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# Fusarium crown and stem rot of Echeveria

*Succulent plants continue to be very popular in production. At a recent greenhouse visit, Echeveria plants were yellowing, shriveling, and dying from Fusarium infection.*

Often when individual plants start dying on greenhouse benches, common root pathogens, including *Pythium* and *Phytophthora*, are suspected. When the *Echeveria* stems and roots were examined, symptoms were not typical of *Pythium* infection, which usually causes more of a “soft rot” of the crown and roots. The leaves and stem had more of a “dry rot” appearance where the leaves yellowed, turned brown to black, shriveled, were leathery, and stayed intact (Images 1 and 2).



Image 1. Hens and Chicks (*Echeveria* sp.) plants turning yellow, brown, and dying. (Image by J. Williams-Woodward)

Beneath the plant canopy on stem at the soil line, white clusters of *Fusarium* spores and hyphae could be seen (Image 3). *Fusarium* spores are somewhat sticky and are easily spread by water-splashing, wind, and worker activity on contaminated tools and hands. *Fusarium* is a good colonizer of weakened tissues, particularly from drought stress. Soils that go through repeated cycles of excessive drying and re-wetting will stress the roots and foliage, which can be readily infected by *Fusarium*. The species of *Fusarium* was not determined on this plant sample. Most often the cause of the stem rot is *Fusarium oxysporum*. Some *F. oxysporum* isolates are very host specific; however, many are not.

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*Fusarium* spores and hyphae can survive on contaminated tools, benches, pots, trays, and in soil. Therefore, removal of infected plants and following good sanitation practices to reduce *Fusarium* survival are important to reduce continued *Fusarium* infection and spread.

It is important to accurately identify the cause of plant diseases. Misidentification can result in application of ineffective chemical and biological control options. Fungicides to reduce *Fusarium* infection are mostly ineffective on Pythium root rot, and none are effective on bacterial soft rot. A previous e-GRO Alert covered identification and management of bacterial soft rot (<https://www.e-gro.org/pdf/2022-11-35.pdf>). One of the ways to help identify bacterial soft rot is by smelling the soft, rotting leaves. Bacterial soft rot causes a foul smelling odor. *Fusarium* does not.

Fungicides will not cure an infected plant. These plants should be promptly discarded. Fungicide efficacy in reducing *Fusarium* infection varies, and is often dependent upon the *Fusarium* species and host combination. Generally, fungicides containing (listed alphabetically by active) azoxystrobin (Heritage), benzovindiflupyr + azoxystrobin (Mural), difenoconazole + pydiflumetofen (Postiva), fludioxonil (Medallion), pyraclostrobin + fluxapyroxad (Orkestra Intrinsic), thiophanate methyl, and triticonazole (Trinity) can be effective when applied preventively. Succulents can be sensitive to some fungicides, and few have them listed on their label. Always test for possible phytotoxicity before use.

\*\*The mention of specific active ingredients does not constitute an endorsement or recommendation of, or discrimination against similar products not mentioned. ALWAYS READ PRODUCT LABELS AND USE THEM AS DIRECTED ON THE LABEL.



Image 2. *Echeveria* leaves yellowing, browning from the petiole. Leaves are shriveled beginning at the crown. *Fusarium* infection is causing a “dry rot” rather than a soft, mushy rot due to Pythium root rot or bacterial soft rot (*Pectobacterium*). (Image by J. Williams-Woodward)



Image 3. *Fusarium* infection caused a dark, shriveled rot of the stem and crown. Arrows are pointing to white clusters of *Fusarium* spores and hyphae on the dead tissue. (Image by J. Williams-Woodward)



Image 4. Zebra Haworthia dying from the bacterial soft rot pathogen, *Pectobacterium carotovorum*, which causes a soft, mushy, smelly rot of leaves and eventual collapse of plant. (Image by J. Williams-Woodward)

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