CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating

Delottococcus confusus (De Lotto): A Protea Mealybug

Hemiptera: Pseudococcidae

Pest Rating: C

Initiating Event:

In association with a nursery regulatory inspection on November 20, 2012, San Luis Obispo County inspectors collected a sample of mealybugs from Protea trees in a residential neighborhood. On November 21, Dr. Natalia von Ellenrieder (CDFA) identified these mealybugs as *Delottococcus confusus* DeLotto (PDR 1599182). This was the first time this species was found in an outdoor situation in California not on nursery stock.

History & Status:

Background: *Delottococcus confusus* is primarily known as a pest of Proteaceae (*Protea* sp., *P. caffra, P. cynarioides, Leucadendron* sp. and *Leucadendron argenteum*). Other host records include Brunia and *Berzelia lanuginose* (Bruniaceae) (PDR 1267226), *Canthium subovatum* (Rubiaceae), *Carissa* sp. (Apocynaceae), *Lycium* sp. and *Lycium tetrandrum* (Solanaceae), *Mimusops* sp. and *Mimusops caffra* (Sapotaceae), *Plectranthus* sp. (Lamiaceae), *Psidium guajava* (Myrtaceae), *Trichilia* sp. and *Trichilia emetica* (Meliaceae), and *Xymalos monospora* (Monimiaceae)[1]. Because the host plants (Proteaceae) are commonly grown for both cut flowers and landscape plants, *Delottococcus confusus* may be spread through international plant trade.

Worldwide Distribution: *Delottococcus confusus* is native to South Africa[2]. The only other locality where the mealybug is known to be present is Hawaii[1]. Records from Portugal[3] may be based on a species misidentification.

Official Control: *Delottococcus confusus* is not known to be under official control anywhere.

California Distribution: *Delottococcus confusus* was first found in the environment in November 2012 on protea trees in a residential neighborhood of Los Osos, San Luis Obispo County. Follow-up surveys for the mealybug found it in neighboring Morro Bay (PDRs FR0P06009404 and FR0P06009408) and Escondido, San Diego County (PDR SD0P06153483).

California Interceptions: *Delottococcus confusus* was first found on cut protea flowers that originated from a nursery in San Diego County in April 2003 (PDR 1254887). In December 2003 the mealybugs were found on protea plants in a nursery in Monterey County (PDR 1402552). In 2004 they were next found on protea plants and *Berzelia lanuginose* in two nurseries in Ventura County (PDRs 1267227, 1267226, 1267251, 1267252, 1267253) as well as protea plants in a nursery in San Luis Obispo County (PDRs 1334145, 1334146, 1334147, 1334148, 1334139, 1334401, 1334992, 1334993 1334998, 1334999, 1335000). In 2005 the mealybug was found on protea plants in a nursery in Santa Cruz County (PDR 1289989) and on cut protea flowers that originated from a second nursery in San Diego County (PDR 1367761). Then in November 2006 a heavy infestation of the mealybug was found outdoors on *Leucadendron argenteum* trees and to a lesser extent other protea at a nursery in Sonoma County[4] (PDRs 1428445, 1428417). In 2007 CDFA began to intercept the mealybugs on shipments of cut flowers and foliage from Hawaii (PDRs 1423774, 1354945, 1556872, 1556886, 1494189, 1649533, 1509569, 1544327, 1649626, 1555754, 1555768, 1631162, 300P06039982, 300P06039987, 1544072, 1544071, 1609382, 300P06040043, 450P06001871, 1641489, 190P06058445, 300P06040121). In 2008 *Delottococcus confusus* resurfaced on protea plants at the same nursery in San Luis Obispo County (PDRs 1458700, 1458708). In 2009 they were found on protea plants in a greenhouse and outside at a second nursery in San Luis Obispo County (PDRs 1459343, 1335105) as well as at a nursery in Santa Barbara County (PDR 1555084). In 2010 they were intercepted on protea plants from a 2nd nursery in Santa Barbara County (PDR 1645051), and in 2011 they were found on protea plants at a repeat nursery (PDR 1554851) and a new nursery (PDR 1658335) in Santa Barbara County. In 2012 they were found on protea plants at a nursery in Riverside County (PDR 1590378) and intercepted on a shipment of cut flowers from a nursery in Santa Barbara County (PDR 1576404). And in November 2012 they were found in a repeat nursery in San Luis Obispo County where they were found in 2009 (PDR 1599179), as well as in a residential neighborhood near that nursery (PDR 1599182).

The risk *Delottococcus confusus* poses to California is evaluated below.

Consequences of Introduction:

1) Climate/Host Interaction: Proteaceae are commonly grown as ornamental plants in California and are common in the nursery industry. *Delottococcus confusus* is expected to be able to establish wherever these plants are grown. *D. confusus* receives a **High (3)** rating in this category.

Evaluate if the pest would have suitable hosts and climate to establish in California. Score:

– **Low (1)** not likely to establish in California; or likely to establish in very limited areas
– **Medium (2)** may be able to establish in a larger but limited part of California
– **High (3)** likely to establish a widespread distribution in California

2) <u>Pest Host Range:</u> All of the *Delottococcus confusus* collected in the United States to date have been on Proteaceae except for one record on *Berzelia lanuginose* (Bruniaceae). However, there are records of the mealybug from South Africa, verified by a taxonomic expert, on a variety of other hosts in eight other plant families[1]. *D. confusus* receives a **Medium (2)** in this category.

Evaluate the host range of the pest:

– **Low (1)** has a very limited host range
– **Medium (2)** has a moderate host range
– **High (3)** has a wide host range

3) <u>Pest Dispersal Potential:</u> *Delottococcus confusus* has demonstrated its ability to disperse long distances through the trade of ornamental plants and flowers. Mealybugs may also be dispersed by wind. They are capable of rapid reproduction and large infestations of the mealybug have appeared relatively rapidly in California[4]. *D. confusus* receives a **High (3)** in this category.

Evaluate the natural and artificial dispersal potential of the pest. Score:

– **Low (1)** does not have high reproductive or dispersal potential.
– **Medium (2)** has either high reproductive or dispersal potential.
– **High (3)** has both high reproduction and dispersal potential.

4) <u>Economic Impact:</u> Heavy infestations of *Delottococcus confusus* are capable of damaging nursery stock by causing necrosis of leaves and growing tips and may kill trees[4]. The mealybug may also cause significant problems for proteas grown for cut flowers4 by contaminating flowers by their presence, honeydew, and sooty mold[5]. Cut flowers are a $477 million industry in California and other states and nations may reject infested flowers. Furthermore, *D. confusus* has been recorded from guava (*Psidium guajava*)[1]. Guava is a very popular tree in the Southern California landscape and there is at least some commercial guava production in California that may be affected. *D. confusus* could trigger a loss of markets and may increase production costs of nursery stock and cut flowers. The mealybug receives a **Medium (2)** rating in this category.

Evaluate the economic impact of the pest to California using the criteria below. Score:

A. The pest could lower crop yield.
B. The pest could lower crop value (includes increasing crop production costs).

C. The pest could trigger the loss of markets (includes quarantines).
D. The pest could negatively change normal cultural practices.
E. The pest can vector, or is vectored, by another pestiferous organism.
F. The organism is injurious or poisonous to agriculturally important animals.
G. The organism can interfere with the delivery or supply of water for agricultural uses.

- **Low (1)** causes 0 or 1 of these impacts.
- **Medium (2)** causes 2 of these impacts.
- **High (3)** causes 3 or more of these impacts.

5) Environmental Impact: There are no plants listed as threatened or endangered in California that are expected to be hosts of *Delottococcus confusus*. Populations of the mealybug have been found established in residential areas and outdoor nursery settings and do not appear to be triggering any additional treatment programs by residents or industry. Furthermore there is no evidence that any residents are replacing infested plants with alternative species. Protea plants supporting populations of *D. confusus* are still alive in an abandoned nursery setting in San Diego County, suggesting that unmanaged populations of *D. confusus* may not kill plants. *D. confusus* receives a **Low (1)** rating in this category.

Evaluate the environmental impact of the pest on California using the criteria below.

A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
B. The pest could directly affect threatened or endangered species.
C. The pest could impact threatened or endangered species by disrupting critical habitats.
D. The pest could trigger additional official or private treatment programs.
E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

Score the pest for Environmental Impact. Score:

– **Low (1)** causes none of the above to occur.
– **Medium (2)** causes one of the above to occur.
– **High (3)** causes two or more of the above to occur.

Consequences of Introduction to California for *Delottococcus confusus*: Medium (11)

Add up the total score and include it here.

– **Low** = 5-8 points
– **Medium** = 9-12 points
– **High** = 13-15 points

6) <u>Post Entry Distribution and Survey Information:</u> *Delottococcus confusus* has been found to be established by survey in San Luis Obispo County and San Diego County. The mealybug receives a **High (-3)** in this category.

Evaluate the known distribution of pest in California. Only official records and published records identified by a taxonomic expert and backed up by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication, or have been delimited with no further detections should not be included.

– **Not established (0)** Pest never detected in California, or known only from incursions.
– **Low (-1)** Pest has a localized distribution in California; or is established in 1 California ecoarea (region)
– **Medium (-2)** Pest is widespread in California but has not fully established in the endangered area; or pest established in 2 contiguous ecoareas
– **High (-3)** Pest has fully established in the endangered area; or pest reported in more than 2 contiguous or non-contiguous ecoareas

Consequences of Introduction to California for Delottococcus confusus: Low (8)

Add up the total score and include it here.

– **Low** = 5-8 points
– **Medium** = 9-12 points
– **High** = 13-17 points

Uncertainty:

Outside of the areas where *Delottococcus confusus* has been found in the environment, populations of the mealybug have been found in outdoor situations in other nurseries at distant locations, sometimes in large populations. It is probable that the mealybug has escaped into the environment from some of these nurseries or other undetected, similar situations. The mealybug may have a larger distribution in the state than is realized.

Under some circumstances, heavy infestations of the pest might trigger additional treatment programs in the nursery industry or by residents who find infested ornamental plants unacceptable. The mealybug could also

cause minor alteration of urban landscaping as some residents and landscapers may replace infested plants with alternative species. This could lead to a moderate, albeit localized, environmental impact in some cases.

Conclusion and Rating Justification:

Delottococcus confusus has been appearing in California's nursery system for a decade. Surveys have now revealed that the pest is established in San Luis Obispo County and San Diego County. There is no evidence that the mealybug is significantly impacting the environment or economy. The mealybug is probably present in other parts of California and is expected to establish a widespread distribution in the state. The **Low (8)** consequences of the mealybug in California justify an C rating.

References:

[1]Miller, D.R. and J.H. Giliomee. 2011. Systematic revision of the mealybug genus Delottococcus Cox & Ben-Dov (Hemiptera: Pseudococcidae). African Entomology 19(3): 614–640. http://www.sel.barc.usda.gov/Coccoidea/Delottococcus.pdf

[2]Lotto, G. De. 1977. On some African mealybugs (Homoptera: Coccoidea: Pseudococcidae). Journal of the Entomological Society of Southern Africa. 40(1):13-36. http://www.cabdirect.org/abstracts/19770546873.html

[3]Leandro, M.J., Oliveira, M., Passarinho, A.M., Figueiredo, E., Franco, J.C., Neves-Martins, J. and Mexia, A. 2008. ASSESSMENT OF PARASITISM BY ANAGYRUS PSEUDOCOCCI AND LEPTOMASTIX DACTYLOPII ON MEALYBUGS FROM PROTEACEAE. Acta Hort. (ISHS) 805:121-126 http://www.actahort.org/books/805/805_14.htm

[4]Watson, Gillian. 2006. HEMIPTERA: STERNORRHYNCHA: NEW FEDERAL RECORDS. California Plant Pest and Disease Report 23(1):10. http://www.cdfa.ca.gov/plant/ppd/PDF/CPPDR_2006_23-1.pdf

[5]Mazzeo, G., J.C. Franco, and A. Russo. 2009. A new Paracoccus species from Palaearctic region (Hemiptera, Sternorrhyncha, Coccoidea, Pseudococcidae) . Zootaxa 2274: 62–68 http://www.mapress.com/zootaxa/2009/f/zt02274p068.pdf

[6]Sasa, A. 2011. Arthropods associated with commercial Proteaceae in the Western Cape Province, South Africa. http://scholar.sun.ac.za/handle/10019.1/6805

Responsible Party:

Jason Leathers, 1220 N Street, Sacramento, CA, 95814, (916) 654-1211, plant.health[@]cdfa.ca.gov.

Comment Period:

The 45-day comment period was opened on Monday, March 16, 2015 and closed on Thursday, April 30, 2015.