

ENTOMOLOGY

Purpose

Insects are extremely important animals; some are very destructive and many are beneficial. Insects may damage or kill cultivated plants, they may damage or contaminate stored foods and other products, and they may attack man or animals and bite, sting, or act as vectors of disease. Insects can be beneficial for pollination of crops, parasites and predators of destructive species. They are also important as food for birds, fish and other animals, and provide products of commercial value such as honey, wax, silk, and shellac. It is important that FFA members be able to recognize some of the more important beneficial and destructive species of insects and their relatives. In addition to proper identification of the pest, it is important to be aware of control strategies and know how to properly apply pesticides safely should chemical control be required.

Objectives

Students participating in this CDE should be able to:

- I. Identify many beneficial and destructive insects and their close relatives.
- II. Identify the class and order, type of metamorphosis, type of mouthparts, and understand common pest control strategies.
- III. Understand how to apply pesticides safely.
- IV. Understand insect biology, behavior, and collection techniques.

Crosswalk with Show-Me Standards

Objectives – Students participating in the Career Development Event should be able to:		Show-Me Standards	
		Knowledge Standards (Content Areas)	Performance Standards (Goals)
1.	Identify many beneficial and destructive insects and their close relatives.	MA.1, MA.2	1.5, 1.10
2.	Identify the class and order, type of metamorphosis, type of mouthparts, and understand common pest control strategies.	SC.3, SC.4, SC.8 HP.3, HP.6, HP.7	3.1, 3.5, 3.8 4.4, 4.7, 4.8
3.	Understand how to apply pesticides safely.		
4.	Understand insect biology, behavior, and collection techniques.		

Corresponding Secondary Agriculture Curriculum			
Course and/or Curriculum:	Agricultural Science II	Unit(s):	Entomology Plant Science - Lesson 4 Crop Science - Lesson 9
	Greenhouse Operation and Management		Unit VI – Plant Health

Event Format

The Entomology CDE shall consist of the following two (2) components:

1. Insect Identification – There will be 40 adult insect specimens chosen from the six insect relatives and 109 insect groups on the FFA Insect Checklist (Form 50C). Contestants will give the name of the specimens; the order; the type of metamorphosis; and the type of mouthparts. Contestants will be allowed 45 seconds to identify each insect.
2. Insect Biology and Control Strategies Written Test – The Pesticide Application Exam will consist of 75 true/false and multiple choice questions taken directly from listed references.

Event Scoring

Event	Points
Insect Identification (40 specimens worth 8 possible points)	320
Correct Name 2 pts	
Correct Order 2 pts	
Correct type of Metamorphosis 2 pts	
Correct type of Mouthparts 2pts	
Pesticide Application Quiz (75 questions @ 2 pts each)	150
TOTAL	470

Event Rules and Regulations

1. All written materials will be furnished for the CDE. Contestants should provide pencils and clean clipboards. Scratch paper will be provided.
2. Calculators may be used. In all events, only six-function, (**nonprogrammable** and **non-graphing**) models may be used. Therefore, the calculators are limited to the following keys: Plus (+); Minus (-); Multiplication (x); Division (/); Equals (=); Memory Clear/Recall (MRC) Memory Minus (M-); Memory Plus(M+); Plus / Minus (+/-); Percentage (%); Square Root ($\sqrt{\quad}$). See page 3, rule #8 of the General CDE Guidelines for an example.
3. Contestants will not be able to touch or handle insect specimens. Magnifying glasses will be allowed, but will not be provided.
4. Contestants will be given a number by which they will be identified throughout the event.
5. All contestants must be prompt at their stations throughout the event. No provisions will be made for tardiness and will most certainly cause late contestants to lose event points.
6. Contestants will not communicate with each other while the CDE is in progress.
7. Each contestant will be provided the Insect Identification List (Form 50B) and the appropriate scansheet during the CDE.

References

A Field Guide to the Insects of America North of Mexico by Donald J. Borror and Richard E. White, 1970. Houghton Mifflin Company, Boston (Peterson Field Guide Series).

Applying Pesticides Correctly (MX328-revised 01/97) Units 1, 4, & 5. (a.k.a. the “White” book). U.S. Department of Agriculture and U.S. Environmental Protection Agency (a guide for private and commercial applicators).

Color slides. A complete set of slides (99) showing all the insects to be identified in the Entomology CDE.

Entomology Unit for Ag. Science II (Instructor and Student Reference).

(Above materials available from: Instructional Materials Laboratory, <http://iml-ag.missouri.edu>
1400 Rock Quarry Rd. Q156, University of Missouri, Columbia, MO 65202)

The Practical Entomologist, Rick Imes, A Fireside Book. Published by Simon & Schuster, New York.

Forms

See following Form 50A, Form 50B, Form 50C. The scantron used at the state contest, provided by www.judgingcard.com can be found at the link: <http://dass.missouri.edu/aged/resources/>.

FFA INSECT CHECKLIST

FORM 50C

<u>Insect</u>	<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>	
001.	Alfalfa butterfly	Lepidoptera	Complete	Sucking
002.	Alfalfa weevil	Coleoptera	Complete	Chewing
003.	American cockroach	Blattodea	Simple	Chewing
004.	Ant	Hymenoptera	Complete	Chewing
005.	Assassin bug	Hemiptera	Simple	Sucking
006.	Bagworm larvae (in bag)	Lepidoptera	Complete	Chewing
007.	Bald-faced hornet	Hymenoptera	Complete	Chewing
008.	Bean leaf beetle	Coleoptera	Complete	Chewing
009.	Black cutworm moth	Lepidoptera	Complete	Sucking
010.	Black cutworm moth (larvae)	Lepidoptera	Complete	Chewing
011.	Blister beetle	Coleoptera	Complete	Chewing
012.	Boll weevil	Coleoptera	Complete	Chewing
013.	Boxelder bug	Hemiptera	Simple	Sucking
014.	Brown stink bug	Hemiptera	Simple	Sucking
015.	Brown-banded cockroach	Blattodea	Simple	Chewing
016.	Buckeye butterfly	Lepidoptera	Complete	Sucking
017.	Bumble bee	Hymenoptera	Complete	Chewing
018.	Cabbage butterfly	Lepidoptera	Complete	Sucking
019.	Cabbage looper	Lepidoptera	Complete	Sucking
020.	Caddisfly	Trichoptera	Complete	Chewing
021.	Camel cricket	Orthoptera	Simple	Chewing
022.	Carpenter bee	Hymenoptera	Complete	Chewing
023.	Carpet beetle	Coleoptera	Complete	Chewing
024.	Carrion beetle	Coleoptera	Complete	Chewing
025.	Chinch bug	Hemiptera	Simple	Sucking
026.	Cicada	Homoptera	Simple	Sucking
027.	Click beetle	Coleoptera	Complete	Chewing
028.	Codling moth	Lepidoptera	Complete	Sucking

	<u>Insect</u>	<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>
029.	Colorado potato beetle	Coleoptera	Complete	Chewing
030.	Corn earworm moth	Lepidoptera	Complete	Sucking
031.	Corn earworm moth (larvae)	Lepidoptera	Complete	Chewing
032.	Corn rootworm larvae	Coleoptera	Complete	Chewing
033.	Damsel bug	Hemiptera	Simple	Sucking
034.	Damselfly	Odonata	Simple	Chewing
035.	Differential grasshopper (short-horned)	Orthoptera	Simple	Chewing
036.	Dobsonfly	Neuroptera	Complete	Chewing
037.	Dragonfly	Odonata	Simple	Chewing
038.	Earwig	Dermaptera	Simple	Chewing
039.	Elm leaf beetle	Coleoptera	Complete	Chewing
040.	European corn borer moth	Lepidoptera	Complete	Sucking
041.	European corn borer moth (larvae)	Lepidoptera	Complete	Chewing
042.	Field cricket	Orthoptera	Simple	Chewing
043.	Flea	Siphonaptera	Complete	Sucking
044.	Flea beetle	Coleoptera	Complete	Chewing
045.	Flour beetle	Coleoptera	Complete	Chewing
046.	Forage Looper moth	Lepidoptera	Complete	Sucking
047.	Forage Looper moth (larvae)	Lepidoptera	Complete	Chewing
048.	German cockroach	Blattodea	Simple	Chewing
049.	Giant water bug	Hemiptera	Simple	Sucking
050.	Green bottle fly	Diptera	Complete	Sucking
051.	Green June beetle	Coleoptera	Complete	Chewing
052.	Green lacewing	Neuroptera	Complete	Chewing
053.	Green stink bug	Hemiptera	Simple	Sucking
054.	Ground beetle	Coleoptera	Complete	Chewing
055.	Harlequin bug	Hemiptera	Simple	Sucking
056.	Hog louse	Anoplura	Simple	Sucking

	<u>Insect</u>	<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>
057.	Honey bee	Hymenoptera	Complete	Chewing
058.	Horntail	Hymenoptera	Complete	Chewing
059.	Horse fly	Diptera	Complete	Sucking
060.	House fly	Diptera	Complete	Sucking
061.	Ichneumon wasp	Hymenoptera	Complete	Chewing
062.	Indian meal moth	Lepidoptera	Complete	Sucking
063.	Japanese beetle	Coleoptera	Complete	Chewing
064.	Lace bug	Hemiptera	Simple	Sucking
065.	Ladybird beetle	Coleoptera	Complete	Chewing
066.	Leafhopper	Homoptera	Simple	Sucking
067.	Lightningbug (firefly)	Coleoptera	Complete	Chewing
068.	Long-horned beetle	Coleoptera	Complete	Chewing
069.	Long-horned grasshopper	Orthoptera	Simple	Chewing
070.	Luna moth	Lepidoptera	Complete	Sucking
071.	Mayfly	Ephemeroptera	Simple	Chewing
072.	Mealybug	Homoptera	Simple	Sucking
073.	Metallic wood-boring beetle	Coleoptera	Complete	Chewing
074.	Mexican bean beetle	Coleoptera	Complete	Chewing
075.	Minute pirate bug	Hemiptera	Simple	Sucking
076.	Mole cricket	Orthoptera	Simple	Chewing
077.	Monarch butterfly	Lepidoptera	Complete	Sucking
078.	Mosquito	Diptera	Complete	Sucking
079.	Moth fly	Diptera	Complete	Sucking
080.	Mud dauber wasp	Hymenoptera	Complete	Chewing
081.	Northern corn rootworm	Coleoptera	Complete	Chewing
082.	Oriental cockroach	Blattodea	Simple	Chewing
083.	Peachtree borer moth	Lepidoptera	Complete	Sucking
084.	Pennsylvania wood cockroach	Blattodea	Simple	Chewing

<u>Insect</u>		<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>
085.	Praying mantis	Mantodea	Simple	Chewing
086.	Red-legged grasshopper	Orthoptera	Simple	Chewing
087.	Rice weevil	Coleoptera	Complete	Chewing
088.	Robber fly	Diptera	Complete	Sucking
089.	Rove beetle	Coleoptera	Complete	Chewing
090.	Saw-toothed grain beetle	Coleoptera	Complete	Chewing
091.	Scorpionfly	Mecoptera	Complete	Chewing
092.	Soldier beetle	Coleoptera	Complete	Chewing
093.	Southern corn rootworm (Spotted cucumber beetle)	Coleoptera	Complete	Chewing
094.	Squash bug	Hemiptera	Simple	Sucking
095.	Stonefly	Plecoptera	Simple	Chewing
096.	Syrphid fly (Flower fly)	Diptera	Complete	Sucking
097.	Tachinid fly	Diptera	Complete	Sucking
098.	Tarnished plant bug	Hemiptera	Simple	Sucking
099.	Tent caterpillar moth	Lepidoptera	Complete	Sucking
100.	Termite	Isoptera	Simple	Chewing
101.	Tiger beetle	Coleoptera	Complete	Chewing
102.	Tiger moth	Lepidoptera	Complete	Sucking
103.	Tiger swallowtail butterfly	Lepidoptera	Complete	Sucking
104.	Tobacco hornworm moth	Lepidoptera	Complete	Sucking
105.	Treehopper	Homoptera	Simple	Sucking
106.	True armyworm moth	Lepidoptera	Complete	Sucking
107.	True armyworm moth (larvae)	Lepidoptera	Complete	Chewing
108.	Underwing moth	Lepidoptera	Complete	Sucking
109.	Velvet ant	Hymenoptera	Complete	Chewing
110.	Viceroy butterfly	Lepidoptera	Complete	Sucking
111.	Walking stick	Phasmatodea	Simple	Chewing
112.	Water strider	Hemiptera	Simple	Sucking
113.	Western corn rootworm	Coleoptera	Complete	Chewing
114.	White-lined sphinx	Lepidoptera	Complete	Sucking
115.	Yellowjacket	Hymenoptera	Complete	Chewing

FFA Entomology CDE Insect Identification List

COMMON NAME

- | | | |
|---|---|--|
| 001. Alfalfa butterfly | 039. Elm leaf beetle | 078. Mosquito |
| 002. Alfalfa weevil | 040. European corn borer moth | 079. Moth fly |
| 003. American cockroach | 041. European corn borer moth larvae | 080. Mud dauber wasp |
| 004. Ant | 042. Field cricket | 081. Northern corn rootworm |
| 005. Assassin bug | 043. Flea | 082. Oriental cockroach |
| 006. Bagworm larvae (in bag) | 044. Flea beetle | 083. Peachtree borer moth |
| 007. Bald-faced hornet | 045. Flour beetle | 084. Pennsylvania wood cockroach |
| 008. Bean leaf beetle | 046. Forage Looper moth | 085. Praying mantis |
| 009. Black cutworm moth | 047. Forage Looper moth larvae | 086. Red-legged grasshopper |
| 010. Black cutworm moth larvae | 048. German cockroach | 087. Rice weevil |
| 011. Blister beetle | 049. Giant water bug | 088. Robber fly |
| 012. Boll weevil | 050. Green bottle fly | 089. Rove beetle |
| 013. Boxelder bug | 051. Green June beetle | 090. Saw-toothed grain beetle |
| 014. Brown stink bug | 052. Green lacewing | 091. Scorpionfly |
| 015. Brown-banded cockroach | 053. Green stink bug | 092. Soldier beetle |
| 016. Buckeye butterfly | 054. Ground beetle | 093. Southern corn rootworm
(Spotted cucumber beetle) |
| 017. Bumble bee | 055. Harlequin bug | 094. Squash bug |
| 018. Cabbage butterfly | 056. Hog louse | 095. Stonefly |
| 019. Cabbage looper | 057. Honey bee | 096. Syrphid fly (Flower fly) |
| 020. Caddisfly | 058. Horntail | 097. Tachinid fly |
| 021. Camel cricket | 059. Horse fly | 098. Tarnished plant bug |
| 022. Carpenter bee | 060. House fly | 099. Tent caterpillar moth |
| 023. Carpet beetle | 061. Ichneumon wasp | 100. Termite |
| 024. Carrion beetle | 062. Indian meal moth | 101. Tiger beetle |
| 025. Chinch bug | 063. Japanese beetle | 102. Tiger moth |
| 026. Cicada | 064. Lace bug | 103. Tiger swallowtail butterfly |
| 027. Click beetle | 065. Ladybird beetle | 104. Tobacco hornworm moth |
| 028. Codling moth | 066. Leafhopper | 105. Treehopper |
| 029. Colorado potato beetle | 067. Lightningbug (Firefly) | 106. True armyworm moth |
| 030. Corn earworm moth | 068. Long-horned beetle | 107. True armyworm moth larvae |
| 031. Corn earworm moth larvae | 069. Long-horned grasshopper | 108. Underwing moth |
| 032. Corn rootworm larvae | 070. Luna moth | 109. Velvet ant |
| 033. Damsel bug | 071. Mayfly | 110. Viceroy butterfly |
| 034. Damselfly | 072. Mealybug | 111. Walkingstick |
| 035. Differential grasshopper
(Short-horned) | 073. Metallic wood-boring beetle | 112. Water strider |
| 036. Dobsonfly | 074. Mexican bean beetle | 113. Western corn rootworm |
| 037. Dragonfly | 075. Minute pirate bug | 114. White-lined sphinx |
| 038. Earwig | 076. Mole cricket | 115. Yellowjacket |
| | 077. Monarch butterfly | |

INSECT ORDERS			METAMORPHOSIS
01. Anoplura	08. Homoptera	15. Odonata	S - Simple C - Complete
02. Blattodea	09. Hymenoptera	16. Orthoptera	
03. Coleoptera	10. Isoptera	17. Phasmatodea	MOUTH PARTS
04. Dermaptera	11. Lepidoptera	18. Plecoptera	S - Sucking C - Chewing
05. Diptera	12. Mantodea	19. Siphonaptera	
06. Ephemeroptera	13. Mecoptera	20. Trichoptera	
07. Hemiptera	14. Neuroptera		

Name: _____ Contestant No: _____ School: _____

Directions: Enter the correct Common Name number and Order letter in the appropriate column. Darken the circle of the correct Metamorphosis and Mouth Parts letter in the appropriate column (make all entries LEGIBLE).

Common Name Number	Order	Metamorphosis		Mouth Parts		Common Name Number	Order	Metamorphosis		Mouth Parts	
		Simple	Complete	Sucking	Chewing			Simple	Complete	Sucking	Chewing
		S	C	S	C			S	C	S	C
1.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	21.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	22.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	23.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	24.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	25.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	26.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	27.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	28.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	29.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	30.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	31.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	32.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	33.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	34.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	35.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	36.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	37.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	38.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	39.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	40.		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>