

**Registration form**

**Aerial Application CEU Training \$150.00  
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 & 8. Signature is required.

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

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

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

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

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

**License or Operator ID #** \_\_\_\_\_ **Exp. Date** \_\_\_\_\_

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

Commercial Applicator \_\_\_\_\_ Residential Applicator \_\_\_\_\_ Industrial Applicator \_\_\_\_\_  
Pesticide Handler \_\_\_\_\_ Agricultural Applicator \_\_\_\_\_ Adviser \_\_\_\_\_ Other \_\_\_\_\_

**Your certificate will be mailed to you in about two weeks.**

Technical Learning College PO Box 3060, Chino Valley, AZ 86323  
Toll Free (866) 557-1746 Fax (928) 272-0747 E-Mail [info@tlch2o.com](mailto:info@tlch2o.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.

*You can obtain a printed version of the course manual from TLC for an additional \$59.95 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.

**Do not solely depend on TLC's Approval list for it may be outdated.**

**Some States and many employers require the final exam to be proctored.**

<http://www.abctlc.com/downloads/PDF/PROCTORFORM.pdf>

**A second certificate of completion for a second State Agency \$50 processing fee.**

**All downloads are electronically tracked and monitored for security purposes.**

**No refunds.**

**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.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## **2017 Changes to EPA's Farm Worker Protection Standard**

*In late 2015 the Environmental Protection Agency issued the long awaited revision to the Worker Protection Standard (WPS). This law it is now technically active and it will be enforced. Please keep in mind that the WPS covers both restricted use AND general use pesticides. This course is not for worker and/or handler training. Always follow the label and your State Pesticide Agency rules.*

*This course contains EPA's federal rule requirements. Please be aware that each state implements pesticide regulations that may be more stringent than EPA's regulations and these frequently are changed. Check with your state environmental/pesticide agency for more information.*

When 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.**

Fax Number (928) 272-0747 Back-Up Fax (928) 468-0675

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.***

### **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.

**Aerial Application Answer Key**      Name \_\_\_\_\_

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

**You are solely responsible in ensuring that this course is accepted for credit by your State. 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 \_\_\_\_\_**

***You are responsible to ensure that TLC receives the Assignment and Registration Key. Please call us to ensure that we received it.***

**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 E F | 6. A B C D E F  |
| 2. A B C D E F | 7. A B C D E F  |
| 3. A B C D E F | 8. A B C D E F  |
| 4. A B C D E F | 9. A B C D E F  |
| 5. A B C D E F | 10. A B C D E F |

**Topic 2 Understanding Hydraulics and Sprayer Principles**

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

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

**Topic 3 Understanding Pumps and Aerial Sprayers**

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

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

**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 E F | 6. A B C D E F  |
| 2. A B C D E F | 7. A B C D E F  |
| 3. A B C D E F | 8. A B C D E F  |
| 4. A B C D E F | 9. A B C D E F  |
| 5. A B C D E F | 10. A B C D E F |

**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 E F | 6. A B C D E F  |
| 2. A B C D E F | 7. A B C D E F  |
| 3. A B C D E F | 8. A B C D E F  |
| 4. A B C D E F | 9. A B C D E F  |
| 5. A B C D E F | 10. A B C D E F |

**Topic 6 Complications/ Limitations / Risk**

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

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

**Topic 7 Aerial and Agricultural Pesticides**

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

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

**Amount of Time for Course Completion – How many hours you spent on course?**

**Must match State Hour Requirement \_\_\_\_\_ (Hours)**

Please fax or email this answer key and the registration Page to TLC.

## **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 HERB OR HERBAL 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.

**All downloads are electronically tracked and monitored for security purposes.**

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 4, if your last name begins with the letter H to P, you are to complete assignment number 3 and if your last name begins with the letter Q-R, you will pick assignment number 2, and if your last name begins with the letter S-Z, you will pick assignment number 1.

Assignment #1 for all pest applicators whose last name begins with S-Z you will find your assignment on pages 9-22.

Assignment #2 for all pest applicators whose last name starting with the letter Q-R, your assignment is found on pages 23-36.

Assignment #3 for all pest applicators whose last name starting with the letter H-P, your assignment is found on pages 37-50.

Assignment #4 for all pest applicators whose last name starting with the letter A-G, your assignment is found on pages 51-64

Alternative Assignment #5 for repeat students Pages 65-78

**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 CEU Training Assignment #1 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 4, if your last name begins with the letter H to P, you are to complete assignment number 3 and if your last name begins with the letter Q-R, you will pick assignment number 2, and if your last name begins with the letter S-Z, you will pick assignment number 1.

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

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

1. \_\_\_\_\_ in dense crop canopies can also be more difficult to achieve with aircraft.  
A. Accurate deposition      D. Spray pressure  
B. Respiratory protection      E. Accurate spray timing  
C. Extreme maneuverability      F. None of the Above

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

2. The term Ultra-Low Volume (ULV) (spraying) is used in the context of \_\_\_\_\_.  
A. Application      D. Spray pressure  
B. Pesticide application      E. Accurate spray timing  
C. Extreme maneuverability      F. 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      F. 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)
- B. Vanes in the spreader(s)
- C. Type of respirator
- D. Venturi-type and rotary-slinger spreader(s)
- E. Ventilation system
- F. 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
- B. Respiratory protection
- C. Speed
- D. Spray pressure
- E. Accurate spray timing
- F. 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
- B. Spraying system
- C. Agitator(s)
- D. Venturi spreader(s)
- E. Spray pressure
- F. 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
- B. Spraying system
- C. Agitator(s)
- D. Venturi spreader(s)
- E. Closed transfer systems
- F. 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 system(s)
- B. Vanes in the spreader(s)
- C. Agitator(s)
- D. Venturi-type
- E. Saddles
- F. 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)
- B. Vanes in the spreader(s)
- C. Agitator(s)
- D. Venturi-type and rotary-slinger spreader(s)
- E. Absorbent material(s)
- F. None of the Above

10. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.

- A. Pesticide(s)
- B. Accurate deposition
- C. Positive metering systems
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Liquid(s)
- B. Hydraulic pressure(s)
- C. Velocity(s)
- D. Pressure(s)
- E. Volume(s)
- F. 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 \_\_\_\_\_. 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. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Constant pressure
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. 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. Hydraulic pressure
- C. Velocity of flow
- D. Flowing fluid
- E. Volume of flow
- F. None of the Above

### Boom Sprayers

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

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

7. The full advantages of \_\_\_\_\_ 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. Pesticide(s)
- B. Accurate deposition
- C. Aerial application
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

#### **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. Pesticide(s)
- B. Accurate deposition
- C. Special metering
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Machines should be calibrated often to compensate for wear. 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. Ground temperature
- B. Application rate(s)
- C. Maximum output
- D. Material being used
- E. Liquid dispersal system(s)
- F. None of the Above

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

10. When using \_\_\_\_\_, 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. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Liquid ultra- low volume (ULV) formulations
- F. None of the Above

## 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. Spray system
- C. Aircraft speed
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Target
- E. Sprayer calibration
- F. 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\_\_\_\_\_. The aircraft may also be used for other purposes during the course of the program which require draining the spray system before such use. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. Droplet produced
- B. Spray system
- C. End of the program
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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\_\_\_\_\_.

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Event of a major spray system leak
- E. Sprayer calibration
- F. None of the Above

#### 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. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. An electrical charge
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Spray
- F. 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 \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Based on spraying water
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

### Surface Tension

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

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Pressure
- E. Smallest possible size
- F. None of the Above

9. Surface tension is more apparent at low operating pressures. A higher surface tension reduces the spray angle, particularly on hollow cone nozzles. Low surface tensions can allow nozzles to be operated at \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. Lower pressures
- F. None of the Above

### Liquid Application and Calculations

10. You should conduct sprayer calibration using tap water or base oil. Calibration depends on the \_\_\_\_\_. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Formulation applied and equipment used
- F. None of the Above

## Topic 4 Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. Airports or airstrips must be of \_\_\_\_\_ to handle the aircraft that may be used for the program. 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and \_\_\_\_\_ at an elevation of approximately 4,000 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. 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 protection
- C. Environmental assessments (EA)
- D. Environmental issues
- E. Accurate spraying
- F. 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. Application
- B. Pretreatment reconnaissance
- C. Maneuverability
- D. Spraying reconnaissance
- E. Test reconnaissance
- F. None of the Above

#### Spray Deposition Monitoring

##### Dyecard Samplers

5. Use dyecards to monitor \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Pesticide absorption
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. Application
- B. Spray system
- C. Boom
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for \_\_\_\_\_. For directed and band rigs use the row spacing.

- A. Application
- B. Spray system
- C. Booms
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.

- A. Application
- B. Spraying
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

9. Catch spray for the noted time in Step 2 in container marked in ounces. If boom, catch spray from one nozzle during noted time. 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
- B. Pesticide
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. None of the Above

10. Repeat for each nozzle to assure \_\_\_\_\_. Replace any nozzles whose output is greater than 10 % of the average of all nozzles.

- A. Nozzle or nozzle group
- B. Pesticide distribution
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Organochlorine pesticide(s)
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Pesticide Residues

2. Pesticide residues are generally meant to include pesticides that are detectable in or on places other than \_\_\_\_\_. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.

- A. Pesticide(s)
- B. Accurate deposition
- C. Their intended target
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

### 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Surface tension of the spray solution
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Vapor Drift (Volatilization)

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for vapor drift. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift. Vapor drift can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D.

- A. Pesticide(s)
- B. Accurate deposition
- C. Vapor drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Pesticide droplets or particles
- C. Chemical control
- D. Pesticides
- E. Spray pressure, output and aircraft height
- F. 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. Pesticide(s)
- B. Accurate deposition
- C. Crop dusting
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Volatile herbicide(s)
- C. Chemical control(s)
- D. Organochlorine pesticide(s)
- E. The phenoxy group of herbicides
- F. 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 ambient conditions. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Spray distribution efficiency
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Ultra-low volume application of pesticide(s)
- E. Spray pressure
- F. 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. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. Handler(s)
- B. Agricultural employer(s)
- C. Employee(s)
- D. Early-entry workers
- E. Worker or handler's
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. The size of the droplet(s)
- B. The wider the drift
- C. The lesser the drift
- D. Higher pressures result in larger droplets
- E. Lower pressures result in larger droplets
- F. 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. Drift
- C. Spray
- D. Vapors
- E. Mists
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group
- E. Esters or amines
- F. None of the Above

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

- A. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Nozzle or nozzle group output
- B. Spray pattern
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. None of the Above

9. The gauge should be placed where it may be easily seen. 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. Pesticide sprayer
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Control devices
- F. 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. Pesticide drift
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Droplet sizes
- F. 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
- B. Pyrethroid
- C. Insect growth regulator
- D. Cholinesterase inhibition
- E. Organophosphate
- F. None of the Above

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

- A. Insecticide
- B. Pyrethroid
- C. Insect growth regulator
- D. Restricted pesticide
- E. Organophosphate
- F. 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. Permethrin
- D. Malathion
- E. Organophosphate
- F. 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. Benzamide(s)
- B. Pyrethroid(s)
- C. Pyrethrin(s)
- D. Restricted pesticide (s)
- E. Organophosphate(s)
- F. None of the Above

### Adsorption Process

5. The adsorption process binds \_\_\_\_\_ to soil particles, similar to iron filings or paper clips sticking to a magnet.

- A. Benzamide(s)
- B. Pesticide(s)
- C. Insect growth regulator(s)
- D. Restricted pesticide(s)
- E. Organophosphate(s)
- F. None of the Above

### Adsorption

6. Adsorption is the binding of the pesticide to the mineral components of the soil or organic matter, which is abundant in turf. In turf, organic matter includes, in many circumstances, a thatch layer. In \_\_\_\_\_ there is not a thatch layer like we have in a turf system. This layer makes the turf system quite unique with regard to the buffering capacity of the system to those materials introduced into it.

- A. Volatilization
- B. Pesticide transfer
- C. Photodegradation
- D. Environmental factors
- E. Other pesticide application circumstances
- F. None of the Above

### **Pesticide Transfer**

7. 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
- B. Movement
- C. Photodegradation
- D. Environmental factors
- E. Pesticide chemical application(s)
- F. None of the Above

### **Thermophilic Temperatures**

8. Volatilization of a pesticide is highly temperature dependent; thermophilic temperatures typically increase \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Pesticide losses
- F. 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. Pesticide chemical application(s)
- C. Vapor drift
- D. Environmental factors
- E. Photodegradation
- F. None of the Above

10. All \_\_\_\_\_ should be in the original DOT approved containers and correctly labeled. All containers should be secured against movement that could result in breaking or spilling. Never transport pesticides in a vehicle that also carries food or feed products.

- A. Restricted pesticide(s)
- B. Pesticides
- C. Agriculture pesticides
- D. Pesticide chemical application(s)
- E. Pesticides and compatibility agent(s)
- F. None of the Above

## **Aerial Application CEU Training Assignment #2 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 4, if your last name begins with the letter H to P, you are to complete assignment number 3 and if your last name begins with the letter Q-R, you will pick assignment number 2, and if your last name begins with the letter S-Z, you will pick assignment number 1.

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. 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  
B. Spraying  
C. Maneuverability  
D. Spray pressure  
E. Accurate spray timing  
F. None of the Above

### **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)  
B. Deposition  
C. Atmosphere  
D. Ultra-low volume application of pesticide(s)  
E. Most appropriate spraying equipment  
F. 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  
B. Respiratory protection  
C. Speed  
D. Spray pressure  
E. Accurate spray timing  
F. 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. Application                   | D. Spray pressure        |
| B. Acceptable spray distribution | E. Accurate spray timing |
| C. Extreme maneuverability       | F. 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     | D. Venturi spreader(s) |
| B. Spraying system | E. Spray pressure      |
| C. Agitator(s)     | F. 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  | D. Venturi spreader(s)     |
| B. Spraying system | E. Closed transfer systems |
| C. Agitator(s)     | F. 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) | D. Venturi-type      |
| B. Vanes in the spreader(s)    | E. Saddles           |
| C. Agitator(s)                 | F. 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) | D. Venturi-type and rotary-slinger spreader(s) |
| B. Vanes in the spreader(s)    | E. Absorbent material(s)                       |
| C. Agitator(s)                 | F. None of the Above                           |

9. Agitators are available to assist the \_\_\_\_\_ from the hopper.
- |                     |                        |
|---------------------|------------------------|
| A. Secure section   | D. Venturi spreader(s) |
| B. Spraying system  | E. Spray pressure      |
| C. Flow of material | F. None of the Above   |

10. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.
- |                              |   |
|------------------------------|---|
| A. Pesticide(s)              | D. Ultra-low volume application of pesticide(s) |
| B. Accurate deposition       | E. Most appropriate spraying equipment          |
| C. Positive metering systems | F. 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)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Liquid(s)
- B. Hydraulic pressure(s)
- C. Velocity(s)
- D. Pressure(s)
- E. Volume(s)
- F. 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 \_\_\_\_\_. 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. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Constant pressure
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. 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. Hydraulic pressure
- C. Velocity of flow
- D. Flowing fluid
- E. Volume of flow
- F. None of the Above

### Boom Sprayers

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

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

7. The full advantages of \_\_\_\_\_ 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. Pesticide(s)
- B. Accurate deposition
- C. Aerial application
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

#### **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. Pesticide(s)
- B. Accurate deposition
- C. Special metering
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Machines should be calibrated often to compensate for wear. 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. Ground temperature
- B. Application rate(s)
- C. Maximum output
- D. Material being used
- E. Liquid dispersal system(s)
- F. None of the Above

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

10. When using \_\_\_\_\_, 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. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Liquid ultra- low volume (ULV) formulations
- F. None of the Above

## 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. Spray system
- C. Aircraft speed
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Target
- E. Sprayer calibration
- F. 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\_\_\_\_\_. The aircraft may also be used for other purposes during the course of the program which require draining the spray system before such use. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. Droplet produced
- B. Spray system
- C. End of the program
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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\_\_\_\_\_.

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Event of a major spray system leak
- E. Sprayer calibration
- F. None of the Above

#### 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. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. An electrical charge
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Spray
- F. 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 \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Based on spraying water
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

**Surface Tension**

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

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Pressure
- E. Smallest possible size
- F. None of the Above

9. Surface tension is more apparent at low operating pressures. A higher surface tension reduces the spray angle, particularly on hollow cone nozzles. Low surface tensions can allow nozzles to be operated at \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. Lower pressures
- F. None of the Above

**Liquid Application and Calculations**

10. You should conduct sprayer calibration using tap water or base oil. Calibration depends on the \_\_\_\_\_. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Formulation applied and equipment used
- F. None of the Above

## Topic 4 Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. Airports or airstrips must be of \_\_\_\_\_ to handle the aircraft that may be used for the program. 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and \_\_\_\_\_ at an elevation of approximately 4,000 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. 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 protection
- C. Environmental assessments (EA)
- D. Environmental issues
- E. Accurate spraying
- F. 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. Application
- B. Pretreatment reconnaissance
- C. Maneuverability
- D. Spraying reconnaissance
- E. Test reconnaissance
- F. None of the Above

#### Spray Deposition Monitoring

##### Dyecard Samplers

5. Use dyecards to monitor \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Pesticide absorption
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. 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 \_\_\_\_\_.
- A. Application
  - B. Spray system
  - C. Boom
  - D. Liquid formulation spray deposition
  - E. Nozzle or nozzle group output
  - F. None of the Above

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for \_\_\_\_\_. For directed and band rigs use the row spacing.

- A. Application
- B. Spray system
- C. Booms
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.

- A. Application
- B. Spraying
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

9. Catch spray for the noted time in Step 2 in container marked in ounces. If boom, catch spray from one nozzle during noted time. 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
- B. Pesticide
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. None of the Above

10. Repeat for each nozzle to assure \_\_\_\_\_. Replace any nozzles whose output is greater than 10 % of the average of all nozzles.

- A. Nozzle or nozzle group
- B. Pesticide distribution
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Organochlorine pesticide(s)
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Pesticide Residues

2. Pesticide residues are generally meant to include pesticides that are detectable in or on places other than \_\_\_\_\_. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.

- A. Pesticide(s)
- B. Accurate deposition
- C. Their intended target
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

### 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Surface tension of the spray solution
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Vapor Drift (Volatilization)

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for vapor drift. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift. Vapor drift can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D.

- A. Pesticide(s)
- B. Accurate deposition
- C. Vapor drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Pesticide droplets or particles
- C. Chemical control
- D. Pesticides
- E. Spray pressure, output and aircraft height
- F. 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. Pesticide(s)
- B. Accurate deposition
- C. Crop dusting
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Volatile herbicide(s)
- C. Chemical control(s)
- D. Organochlorine pesticide(s)
- E. The phenoxy group of herbicides
- F. 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 ambient conditions. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Spray distribution efficiency
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Ultra-low volume application of pesticide(s)
- E. Spray pressure
- F. 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. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. Handler(s)
- B. Agricultural employer(s)
- C. Employee(s)
- D. Early-entry workers
- E. Worker or handler's
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. The size of the droplet(s)
- B. The wider the drift
- C. The lesser the drift
- D. Higher pressures result in larger droplets
- E. Lower pressures result in larger droplets
- F. 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. Drift
- C. Spray
- D. Vapors
- E. Mists
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group
- E. Esters or amines
- F. None of the Above

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

- A. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Nozzle or nozzle group output
- B. Spray pattern
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. None of the Above

9. The gauge should be placed where it may be easily seen. 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. Pesticide sprayer
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Control devices
- F. 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. Pesticide drift
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Droplet sizes
- F. 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
- B. Pyrethroid
- C. Insect growth regulator
- D. Restricted pesticide
- E. Organophosphate
- F. 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; 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. Insect growth regulator
- B. Organophosphate
- C. Benzoyl-phenylurea
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

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 (Aldridge, 1990; Chen et al., 1991; Snodgrass, 1992).

- A. Benzamide(s)
- B. Pyrethroid(s)
- C. Pyrethrin(s)
- D. Restricted pesticide (s)
- E. Organophosphate(s)
- F. 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. Benzamide(s)
- B. Pesticide(s)
- C. Insect growth regulator(s)
- D. Restricted pesticide(s)
- E. Organophosphate(s)
- F. 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
- B. Pesticide transfer
- C. Photodegradation
- D. Environmental factors
- E. Other pesticide application circumstances
- F. 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
- B. Movement
- C. Photodegradation
- D. Environmental factors
- E. Pesticide chemical application(s)
- F. None of the Above

### **Volatilization**

7. Volatilization occurs when a pesticide partitions from the solid or aqueous phase to the \_\_\_\_\_ . 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 30 percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. Solid
- B. Liquid
- C. Photodegradation
- D. Environmental
- E. Pesticide chemical application(s)
- F. None of the Above

### **Thermophilic Temperatures**

8. Volatilization can result in reduced control of the target pest because less pesticide remains at the target site. \_\_\_\_\_ , 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. Vapor drift
- C. Pesticide chemical application(s)
- D. Environmental factors
- E. Photodegradation
- F. 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. Pesticide chemical application(s)
- C. Vapor drift
- D. Environmental factors
- E. Photodegradation
- F. 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. Agriculture pesticides
- D. Pesticide chemical application(s)
- E. Pesticides and compatibility agent(s)
- F. None of the Above

## **Aerial Application CEU Training Assignment #3 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 4, if your last name begins with the letter H to P, you are to complete assignment number 3 and if your last name begins with the letter Q-R, you will pick assignment number 2, and if your last name begins with the letter S-Z, you will pick assignment number 1.

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      D. Spray pressure  
B. Respiratory protection      E. Accurate spray timing  
C. Extreme maneuverability      F. None of the Above

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

2. The term Ultra-Low Volume (ULV) (spraying) is used in the context of \_\_\_\_\_.  
A. Application      D. Spray pressure  
B. Pesticide application      E. Accurate spray timing  
C. Extreme maneuverability      F. 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      F. 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)
  - B. Vanes in the spreader(s)
  - C. Type of respirator
  - D. Venturi-type and rotary-slinger spreader(s)
  - E. Ventilation system
  - F. 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
  - B. Respiratory protection
  - C. Speed
  - D. Spray pressure
  - E. Accurate spray timing
  - F. 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
  - B. Spraying system
  - C. Agitator(s)
  - D. Venturi spreader(s)
  - E. Spray pressure
  - F. 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
  - B. Spraying system
  - C. Agitator(s)
  - D. Venturi spreader(s)
  - E. Closed transfer systems
  - F. 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 system(s)
  - B. Vanes in the spreader(s)
  - C. Agitator(s)
  - D. Venturi-type
  - E. Saddles
  - F. 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)
  - B. Vanes in the spreader(s)
  - C. Agitator(s)
  - D. Venturi-type and rotary-slinger spreader(s)
  - E. Absorbent material(s)
  - F. None of the Above
10. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.
- A. Pesticide(s)
  - B. Accurate deposition
  - C. Positive metering systems
  - D. Ultra-low volume application of pesticide(s)
  - E. Most appropriate spraying equipment
  - F. 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)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Liquid(s)
- B. Hydraulic pressure(s)
- C. Velocity(s)
- D. Pressure(s)
- E. Volume(s)
- F. 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 \_\_\_\_\_. 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. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Constant pressure
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. 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. Hydraulic pressure
- C. Velocity of flow
- D. Flowing fluid
- E. Volume of flow
- F. None of the Above

### Boom Sprayers

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

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

7. The full advantages of \_\_\_\_\_ 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. Pesticide(s)
- B. Accurate deposition
- C. Aerial application
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

#### **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. Pesticide(s)
- B. Accurate deposition
- C. Special metering
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Machines should be calibrated often to compensate for wear. 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. Ground temperature
- B. Application rate(s)
- C. Maximum output
- D. Material being used
- E. Liquid dispersal system(s)
- F. None of the Above

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

10. When using \_\_\_\_\_, 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. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Liquid ultra- low volume (ULV) formulations
- F. None of the Above



## 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. Spray system
- C. Aircraft speed
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Target
- E. Sprayer calibration
- F. 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\_\_\_\_\_. The aircraft may also be used for other purposes during the course of the program which require draining the spray system before such use. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. Droplet produced
- B. Spray system
- C. End of the program
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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\_\_\_\_\_.

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Event of a major spray system leak
- E. Sprayer calibration
- F. None of the Above

#### 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. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. An electrical charge
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Spray
- F. 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 \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Based on spraying water
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

**Surface Tension**

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

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Pressure
- E. Smallest possible size
- F. None of the Above

9. Surface tension is more apparent at low operating pressures. A higher surface tension reduces the spray angle, particularly on hollow cone nozzles. Low surface tensions can allow nozzles to be operated at \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. Lower pressures
- F. None of the Above

**Liquid Application and Calculations**

10. You should conduct sprayer calibration using tap water or base oil. Calibration depends on the \_\_\_\_\_. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Formulation applied and equipment used
- F. None of the Above

## Topic 4 Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. Airports or airstrips must be of \_\_\_\_\_ to handle the aircraft that may be used for the program. 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and \_\_\_\_\_ at an elevation of approximately 4,000 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. 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 protection
- C. Environmental assessments (EA)
- D. Environmental issues
- E. Accurate spraying
- F. 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. Application
- B. Pretreatment reconnaissance
- C. Maneuverability
- D. Spraying reconnaissance
- E. Test reconnaissance
- F. None of the Above

#### Spray Deposition Monitoring

##### Dyecard Samplers

5. Use dyecards to monitor \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Pesticide absorption
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. Application
- B. Spray system
- C. Boom
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for \_\_\_\_\_. For directed and band rigs use the row spacing.

- A. Application
- B. Spray system
- C. Booms
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.

- A. Application
- B. Spraying
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

9. Catch spray for the noted time in Step 2 in container marked in ounces. If boom, catch spray from one nozzle during noted time. 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
- B. Pesticide
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. None of the Above

10. Repeat for each nozzle to assure \_\_\_\_\_. Replace any nozzles whose output is greater than 10 % of the average of all nozzles.

- A. Nozzle or nozzle group
- B. Pesticide distribution
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Organochlorine pesticide(s)
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Pesticide Residues

2. Pesticide residues are generally meant to include pesticides that are detectable in or on places other than \_\_\_\_\_. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.

- A. Pesticide(s)
- B. Accurate deposition
- C. Their intended target
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

### 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Surface tension of the spray solution
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Vapor Drift (Volatilization)

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for vapor drift. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift. Vapor drift can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D.

- A. Pesticide(s)
- B. Accurate deposition
- C. Vapor drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Pesticide droplets or particles
- C. Chemical control
- D. Pesticides
- E. Spray pressure, output and aircraft height
- F. 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. Pesticide(s)
- B. Accurate deposition
- C. Crop dusting
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Volatile herbicide(s)
- C. Chemical control(s)
- D. Organochlorine pesticide(s)
- E. The phenoxy group of herbicides
- F. 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 ambient conditions. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Spray distribution efficiency
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Ultra-low volume application of pesticide(s)
- E. Spray pressure
- F. 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. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. Handler(s)
- B. Agricultural employer(s)
- C. Employee(s)
- D. Early-entry workers
- E. Worker or handler's
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. The size of the droplet(s)
- B. The wider the drift
- C. The lesser the drift
- D. Higher pressures result in larger droplets
- E. Lower pressures result in larger droplets
- F. 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. Drift
- C. Spray
- D. Vapors
- E. Mists
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group
- E. Esters or amines
- F. None of the Above

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

- A. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Nozzle or nozzle group output
- B. Spray pattern
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. None of the Above

9. The gauge should be placed where it may be easily seen. 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. Pesticide sprayer
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Control devices
- F. 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. Pesticide drift
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Droplet sizes
- F. 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
- B. Fenthion
- C. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. 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; 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. Insect growth regulator
- B. Organophosphate
- C. Benzoyl-phenylurea
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

### Permethrin

3. Permethrin is a broad-spectrum pyrethroid insecticide. It is available in dusts, emulsifiable concentrates, smokes, ULV concentrates, and wettable-powder formulations. The historical development of the \_\_\_\_\_ is based on the pyrethrins, which are derived from chrysanthemums.

- A. Insect growth regulator
- B. Chitin
- C. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

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 (Aldridge, 1990; Chen et al., 1991; Snodgrass, 1992).

- A. Benzamide(s)
- B. Pyrethroid(s)
- C. Pyrethrin(s)
- D. Restricted pesticide (s)
- E. Organophosphate(s)
- F. None of the Above

### Adsorption Process

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

- A. Restricted pesticide(s)
- B. Action threshold(s)
- C. Adsorption
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. None of the Above

### Pesticide Transfer

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

- A. Volatilization
- B. Movement
- C. Photodegradation
- D. Environmental factors
- E. Pesticide chemical application(s)
- F. None of the Above

### **Volatilization**

7. Volatilization occurs when a pesticide partitions from the solid or aqueous phase to the \_\_\_\_\_ . 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 30 percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. Solid
- B. Liquid
- C. Photodegradation
- D. Environmental
- E. Pesticide chemical application(s)
- F. 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. Ultra-low volume application of pesticide(s)
- C. Action threshold(s)
- D. Environmental factors
- E. Photodegradation
- F. 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. Restricted pesticide(s)
- B. Action threshold(s)
- C. Pesticide losses
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. 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. Agriculture pesticides
- D. Pesticide chemical application(s)
- E. Pesticides and compatibility agent(s)
- F. None of the Above

## **Aerial Application CEU Training Assignment #4 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 4, if your last name begins with the letter H to P, you are to complete assignment number 3 and if your last name begins with the letter Q-R, you will pick assignment number 2, and if your last name begins with the letter S-Z, you will pick assignment number 1.

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. Application             | D. Spray pressure        |
| B. Pesticide application   | E. Accurate spray timing |
| C. Extreme maneuverability | F. None of the Above     |

2. \_\_\_\_\_ application of pesticides has been defined as spraying at a Volume Application Rate (VAR) of less than 5 L/ha for field crops or less than 50 L/ha for tree/bush crops.

- |                                |  |
|--------------------------------|--|
| A. Positive metering system(s) | D. Venturi-type and rotary-slinger spreader(s) |
| B. Vanes in the spreader(s)    | E. Absorbent material(s)                       |
| C. Ultra-low volume            | F. 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 | F. 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. Respiratory protection
- C. Speed
- D. Spray pressure
- E. Accurate spray timing
- F. 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. Application
- B. Acceptable spray distribution
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

### **Sprayer Field Settings**

6. The use of \_\_\_\_\_ 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. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Agitator(s)
- D. Venturi-type and rotary-slinger spreader(s)
- E. Artificial targets
- F. 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
- B. Spraying system
- C. Agitator(s)
- D. Venturi spreader(s)
- E. Closed transfer systems
- F. 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. Secure section
- B. Spraying system
- C. Agitator(s)
- D. Base of the hopper
- E. Spray pressure
- F. None of the Above

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

- A. Secure section
- B. Spraying system
- C. Flow of material
- D. Venturi spreader(s)
- E. Spray pressure
- F. None of the Above

10. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.

- A. Pesticide(s)
- B. Accurate deposition
- C. Positive metering systems
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Liquid(s)
- B. Hydraulic pressure(s)
- C. Velocity(s)
- D. Pressure(s)
- E. Volume(s)
- F. 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 \_\_\_\_\_. 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. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Constant pressure
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. 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. Hydraulic pressure
- C. Velocity of flow
- D. Flowing fluid
- E. Volume of flow
- F. None of the Above

### Boom Sprayers

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

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

7. The full advantages of \_\_\_\_\_ 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. Pesticide(s)
- B. Accurate deposition
- C. Aerial application
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

#### **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. Pesticide(s)
- B. Accurate deposition
- C. Special metering
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Machines should be calibrated often to compensate for wear. 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. Ground temperature
- B. Application rate(s)
- C. Maximum output
- D. Material being used
- E. Liquid dispersal system(s)
- F. None of the Above

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

10. When using \_\_\_\_\_, 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. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Liquid ultra- low volume (ULV) formulations
- F. None of the Above

## 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. Spray system
- C. Aircraft speed
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Target
- E. Sprayer calibration
- F. 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\_\_\_\_\_. The aircraft may also be used for other purposes during the course of the program which require draining the spray system before such use. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. Droplet produced
- B. Spray system
- C. End of the program
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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\_\_\_\_\_.

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Event of a major spray system leak
- E. Sprayer calibration
- F. None of the Above

#### 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. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. An electrical charge
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Spray
- F. 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 \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Based on spraying water
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

**Surface Tension**

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

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Pressure
- E. Smallest possible size
- F. None of the Above

9. Surface tension is more apparent at low operating pressures. A higher surface tension reduces the spray angle, particularly on hollow cone nozzles. Low surface tensions can allow nozzles to be operated at \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. Lower pressures
- F. None of the Above

**Liquid Application and Calculations**

10. You should conduct sprayer calibration using tap water or base oil. Calibration depends on the \_\_\_\_\_. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Formulation applied and equipment used
- F. None of the Above



## Topic 4 Aerial Application Assignment and Control Information Section

### Aircraft Facilities

#### Airports and Airstrips

1. Airports or airstrips must be of \_\_\_\_\_ to handle the aircraft that may be used for the program. 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

#### Minimum Airstrip Sizes

2. The airstrip lengths shown below are for runways with clear approaches and \_\_\_\_\_ at an elevation of approximately 4,000 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. 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 protection
- C. Environmental assessments (EA)
- D. Environmental issues
- E. Accurate spraying
- F. 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. Application
- B. Pretreatment reconnaissance
- C. Maneuverability
- D. Spraying reconnaissance
- E. Test reconnaissance
- F. None of the Above

#### Spray Deposition Monitoring

##### Dyecard Samplers

5. Use dyecards to monitor \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Pesticide absorption
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. Application
- B. Spray system
- C. Boom
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

### **Spray Boom Calibration**

7. Use chart for distance to drive in the field. Use nozzle spacing for \_\_\_\_\_. For directed and band rigs use the row spacing.

- A. Application
- B. Spray system
- C. Booms
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.

- A. Application
- B. Spraying
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

9. Catch spray for the noted time in Step 2 in container marked in ounces. If boom, catch spray from one nozzle during noted time. 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
- B. Pesticide
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. None of the Above

10. Repeat for each nozzle to assure \_\_\_\_\_. Replace any nozzles whose output is greater than 10 % of the average of all nozzles.

- A. Nozzle or nozzle group
- B. Pesticide distribution
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Organochlorine pesticide(s)
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Pesticide Residues

2. Pesticide residues are generally meant to include pesticides that are detectable in or on places other than \_\_\_\_\_. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.

- A. Pesticide(s)
- B. Accurate deposition
- C. Their intended target
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

### 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Surface tension of the spray solution
- E. Spray pressure, output and aircraft height
- F. None of the Above

### Vapor Drift (Volatilization)

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for vapor drift. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift. Vapor drift can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D.

- A. Pesticide(s)
- B. Accurate deposition
- C. Vapor drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Pesticide droplets or particles
- C. Chemical control
- D. Pesticides
- E. Spray pressure, output and aircraft height
- F. 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. Pesticide(s)
- B. Accurate deposition
- C. Crop dusting
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Volatile herbicide(s)
- C. Chemical control(s)
- D. Organochlorine pesticide(s)
- E. The phenoxy group of herbicides
- F. 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 ambient conditions. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Spray distribution efficiency
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Ultra-low volume application of pesticide(s)
- E. Spray pressure
- F. 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. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. Handler(s)
- B. Agricultural employer(s)
- C. Employee(s)
- D. Early-entry workers
- E. Worker or handler's
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. The size of the droplet(s)
- B. The wider the drift
- C. The lesser the drift
- D. Higher pressures result in larger droplets
- E. Lower pressures result in larger droplets
- F. 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. Drift
- C. Spray
- D. Vapors
- E. Mists
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group
- E. Esters or amines
- F. None of the Above

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

- A. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Nozzle or nozzle group output
- B. Spray pattern
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. None of the Above

9. The gauge should be placed where it may be easily seen. 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. Pesticide sprayer
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Control devices
- F. 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. Pesticide drift
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Droplet sizes
- F. 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
- B. Fenthion
- C. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. 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; 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. Insect growth regulator
- B. Organophosphate
- C. Benzoyl-phenylurea
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

### Permethrin

3. Permethrin is a broad-spectrum pyrethroid insecticide. It is available in dusts, emulsifiable concentrates, smokes, ULV concentrates, and wettable-powder formulations. The historical development of the \_\_\_\_\_ is based on the pyrethrins, which are derived from chrysanthemums.

- A. Insect growth regulator
- B. Chitin
- C. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

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 (Aldridge, 1990; Chen et al., 1991; Snodgrass, 1992).

- A. Benzamide(s)
- B. Pyrethroid(s)
- C. Pyrethrin(s)
- D. Restricted pesticide (s)
- E. Organophosphate(s)
- F. None of the Above

### Adsorption Process

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

- A. Restricted pesticide(s)
- B. Action threshold(s)
- C. Adsorption
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. None of the Above

### Pesticide Transfer

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

- A. Volatilization
- B. Movement
- C. Photodegradation
- D. Environmental factors
- E. Pesticide chemical application(s)
- F. None of the Above

### **Volatilization**

7. Volatilization occurs when a pesticide partitions from the solid or aqueous phase to the \_\_\_\_\_ . 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 30 percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. Solid
- B. Liquid
- C. Photodegradation
- D. Environmental
- E. Pesticide chemical application(s)
- F. 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. Ultra-low volume application of pesticide(s)
- C. Action threshold(s)
- D. Environmental factors
- E. Photodegradation
- F. 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. Restricted pesticide(s)
- B. Action threshold(s)
- C. Pesticide losses
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. 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. Agriculture pesticides
- D. Pesticide chemical application(s)
- E. Pesticides and compatibility agent(s)
- F. None of the Above



## 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. \_\_\_\_\_ application of pesticides has been defined as spraying at a Volume Application Rate (VAR) of less than 5 L/ha for field crops or less than 50 L/ha for tree/bush crops.

- A. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Ultra-low volume
- D. Venturi-type and rotary-slinger spreader(s)
- E. Absorbent material(s)
- F. 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. 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
- B. Spraying
- C. Maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. 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. Secure section
- B. Spraying system
- C. Agitator(s)
- D. Base of the hopper
- E. Spray pressure
- F. None of the Above

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

- A. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Agitator(s)
- D. Venturi-type and rotary-slinger spreader(s)
- E. Absorbent material(s)
- F. 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. Secure section
- B. Spraying system
- C. Agitator(s)
- D. Venturi spreader(s)
- E. Auger and forced-air boom
- F. None of the Above

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

- A. Pesticide(s)
- B. Accurate deposition
- C. Volatility and spray drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

7. \_\_\_\_\_ are valuable for metering pelleted herbicides or hard slick grass seed in fixed-wing aircraft. Chaffy grass seed can be especially difficult to meter and applicator, worker or handler "know-how" is valuable.

- A. Pesticide(s)
- B. Accurate deposition
- C. Positive metering systems
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Positive metering system(s)
- B. Vanes in the spreader(s)
- C. Type of respirator
- D. Venturi-type and rotary-slinger spreader(s)
- E. Ventilation system
- F. 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. Application
- B. Acceptable spray distribution
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. 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. Secure section
- B. Spraying system
- C. Agitator(s)
- D. Venturi spreader(s)
- E. Closed transfer systems
- F. 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)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Liquid(s)
- B. Hydraulic pressure(s)
- C. Velocity(s)
- D. Pressure(s)
- E. Volume(s)
- F. 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 \_\_\_\_\_. 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. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Constant pressure
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. None of the Above

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

- A. Spray nozzle(s)
- B. Hydraulic line(s)
- C. Isobar(s)
- D. Relative pressures of the liquid(s)
- E. Height of liquid column(s)
- F. 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. Liquids
- B. Hydraulic pressure
- C. Velocity of flow
- D. Flowing fluid
- E. Volume of flow
- F. None of the Above

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

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

7. The full advantages of \_\_\_\_\_ 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. Pesticide(s)
- B. Accurate deposition
- C. Aerial application
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

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. Pesticide(s)
- B. Accurate deposition
- C. Special metering
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

9. The nozzle type and pressure should be selected for the \_\_\_\_\_ and the atomization required for the job. Machines should be calibrated often to compensate for wear. 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. Ground temperature
- B. Application rate(s)
- C. Maximum output
- D. Material being used
- E. Liquid dispersal system(s)
- F. None of the Above

10. When using \_\_\_\_\_, 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. Pesticide(s)
- B. Accurate deposition
- C. Pesticide labeling
- D. Ultra-low volume application of pesticide(s)
- E. Liquid ultra- low volume (ULV) formulations
- F. None of the Above

### 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. Droplet produced
- B. Spray system
- C. Aircraft speed
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Target
- E. Sprayer calibration
- F. None of the Above

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\_\_\_\_\_. The aircraft may also be used for other purposes during the course of the program which require draining the spray system before such use. Check all low points for drain valves or removable plugs that will allow draining the spray system.

- A. Droplet produced
- B. Spray system
- C. End of the program
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

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\_\_\_\_\_.

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Event of a major spray system leak
- E. Sprayer calibration
- F. None of the Above

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. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. An electrical charge
- F. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Spray
- F. None of the Above

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  $S_g$  of a liquid other than water is on the capacity of the spray nozzle. All vendor-supplied performance data for nozzles are \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Based on spraying water
- D. Higher amounts of sprays
- E. Surface tension of a liquid
- F. None of the Above

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

- A. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Pressure
- E. Smallest possible size
- F. None of the Above

9. Surface tension is more apparent at low operating pressures. A higher surface tension reduces the spray angle, particularly on hollow cone nozzles. Low surface tensions can allow nozzles to be operated at \_\_\_\_\_.

- A. Droplet produced
- B. Spray system
- C. Tap water or base oil
- D. Higher amounts of sprays
- E. Lower pressures
- F. None of the Above

10. You should conduct sprayer calibration using tap water or base oil. Calibration depends on the \_\_\_\_\_. 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. Pesticide
- B. Droplet release point
- C. Higher amounts of sprays
- D. Tension
- E. Formulation applied and equipment used
- F. None of the Above

## Topic 4 Aerial Application Assignment and Control Information Section

1. Airports or airstrips must be of \_\_\_\_\_ to handle the aircraft that may be used for the program. 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

2. The airstrip lengths shown below are for runways with clear approaches and \_\_\_\_\_ at an elevation of approximately 4,000 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. Application
- B. Shorter
- C. Maneuverability
- D. Adequate size
- E. Average sod conditions
- F. None of the Above

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 protection
- C. Environmental assessments (EA)
- D. Environmental issues
- E. Accurate spraying
- F. None of the Above

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. Application
- B. Pretreatment reconnaissance
- C. Maneuverability
- D. Spraying reconnaissance
- E. Test reconnaissance
- F. None of the Above

5. Use dyecards to monitor \_\_\_\_\_.

- A. Nozzle or nozzle group output
- B. Pesticide absorption
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. Application
- B. Spray system
- C. Boom
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

7. Use chart for distance to drive in the field. Use nozzle spacing for \_\_\_\_\_. For directed and band rigs use the row spacing.

- A. Application
- B. Spray system
- C. Booms
- D. Liquid formulation spray deposition
- E. Nozzle or nozzle group output
- F. None of the Above

8. Set throttle for \_\_\_\_\_ and operate all equipment. Note seconds required to drive measured distance.

- A. Application
- B. Spraying
- C. Extreme maneuverability
- D. Spray pressure
- E. Accurate spray timing
- F. None of the Above

9. Catch spray for the noted time in Step 2 in container marked in ounces. If boom, catch spray from one nozzle during noted time. 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
- B. Pesticide
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. None of the Above

10. Repeat for each nozzle to assure \_\_\_\_\_. Replace any nozzles whose output is greater than 10 % of the average of all nozzles.

- A. Nozzle or nozzle group
- B. Pesticide distribution
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Spray pressure
- F. 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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Organochlorine pesticide(s)
- E. Spray pressure, output and aircraft height
- F. None of the Above

2. Pesticide residues are generally meant to include pesticides that are detectable in or on places other than \_\_\_\_\_. Fresh water reservoirs, stream bed sediments, and harvested food would be examples of places that would be tested for pesticide residues.

- A. Pesticide(s)
- B. Accurate deposition
- C. Their intended target
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. None of the Above

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)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Surface tension of the spray solution
- E. Spray pressure, output and aircraft height
- F. None of the Above

4. Hot temperatures, moist soils, and temperature inversions all increase the potential for vapor drift. \_\_\_\_\_ is not movement of material caused by wind. In fact, calm or no wind may lead to inversions that could result in vapor drift. Vapor drift can be avoided by simply refraining from the use of ester-containing formulations of 2,4-D.

- A. Pesticide(s)
- B. Accurate deposition
- C. Vapor drift
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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 or particles
- C. Chemical control
- D. Pesticides
- E. Spray pressure, output and aircraft height
- F. 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. Pesticide(s)
- B. Accurate deposition
- C. Crop dusting
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Volatile herbicide(s)
- C. Chemical control(s)
- D. Organochlorine pesticide(s)
- E. The phenoxy group of herbicides
- F. None of the Above

8. The distance a spray droplet travels depends on the droplet size and downward velocity, the release height and the ambient conditions. Vortices created by the aircraft passage will also influence \_\_\_\_\_.

- A. Pesticide(s)
- B. Accurate deposition
- C. Spray distribution efficiency
- D. Ultra-low volume application of pesticide(s)
- E. Most appropriate spraying equipment
- F. 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. Granular material(s)
- B. Pesticide droplets or particles
- C. Chemical control
- D. Ultra-low volume application of pesticide(s)
- E. Spray pressure
- F. None of the Above

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. Both the spray equipment and the aircraft must be thoroughly cleaned ("decontaminated") and dried, before being stored.

- A. Handler(s)
- B. Agricultural employer(s)
- C. Employee(s)
- D. Early-entry workers
- E. Worker or handler's
- F. None of the Above

## 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. Nozzle or nozzle group output
- B. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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. Application and areas
- C. Uniform distribution
- D. Application site
- E. Row spacing
- F. 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 \_\_\_\_\_.

- A. The size of the droplet(s)
- B. The wider the drift
- C. The lesser the drift
- D. Higher pressures result in larger droplets
- E. Lower pressures result in larger droplets
- F. None of the Above

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. Drift
- C. Spray
- D. Vapors
- E. Mists
- F. None of the Above

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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group
- E. Esters or amines
- F. None of the Above

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

- A. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. 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. Phenoxy herbicides
- B. Esters
- C. Volatile herbicide(s)
- D. The phenoxy group of herbicides
- E. Esters or amines
- F. None of the Above

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. Nozzle or nozzle group output
- B. Spray pattern
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Row spacing
- F. None of the Above

9. The gauge should be placed where it may be easily seen. 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. Pesticide sprayer
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Control devices
- F. 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. Pesticide drift
- C. Uniform distribution
- D. Liquid formulation spray deposition
- E. Droplet sizes
- F. 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. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

2. 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. Ultra-low volume application of pesticide(s)
- C. Action threshold(s)
- D. Environmental factors
- E. Photodegradation
- F. None of the Above

3. 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. Restricted pesticide(s)
- B. Action threshold(s)
- C. Pesticide losses
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. None of the Above

4. 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. Agriculture pesticides
- D. Pesticide chemical application(s)
- E. Pesticides and compatibility agent(s)
- F. None of the Above

5. Permethrin is a broad-spectrum pyrethroid insecticide. It is available in dusts, emulsifiable concentrates, smokes, ULV concentrates, and wettable-powder formulations. The historical development of the \_\_\_\_\_ is based on the pyrethrins, which are derived from chrysanthemums.

- A. Insect growth regulator
- B. Chitin
- C. Benzoyl-phenylurea termiticide
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

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 (Aldridge, 1990; Chen et al., 1991; Snodgrass, 1992).

- A. Benzamide(s)
- B. Pyrethroid(s)
- C. Pyrethrin(s)
- D. Restricted pesticide (s)
- E. Organophosphate(s)
- F. None of the Above

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

- A. Restricted pesticide(s)
- B. Action threshold(s)
- C. Adsorption
- D. Pesticide chemical application(s)
- E. Compatibility agent(s)
- F. 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. Environmental factors
- E. Pesticide chemical application(s)
- F. None of the Above

9. Malathion is a(n) \_\_\_\_\_ parasympathomimetic which binds irreversibly to cholinesterase. 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. Insect growth regulator
- B. Organophosphate
- C. Benzoyl-phenylurea
- D. Hormonal IGRs
- E. Benzamide
- F. None of the Above

10. Volatilization occurs when a pesticide partitions from the solid or aqueous phase to the \_\_\_\_\_. 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 30 percent or greater loss of the soil contaminant through volatilization is not unusual.

- A. Solid
- B. Liquid
- C. Photodegradation
- D. Environmental
- E. Pesticide chemical application(s)
- F. None of the Above