First Report of Leaf Spot Disease Caused by *Gibbago trianthemae* on *Sesuvium portulacastrum* in China

Xiao-feng Chen,^{1,2} Ji-yu Su,³ Wei-hong He,¹ Jia-yuan Guo,³
Jian-qiang Huang,³ Dan Wang,¹ Nan Yang,¹ Hong-li Hu,^{3,†}
Zong-hua Wang,^{1,2,3,†} and Xiang-ying Wei^{1,†}

¹ Institute of Oceanography, College of Geography and Oceanography,
Minjiang University, Fuzhou 350108, China

² Marine and Agricultural Biotechnology Laboratory, Fuzhou Institute
of Oceanography, Minjiang University, Fuzhou 350108, China

³ State Key Laboratory of Ecological Pest Control for Fujian and Taiwan
Crops, College of Plant Protection, Fujian Agriculture and Forestry
University, Fuzhou 350002, China

Funding: This work was supported by grants from the Natural Science Foundation of Fujian Province (2019J01766) and Minjiang University (MYK19026) to X.C. Plant Dis. 106:2261, 2022; published online as <https://doi.org/10.1094/PDIS-10-21-2334-PDN>. Accepted for publication 22 January 2022.

Sea purslane (*Sesuvium portulacastrum* L.), a member of the family Aizoaceae, is a sprawling perennial herb with smooth, fleshy, glossy green leaves grown in most coastal areas, and it is highly tolerant to salt, drought, and heavy metals, making it a pioneer plant species for dune fixation, seawater desalination, and phytoremediation in coastal areas (Lokhande et al. 2013). In addition, it can also be used as vegetable, livestock feed, ornamental, and medicinal plant. During the investigation of coastal plant germplasm resources in Fujian province of China in June 2021, a severe leaf spot disease of *S. portulacastrum* was observed. Infected leaves showed round, sunken, dark-brown, necrotic lesions with maroon to brown margins, and severely diseased plants showed considerable leaf necrosis and premature defoliation. Typical infected leaves of *S. portulacastrum* were collected from Houhai (25°18'11.54"N, 119°14'31.98"E), located in Putian city, Fujian province. After isolation and purification, one fungal isolate (SPHH) was obtained. Colonies of SPHH on potato dextrose agar medium reached 4.0 cm in diameter after 7 days at 26°C. On the medium prepared with *S. portulacastrum* leaves (fresh leaves, 200 g/liter; glucose, 15 g/liter; agar, 20 g/liter; pH 6.5) at 26°C with cycled light (12 h light/12 h dark) for 7 days, conidiophores were slightly pigmented, solitary or loosely fasciculate, erect, rarely branched, septate, and slightly swollen at the apex with sympodial proliferation; mature conidia were yellow-brown, smooth, beakless, ellipsoid, muriform, possessing three to four transverse septa with slight constriction at the median septum and one to four longitudinal septa, with average dimension of 31 to 41 × 15 to 22 μm ($n = 100$). Conidia germinated from apical, lateral, and basal cells to form multiple germ tubes. Germ tubes could develop into secondary conidiophores to produce similar conidia. These morphological characteristics were similar to those of *Gibbago trianthemae* (Simmons 1986).

Until now, *G. trianthemae* has only been reported as the pathogen on horse purslane (*Trianthema portulacastrum* L.) in Cuba, the United States, Venezuela, India, Pakistan, and Mexico (Akhtar et al. 2013; Aneja and Kaushal 1999; Félix-Gastélum et al. 2021; Simmons 1986). The internal transcribed spacer (ITS) region of rDNA was amplified and sequenced using primers ITS1F and ITS4 (Gardes and Bruns 1993; White et al. 1990). The resultant amplicon sequence (NCBI accession no. OK513442) showed 99.64% identity (559/561 bp) with the ITS of *G. trianthemae* strain GT-VM (NCBI accession no. KJ825852, Kumar et al. 2016). A phylogenetic tree was constructed using the ITS sequences of strain SPHH, *G. trianthemae* strains, and other strains from genera *Dendryphiella*, *Paradendryphiella*, *Stemphylium*, and *Pleospora*. Strain SPHH was located within the same clade with *G. trianthemae* strains. Healthy *S. portulacastrum* plants were spray inoculated with conidial suspension (10^5 conidia/ml) of SPHH and were kept at 26°C with high humidity. Round, water-soaked lesions were observed on inoculated plant leaves 3 to 5 days after inoculation, similar to the symptoms found in the natural environment. With the lesions expanded, infected leaves gradually became chlorotic and abscised after 7 to 10 days. Plants inoculated with 0.02% Tween 20 solution, which was used to prepare the conidial suspension of *G. trianthemae*, remained symptomless. All pathogenicity tests were performed in two independent biological replicates, with five technical repeats for each, and similar results were obtained. Reisolation of *G. trianthemae* from the diseased tissues of inoculated *S. portulacastrum* fulfilled Koch's postulates. Thus, *G. trianthemae* was the causal agent of the leaf spot disease of *S. portulacastrum*. This is the first report of *G. trianthemae* as a pathogen on *S. portulacastrum*. *G. trianthemae* has been considered to possess great potential to develop into a mycoherbicide against *T. portulacastrum* (Kumar et al. 2016; Mitchell 1988); however, due to the ecological and certain economic importance of *S. portulacastrum*, management of this fungal disease on *S. portulacastrum* may be necessary.

References

- Akhtar, K. P., et al. 2013. Australas. Plant Dis. Notes 8:109.
- Aneja, K. R., and Kaushal, S. 1999. J. Biol. Control 12:157.
- Félix-Gastélum, R., et al. 2021. Can. J. Plant Pathol. 43:431.
- Gardes, M., and Bruns, T. D. 1993. Mol. Ecol. 2:113.
- Kumar, V., et al. 2016. Arch. Phytopathol. Pflanzenschutz 49:1.
- Lokhande, V. H., et al. 2013. Agron. Sustain. Dev. 33:329.
- Mitchell, J. K. 1988. Plant Dis. 72:354.
- Simmons, E. G. 1986. Mycotaxon 27:107.
- White, T. J., et al. 1990. Page 315 in: PCR Protocols: A Guide to Methods and Applications. Academic Press, San Diego, CA.

The author(s) declare no conflict of interest.

e-Xtra

Keywords: coastal halophytes, etiology, fungi, *Gibbago trianthemae*, leaf spot disease, *Sesuvium portulacastrum*

[†]Indicates the corresponding authors.

H.-l. Hu; huhongli7905@gmail.com, Z.-h. Wang; zonghuaw@163.com, and X.-y. Wei; xiangyingwei@mju.edu.cn