

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

Insect		Order	Metamorphosis	Mouth Parts
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.	Blister beetle	Coleoptera	Complete	Chewing
011.	Boll weevil	Coleoptera	Complete	Chewing
012.	Boxelder bug	Hemiptera	Simple	Sucking
013.	Brown stink bug	Hemiptera	Simple	Sucking
014.	Brown-banded cockroach	Blattodea	Simple	Chewing
015.	Buckeye butterfly	Lepidoptera	Complete	Sucking
016.	Bumble bee	Hymenoptera	Complete	Chewing
017.	Cabbage butterfly	Lepidoptera	Complete	Sucking
018.	Cabbage looper	Lepidoptera	Complete	Sucking
019.	Caddisfly	Trichoptera	Complete	Chewing
020.	Camel cricket	Orthoptera	Simple	Chewing
021.	Carpenter bee	Hymenoptera	Complete	Chewing
022.	Carpet beetle	Coleoptera	Complete	Chewing
023.	Carrion beetle	Coleoptera	Complete	Chewing
024.	Chinch bug	Hemiptera	Simple	Sucking
025.	Cicada	Homoptera	Simple	Sucking
026.	Click beetle	Coleoptera	Complete	Chewing
027.	Codling moth	Lepidoptera	Complete	Sucking
028.	Colorado potato beetle	Coleoptera	Complete	Chewing

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

	<u>Insect</u>	<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>
058.	Japanese beetle	Coleoptera	Complete	Chewing
059.	Lace bug	Hemiptera	Simple	Sucking
060.	Ladybird beetle	Coleoptera	Complete	Chewing
061.	Leafhopper	Homoptera	Simple	Sucking
062.	Lightningbug (firefly)	Coleoptera	Complete	Chewing
063.	Long-horned beetle	Coleoptera	Complete	Chewing
064.	Long-horned grasshopper	Orthoptera	Simple	Chewing
065.	Luna moth	Lepidoptera	Complete	Sucking
066.	Mayfly	Ephemeroptera	Simple	Chewing
067.	Mealybug	Homoptera	Simple	Sucking
068.	Metallic wood-boring beetle	Coleoptera	Complete	Chewing
069.	Mexican bean beetle	Coleoptera	Complete	Chewing
070.	Minute pirate bug	Hemiptera	Simple	Sucking
071.	Mole cricket	Orthoptera	Simple	Chewing
072.	Monarch butterfly	Lepidoptera	Complete	Sucking
073.	Mosquito	Diptera	Complete	Sucking
074.	Moth fly	Diptera	Complete	Sucking
075.	Mud dauber wasp	Hymenoptera	Complete	Chewing
076.	Northern corn rootworm	Coleoptera	Complete	Chewing
077.	Oriental cockroach	Blattodea	Simple	Chewing
078.	Peachtree borer moth	Lepidoptera	Complete	Sucking
079.	Pennsylvania wood cockroach	Blattodea	Simple	Chewing
080.	Praying mantid	Mantodea	Simple	Chewing
081.	Red-legged grasshopper	Orthoptera	Simple	Chewing
082.	Rice weevil	Coleoptera	Complete	Chewing
083.	Robber fly	Diptera	Complete	Sucking
084.	Rove beetle	Coleoptera	Complete	Chewing
085.	Saw-toothed grain beetle	Coleoptera	Complete	Chewing
086.	Scorpionfly	Mecoptera	Complete	Chewing
087.	Soldier beetle	Coleoptera	Complete	Chewing

	<u>Insect</u>	<u>Order</u>	<u>Metamorphosis</u>	<u>Mouth Parts</u>
088.	Southern corn rootworm (Spotted cucumber beetle)	Coleoptera	Complete	Chewing
089.	Squash bug	Hemiptera	Simple	Sucking
090.	Stonefly	Plecoptera	Simple	Chewing
091.	Syrphid fly (Flower fly)	Diptera	Complete	Sucking
092.	Tachinid fly	Diptera	Complete	Sucking
093.	Tarnished plant bug	Hemiptera	Simple	Sucking
094.	Tent caterpillar moth	Lepidoptera	Complete	Sucking
095.	Termite	Isoptera	Simple	Chewing
096.	Tiger beetle	Coleoptera	Complete	Chewing
097.	Tiger moth	Lepidoptera	Complete	Sucking
098.	Tiger swallowtail butterfly	Lepidoptera	Complete	Sucking
099.	Tobacco hornworm moth	Lepidoptera	Complete	Sucking
100.	Treehopper	Homoptera	Simple	Sucking
101.	True armyworm moth	Lepidoptera	Complete	Sucking
102.	Underwing moth	Lepidoptera	Complete	Sucking
103.	Velvet ant	Hymenoptera	Complete	Chewing
104.	Viceroy butterfly	Lepidoptera	Complete	Sucking
105.	Walking stick	Phasmatodea	Simple	Chewing
106.	Water strider	Hemiptera	Simple	Sucking
107.	Western corn rootworm	Coleoptera	Complete	Chewing
108.	White-lined sphinx	Lepidoptera	Complete	Sucking
109.	Yellowjacket	Hymenoptera	Complete	Chewing

**FFA Entomology CDE
Insect Identification List**

COMMON NAME

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

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