buffer zones, spray blocks, and sensitive areas) is recorded on a master program map, then jointly sign and date the map.
- A. Pretreatment reconnaissance  
B. Test reconnaissance  
C. Spraying reconnaissance  
D. None of the Above

#### Spray Deposition Monitoring

##### Dyecard Samplers

5. Use dyecards to monitor \_\_\_\_\_.
- A. Nozzle or nozzle group output  
B. Row spacing  
C. Liquid formulation spray deposition  
D. None of the Above

6. Dyecards are made of clay and are used to provide some information on swath width, spray droplet deposition pattern, and droplet size; and to identify leaks in the spray system.
- A. True      B. False

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for booms. For directed and band rigs use the \_\_\_\_\_.
- A. Column spacing      C. Nozzle or nozzle group output  
B. Row spacing      D. None of the Above
8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.
- A. Spraying      C. Accurate spray timing  
B. Extreme maneuverability      D. None of the Above
9. On directed rigs, catch spray from all nozzles per row for noted time. \_\_\_\_\_ output in ounces = gallons/acre actually applied.
- A. Nozzle or nozzle group      C. Liquid formulation  
B. Uniform distribution      D. None of the Above
10. Replace any nozzles whose output is greater than \_\_\_\_\_ % of the average of all nozzles.
- A. 25      C. 10  
B. 40      D. None of the Above

## **Topic 5 - Pesticide Drift Control and Training Requirements**

1. Spray drift shall include movement of pesticides to target sites not caused by erosion, migration, volatility, or windblown soil particles that occurs after application or application of fumigants unless specifically addressed on the product label with respect to drift control requirements."
- A. True      B. False

### **Pesticide Residues**

2. Fresh water reservoirs, stream bed sediments, and harvested food would not be good examples of places that should be tested for pesticide residues.
- A. True      B. False

### **Understanding the Dangers of Drift**

3. The size of \_\_\_\_\_ depends upon the particular formulation and can be controlled to some extent by screening. In the case of sprays, droplet size is generally increased by reducing pressures or increasing nozzle size.
- A. Granular material(s)      C. Surface tension of the spray solution  
B. Pesticide droplets or particles      D. None of the Above

### **Vapor Drift (Volatilization)**

4. Which of the following can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D?
- A. Accurate deposition      C. Chemical control  
B. Vapor drift                      D. None of the Above

### **Chemical Control in an IPM Program**

5. Regular field scouting, coupled with forecasting pest problems and determining economic thresholds, is used to ensure that \_\_\_\_\_ are only applied when pest populations warrant chemical control.
- A. Granular material(s)                      C. Pesticides  
B. Chemical control                      D. None of the Above

### **Bowen's Disease**

6. Crop dusting involving Organochlorine pesticides has been implicated in Bowen's disease. However, lead arsenic has not been used by aerial applicators or in any other form of agriculture for three decades because of the adverse effects to human health that were not as well known when the powder was legal.
- A. True      B. False

### **Environmental Effects**

#### **Effects on Non-target Species**

7. A number of the \_\_\_\_\_ have been banned from most uses worldwide, and globally they are controlled via the Stockholm Convention on persistent organic pollutants. These include: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene.
- A. Granular material(s)      C. Organochlorine pesticide(s)  
B. Chemical control(s)      D. None of the Above

### **Meteorological Considerations**

8. The distance a spray droplet travels depends on the droplet size and downward velocity, the release height and the \_\_\_\_\_.
- A. Accurate deposition                      C. Ambient conditions  
B. Spray distribution efficiency      D. None of the Above

### **Sprayer Field Settings**

9. During a flight, \_\_\_\_\_, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the spraying system.
- A. Pesticide droplets or particles      C. Spray pressure  
B. Chemical control                      D. None of the Above

### **Equipment Storage**

10. Refer to the relevant applicator, \_\_\_\_\_ instruction manuals for both the spray equipment and the aircraft.
- A. Agricultural employer(s)                      C. Worker or handler's  
B. Employee(s)                      D. None of the Above

## Topic 6 - Complications/ Limitations / Risk

### Specific Restrictions

1. Specific restrictions may include prohibiting the use of certain pesticides under certain conditions, prohibiting certain methods of application, requiring use of a foliage barrier, or requiring a buffer zone distance between the site of \_\_\_\_\_ to be protected.

- A. Nozzle or nozzle group output
- B. Uniform distribution
- C. Application and areas
- D. None of the Above

2. During the past few years, the OPP has received and reviewed new studies on \_\_\_\_\_ that it required from pesticide registrants to support their product registrations.

- A. Spray drift
- B. Uniform distribution
- C. Application site
- D. None of the Above

### Droplet Drift

3. The distance of droplet drift depends upon the size of the droplets, the velocity of the wind and the height above the ground where the herbicide is discharged. In general, larger orifices and lower pressures result in \_\_\_\_\_.

- A. Droplet drift
- B. Larger droplets
- C. Lower pressures
- D. None of the Above

### Vapor Drift

4. Volatile herbicides may produce \_\_\_\_\_ that can be carried great distances from the target area to other crop sites.

- A. The size of the droplet(s)
- B. Mists
- C. Vapors
- D. None of the Above

### Phenoxy Herbicides

5. The phenoxy group of herbicides has been most often involved in crop injury by off-target drift. \_\_\_\_\_ includes 2,4-D, 2,4,5-T, 2,4-DB, 2,4,5-TP (Silvex) and MCPA. These herbicides are most commonly used for the control of broad-leaved weeds in crops and for the control of undesirable woody species.

- A. The phenoxy group
- B. Volatile herbicide(s)
- C. Esters
- D. None of the Above

6. \_\_\_\_\_ in general are formulated in two ways, as esters or amines.

- A. Phenoxy herbicides
- B. Amines
- C. Esters
- D. None of the Above

7. \_\_\_\_\_ are more effective in controlling hard-to-kill weeds but are the most hazardous in terms of volatility and consequent drift to sensitive crops.

- A. Esters
- B. Volatile herbicide(s)
- C. Amines
- D. None of the Above

### Other Components

8. Which of the following are necessary to make the tank, pump and nozzles work together.

- A. Spray pattern
- B. Uniform distribution
- C. Flow control devices
- D. None of the Above

9. \_\_\_\_\_ trap particles and debris in the spray mixture and protect the pump, control devices and nozzles from damage.
- A. Nozzle or nozzle group output      C. Strainers  
B. Control valves                              D. None of the Above

### Dispersal Summary

10. All nozzles produce a range of \_\_\_\_\_. The small, drift-prone particles cannot be eliminated but can be reduced and kept within reasonable limits.
- A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
B. Droplet sizes                              D. None of the Above

## Topic 7 - Aerial and Agricultural Pesticides

### Fenthion

1. Fenthion is a contact and stomach \_\_\_\_\_ used against many sucking, biting pests.
- A. Insecticide                                  C. Restricted pesticide  
B. Insect growth regulator      D. None of the Above

### Malathion

2. Malathion is an insecticide of relatively low human toxicity; however recent studies have shown that children with higher levels of Malathion in their urine seem to be at an increased risk of attention deficit hyperactivity disorder.
- A. True                      B. False

3. \_\_\_\_\_ have been synthesized to be similar to pyrethrins yet more stable in the environment. Evidence suggests that they have a very large margin of safety when used as directed by the label.
- A. Pyrethroid(s)                                  C. Organophosphate(s)  
B. Pyrethrin(s)                                  D. None of the Above

### Adsorption Process

4. The adsorption process binds \_\_\_\_\_ to soil particles, similar to iron filings or paper clips sticking to a magnet.
- A. Pesticide(s)                                  C. Organophosphate(s)  
B. Insect growth regulator(s)      D. None of the Above

### Pesticide Transfer

5. \_\_\_\_\_ is sometimes essential for pest control. For example, for certain pre-emergence herbicides to be effective, they must move within the soil to reach the germinating seeds.
- A. Volatilization                                  C. Pesticide transfer  
B. Photodegradation                              D. None of the Above

### Pesticide Transfer

6. Too much \_\_\_\_\_, however, can move a pesticide away from the target pest. This can lead to reduced pest control, contamination of surface water and groundwater, and injury of non-target species, including humans.
- A. Volatilization                                  C. Environmental factors  
B. Movement                                      D. None of the Above

### Volatilization

7. Once volatilized, a pesticide may diffuse into the atmosphere and either be destroyed or continue as an environmental risk. When mixing disturbs a soil contaminated by a pesticide or other organic compound, a \_\_\_\_\_ percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. 50
- B. 10
- C. 30
- D. None of the Above

### Thermophilic Temperatures

8. \_\_\_\_\_, the movement of pesticide vapors or gases in the atmosphere, can lead to injury of nontarget species. Herbicide vapors in particular can injure nontarget plants.

- A. Volatilization
- B. Pesticide chemical application(s)
- C. Vapor drift
- D. None of the Above

### Photodegradation

9. Photodegradation is the breakdown of pesticides by light, particularly sunlight. \_\_\_\_\_ can destroy pesticides on foliage, on the surface of the soil, and even in the air.

- A. Volatilization
- B. Vapor drift
- C. Photodegradation
- D. None of the Above

### Proper Pesticide Handling

10. Care must be exercised in cleaning equipment, clothing, and persons working with \_\_\_\_\_. Additionally, special precautions are necessary if pesticides are spilled or catch fire. Certain materials associated with vector control operations, including some pesticides, are considered by EPA and DPR to represent hazardous wastes.

- A. Restricted pesticide(s)
- B. Pesticides
- C. Pesticide chemical application(s)
- D. None of the Above

### California DPR Requirement

The Assignment must be submitted to TLC by December 27 in order to be submitted to DPR by the 31<sup>st</sup>. If it is late, you will be penalized \$50 per day.

## **Aerial Application CEU Training Assignment #3 Last Names Q-R**

You will have 90 days from the start of this course to have successfully passed this assignment with a score of 70 %. You may e mail the answers to TLC, info@tlch2o.com or fax the answers to TLC, (928) 272-0747. This assignment is available to you in a Word Format on TLC's Website. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

**Write your answers on the Answer Key found in the front of this assignment.**

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.
3. If your last name begins with an A to G, you will pick assignment number 1, if your last name begins with the letter H to P, you are to complete assignment number 2 and if your last name begins with the letter Q-R, you will pick assignment number 3, and if your last name begins with the letter S-Z, you will pick assignment number 4, and if your last name begins with the letter S-Z, you will pick assignment number 4.

There are no intention trick questions. All questions require the specific answer as found in the text.

### **Topic 1-Aerial Application**

1. \_\_\_\_\_ in dense crop canopies can also be more difficult to achieve with aircraft.  
A. Accurate deposition            C. Spray pressure  
B. Easy maneuverability        D. None of the Above

#### **Ultra-Low Volume (ULV)**

2. The term Ultra-Low Volume (ULV) (spraying) is used in the context of \_\_\_\_\_.  
A. Pesticide application            C. Accurate spray timing  
B. Maneuverability                D. None of the Above

#### **Field Application**

3. Employers and applicator, worker or handlers must make sure that all safety equipment, clothing and aircraft loading equipment are clean and in a good state of repair.  
A. True            B. False
4. Enclosed cabs that provide respiratory protection must have a properly functioning \_\_\_\_\_ that is used and maintained according to the manufacturer's written operating instructions.  
A. Vanes in the spreader(s)            C. Ventilation system  
B. Escape hatch                        D. None of the Above

### Advantages of Rotary Wing Aircraft

5. Rotary wing aircraft offers the advantages of extreme maneuverability and \_\_\_\_\_ variation, and may be operated in almost any local area.
- A. Application                      C. Spray pressure  
B. Speed                              D. None of the Above

### Sprayer Field Settings

6. During a flight, spray pressure, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the \_\_\_\_\_.
- A. Application                      C. Venturi spreader(s)  
B. Spraying system                D. None of the Above

### Chemical Handling

7. To help keep sprayer-applicator, worker or handler exposure to a minimum, wherever possible preference must be given to using pesticide packs handled via \_\_\_\_\_.
- A. Open system                    C. Closed transfer systems  
B. Agitator(s)                      D. None of the Above

### Dry-Material Spreaders

8. \_\_\_\_\_ and rotary-slinger spreaders are used to distribute dry formulations of herbicides, fertilizers, and seed.
- A. Positive metering                C. Venturi-type  
B. Saddles                          D. None of the Above

### Swath Pattern Application

9. \_\_\_\_\_ can be adjusted to control the, and the pattern should be tested for even distribution of materials upon initial spreader installation.
- A. Positive metering system(s)    C. Venturi-type and rotary-slinger spreader(s)  
B. Vanes in the spreader(s)        D. None of the Above
10. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft.
- A. Accurate deposition              C. Most appropriate spraying equipment  
B. Positive metering systems        D. None of the Above

## Topic 2 - Understanding Hydraulics and Sprayer Principles

1. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through \_\_\_\_\_, and the use of hydraulic pressure in machinery.
- A. Nozzle(s)                        C. Relative pressures of the liquid(s)  
B. Height of liquid column(s)    D. None of the Above
2. \_\_\_\_\_ are almost incompressible.
- A. Liquid(s)                        C. Pressure(s)  
B. Volume(s)                        D. None of the Above

### **Meteorology**

3. Certain typical weather patterns are associated with relatively high and relatively low pressures, and how they vary with time. The barometric pressure may be given in popular weather forecasts, though few people know what to do with it

- A. True      B. False

4. Velocity of flow is an important consideration in sizing the \_\_\_\_\_.

- A. Spray nozzle(s)    C. Relative pressures of the liquid(s)  
B. Hydraulic line(s)    D. None of the Above

### **Bernoulli's Principle**

5. Bernoulli's principle thus says that a rise (fall) in pressure in a \_\_\_\_\_ must always be accompanied by a decrease (increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (increase) in the pressure.

- A. Flowing fluid      C. Volume of flow  
B. Velocity of flow    D. None of the Above

### **Boom Sprayers**

6. Most sprayers distribute pesticides using spray nozzles spaced at irregular intervals.

- A. True      B. False

7. The full advantages of aerial application are more likely to be realized when its use is preplanned.

- A. True      B. False

### **More on Ultra Low Volume**

8. Ultra-Low Volume (ULV) equipment ranges in capacity from a few ounces to 1/2 gallon per acre. \_\_\_\_\_ and atomizing attachments such as Micronair, Mini-spin and Airfoil are frequently used to aid in droplet break-up.

- A. Guessing                      C. Electrochromic  
B. Special metering            D. None of the Above

### **Understanding Spray Nozzles**

9. The nozzle type and pressure should be selected for the \_\_\_\_\_ and the atomization required for the job.

- A. Formulation                      C. Material being used  
B. Application rate(s)            D. None of the Above

### **Ultra-Low Volume (ULV) Formulations and Temperature**

10. When using liquid ultra- low volume (ULV) formulations, special consideration **must** be given to monitoring the air and ground temperature difference. The best weather for spraying treatment is usually mid-afternoon.

- A. True      B. False

## Topic 3 - Understanding Pumps and Aerial Sprayers

### Spray Nozzle Categorization

#### Application

1. Droplet micron size is determined by the specific nozzle used first and foremost. In general, the larger the orifice tube, the larger the micron size of the droplet produced. The second factor in determining droplet size is the \_\_\_\_\_.

- A. Droplet produced
- B. Aircraft speed
- C. Surface tension of a liquid
- D. None of the Above

#### Distance between Nozzle and Target (Boom Height)

2. Less distance between the droplet release point and the \_\_\_\_\_ will reduce spray drift. Less distance means less time to travel from nozzle to target and therefore less drift occurs.

- A. Distance
- B. Height
- C. Target
- D. None of the Above

#### Drain Valve(s)

3. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. True
- B. False

#### Emergency Shut-off Valve

4. The emergency shutoff valve is not necessary because of positive shut –off valves.

- A. True
- B. False

#### Electrostatic Sprayers

5. Electrostatic sprayers which apply \_\_\_\_\_ to the material being sprayed reduce spraying time and improve insect and disease control per unit of chemical applied.

- A. Droplets
- B. Tap water or base oil
- C. An electrical charge
- D. None of the Above

6. Higher amounts of sprays from air-assisted electrostatic units were also found deeper in the crop canopy compared to the amounts delivered by uncharged hydraulic sprayers. These sprayers also deposit more \_\_\_\_\_ on any fruit present in the canopy, however.

- A. Tension
- B. Spray
- C. Droplet release point
- D. None of the Above

#### Specific Gravity

7. Specific gravity is the ratio of the mass of a given volume of liquid to the mass of the same volume of water. In spraying, the main effect of the specific gravity Sg of a liquid other than water is on the capacity of the spray nozzle.

- A. True
- B. False

#### Surface Tension

8. The surface tension of a liquid tends to assume the \_\_\_\_\_, acting as a membrane under tension.

- A. Droplet size
- B. Largest size
- C. Smallest possible size
- D. None of the Above

9. A lower surface tension reduces the spray angle, particularly on hollow cone nozzles.  
A. True      B. False

### **Liquid Application and Calculations**

10. You should conduct sprayer calibration using tap water or base oil.  
A. True      B. False

## **Topic 4 - Aerial Application Assignment and Control Information Section**

### **Aircraft Facilities**

#### **Airports and Airstrips**

1. Hard-surfaced runways are desirable when small aircraft are used.  
A. True      B. False

#### **Minimum Airstrip Sizes**

2. The airstrip lengths shown below are for runways with clear approaches and average sod conditions at an elevation of approximately \_\_\_\_\_ feet above sea level. At higher elevations or when fields are soft, longer airstrips will be required. Hard-surfaced runways at lower elevations may be somewhat shorter.  
A. 1,000      C. 4,000  
B. 2,500      D. None of the Above

#### **Notify Beekeepers**

3. Many of the pesticides used in aerial treatments are highly toxic to bees. Notify beekeepers about the meetings. Program operational guidelines, environmental impact statements, \_\_\_\_\_, State laws, and/or pesticide labels may also require that beekeepers in the area be notified of control programs.  
A. Environmental application      C. Accurate spraying  
B. Environmental assessments (EA)      D. None of the Above

#### **Spray Block, Sensitive Area, and Buffer Zone Verification**

4. After taking a \_\_\_\_\_ flight with each pilot and confirming that everything (buffer zones, spray blocks, and sensitive areas) is recorded on a master program map, then jointly sign and date the map.  
A. Spraying reconnaissance      C. Pretreatment reconnaissance  
B. Test reconnaissance      D. None of the Above

#### **Spray Deposition Monitoring**

##### **Dyecard Samplers**

5. Use dyecards to monitor \_\_\_\_\_.  
A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
B. Pesticide absorption      D. None of the Above
6. Dyecards are made of water- or oil-sensitive paper and are used to provide valuable information on swath width, spray droplet deposition pattern, and droplet size; and to identify leaks in the spray system.  
A. True      B. False

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for booms. For directed and band rigs use the \_\_\_\_\_.
- A. Column spacing                      C. Nozzle or nozzle group output  
B. Row spacing                          D. None of the Above
8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.
- A. Volume                                  C. Spray pressure  
B. Spraying                                D. None of the Above
9. On directed rigs, catch spray from all nozzles per row for noted time. \_\_\_\_\_ output in ounces = gallons/acre actually applied.
- A. Nozzle or nozzle group              C. Liquid formulation  
B. Uniform distribution                D. None of the Above
10. Replace any nozzles whose output is greater than \_\_\_\_\_ % of the average of all nozzles.
- A. 25                                      C. 10  
B. 40                                      D. None of the Above

## **Topic 5 - Pesticide Drift Control and Training Requirements**

1. Spray drift shall not include movement of pesticides to non- or off-target sites caused by erosion, migration, volatility, or windblown soil particles that occurs after application or application of fumigants unless specifically addressed on the product label with respect to drift control requirements."
- A. True                      B. False

### **Pesticide Residues**

2. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.
- A. True                      B. False

### **Understanding the Dangers of Drift**

3. Droplet size depends primarily upon the spray pressure, nozzle design and orientation, and the \_\_\_\_\_.
- A. Granular material(s)                      C. Surface tension of the spray solution  
B. Pesticide droplets or particles        D. None of the Above

### **Vapor Drift (Volatilization)**

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for \_\_\_\_\_.
- A. Accurate deposition                      C. Chemical control  
B. Vapor drift                                  D. None of the Above

### **Chemical Control in an IPM Program**

5. Regular field scouting, coupled with forecasting pest problems and determining economic thresholds, is used to ensure that \_\_\_\_\_ are only applied when pest populations warrant chemical control.

- A. Granular material(s)
- B. Chemical control
- C. Pesticides
- D. None of the Above

### **Bowen's Disease**

6. \_\_\_\_\_ involving arsenic powders has been implicated in Bowen's disease.

- A. Accurate deposition
- B. Crop dusting
- C. Most appropriate spraying equipment
- D. None of the Above

### **Environmental Effects**

#### **Effects on Non-target Species**

7. A number of the \_\_\_\_\_ have been banned from most uses worldwide, and globally they are controlled via the Stockholm Convention on persistent organic pollutants. These include: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene.

- A. Arsenic powders
- B. Volatile herbicide(s)
- C. Organochlorine pesticide(s)
- D. None of the Above

### **Meteorological Considerations**

8. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Accurate deposition
- B. Spray distribution efficiency
- C. Ambient conditions
- D. None of the Above

### **Sprayer Field Settings**

9. During a flight, \_\_\_\_\_, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the spraying system.

- A. Pesticide droplets or particles
- B. Chemical control
- C. Spray pressure
- D. None of the Above

### **Equipment Storage**

10. Aircraft mounted spray equipment is often removed after spraying to release the aircraft for other duties. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. True
- B. False

## **Topic 6 - Complications/ Limitations / Risk**

### **Specific Restrictions**

1. Specific restrictions may include prohibiting the use of certain pesticides under certain conditions, prohibiting certain methods of application, requiring use of a foliage barrier, or requiring a buffer zone distance between the site of \_\_\_\_\_ to be protected.

- A. Nozzle or nozzle group output
- B. Application and areas
- C. Application site
- D. None of the Above

2. During the past few years, the OPP has received and reviewed new studies on spray drift that it required from pesticide registrants to support their product registrations. The OPP has completed its review of these studies and reached conclusions about the factors that influence drift and the amounts of sprays which can drift from the \_\_\_\_\_.

- A. Output
- B. Distribution
- C. Application site
- D. None of the Above

### **Droplet Drift**

3. The distance of droplet drift depends upon the size of the droplets, the velocity of the wind and the height above the ground where the herbicide is discharged. In general, larger orifices and \_\_\_\_\_ result in larger droplets.

- A. Droplet drift
- B. Larger droplets
- C. Lower pressures
- D. None of the Above

### **Vapor Drift**

4. Volatility refers to the ability of a herbicide to vaporize and to mix freely with the air. Volatile herbicides may produce \_\_\_\_\_ that can be carried great distances from the target area to other crop sites.

- A. The size of the droplet(s)
- B. Mists
- C. Vapors
- D. None of the Above

### **Phenoxy Herbicides**

5. These herbicides are most commonly used for the control of broad-leaved weeds in crops and for the control of undesirable woody species.

- A. The phenoxy group
- B. Volatile herbicide(s)
- C. Esters
- D. None of the Above

6. \_\_\_\_\_ in general are formulated in two ways, as esters or amines.

- A. Phenoxy herbicides
- B. Amines
- C. Esters
- D. None of the Above

7. \_\_\_\_\_ are more effective in controlling hard-to-kill weeds but are the most hazardous in terms of volatility and consequent drift to sensitive crops.

- A. Esters
- B. Volatile herbicide(s)
- C. Amines
- D. None of the Above

### **Other Components**

8. Flow control devices are necessary to make the tank, pump and nozzles work together. Depending on the application system, these devices may include pressure regulators, unloader valves and control valves. Because both the \_\_\_\_\_ and flow rate are determined by operating pressure, each sprayer should be equipped with a pressure gauge.

- A. Spray pattern
- B. Uniform distribution
- C. Flow control devices
- D. None of the Above

9. Strainers trap particles and debris in the spray mixture and protect the pump, \_\_\_\_\_ and nozzles from damage.

- A. Nozzle or nozzle group output
- B. Control devices
- C. Strainers
- D. None of the Above

### Dispersal Summary

10. All nozzles produce a range of \_\_\_\_\_. The small, drift-prone particles cannot be eliminated but can be reduced and kept within reasonable limits.
- A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
B. Droplet sizes      D. None of the Above

## Topic 7 - Aerial and Agricultural Pesticides

### Fenthion

1. Due to its relatively low toxicity towards humans and mammals, \_\_\_\_\_ is listed as moderately toxic compound in U.S. Environmental Protection Agency and World Health Organization toxicity class
- A. Insect growth regulator      C. Hormonal IGRs  
B. Fenthion      D. None of the Above

### Malathion

2. Malathion is a(n) \_\_\_\_\_ parasympathomimetic which binds irreversibly to cholinesterase. Malathion is an insecticide of relatively low human toxicity.
- A. Organophosphate      C. Benzamide  
B. Benzoyl-phenylurea      D. None of the Above

### Permethrin

3. Permethrin is a broad-spectrum pyrethroid insecticide.
- A. True      B. False
4. \_\_\_\_\_ have been synthesized to be similar to pyrethrins yet more stable in the environment. Evidence suggests that they have a very large margin of safety when used as directed by the label.
- A. Pyrethroid(s)      C. Organophosphate(s)  
B. Pyrethrin(s)      D. None of the Above

### Adsorption Process

5. \_\_\_\_\_ often occurs because of the attraction between a chemical and soil particles.
- A. Action threshold(s)      C. Compatibility  
B. Adsorption      D. None of the Above

### Pesticide Transfer

6. Five ways that pesticides can be transferred are through \_\_\_\_\_, runoff, leaching, absorption and crop removal.
- A. Volatilization      C. Environmental factors  
B. Photodegradation      D. None of the Above

### Volatilization

7. Once volatilized, a pesticide may diffuse into the atmosphere and either be destroyed or continue as an environmental risk. When mixing disturbs a soil contaminated by a pesticide or other organic compound, a \_\_\_\_\_ percent or greater loss of the soil contaminant through volatilization is not unusual.
- A. 50      C. 30  
B. 10      D. None of the Above

### **Thermophilic Temperatures**

8. Moisture also affects volatilization rates. Water may physically impede the flow of a gas phase pesticide by obstructing the pores through which gases travel. \_\_\_\_\_ may also promote volatilization by liberating weakly adsorbed pesticides.

- A. Water
- B. Photodegradation
- C. Environmental factors
- D. None of the Above

### **Photodegradation**

9. Factors that influence pesticide photodegradation include the intensity of the sunlight, properties of the application site, the application method and the properties of the pesticide. \_\_\_\_\_ from photodegradation can be reduced by adding the pesticide to the soil during or immediately after application.

- A. Action threshold(s)
- B. Pesticide losses
- C. Compatibility
- D. None of the Above

### **Proper Pesticide Handling**

10. Special precautions are suggested if pesticides are spilled or catch fire. Certain materials associated with vector control operations, including some pesticides, are considered by OSHA to represent hazardous wastes.

- A. True
- B. False

### **California DPR Requirement**

The Assignment must be submitted to TLC by December 27 in order to be submitted to DPR by the 31<sup>st</sup>. If it is late, you will be penalized \$50 per day.

## **Aerial Application CEU Training Assignment #4 Last Names S-Z**

You will have 90 days from the start of this course to have successfully passed this assignment with a score of 70 %. You may e mail the answers to TLC, info@tlch2o.com or fax the answers to TLC, (928) 272-0747. This assignment is available to you in a Word Format on TLC's Website. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

**Write your answers on the Answer Key found in the front of this assignment.**

1. We will require all students to fax or e-mail a copy of their driver's license with the registration form.
2. You will need to pick one of the following four assignments to complete. This selection process is based upon your last name.
3. If your last name begins with an A to G, you will pick assignment number 1, if your last name begins with the letter H to P, you are to complete assignment number 2 and if your last name begins with the letter Q-R, you will pick assignment number 3, and if your last name begins with the letter S-Z, you will pick assignment number 4, and if your last name begins with the letter S-Z, you will pick assignment number 4.

There are no intention trick questions. All questions require the specific answer as found in the text.

### **Topic 1 Aerial Application Introduction**

#### **Ultra-Low Volume (ULV)**

1. The term Ultra-Low Volume (ULV) (spraying) is used in the context of \_\_\_\_\_.  
A. Pesticide application                      C. Spray timing  
B. Maneuverability                              D. None of the Above
2. Ultra-low volume application of pesticides has been defined as spraying at a Volume Application Rate (VAR) of less than \_\_\_\_\_ L/ha for field crops or less than \_\_\_\_\_ L/ha for tree/bush crops.  
A. 5 and 25    C. 7 and 75  
B. 5 and 50    D. None of the Above

#### **Field Application**

3. Adequate pre-preparation will make sure that the actual \_\_\_\_\_ is carried out under the safest conditions and accurate spray timing will help ensure that the product is used to optimum effect. Employers and applicator, worker or handlers must make sure that all safety equipment, clothing and aircraft loading equipment are clean and in a good state of repair.  
A. Application                                      D. Spray pressure  
B. Spraying    E. Accurate spray timing  
C. Maneuverability                                D. None of the Above

4. Rotary wing aircraft offers the advantages of extreme maneuverability and \_\_\_\_\_ variation, and may be operated in almost any local area.

- A. Application
- B. Speed
- C. Spray pressure
- D. None of the Above

5. \_\_\_\_\_ is relatively easy to achieve with most ground-based directed spraying, but spray application with fixed and rotary wing aircraft presents more complex problems.

- A. Acceptable spray distribution
- B. Extreme maneuverability
- C. Accurate spray timing
- D. None of the Above

### **Sprayer Field Settings**

6. The use of artificial targets within the treated crop is strongly recommended to check and evaluate spray deposit efficiency as well as confirm the lane separation distances. This is where the ground staff can report back to the pilot, via the radio, any problems with the spraying system such as blocked nozzles or incorrectly operating atomizers.

- A. True
- B. False

### **Chemical Handling**

7. To help keep sprayer-applicator, worker or handler exposure to a minimum, wherever possible preference must be given to using pesticide packs handled via \_\_\_\_\_.

- A. Opened spraying system
- B. Agitator(s)
- C. Closed transfer systems
- D. None of the Above

8. Fixed-wing aircraft use venturi spreaders while helicopters use rotary spreaders. Venturi spreaders clamp to the gate box at the \_\_\_\_\_.

- A. Top of the hopper
- B. Base of the agitator(s)
- C. Base of the hopper
- D. None of the Above

9. Agitators are available to assist the \_\_\_\_\_ from the hopper.

- A. Spraying system
- B. Flow of material
- C. Spray pressure
- D. None of the Above

10. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.

- A. True
- B. False

## Topic 2 - Understanding Hydraulics and Sprayer Principles

1. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through \_\_\_\_\_, and the use of hydraulic pressure in machinery.

- A. Nozzle(s)                      C. Relative pressures of the liquid(s)  
B. Hydraulic line(s)            D. None of the Above

2. \_\_\_\_\_ are almost incompressible.

- A. Liquid(s)                      C. Pressure(s)  
B. Hydraulic pressure(s)        D. None of the Above

### Meteorology

3. The atmospheric pressure is of great importance in meteorology, since it determines the winds, which generally move at right angles to the direction of the most rapid change of pressure, that is, along the isobars, which are contours of \_\_\_\_\_.

- A. Hydraulic line(s)              C. Height of liquid column(s)  
B. Constant pressure            D. None of the Above

4. Velocity of flow is an important consideration in sizing the \_\_\_\_\_.

- A. Spray nozzle(s)              C. Relative pressures of the fittings  
B. Hydraulic line(s)            D. None of the Above

### Bernoulli's Principle

5. Bernoulli's principle thus says that a rise (fall) in pressure in a \_\_\_\_\_ must always be accompanied by a decrease (increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (increase) in the pressure.

- A. Liquids                          C. Flowing fluid  
B. Hydraulic pressure            D. None of the Above

### Boom Sprayers

6. The most common example of boom sprayer would be wide horizontal booms used on field sprayers to spray field crops.

- A. True                      B. False

7. Development of a planned aerial application program does not require good cooperation between pilot and grower.

- A. True                      B. False

### More on Ultra Low Volume

8. Ultra-Low Volume (ULV) equipment ranges in capacity from a few ounces to 1/2 gallon per acre. \_\_\_\_\_ and atomizing attachments such as Micronair, Mini-spin and Airfoil are frequently used to aid in droplet break-up.

- A. Guessing                      C. Electrochromic  
B. Special metering            D. None of the Above

### Understanding Spray Nozzles

9. Machines should be calibrated often to compensate for\_\_\_\_\_. The application rate (gallons per acre) will be set by the chemical being applied and the crop being treated as listed on the manufacturer's label.

- A. Formulation
- B. Application rate(s)
- C. Wear
- D. None of the Above

### Ultra-Low Volume (ULV) Formulations and Temperature

10. When using liquid ultra- low volume (ULV) formulations, special consideration **must** be given to monitoring the air and ground temperature difference. This is one of the critical indicators of the time to quit treating for the day. The best weather for spraying treatment is usually from dawn until mid-morning.

- A. True
- B. False

## Topic 3 - Understanding Pumps and Aerial Sprayers

### Spray Nozzle Categorization

#### Application

1. Droplet micron size is determined by the specific nozzle used first and foremost. In general, the larger the orifice tube, the larger the micron size of the droplet produced. The second factor in determining droplet size is the\_\_\_\_\_.

- A. Droplet produced
- B. Aircraft speed
- C. Higher amounts of sprays
- D. None of the Above

### Distance between Nozzle and Target (Boom Height)

2. Less distance between the droplet release point and the target will increase spray drift. More distance means less time to travel from nozzle to target and therefore less drift occurs.

- A. True
- B. False

### Drain Valve(s)

3. The drain valve(s) must be located at the lowest point(s) in the system to allow for complete draining of the spray system at the\_\_\_\_\_.

- A. Refilling of chemical
- B. End of the program
- C. Start of the program
- D. None of the Above

### Emergency Shut-off Valve

4. The emergency shutoff valve should be located between the hopper and pump. The valve should be as close to the hopper as possible to prevent the loss of pesticide and damage to the environment in the event of a major spray system leak.

- A. True
- B. False

### Electrostatic Sprayers

5. Electrostatic sprayers which apply \_\_\_\_\_to the material being sprayed reduce spraying time and improve insect and disease control per unit of chemical applied.

- A. Droplets
- B. An electrical charge
- C. Higher amounts
- D. None of the Above

6. Higher amounts of sprays from air-assisted electrostatic units were also found deeper in the crop canopy compared to the amounts delivered by uncharged hydraulic sprayers.  
A. True      B. False

### **Specific Gravity**

7. Specific gravity is the ratio of the energy of a given volume of liquid to the mass of the same pressure of water.  
A. True      B. False

### **Surface Tension**

8. The surface tension of a liquid tends to assume the \_\_\_\_\_, acting as a membrane under tension.  
A. Pressure needed      C. Droplet release point  
B. Smallest possible size      D. None of the Above
9. Low surface tensions can allow nozzles to be operated at higher pressures.  
A. True      B. False

### **Liquid Application and Calculations**

10. You should conduct sprayer calibration using mineral spirits or kerosene.  
A. True      B. False

## **Topic 4 - Aerial Application Assignment and Control Information Section**

### **Aircraft Facilities**

#### **Airports and Airstrips**

1. Soft-surfaced runways are desirable when large multi-engine aircraft are used. The contractor/pilot must complete all arrangements necessary to use any airport.  
A. True      B. False

#### **Minimum Airstrip Sizes**

2. The airstrip lengths shown below are for runways with clear approaches and average sod conditions at an elevation of approximately \_\_\_\_\_ feet above sea level. At higher elevations or when fields are soft, longer airstrips will be required. Hard-surfaced runways at lower elevations may be somewhat shorter.  
A. 1,000      C. 4,000  
B. 2,500      D. None of the Above

#### **Notify Beekeepers**

3. Many of the pesticides used in aerial treatments are highly toxic to bees. Notify beekeepers about the meetings. Program operational guidelines, environmental impact statements, \_\_\_\_\_, State laws, and/or pesticide labels may also require that beekeepers in the area be notified of control programs.  
A. Environmental application      C. Environmental issues  
B. Environmental assessments (EA)      D. None of the Above

### **Spray Block, Sensitive Area, and Buffer Zone Verification**

4. After taking a \_\_\_\_\_ flight with each pilot and confirming that everything (buffer zones, spray blocks, and sensitive areas) is recorded on a master program map, then jointly sign and date the map. When observation aircraft are not available, then using ground vehicles to show pilots and/or flaggers their assigned blocks may be necessary.
- A. Spraying reconnaissance                      C. Pretreatment reconnaissance  
B. Test reconnaissance                         D. None of the Above

### **Spray Deposition Monitoring**

#### **Dyecard Samplers**

5. Use dyecards to monitor \_\_\_\_\_.
- A. Nozzle or nozzle group output            C. Liquid formulation spray deposition  
B. Row spacing                                    D. None of the Above
6. Dyecards are made of pesticide-repellant plastic and are used to provide valuable information on swath width, spray droplet deposition pattern, and droplet size; and to identify leaks in the spray system.
- A. True            B. False

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for booms. For directed and band rigs use the \_\_\_\_\_.
- A. Column spacing                                C. Nozzle or nozzle group output  
B. Row spacing                                    D. None of the Above
8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.
- A. Spraying                                        C. Accurate spray timing  
B. Extreme maneuverability                 D. None of the Above
9. On directed rigs, catch spray from all nozzles per row for noted time. \_\_\_\_\_ output in ounces = gallons/acre actually applied.
- A. Nozzle or nozzle group                      C. Liquid formulation  
B. Uniform distribution                         D. None of the Above
10. Replace any nozzles whose output is greater than \_\_\_\_\_ % of the average of all nozzles.
- A. 25                      C. 10  
B. 40                      D. None of the Above

## Topic 5 - Pesticide Drift Control and Training Requirements

### The EPA defines spray or dust drift as:

1. "the physical movement of \_\_\_\_\_ through the air at the time of pesticide application or soon thereafter from the target site to any non- or off-target site. Spray drift shall not include movement of pesticides to non- or off-target sites caused by erosion, migration, volatility, or windblown soil particles that occurs after application or application of fumigants unless specifically addressed on the product label with respect to drift control requirements."

- A. Granular material(s)                      C. Organochlorine pesticide(s)  
B. Pesticide droplets or particles      D. None of the Above

### Pesticide Residues

2. Fresh water reservoirs, stream bed sediments, and harvested food do not need to be tested for pesticide residues.

- A. True      B. False

### Understanding the Dangers of Drift

3. The size of \_\_\_\_\_ depends upon the particular formulation and can be controlled to some extent by screening. In the case of sprays, droplet size is generally increased by reducing pressures or increasing nozzle size.

- A. Granular material(s)                      C. Surface tension of the spray solution  
B. Pesticide droplets or particles      D. None of the Above

### Vapor Drift (Volatilization)

4. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift.

- A. Accurate deposition                      C. Chemical control  
B. Vapor drift                                  D. None of the Above

### Chemical Control in an IPM Program

5. Regular field scouting, coupled with forecasting pest problems and determining economic thresholds, is used to ensure that \_\_\_\_\_ are only applied when pest populations warrant chemical control.

- A. Granular material(s)                      C. Pesticides  
B. Chemical control                          D. None of the Above

### Bowen's Disease

6. \_\_\_\_\_ involving arsenic powders has been implicated in Bowen's disease. However, lead arsenic has not been used by aerial applicators or in any other form of agriculture for three decades because of the adverse effects to human health that were not as well known when the powder was legal.

- A. Accurate deposition                      C. Most appropriate spraying equipment  
B. Crop dusting                                D. None of the Above

## Environmental Effects

### Effects on Non-target Species

7. A number of the \_\_\_\_\_ have been banned from most uses worldwide, and globally they are controlled via the Stockholm Convention on persistent organic pollutants. These include: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene.

- A. Arsenic powders)
- B. Volatile herbicide(s)
- C. Organochlorine pesticide(s)
- D. None of the Above

### Meteorological Considerations

8. The distance a spray droplet travels depends on the droplet size and downward velocity, the release height and the \_\_\_\_\_.

- A. Accurate deposition
- B. Spray distribution efficiency
- C. Ambient conditions
- D. None of the Above

### Sprayer Field Settings

9. During a flight, spray pressure, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the spraying system.

- A. True
- B. False

### Equipment Storage

10. Aircraft mounted spray equipment is often removed after spraying to release the aircraft for other duties. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. True
- B. False

## Topic 6 - Complications/ Limitations / Risk

### Specific Restrictions

1. Specific restrictions may include prohibiting the use of certain pesticides under certain conditions, prohibiting certain methods of application, requiring use of a foliage barrier, or requiring a buffer zone distance between the site of \_\_\_\_\_ to be protected.

- A. Application and areas
- B. Uniform distribution
- C. Row spacing
- D. None of the Above

2. The OPP has completed its review of these studies and reached conclusions about the factors that influence drift and the amounts of sprays which can drift from the \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Uniform distribution
- C. Application site
- D. None of the Above

### Droplet Drift

3. The distance of droplet drift depends upon the size of the droplets, the velocity of the wind and the height above the ground where the herbicide is discharged. In general, larger orifices and \_\_\_\_\_ result in larger droplets.

- A. Droplet drift
- B. Higher pressures
- C. Lower pressures
- D. None of the Above

### Vapor Drift

4. Volatility refers to the ability of a herbicide to vaporize and to mix freely with the air.  
A. True      B. False

### Phenoxy Herbicides

5. The phenoxy group of herbicides has been most often involved in crop injury by off-target drift. \_\_\_\_\_ includes 2,4-D, 2,4,5-T, 2,4-DB, 2,4,5-TP (Silvex) and MCPA.  
A. The phenoxy group      C. Esters  
B. Volatile herbicide(s)      D. None of the Above
6. Which of the following in general are formulated in two ways, as esters or amines?  
A. Phenoxy herbicides      C. Esters  
B. Amines      D. None of the Above
7. Which of the following are more effective in controlling hard-to-kill weeds but are the most hazardous in terms of volatility and consequent drift to sensitive crops?  
A. Esters      C. Amines  
B. Volatile herbicide(s)      D. None of the Above

### Other Components

8. Flow control devices are necessary to make the tank, pump and nozzles work together. Depending on the application system, these devices may include pressure regulators, unloader valves and \_\_\_\_\_.  
A. Spray pattern      C. Control valves  
B. Uniform distribution      D. None of the Above
9. Strainers trap particles and debris in the spray mixture and protect the pump, \_\_\_\_\_ and nozzles from damage.  
A. Nozzle or nozzle group output      C. Strainers  
B. Control devices      D. None of the Above

### Dispersal Summary

10. All nozzles produce a range of \_\_\_\_\_. The small, drift-prone particles cannot be eliminated but can be reduced and kept within reasonable limits.  
A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
B. Droplet sizes      D. None of the Above

## Topic 7 - Aerial and Agricultural Pesticides

### Fenthion

1. Due to its relatively low toxicity towards humans and mammals, \_\_\_\_\_ is listed as moderately toxic compound in U.S. Environmental Protection Agency and World Health Organization toxicity class  
A. Insect growth regulator      C. Hormonal IGRs  
B. Fenthion      D. None of the Above
2. Permethrin is an insecticide of relatively low human toxicity; however recent studies have shown that children with higher levels of Permethrin in their urine seem to be at an increased risk of attention deficit hyperactivity disorder.  
A. True      B. False



## Aerial Application CEU Training Assignment #5 Supplemental

You will have 90 days from the start of this course to have successfully passed this assignment with a score of 70 %. You may e mail the answers to TLC, info@tlch2o.com or fax the answers to TLC, (928) 272-0747. This assignment is available to you in a Word Format on TLC's Website. You can find online assistance for this course on the in the Search function on Adobe Acrobat PDF to help find the answers. Once you have paid the course fee, you will be provided complete course support from Student Services (928) 468-0665.

**Write your answers on the Answer Key found in the front of this assignment.**  
If you are a repeat student, please take the alterative version # 5 assignment.

There are no intention trick questions. All questions require the specific answer as found in the text.

### Topic 1- Aerial Application Introduction Supplement

1. Ultra-low volume application of pesticides has been defined as spraying at a Volume Application Rate (VAR) of less than \_\_\_\_\_ L/ha for field crops or less than \_\_\_\_\_ L/ha for tree/bush crops.

- A. 5 and 25
- B. 5 and 50
- C. 7 and 75
- D. None of the Above

2. Adequate pre-preparation will make sure that the actual \_\_\_\_\_ is carried out under the safest conditions and accurate spray timing will help ensure that the product is used to optimum effect.

- A. Spraying
- B. Maneuverability
- C. Timing
- D. None of the Above

3. Fixed-wing aircraft use venturi spreaders while helicopters use rotary spreaders. Venturi spreaders clamp to the gate box at the \_\_\_\_\_.

- A. Secured section
- B. Agitator(s)
- C. Base of the hopper
- D. None of the Above

4. \_\_\_\_\_ and positive metering systems are available.

- A. Rotary
- B. Agitator(s)
- C. Venturi-type and rotary-slinger spreader(s)
- D. None of the Above

5. Rotor spreaders are self-contained units that hang below the helicopter. A recent approach for helicopters is to use saddle tanks with a(n) \_\_\_\_\_.

- A. Spraying system
- B. Agitator(s)
- C. Auger and forced-air boom
- D. None of the Above

6. \_\_\_\_\_ can be a problem with aerial spraying and environmental contamination can be significant if spraying is incorrectly executed.

- A. Accurate deposition
- B. Volatility and spray drift
- C. Ultra-low volume application of pesticide(s)
- D. None of the Above

7. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft.
- A. Accurate deposition                      C. Ultra-low volume application  
B. Positive metering systems              D. None of the Above
8. The cab must be declared in writing by the manufacturer or by a governmental agency to provide at least as much respiratory protection as the \_\_\_\_\_ listed on the pesticide labeling.
- A. Vanes    C. Ventilation system  
B. Type of respirator                          D. None of the Above
9. \_\_\_\_\_ is relatively easy to achieve with most ground-based directed spraying, but spray application with fixed and rotary wing aircraft presents more complex problems.
- A. Acceptable spray distribution          C. Accurate spray timing  
B. Extreme maneuverability                D. None of the Above
10. To help keep sprayer-applicator, worker or handler exposure to a minimum, wherever possible preference must be given to using pesticide packs handled via \_\_\_\_\_.
- A. Venturi spreader(s)                      C. Closed transfer systems  
B. Agitator(s)                                  D. None of the Above

## Topic 2 - Understanding Hydraulics and Sprayer Principles

1. Hydrodynamics, the study of liquids in motion, is concerned with such matters as friction and turbulence generated in pipes by flowing liquids, the flow of water over weirs and through \_\_\_\_\_, and the use of hydraulic pressure in machinery.
- A. Nozzle(s)                                      C. Relative pressures of the liquid(s)  
B. Isobar(s)                                      D. None of the Above
2. \_\_\_\_\_ are almost incompressible.
- A. Liquid(s)                                      C. Pressure(s)  
B. Hydraulic pressure(s)                  D. None of the Above
3. The atmospheric pressure is of great importance in meteorology, since it determines the winds, which generally move at right angles to the direction of the most rapid change of pressure, that is, along the isobars, which are contours of \_\_\_\_\_.
- A. Relative pressures                      C. Height of liquid column(s)  
B. Constant pressure                      D. None of the Above
4. Velocity of flow is an important consideration in sizing the \_\_\_\_\_.
- A. Spray nozzle(s)                      C. Fittings  
B. Hydraulic line(s)                      D. None of the Above
5. Bernoulli's principle thus says that a rise (fall) in pressure in a \_\_\_\_\_ must always be accompanied by a decrease (increase) in the speed, and conversely, if an increase (decrease) in, the speed of the fluid results in a decrease (increase) in the pressure.
- A. Flowing fluid                              C. Column  
B. Flume    D. None of the Above

6. Most sprayers distribute pesticides using a boom with spray nozzles spaced at regular intervals. The most common example would be wide horizontal booms used on field sprayers to spray field crops.

- A. True      B. False

7. The full advantages of aerial application are more likely to be realized when its use is preplanned. Development of a planned aerial application program will require good cooperation between pilot and grower.

- A. True      B. False

8. Ultra-Low Volume (ULV) equipment ranges in capacity from a few ounces to \_\_\_\_\_ gallon per acre.

- A. 1/5      C. 1/2  
B. 1/3      D. None of the Above

9. The nozzle type and pressure should be selected for the \_\_\_\_\_ and the atomization required for the job.

- A. Formulation      C. Material being used  
B. Application rate(s)      D. None of the Above

10. When using liquid ultra- low volume (ULV) formulations, special consideration are not necessary for monitoring the air and ground temperature difference.

- A. True      B. False

### Topic 3 - Understanding Pumps and Aerial Sprayers

1. Droplet micron size is determined by the specific nozzle used first and foremost. In general, the larger the orifice tube, the larger the micron size of the droplet produced. The second factor in determining droplet size is the \_\_\_\_\_.

- A. Spray system      C. Surface tension of a liquid  
B. Aircraft speed      D. None of the Above

2. Less distance between the droplet release point and the \_\_\_\_\_ will reduce spray drift. Less distance means less time to travel from nozzle to target and therefore less drift occurs.

- A. Target      C. Droplet release point  
B. Sprayer calibration      D. None of the Above

3. Check all high points for drain valves or removable plugs that will allow draining the spray system.

- A. True      B. False

4. The emergency shutoff valve should be located between the hopper and pump. The valve should be as close to the hopper as possible to prevent the loss of pesticide and damage to the environment in the event of a major spray system leak.

- A. True      B. False

5. Electrostatic sprayers which apply \_\_\_\_\_ to the material being sprayed reduce spraying time and improve insect and disease control per unit of chemical applied.

- A. Energy      C. Friction  
B. An electrical charge      D. None of the Above



5. Use dyecards to monitor \_\_\_\_\_.
- A. Nozzle or nozzle group output      C. Liquid formulation spray deposition  
 B. Pesticide absorption                      D. None of the Above
6. Dyecards are made of water- or oil-sensitive paper and are used to provide valuable information on swath width, spray droplet deposition pattern, and droplet size; and to identify leaks in the spray system.
- A. True      B. False
7. Use chart for distance to drive in the field. Use nozzle spacing for booms. For directed and band rigs use the \_\_\_\_\_.
- A. Column spacing                      C. Nozzle or nozzle group output  
 B. Row spacing                          D. None of the Above
8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.
- A. Application                          C. Spray pressure  
 B. Spraying                              D. None of the Above
9. On directed rigs, catch spray from all nozzles per row for noted time. \_\_\_\_\_ output in ounces = gallons/acre actually applied.
- A. Nozzle or nozzle group              C. Liquid formulation  
 B. Uniform distribution                D. None of the Above
10. Replace any nozzles whose output is greater than \_\_\_\_\_ % of the average of all nozzles.
- A. 25                      C. 10  
 B. 40                      D. None of the Above

## Topic 5 - Pesticide Drift Control and Training Requirements

### The EPA defines spray or dust drift as:

1. "the physical movement of \_\_\_\_\_ through the air at the time of pesticide application or soon thereafter from the target site to any non- or off-target site. Spray drift shall not include movement of pesticides to non- or off-target sites caused by erosion, migration, volatility, or windblown soil particles that occurs after application or application of fumigants unless specifically addressed on the product label with respect to drift control requirements."
- A. Granular material(s)                      C. Organochlorine pesticide(s)  
 B. Pesticide droplets or particles      D. None of the Above
2. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.
- A. True      B. False
3. Droplet size depends primarily upon the spray pressure, nozzle design and orientation, and the \_\_\_\_\_.
- A. Granular material(s)                      C. Surface tension of the spray solution  
 B. Pesticide droplets or particles      D. None of the Above

4. Which of the following can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D?

- A. Accurate deposition
- B. Vapor drift
- C. Chemical control
- D. None of the Above

5. Regular field scouting, coupled with forecasting pest problems and determining economic thresholds, is used to ensure that \_\_\_\_\_ are only applied when pest populations warrant chemical control.

- A. Granular material(s)
- B. Pesticide droplets
- C. Pesticides
- D. None of the Above

6. \_\_\_\_\_ involving arsenic powders has been implicated in Bowen's disease. However, lead arsenic has not been used by aerial applicators or in any other form of agriculture for three decades because of the adverse effects to human health that were not as well known when the powder was legal.

- A. Accurate deposition
- B. Crop dusting
- C. Most spraying equipment
- D. None of the Above

7. A number of the \_\_\_\_\_ have been banned from most uses worldwide, and globally they are controlled via the Stockholm Convention on persistent organic pollutants. These include: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene.

- A. Lead arsenic
- B. Volatile herbicide(s)
- C. Organochlorine pesticide(s)
- D. None of the Above

8. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Accurate deposition
- B. Spray distribution efficiency
- C. Ambient conditions
- D. None of the Above

9. During a flight, \_\_\_\_\_, output and aircraft height above the crop can be adjusted if necessary however, as the pilot has to concentrate on flying the aircraft he may only occasionally check the spraying system.

- A. Ultra-low volume
- B. Chemical control
- C. Spray pressure
- D. None of the Above

10. Aircraft mounted spray equipment is often removed after spraying to release the aircraft for other duties. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. True
- B. False

## Topic 6 - Complications/ Limitations / Risk

1. Specific restrictions may include prohibiting the use of certain pesticides under certain conditions, prohibiting certain methods of application, requiring use of a foliage barrier, or requiring a buffer zone distance between the site of \_\_\_\_\_ to be protected.

- A. Application and areas
- B. Uniform distribution
- C. Row spacing
- D. None of the Above

2. During the past few years, the OPP has received and reviewed new studies on spray drift that it required from pesticide registrants to support their product registrations. The OPP has completed its review of these studies and reached conclusions about the factors that influence drift and the amounts of sprays which can drift from the \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Uniform distribution
- C. Application site
- D. None of the Above

3. The distance of droplet drift depends upon the size of the droplets, the velocity of the wind and the height above the ground where the herbicide is discharged. In general, larger orifices and lower pressures result in \_\_\_\_\_.

- A. Droplet drift
- B. Larger droplets
- C. Lower pressures
- D. None of the Above

4. Volatility refers to the ability of a herbicide to dehydrate and to mix freely with a liquid.

- A. True
- B. False

5. These herbicides are most commonly used for the control of broad-leaved weeds in crops and for the control of undesirable woody species.

- A. The phenoxy group
- B. Volatile herbicide(s)
- C. Esters
- D. None of the Above

6. \_\_\_\_\_ in general are formulated in two ways, as esters or amines.

- A. Phenoxy herbicides
- B. Volatile herbicide(s)
- C. Esters
- D. None of the Above

7. \_\_\_\_\_ are more effective in controlling hard-to-kill weeds but are the most hazardous in terms of volatility and consequent drift to sensitive crops.

- A. Esters
- B. Volatile herbicide(s)
- C. Amines
- D. None of the Above

8. Which of the following are necessary to make the tank, pump and nozzles work together? Depending on the application system, these devices may include pressure regulators, unloader valves and control valves.

- A. Spray pattern
- B. Uniform distribution
- C. Flow control devices
- D. None of the Above

9. Strainers are also required for effective treatments. Strainers trap particles and debris in the spray mixture and protect the pump, \_\_\_\_\_ and nozzles from damage.

- A. Nozzle or nozzle group output
- B. Control devices
- C. Strainers
- D. None of the Above

10. All nozzles produce a range of \_\_\_\_\_. The small, drift-prone particles cannot be eliminated but can be reduced and kept within reasonable limits.

- A. Nozzle or nozzle group output
- B. Droplet sizes
- C. Liquid formulation spray deposition
- D. None of the Above

## Topic 7 - Aerial and Agricultural Pesticides

1. Due to its relatively low toxicity towards humans and mammals, \_\_\_\_\_ is listed as moderately toxic compound in U.S. Environmental Protection Agency and World Health Organization toxicity class

- A. Insect growth regulator
- B. Fenthion
- C. Hormonal IGRs
- D. None of the Above

2. \_\_\_\_\_ may also promote volatilization by liberating weakly adsorbed pesticides.

- A. Water
- B. Action threshold(s)
- C. Environmental factors
- D. None of the Above

3. \_\_\_\_\_ from photodegradation can be reduced by adding the pesticide to the soil during or immediately after application.

- A. Action threshold(s)
- B. Pesticide losses
- C. Compatibility agent(s)
- D. None of the Above

4. Special precautions are necessary if pesticides are spilled or catch fire.

- A. True
- B. False

5. Permethrin is a broad-spectrum pyrethroid insecticide. It is available in dusts, emulsifiable concentrates, smokes, ULV concentrates, and wettable-powder formulations.

- A. True
- B. False

6. \_\_\_\_\_ have been synthesized to be similar to pyrethrins yet more stable in the environment. Evidence suggests that they have a very large margin of safety when used as directed by the label.

- A. Pyrethroid(s)
- B. Pyrethrin(s)
- C. Organophosphate(s)
- D. None of the Above

7. \_\_\_\_\_ often occurs because of the attraction between a chemical and soil particles.

- A. Photodegradation
- B. Adsorption
- C. Compatibility
- D. None of the Above

8. Five ways that pesticides can be transferred are through \_\_\_\_\_, runoff, leaching, absorption and crop removal.

- A. Volatilization
- B. Movement
- C. Photodegradation
- D. None of the Above

9. Malathion is a(n) \_\_\_\_\_ parasympathomimetic which binds irreversibly to cholinesterase.

- A. Benzamide
- B. Benzoyl-phenylurea
- C. Organophosphate
- D. None of the Above

10. When mixing disturbs a soil contaminated by a pesticide or other organic compound, a \_\_\_\_\_ percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. 50
- B. 10
- C. 30
- D. None of the Above