



NEW PEST ADVISORY GROUP (NPAG)
Plant Epidemiology and Risk Analysis Laboratory
Center for Plant Health Science & Technology

*******THIS REPORT HAS BEEN AMENDED. PLEASE REFER TO PAGE 5 FOR THE MOST UP TO DATE INFORMATION*******

NPAG Report
Duponchelia fovealis* Zeller: *Duponchelia
Lepidoptera/Pyralidae
NPAG Chair Approval Date: August 26, 2005

Historic Initiating Event, Notifier and Affiliation, Notification Date: On April 25, Paul Courneya (2005), USDA, APHIS, PPQ notified the NPAG that *Duponchelia fovealis* Zeller was present in Canada. He stated that the Canadians claimed the moth was already present in the United States. Paul Courneya included a message from the Systematic Entomology Laboratory (SEL) (2004) to Marc Epstein of the California Department of Food and Agriculture (CDFA) that SEL identified specimens submitted by the CDFA on July 30, 2004, as *D. fovealis*. Marc Epstein (2005a, 2005b) stated that *D. fovealis* has not been reported in California in 2005. On April 29, Frederick Thomas (2005a), USDA, APHIS, PPQ, asked the NPAG to report on the pest since the United States imports between 0.5% and 0.9% of its imported value of cut flowers from Canada (USDA 2005).

Data sheet(s): Robert A. Schall, June 20, 2005.

Current PPQ Policy: *Duponchelia fovealis* is listed as a reportable/actionable pest in the PIN309 database, but it is not listed on the APHIS Regulated Plant Pest List (Query conducted 11 July 2005).

Pest Situation Overview:

Exotic Status: *D. fovealis* is an exotic, but imminent threat to the United States, with the open and present pathway being agricultural commodities shipped from Canada to the United States (Epstein 2005a, Thomas 2005a).

Biology: Biological conditions that allow *D. fovealis* to avoid detection and, thus, favor population growth are: 1) the ability of pest larvae to burrow into stems, thereby avoiding detection; 2) the tendency of pest larvae to shelter among the lower leaves of host plants; 3) difficulty in detecting eggs; 4) the cryptic behavior of larvae, which may be concealed in soil, as well as in webbed plant parts; and 5) greenhouse conditions at higher temperatures (CFIA 2005). *D. fovealis* is highly tolerant of humid, waterlogged conditions. Therefore, it is pre-adapted to damp, moist conditions found in greenhouses (CFIA 2005). The larvae are polyphagous and develop quickly (Rebel 1910). They feed on leaves and flowers and bore into stems (MacLeod 1996). *D. fovealis* has no apparent over wintering stage or cold tolerance and would not survive outdoors in Canada during the winter. However, in greenhouses that are operated year-round, it could breed continuously (CFIA 2005).

At 20°C (68°F), the developmental time from egg to adult is 47 days, with the adult living 10 days (Jackel *et al.* 1996). Beemster (2004) and Pijnakker (2001) reported that the adult stage lasts 7 to 14 days. One female can lay up to 200 eggs (Beemster 2004, Jackel *et al.* 1996). The number of generations per year is variable. *D. fovealis* continuously broods under conditions in the Canary Islands (Boggis 2005). In Malta, there are only two generations per year (Valletta 1973 as cited by CFIA 2005). There are 8 to 9 generations per year in greenhouses at 22°C (72°F) (Messelink 2001 as cited by Pijnakker 2001). The egg stage lasts 4 to 9 days (Beemster 2004, Pijnakker 2001). The eggs are laid separately or in groups of 3 to 10 on both the underside and the upper side of the leaf (Beemster 2004, CFIA 2005). As well as on plants, females lay eggs on furnishings in the greenhouse (Jackel *et al.* 1996). The larval stage lasts 21 to 30 days (Beemster 2004, Pijnakker 2001). Often living protected in a fine web, larvae prefer to live in the moist soil layer, where they damage plants by feeding on the

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roots and growing points; the larvae will also tunnel in the stems. In densely planted crops, larvae also occur higher up in the canopy where they feed on leaves and stems (Jackel *et al.* 1996, Messelink and Van Wensveen 2003). The larvae of *D. fovealis* like humid conditions. Therefore, the larvae are often found associated with the cultivation of aquatic plants. In North Africa, *D. fovealis* is associated with salt marshes (Boggis 2005), and in Iraq, with oases (Wiltshire 1957 as cited by CFIA 2005). In the greenhouse, the larvae are often found at the surface of the soil, under pots, in the first centimeter of substrate (at the root level or at the root collar), under the first leaves, and, perhaps, also in the fruit (Pijnakker 2001). The pupal stage lasts 7 to 14 days (Beemster 2004, Pijnakker 2001). Pupation occurs in a cocoon in the ground (Beemster 2004).

Prevalence and global distribution: *D. fovealis* has its origin in southern Europe and North Africa. Specimens in the British Museum of Natural History have been obtained from Gibraltar, Italy, Crete, Cyprus, Canary Islands, Kenya, Uganda, Ghana, Malawi, Transvaal, and South Africa (Boggis 2005). The following are outdoor records: France (Corsica) Gibraltar, Greece (Crete), Italy (Liguria, Sardinia and Sicily), Malta, Netherlands, Portugal, Spain, United Kingdom, and Yugoslavia (Boggis 2005, CFIA 2005, Dalla Guda *et al.* 1988, Karsholt and Razowski 1996, Nash and Skinner 2005, Trematerra 1990, Vierbergen 2002 as cited by Schall 2005). Current distribution includes 1) in **Africa:** Ghana, Malawi, Kenya, South Africa, Transvaal, Uganda, Algeria, Reunion and the Canary Islands; 2) in **Europe;** Cyprus, Gibraltar, Greece (Crete), Italy, Belgium, Czech Republic, Finland, Germany, Hungary, the Netherlands, and the United Kingdom; 3) in the **Middle East:** Bahrain, India (N. W.), Iran, Iraq, Lebanon, Palestine, and Syria; 4) in **North America:** Canada (possibly only established in greenhouses) (Boggis 2005, CFIA 2005, De Prins 2000, EPPO 2004, <http://monsie.itfrance.com>, Jackel *et al.* 1996, Kyrki and Itamies 1984, Marek and Bartova 1998, Romeijn 1996, Szaboky 1994). Because this pest is now present in Canada (CFIA 2005, Thomas 2005a), it is an imminent threat to the United States with the pathway being greenhouse commodities. The Canadian Food Inspection Agency (CFIA 2005) rated the risk of this pest as medium in greenhouses and low outdoors. Canada is taking eradication measures in greenhouses (Thomas 2005b), but it is unlikely they will do so outdoors. However, they state in their risk assessment that uncertainty of their analysis is high due to reliance on secondary (internet) literature, and because of information gained from foreign literature or anecdotally. The Systematic Entomology Laboratory (SEL) (2004) identified specimens submitted by the CDFA on July 30, 2004, as *D. fovealis*. According to Marc Epstein (2005a, 2005b) *D. fovealis* was found in California in 2004 in a single nursery, but is believed eradicated and has not been reported in California in 2005, and, therefore, no longer occurs in the conterminous United States.

Host Range (See amendment): *D. fovealis* has a wide range of host plants, including a wide variety of commercially grown crop plants (BBA 1998, DEFRA 2001, Kimber 2005, Messelink and Van Wensveen 2003, Pijnakker 2001, Romeijn 1996). This pyralid is a troublesome pest of aquatic plants in greenhouses (Marek and Bartova 1998, Pijnakker 2001). Plants listed as hosts reside in thirty-eight families and include: **Acanthaceae**, *Hygrophila rubella* (hygro); **Alistamaceae**, *Echinodorus tropica* (Burhead); **Amaranthaceae**, *Alternanthera splendida*, (an alternanthera), *A. rosaefolia*, (rose-colored alternanthera); **Apiaceae**, *Apium graveolens*, (celery); **Aponogetonaceae**, *Aponogeton* sp., (an aquatic plant); **Araceae**, *Cryptocoryne* sp. (Water-trumpet); **Asteraceae**, *Bellis perennis* (English Daisy), *Bellis* sp. (daisy), *Cineraria* sp. (Cineraria), *Gerbera* sp. (ever-bloom); **Balsaminaceae**, *Impatiens* sp. (jewelweed); **Begoniaceae**, *Begonia* sp. (begonia), *Begonia elatior* (Begonia - Elatior hybrids); **Caprifoliaceae**, *Sambucus* sp. (elderberry); **Chenopodiaceae**, *Chenopodium album* (lamb's-quarters, goosefoot); **Convolvulaceae**, *Convolvulus arvensis* (bindweed); **Crassulaceae**, *Kalanchoe* sp. (Kalanchoe); **Ericaceae**, *Azalea* sp. (Azalea); **Euphorbiaceae**, *Codiaeum* sp., *Croton* sp. (Croton), *Euphorbia pulcherrima* (poinsettia), *Euphorbia* sp. (spurge); **Gentianaceae**, *Eustoma grandiflorum* (prairie gentian); **Geraniaceae**, *Pelargonium* sp. (geranium); **Lamiaceae**, *Coleus* sp. (Coleus), *Mentha pulegium* (pennyroyal, brook mint); **Liliaceae**, *Ophiopogon* sp. (lilyturf, mondo grass); **Lythraceae**, *Cuphea hyssopifolia* (false heather), *Nesaea pedicellata*, *Rotala macrandra* (tooth-cup), *R. Wallichii* (tooth-cup); **Malvaceae**, *Malva sylvestris*, (high mallow); **Marantaceae**, *Calathea* sp. (Calathea); **Moraceae**, *Ficus trianulatus* (fig); **Onagraceae**, *Ludwigia glandulosa* and *L. perennis* (false looserstrife); **Oxalidaceae**, *Oxalis acetosella* (European wood-sorrel); **Plantaginaceae**, *Plantago lanceolata* (narrow-leaved plantain); **Plumbaginaceae**, *Limonium* sp. (sea lavender, statice); **Primulaceae**, *Cyclamen* sp. (Persian violet, alpine violet); **Poaceae**, *Zea* sp. (maize); **Portulacaceae**, *Portulaca oleracea* (Purslane); **Punicaceae**, *Punica granatum* (pomegranate); **Ranunculaceae**,

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Ranunculus repens, (creeping buttercup); **Rosaceae**, *Rosa* sp. (rose); **Rubiaceae**, *Bouvardia* sp. (Bouvardia); **Saxifragaceae**, *Heuchera* sp. (alumroot, coralbells); **Scrophulariaceae**, *Bacopa lanigera* (water hyssop); *Bacopa* sp. (an aquatic plant); **Solanaceae**, *Capsicum annuum* (pepper); and **Ulmaceae**, *Ulmus* sp. (elm) (BBA 1998, Boggis 2005, Dalla Guda *et al.* 1988, DEFRA 2001, EPPO 2004, Kimber 2005, Marek and Bartova 1998, Messelink and Van Wensveen 2003, Mozafary 1993, NAIS 2001, Pijnakker 2001, and Romeijn 1996 as cited by Schall 2005).

Potential pathways and spread: Based on the flight of the adult, this pyralid can disperse naturally. However, because this species is moving in infested nursery stock (Kimber 2005), it will be widely dispersed over longer distances than by natural dispersal. The nursery in California that discovered the insect received it in begonias shipped from the Netherlands (Wright 2005). CFIA (2005) states that *D. fovealis* was found in cut-flower greenhouses in Ontario, Canada. They state that the pyralid has no cold tolerance and predict that it would die out during winter if it escapes the greenhouses. Kimber (2005) states that *D. fovealis* is thought to have been imported into the United Kingdom with cultivated plants. Schall (2005) compared climatic zones from where the insect is currently established to those of the United States and concluded that the insect could establish in Breckle's (2002) zonobiomes I through V, with zone IV which includes much of California and the west coasts of Oregon and Washington being the most likely. The southeastern United States north to the 38th parallel lies in zones II through V. None of these zones border Ontario, Canada. The only area in Canada where any of these zones occur is on the west coast of British Columbia, which borders Washington State. Therefore, the most likely pathway from Canada to the United States is on cut flowers or other commodities grown in greenhouses, rather than natural spread. If *D. fovealis* were to reach California, the west coast or the southeastern United States, it could naturalize and be difficult to eradicate. PIN309 lists 109 interceptions at numerous United States Ports for *D. fovealis* on various hosts. Ninety-six or 88% of these interceptions were on *Capsicum annuum* or *Capsicum* sp., pepper.

Potential economic and environmental impacts and trade implications: Schall (2005) mentions that *D. fovealis* is not listed as a major economic pest in its native range, but has caused economic loss since 1984 outside of its native range. Pijnakker (2001) stated that the pest was one of the most dreaded to producers of potted plants. The total wholesale value of sales of potted flowering plants in the United States was \$803 Million in 2003 and \$815 million in 2004 (USDA 2005). Messelink and Van Wensveen (2003) reported that the pyralid has become a pest of potted plants in Dutch greenhouses and Kimber (2005) reported outbreaks in nurseries in the United Kingdom. Based on these experiences, it is likely that *D. fovealis* could become a pest in greenhouses throughout the United States. Based on the ecology of the pest discussed above under potential pathways and spread, it is likely that the pest could establish outdoors in some regions of the United States, making it both an agricultural and an environmental threat because of its extensive host range. The European Plant Protection Organization (EPPO 2004), Iceland (BBA 1998), and Norway (NAIS 2001) all regulate this pest. If the pest establishes in the United States, it is likely that foreign countries not having it would regulate exports of all commodities from the United States that might harbor *D. fovealis*.

NPAG teleconference(s): None held.

Response and activities, technology/knowledge gaps and needs (August 2005): Currently, there is no regulatory action in California or by other states against California for *D. fovealis* (Epstein 2005a). Chemical control of *D. fovealis* may not be efficient because of the tendency of larvae to borrow into moist soil avoiding contact with the insecticide. However, formulations of *Bacillus thuringiensis* are somewhat effective in situations where larvae are feeding externally on plants (Messelink and Van Wensveen 2003, Pijnakker 2001). Messelink and Van Wensveen (2003) discuss a number of organisms that are effective as natural controls for *D. fovealis*. However, these organisms do not occur in the United States, and some are not used in areas where they occur because the expense is prohibitive.

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Chair's Approval: /s/ Brian M. Spears

Signature Date: August 26, 2005

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Amended NPAG report
***Duponchelia fovealis* Zeller**
Lepidoptera: Pyralidae
DA Approval Date: September 17, 2010

AMENDMENT:

Initiating Event: On May 18, 2010, Frank Salantri (PPQ PIM) received notification from the Canadian government that *Duponchelia fovealis* was detected on a shipment of plants that entered Canada from California. *Duponchelia fovealis* has been detected with greenhouse plants from Canada in the past and CFIA does not consider it a quarantine pest (Cavey, 2010).

Current Regulatory Response:

The immature insect was found with *Adromischus cristatus* plants shipped from a nursery located in Vista, CA (Cavey, 2010). The nursery was treated twice with pesticides and *D. fovealis* was not found again. CDFA conducted a trace forward of all intrastate shipments from the suspect nursery of *Adromischus cristatus* plants shipped during the 30 day period prior to the Canadian detection. *Duponchelia fovealis* was not detected on any of the remaining *A. cristatus* plants at intrastate trace-forward nurseries (Condos, 2010). The nursery propagates *A. cristatus* plants from cuttings taken from their own mother plants and does not import any known hosts of *D. fovealis*.

CDFA personnel deployed *D. fovealis* pheromone lure traps in an area (north San Diego County) where *D. fovealis* was detected on plants grown in separate greenhouses two times in the last five years (Mullaly, 2010). Traps were placed beginning the week of June 28 and the first capture occurred on July 1, 2010; subsequent sampling through August shows the insect present in at least 11 counties (see map). While the majority of these areas are in southern California, several counties in the central part of the state are also infested. As of late August, 2010, California is stopping expanded surveys (Bailey, 2010).

No feeding damage was observed on any plant or commodity throughout the growing season; however, no specific effort was expended to observe or measure larval feeding. While the distribution of adults is relatively well known, it is unclear where larvae are developing and on what hosts. A recent Crop Protection Compendium report lists main hosts as *Begonia*, *Cyclamen*, *Euphorbia pulcherrima* (poinsettia), *Eustoma grandiflorum* (Lisianthus (cut flower crop)), and *Kalanchoe blossfeldiana* (Flaming katy) (CABI, 2010). There are several of other hosts, including *Capsicum* sp., but the extent of economic damage is limited or unknown.

Regarding trace-forward activities, all states that received shipments for the original nursery have been notified. A limited trapping program will be conducted in eight WR states (OR, WA, CO, UT, TX, OK, HI, and AZ); all states have agreed to participate and will be setting 50 traps each. The target start date for the survey is Sept 1 and it should run approximately six weeks, concluding the trapping year; some states (HI and AZ) will likely be able to trap longer. California is providing its surplus lure to the eight mentioned states. The Eastern Region will conduct a limited survey in 4 states (SC, GA, FL, and TN) and is considering a full survey for 2011 in 14 states (Bailey, 2010).

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