

## California Pest Rating Profile for

### **Adenium obesum virus X**

#### **Pest Rating: A**

Realm: Riboviria; Kingdom: Orthornavirae Phylum:

Kitrinoviricota; Class: Alsuviricetes Order:

Tymovirales; Family: Alphaflexiviridae, Genus:

Potexvirus

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**Comment Period: 10/29/2024 through 12/13/2024**

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#### **Initiating Event:**

In June 2024, a resident of Orange County submitted a desert rose plant, *Adenium obesum*, to the Orange County Agricultural Commissioner's office. The plant had foliar symptoms of mottling. The resident reported she had recently purchased the plant from a retail nursery in Orange County. An Orange County Agricultural Inspector visited that nursery and collected additional samples. The samples were sent to CDFA's Pest Diagnostics Center where plant virologist Tongyan Tian detected cucumber mosaic virus by ELISA and *Adenium obesum virus X* (AobVX) by RT-PCR and gene sequencing. Sequences were a match to sequences from AobVX deposited in GenBank.

Traceback information led from the retailer in Orange County to a wholesaler in San Diego County. The wholesaler provided invoices showing the plants' origin was Thailand. San Diego County Agricultural Inspectors did a delimitation survey, finding that 50% of the plants in one greenhouse showing symptoms. Plants were tested and found positive for AobVX by CDFA. This is the first detection of AobVX in the Americas, and it was assigned a 'Q' rating. The risk to California from AobVX is described herein and a permanent rating is proposed.

#### **History & Status:**

**Background:** *Adenium obesum* (family Apocynaceae) is commonly known as desert rose. It is a perennial succulent shrub, evergreen or drought-deciduous, native to southeast Africa. In the United States, it is an exotic ornamental that is becoming more popular because of its tolerance to drought

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and ease of care. There are a range of colors and forms, all are vegetatively propagated, and it produces numerous, long-lasting flowers (Varella et al., 2015). *Adenium obesum* is a popular perennial houseplant and bonsai in temperate regions.

*Adenium obesum* is a known host of cucumber mosaic potyvirus (Baker et al., 2003), and tomato spotted wilt tospovirus (Adkins and Baker, 2005), but it has not previously been known to host potexviruses. The first detection of this virus and a complete genome sequence was published by Gauthier et al. (2023) from *Adenium obesum* plants in Australia, that were recently imported from China. Their plants were also co-infected with cucumber mosaic virus.

Potexviruses affect numerous crops worldwide. Generally, diseases caused by potexviruses are mosaics with varying degrees of stunting and reduced yields. Potexviruses do not have vectors, but they are transmitted easily with infected sap through contact between healthy and infected plants, from mothers to daughters during vegetative propagation, and while handling plants during cultivation (Ryu et al., 2021). The natural host range of individual potexviruses can be restricted to a few plant species or can be broader.

Potato virus X is the type member of the genus, *Potexvirus*. Potexviruses are found wherever their hosts are grown. The genus contains 38 definitive species and five tentative species (Ryu et al., 2021). The virions are a single particle flexuous filament, and their genome is a positive sense single-stranded RNA. The RNA codes for five proteins, including the virus RNA polymerase, the coat protein, and cell-to-cell movement proteins (triple gene block). Large numbers of potexvirus particles are produced in the cytoplasm of infected plant cells. The particles form large, amorphous aggregates that are visible with a light microscope (Agrios, 2005).

*Hosts:* For AobVX, *Adenium obesum* (desert rose) is the only recorded host.

*Symptoms:* Host plants naturally infected with potexviruses may show mosaic, necrosis, ringspot, or dwarf symptoms or may be symptomless. On *Adenium obesum*, symptoms of AobVX are reported to be mottling of leaves (Gauthier et al., 2023). This is the symptom that was observed on the California plants.

*Transmission:* Potexviruses are transmitted by contact and are easily transmitted mechanically with infected sap. In nature, they are spread by incidental contact and wounding. They are not transmitted by any known vectors (Agrios, 2005). In nurseries, AobVX is likely transmitted when infected plants are used for clonal propagation.

*Damage Potential:* Potexviruses can cause serious losses in their hosts by damaging the leaves, flowers, and fruits and by causing mottling. The losses are greatest when the plants are infected young. Infections at later stages of growth cause smaller losses (Agrios, 2005). For ornamentals like desert roses, consumer tolerance for any discoloration or distortion of the leaves is very low. Symptomatic plants are generally discarded.

**Worldwide Distribution:** China, United States

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**Official Control:** A Q-rating requires the destruction of infected nursery blocks.

**California Distribution:** Orange and San Diego counties (see initiating event).

**California Interceptions:** None

The risk *Adenium obesum* virus X would pose to California is evaluated below.

### Consequences of Introduction:

- 1) Climate/Host Interaction:** AobVX is expected to be capable of establishing within California wherever *A. obesum* is grown. Climates suitable for *A. obesum* will also favor the development of the disease. Distribution of the virus will largely be dependent on the movement of propagative stock and whether it is infected or not.

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

**Score: 3**

- 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) Known Pest Host Range:** The only known host of AobVX is *A. obesum*.

Evaluate the host range of the pest.

**Score: 1**

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

- 3) Pest Reproductive Potential:** The virus is highly likely to spread primarily through infected propagative material and mechanically through contact between plants.

Evaluate the natural and artificial dispersal potential of the pest.

**Score: 2**

- 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) Economic Impact:** AobVX could have a significant effect on crop yield as ornamental plants with any abnormal growth are generally unacceptable for marketing. The removal of infected plants could result in altered cultural practices. There will not be any curative treatments once AobVX has infected plants.
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Evaluate the economic impact of the pest to California using the criteria below.

**Economic Impact: A, B**

- A. The pest could lower crop yield.**
- B. The pest could lower crop value (including increasing crop production costs).**
- C. The pest could trigger the loss of markets (including 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.

**Economic Impact Score: 2**

- 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 is no published information on the effect of this virus on the environment. This genus is not native to California. The quality of ornamental plants with viral infection is lower.

**Environmental Impact: E**

- 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.**

**Environmental Impact Score: 2**

- 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 Adenium obesum virus X: Medium**

Add up the total score and include it here. **10**

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

- 6) Post-Entry Distribution and Survey Information:** Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in
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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.

AobVX has only been identified from nursery plants.

***Evaluation is 'Not established'.***

**Score: 0**

**-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 one suitable climate/host area (region).

-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.

-High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

**7) The final score is the consequences of the introduction score minus the post-entry distribution and survey information score: (Score)**

***Final Score: Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 10***

### **Uncertainty:**

The host range could change if testing is done for other plant species, specifically in Apocynaceae.

### **Conclusion and Rating Justification:**

Based on the evidence provided above, the proposed rating for **Adenium obesum virus X is A.**

### **References:**

Agrios, G. N. 2005. Plant Pathology, 5th Edition. Elsevier Academic Press. 922 pg.

Adkins, S., Baker, C.A. Tomato spotted wilt virus Identified in Desert Rose in Florida. Plant Dis. 2005; 89:526.

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Gauthier, M.E.A., Abeynayake, S.W., Lelwala, R.V., McMaster, C.A., Eichner, R., Morrison, J., Elliott, C.E., Fiorito, S., Dinsdale, A., Pattemore, J. and Barrero, R.A., 2023. First detection and complete

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Ryu, K.H., Song, E. G., and Hong, J. S. 2021. Potexviruses (Alphaflexiviridae), in Editor(s): Dennis H. Bamford, Mark Zuckerman, Encyclopedia of Virology (Fourth Edition), Academic Press, Pages 623-630.

Varella, T.L., Silva, G.M., Cruz, K.Z.C.M., Mikovski, A.I., Nunes, J.R.S., Carvalho, I.F., Silva, M.L. 2015. In vitro germination of desert rose varieties. Ornam Horti 21:227–234

### Responsible Party:

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**\*Comment Period: 10/29/2024 through 12/13/2024**

### \*NOTE:

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at [permits\[@\]cdfa.ca.gov](mailto:permits[@]cdfa.ca.gov).

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### Comment Format:

- ❖ Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

#### Example Comment:

Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to “Climate/Host Interaction” here.]

- ❖ Posted comments will not be able to be viewed immediately.
- ❖ Comments may not be posted if they:

Contain inappropriate language which is not germane to the pest rating proposal;

Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

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Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

Violates agency regulations prohibiting workplace violence, including threats.

- ❖ Comments may be edited prior to posting to ensure they are entirely germane.
- ❖ Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

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**Pest Rating: A**

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