Agricultural Pest Control

Revised 06/2024

Purpose and Standards

The purpose of the Agricultural Pest Control Career Development Event (CDE) is to provide students with new insights into the science and practice of pest management with a specific emphasis on the California Agricultural Industry.

Pests are organisms that damage or interfere with desirable plants in our fields and orchards, landscapes, or wildlands, or damage homes or other structures. A pest can be a plant (weed), vertebrate (bird, rodent, or other mammal), invertebrate (insect, tick, mite, or snail), nematode, pathogen (bacteria, virus, or fungus) that causes disease, or other unwanted organism that may harm water quality, animal life, crop production, or other parts of an ecosystem.

Participants will accurately identify and apply the correct scientific and common name to pests from the categories of Gastropoda, Arachnida, Insecta, and Symphyla. Additionally, participants will give an oral presentation to a panel of industry experts explaining specimens from the categories of beneficial insects, quarantine or invasive insects, and vertebrate pests.

Participants of the Agricultural Pest Control CDE strengthen their leadership, observation, analysis, critical thinking and communication skills while also developing and exercising a competitive team spirit and building an awareness of career opportunities within the pest management industry.

Foundation Standards: 1.2, 1.2d, 2.0, 2.3, 2.4, 2.41.1, 2.41.8, 5.0, 5.1, 5.3, 9.0, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, and 11.0.

Agricultural Pathway Standards: C C2.1, C2.2, C6.1, C11.1, C12.1, C12.2, and C12.3

Contestants

Teams shall consist of three or four members. The scores of the three highest team members shall be used for the team score. All team members are eligible for individual awards.

Classes

|  |  |  |
| --- | --- | --- |
| **Class** | **Individual Points** | **Team Points** |
| Objective-Type Examination | **900** | **2700** |
| Oral Presentations Total | **600** | **1800** |
|  Beneficial | 200 |  |
|  Quarantine/Invasive | 200 |  |
|  Vertebrate Pest | 200 |  |
| Possible Contest Total | **1350** | **4500** |

Tie Breaker

1. The team or individual scoring the highest score(s) in oral presentations will be the winner.
2. If a tie still exists, the total score of the individual or team will be used to determine the high individual or team.
3. If a tie still exists, the contestant with the highest individual Objective Exam score will be used to determine the high individual or team.

Sub-contest Awards

Sub-contest awards will be given for high teams and individuals in the following areas: Exam, Oral Presentation (based on combined beneﬁcial, quarantine/invasive & vertebrate scores).

Rules

1. This contest shall consist of two parts: an objective type examination on 30 insects of California and oral presentations of two insects and one vertebrate pest. Up to three specimens in the Objective-Type Exam can display the actual crop damage.
2. The pest will be displayed in the most appropriate mount available. As many growth stages of the insect will be shown as is possible, including at least the stage most commonly seen in nature. No pictures are to be used.
3. Only common names and orders will be used in the contest and must be used as listed in the Code to receive credit. Scientific names are included only as an aid to help in identification study prior to the contest.
4. Objective Type Examination
	1. The time allowed shall be 30 minutes for identification on a rotation basis.
	2. Contestants must check the appropriate places on the scorecard for all destructive stages of the pest. Mouth parts of the most destructive stage will be indicated by the contestant.
	3. Both common name and order must be written by the contestant as listed in the Curricular Activities Code for points to be given.
	4. Next to each specimen a list of 5 potential hosts numbered 1-5 to be entered on the scan form.
	5. No partial points will be given on scorecard for incomplete answers or improper identification.
	6. Scoring for Objective-Type Examination will be as follows: (Note: Each area will be scored independently. For example: If common name is incorrectly written, points will be given for correctly identifying order, destructive states, etc.)
		1. Common Name (10 Points)
		2. Order (5 Points)
		3. Destructive Stage(s) (5 Points)
		4. Mouth Part(s) (5 Points)
		5. Host(s) (5 Points)
	7. A total of 30 points can be given for each correctly identified specimen.
	8. No duplicate specimens may be used in the Objective-Type Exam. For example, “Cabbageworm” can only be used once in the exam.

List from which 30 pests or insects will be chosen: (Common names only will be used in the contest).

|  |  |  |
| --- | --- | --- |
| **I.** | **Class:**  | **Gastropoda**  |
|    | Order:  | Stylommatophora - Snails & Slugs |
|  |  | Brown Garden Snail – Helix aspersa |
| **II.** | **Class:**  | **Arachnida** |
|  | Order:  | Acari - Mites |
|    |    | Twospotted Spider Mite - Tetranychus urticae |
|    |    | Citrus Red Mite - Panonychus citri  |
| **III.** | **Class:**  | **Insecta** |
|  | Order:  | Orthoptera - Grasshoppers, Crickets, Cockroaches. |
|  |  | Grasshopper - Acrididae (family) |
|  |  | Field Cricket - Gryllus spp.Katydid - Various spp. |
|  |  | American Cockroach – Periplaneta Americana |
|  |  | German Cockroach – Blattella germanica |
|  |  | Oriental Cockroach – Blattella orientalis |
|  | Order:  | Dermaptera – Earwigs |
|  |  | European Earwig - Forficula auricularia  |
|  | Order:  | Isoptera – Termites |
|  |  | Termite – Various spp. |
|  | Order:  | Mallophaga - Chewing Lice |
|  |  | Chicken Body Louse – Menacanthus stramineus  |
|  | Order:  | Thysanoptera – Thrips |
|  |  | Thrip - Thripidae (family)  |
|  | Order:  | Hemiptera – True Bugs, Aphids, Scale, Leafhoppers, Mealybugs |
|  |  | Lygus Bug – Lygus Hesperus |
|  |  | Squash Bug - Anasa tristisGreen Stink Bug – Acrosternum hilareBrown Marmorated Stink Bug – Halyomorpha halysBagrada Bug – Bagrada hilarisGlassy-Winged Sharpshooter – Homalodisca vitripennisLeaf-footed Bug – Leptoglossus phyllopus |
|  |  | Beet Leafhopper – Circulifer tenellus Grape Leafhopper - Erythroneura elegantula Cabbage Aphid - Brevicoryne brassicae |
|  |  | Spotted Alfalfa Aphid – Therioaphis maculata Rose Aphid - Macrosiphum rosae |
|  |  | San Jose Scale – Diaspidiotus perniclosus California Red Scale - Aonidiella aurantii  |
|  |  | Brown Soft Scale - Coccus hesperidum |
|  |  | Black Scale - Saissetia oleae |
|  |     | Cottony Cushion Scale - Icerya purchasiGrape Mealybug- Pseudococcus maritimus  |
|  |  | Whitefly - Aleyrodidae (family)Citricola Scale - Coccus pseudomagnoliarumBean Aphid - Aphis fabaeGreen Peach Aphid - Myzus persicaeLongtailed Mealybug - Pseudococcus longispinusWestern Boxelder Bug – Boisea rubrolineata |
|  | Order:  | Lepidoptera - Butterflies and Moths |
|  |  | Cabbageworm – Pieris rapae |
|  |  | Alfalfa Caterpillar - Colias eurytheme |
|  |  | Western Grapeleaf Skeletonizer - Harrisina brillians |
|  |    | Indian Meal Moth - Plodia interpunctella |
|  |  | Navel Orangeworm - Amyelois transitella  |
|  |  | Oriental Fruit Moth - Grapholita molesta  |
|  |  | Codling Moth - Laspeyresia pomonella |
|  |    | Peach Twig Borer - Anarsia lineatella Tomato Hornworm - Manduca spp. |
|  |  | Corn Earworm – Helicorerpa zea |
|  |    | Alfalfa Looper - Autographa californica |
|  |  | Cutworm - Noctuidae (family) |
|  |  | Western Yellowstriped Armyworm - Spodoptera praefica  |
|  |  | Saltmarsh Caterpillar - Estiqmene acreaDiamondback Moth – Plutella xylostellaObliquebanded Leafroller – Choristoneura rosaceanaOmnivorous Leafroller – Platynota stultana |
|  | Order:  | Coleoptera - Beetles and Weevils |
|  |  | Wireworm - Elateridae (family) |
|  |  | Alfalfa Weevil - Hypera  |
|  |  | Bean Weevil - Acanthoscelides obtectus |
|  |  | Darkling Beetle – Eleodes sp. |
|  |  | Flea Beetle – Epitrix cucmeris |
|  |  | Granary Weevil - Sitophilus granarius  |
|  |  | Sawtoothed Grain Beetle - Oryzaedhilus surinamensis |
|  |  | Shothole Borer – Scolytus rugulosus |
|  |  | Western Spotted Cucumber Beetle – Diabrotica  |
|  |  | Western Striped Cucumber Beetle –Acalymma trivittata Green Fruit Beetle – Cotinis texanaTenlined June Beetle – Polyphylla decemlineata |
|  | Order:  | Hymenoptera - Ants, Bees, Wasps |
|  |  | Argentine Ant – Linepithema humilis |
|  |  | Harvester Ant - Pogonomyrmex sp. Southern Fire Ant – Solenopsis xyloni |
|  | Order:  | Diptera – Flies |
|  |  | House Fly - Musca domestica |
|  |  | Horse Fly - Tabanus spp. |
|  |  | Stable Fly - Stomoxys calcitrans |
|  |  | Walnut Husk Fly – Rhagoletis completa |
|  |  | Mosquito – Culex spp. |
|  |  | Spotted Wing Drosophila – Drosophila suzukii |
|  |  | Biting Midge – Culicoides variipennis |
|  | Order:  | Siphonaptera – Fleas |
|  | Order: | Flea - Pulicidae (family) Zygentoma – Silverfish, Fishmoths, FirebratsSilverfish – Lepisma saccharina |
| **IV.** | **Class:** | **Symphyla** |
|  | Order: | Symphyla – Symphylans |
|  |  | Garden Symphylans – Scutigerella immaculate |

* 1. Common Host: Contest coordinator must select five possible principle hosts from the list below with one being an actual host. Contest hosts must use the exact wording of the principle hosts as listed below. Only the selections below will be used for the actual crop damage when the insect is not present.

|  |  |
| --- | --- |
| Brown Garden Snail | Avocado, Citrus, Strawberry |
| Twospotted Spider Mite | All Crops |
| Citrus Red Mite | Citrus |
| Field Cricket | Cotton, Grain |
| Grasshopper | All Crops |
| Katydid | Citrus |
| American Cockroach | Fermenting Fruits |
| German Cockroach | Food Preparation Areas |
| Oriental Cockroach | Decaying Organic Matter |
| European Earwig | All Crops |
| Termite | Structural Pest |
| Chicken Body Louse | Poultry |
| Thrip | Ornamental, Tomatoes, Onions, Peppers, Citrus |
| Lygus Bug | Alfalfa, Cotton, Beans |
| Squash Bug | Cucurbits |
| Green Stink Bug | Peaches, Grain, Almonds |
| Bagrada Bug | Cole Crops |
| Brown Marmorated Stink Bug | Fruit, Fruiting Vegetable Crops |
| Glassy-Winged Sharpshooter | Grapes |
| Black Scale | Almonds, Citrus, Fruit Trees, Pistachios |
| Brown Soft Scale | Citrus |
| Cabbage Aphid | Cole Crops |
| California Red Scale | Citrus |
| Cottony Cushion Scale | Citrus, Ornamentals |
| Grape Leafhopper | Grapes |
| Rose Aphid | Roses |
| San Jose Scale | Fruit Trees, Walnuts, Almonds |
| Spotted Alfalfa Aphid | Alfalfa |
| Beet Leafhopper | Tomatoes |
| Whitefly | Cucurbits, Tomatoes, Lettuce |
| Grape Mealybug | Grapes |
| Citricola Scale | Citrus |
| Bean Aphid | Beans, Celery |
| Green Peach Aphid | Vegetables, Ornamentals |
| Longtailed MealybugObliquebanded LeafrollerOmnivorous LeafrollerWestern Boxelder Bug | Nursery Stock, OrnamentalsCherry, PeachAvocado, Cotton, GrapesAlmonds, Grapes, Peach |
| Alfalfa Caterpillar | Alfalfa, Beans |
| Alfalfa Looper | Alfalfa, Cotton |
| Codling Moth | Pears, Walnuts |
| Corn Earworm | Corn, Tomatoes, Peppers, Lettuce, Cotton |
| Cutworm | Beans, Cole Crops, Corn, Cotton, Tomatoes |
| Cabbageworm | Cole Crops |
| Indian Meal Moth | Grain, Seeds, Stored Nuts  |
| Navel Orangeworm | Almond, Pistachios, Walnuts |
| Oriental Fruit Moth | Cherry, Peach, Plum |
| Peach Twig Borer | Peaches, Almonds |
| Saltmarsh Caterpillar | Beans, Cole Crops, Lettuce, Celery |
| Tomato Hornworm | Tomatoes |
| Western Grapeleaf Skeletonizer | Grapes |
| Western Yellowstriped ArmywormDiamondback Moth | Cotton, AlfalfaCole Crops |
| Alfalfa Weevil | Alfalfa |
| Bean Weevil | Beans |
| Darkling Beetle | Cole Crops, Lettuce, Pistachios |
| Flea Beetle | Lettuce, Pepper, Tomatoes |
| Granary Weevil | Grain |
| Sawtoothed Grain Beetle | Grain |
| Shothole Borer | Avocado, Cherry, Peach, Plum |
| Western Spotted Cucumber Beetle | Lettuce, Cole Crops, Beans, Potatoes, Cucurbits |
| Western Striped Cucumber Beetle | Cucurbits |
| WirewormGreen Fruit BeetleTenlined June Beetle | Tuber Roots, Corn, CottonPeach, PlumAlmonds |
| Argentine Ant | Citrus |
| Harvester Ant | Seeds |
| Southern Fire Ant | Almonds |
| Horse Fly | Horses, Cattle |
| House Fly | Rotting Vegetables, Livestock, Manure |
| Stable Fly | Livestock  |
| Mosquito | Warm Blooded Animals |
| Spotted Wing Drosophila | Berries, Cherries |
| Walnut Husk Fly | Walnut |
| Biting Midge | Livestock |
| FleaSilverfish | Warm Blooded AnimalsStarches, Sugar, Paper |
| Garden Symphylans | Cole Crops, Peppers, Tomatoes |

1. Oral Presentations
	1. Oral presentations will be given by each contestant; a maximum time limit of three minutes will be allowed for the oral presentation of each of three specimens which will consist of one beneficial insect, one quarantine insect/invasive, and one vertebrate pest. The contestant will have 30 seconds to view the specimen and the time will begin; after two minutes, the judge will stop the presentation if not complete at that time. Within this 3 minute time frame, the judge may ask questions.
	2. Prior to the contest, pests for oral presentations will be selected by the judges and not by the contestants.
	3. One pest will be selected from each of the three categories containing six pests each, 18 total. The categories are beneficial, quarantine/invasive, and vertebrate pests.

| COMMON NAME | SCIENTIFIC NAME |
| --- | --- |
| **Beneficial:** |  |
| Honey Bee | Apis mellifera |
| Lacewing | Chrysopa sp. |
| Convergent Lady Beetle | Hippodamia convergens |
| Assassin bugMantid | Zelus spp.Mantis religiosa |
| Big Eyed Bug | Geocoris spp. |
|  |  |
| **Quarantine/Invasive:** |  |
| Japanese Beetle | Polillia japonica |
| Mediterranean Fruit Fly | Ceratitis capitata “A” |
| Light Brown Apple MothEuropean Grapevine MothAsian Citrus PsyllidRed Imported Fire Ant | Epiphyas postvittanaLobesia botranaDiaphorina citriSolenopsis invicta |
| **Vertebrate Pests:** |  |
| Norway Rat | Rattus norvegicus |
| Vole (Meadow Mouse) | Microtus spp. |
| Pocket Gopher | Thomomys spp. |
| California Ground Squirrel | Otospermophilus beecheyi |
| DeerJackrabbit | O. hemionus columbianusLepus californicus |

* 1. Scoring will be as follows: The contestant should have a general knowledge of the insect which would include such things as:
		1. Beneficial insects: life cycle, habits, hosts, beneficial importance.
		2. Quarantine/invasive insects: principle life cycle, habits, hosts, preventative measures taken, important, procedure taken if quarantine insect is found in California and control measures to be taken.
		3. Vertebrate pests: life cycle, habits, habitat, damage and control measures.
		4. Scoring of presentations:
		(Note: no points for improper ID)

|  |  |
| --- | --- |
| a. Subject matter  | 60%  |
| b. Logic and force  | 10% |
| c. Bearing and addressd. Questions | 10%20% |

1. References
	1. Borrer and Delong: Introduction to the Study of Insects, 1963.
	2. Comstock and Merrick: Manual for the Study of Insects.
	3. Essig: Insects of Western North America.
	4. Fernald: Applied Entomology.
	5. Fichter, George S.: Insect Pests, A Golden Nature Guide.
	6. Kono and Papp: Handbook of Agricultural Pests.
	7. Metcalf: Fundamentals of Insect Life.
	8. Metcalf and Flint: Destructive and Useful Insects.
	9. Sweetman: Biological Control of Insects.
	10. USDA 1962 Yearbook of Agriculture, Insects
		1. References used by judges include only latest published recommendation on pest control made by U.C. Extension Service and Experiment Station as summarized and presented by U.C. Entomology Department who will consider and include pest control recommendation throughout the State of California.
		2. Common Names of Insects: 1978 revisions, Douglas W.S. Sutherland, Chairman, Committee on Common Names of Insects, Entomological Society of America. Source for Purchasing Insects: Combined Scientific Supplies, P.O. Box 1446, Fort Davis, Texas 79734.
	11. VEP, Pest ID Kit (Cal Poly)
	12. Wildlife Pest Control Around Gardens and Homes, Cooperative Extension, University of California, Publication #21385. See your local Cooperative Extension for more information on California Pests.
	13. University of California, Davis IPM Website: [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu)

Sample Scorecard:

Common Name

Order

|  |  |  |
| --- | --- | --- |
| Destructive Stage(s) | Mouth Part(s) | Principle Host |
| LarvaNymphAdultAdult Female | ChewingRaspingSuckingSponging | CottonPistachioAlmondGrapeTomato |

Common Name

Order

|  |  |  |
| --- | --- | --- |
| Destructive Stage(s) | Mouth Part(s) | Principle Host |
| LarvaNymphAdultAdult Female | ChewingRaspingSuckingSponging | Fermented FruitsDecaying Organic MatterGrainsStored NutsAll Crops |

Common Name

Order

|  |  |  |
| --- | --- | --- |
| Destructive Stage(s) | Mouth Part(s) | Principle Host |
| LarvaNymphAdultAdult Female | ChewingRaspingSuckingSponging | OnionsGarlicBeansCole CropsLettuce |