

## First report of *Erysiphe convolvuli* on *Convolvulus arvensis* and *Calystegia sepium* in Chile with a description of the sexual state

### Primera determinación de *Erysiphe convolvuli* sobre *Convolvulus arvensis* y *Calystegia sepium* en Chile con una descripción del estado sexual

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#### RESUMEN

La correhuela (*Convolvulus arvensis* L.) es una planta cosmopolita, ampliamente distribuida en Chile y considerada como una maleza de importancia en cultivos agrícolas. Por muchos años se ha observado la presencia de un oídio creciendo profusamente sobre sus hojas y tallos pero, recientemente, en el otoño de 2010 se observó por primera vez el teleomorfo de este hongo. Se realizó una prospección de plantas sintomáticas encontrándose la forma sexual del oídio desde la Región de Coquimbo hasta la Región del Libertador Bernardo O'Higgins. El patógeno fue identificado como *Erysiphe convolvuli* var. *convolvuli*, el cual no había sido reportado anteriormente en el país. Muestreos realizados en el otoño de 2012 permitieron determinar, además, la presencia de *Erysiphe convolvuli* var. *calystegiae* en dos muestras de *Calystegia sepium*, observándose casmotecios inmaduros en una de ellas.

Field bindweed (*Convolvulus arvensis* L.) known in Chile as “correhuela” is a common weed spread throughout the north central region of the country from Tarapaca to Llanquihue and in the Juan Fernandez islands (Matthei 1995). The weed is frequent on agricultural fields, being a problem for annual and perennial crops due to its perennial character and climbing habit, allowing it to grow on top of the crops. It is also problematic in urban areas where it is an important weed in parks and home gardens. Field bindweed is usually controlled through mechanical means and herbicides, but its presence in the fields is recurrent due to its ability to growth back from root pieces and rhizomes coming from endogenous buds in the roots, which can be found deep in the soil profile (Kogan 1992). *Calystegia sepium* (L.) R.Br., the hedge bindweed, known locally as “carrizalillo” or “suspiro” is found in Chile in the Metropolitan Region, from Bio-Bio to Llanquihue, and in Eastern island (Matthei 1995). It is considered a minor weed found in wet areas, alongside roads, and climbing on fences. *C. arvensis* and *C. sepium* are two cosmopolitan weeds in the Convolvulaceae family, while *Ipomoea batatas* (L.) Lam. is a cultivated crop.

On a worldwide basis, two powdery mildew species are reported on field bindweed, *Erysiphe convolvuli* DC. (Braun 1995) and *Leveillula taurica* (Lév.) Arnaud (Glawe *et al.* 2003). Three varieties of *E. convolvuli* are described,

regarding the number of ascospores per ascus and the associated host. *E. convolvuli* var. *convolvuli* is found associated with *Convolvulus* and has 3 to 4 ascospores per ascus, while *E. convolvuli* var. *calystegiae* U. Braun is found on *Calystegia* and has 5 to 6 ascospores per ascus. *E. convolvuli* var. *dichotoma* R.Y.Zheng & G.Q.Chen is distinct from both by having ramified appendages on its chasmothecia (Braun 1995). Powdery mildew has been frequently observed on field bindweed along its distribution area in Chile as a white ectotrophic mycelium for at least 15 years by the authors. Interestingly, during fall 2010 chasmothecia were found for the first time, across a wide area of central Chile. Two specimens, labeled as *E. convolvuli*, are held by the phytopathological herbarium of the Universidad Austral de Chile; nevertheless, the species has never been officially reported and is not included in the most complete checklist of fungal phytoparasites in Chile (Mujica & Vergara 1980). The fungus has been also recently described for North America (Glawe *et al.* 2003) and Turkey (Sert *et al.* 2006).

A collection of infected field bindweed was made during fall 2010, after the first detection of chasmothecia on bindweed samples found in Calle Larga, Los Andes, Chile. Powdery mildew infected hedge bindweed were also found during the fall 2012. Samples were stained with phloxin and microscopic examination was performed under a phase

contrast microscope (Axiostar Plus, Carl Zeiss, Germany). Morphometric characteristics were compared with those described in literature (Braun 1995, Glawe *et al.* 2003).

Chasmothecia on field bindweed were spherical, thick walled, yellowish to reddish when immature turning dark brown in mature specimens (Fig. 1), 110-150 µm in diameter, with scarce unbranched micellioid hyaline appendages, 5-7 x 66-195 µm (Fig. 2A); asci 3 to 4 per chasmothecium, subglobose, 4-spored, 46 x 80 µm; ascospores elliptic, hyaline 22.5-28 x 12.5-17.5 µm (Fig. 2B). These characteristics allow us to determine this powdery mildew as *Erysiphe convolvuli* var. *convolvuli*. A representative specimen was deposited in the Herbaria of the Natural History Museum Santiago, Chile (SGO). Chasmothecia on hedge bindweed were immature, spherical, thick walled, yellowish to reddish turning dark brown, 102-129 µm in diameter; micellioid hyaline appendages 6-6.5 x 80-112 µm; asci 3 to 4 per chasmothecium, subglobose, 35.4 x 56.3 µm. The specimens were determined as *E. convolvuli* var. *calystegiae* based on its host.

MATERIAL EXAMINED: *Convolvulus arvensis*; Metropolitan Region, Santiago, La Pintana (33°34'13.44"S; 70°38'03"W), 21-IV-2010, leg. and det. J. L. Henriquez (SGO 160482). Region of Libertador Bernardo O'Higgins, Codegua, (34°24'07.25"S; 70°53'11.39"W), 29-IV-2010, leg. and det. J. L. Henriquez (SGO 160483). *Calystegia sepium*;

Chile, Metropolitan Region, Alto Jahuel (33°43'15.25"S; 70°40'15"W), 27-IV-2012, leg. and det. J. L. Henriquez (SGO 161332).

*E. convolvuli* var. *convolvuli* and *E. convolvuli* var. *calystegiae* have not been described in Chile before, besides some specimens which are labeled as *E. convolvuli* in the Herbario Fitopatológico of Universidad Austral de Chile from samples taken from San Carlos and Chillan in the Bio-Bio Region, but the presence of chasmothecia in those samples is unknown. Interestingly, the teleomorph of the grape powdery mildew (*Erysiphe necator* Schwein) was described as well for the first time in Chile a few years ago (Silva 2005). These new findings could be indicating a shift in environmental factors that prompted the development of the sexual stage of powdery mildew fungi in the central region of Chile. However, it is not clear how environmental changes could influence chasmothecial development. Only dryness has been observed to influence its development (Braun 1995), dryer weather at the end of the summer could explain this situation. The introduction of a previously missing mating type could also explain this phenomenon, but there is a lack of information on this respect. On the other hand, most plant pathologists work mainly with pathogens on cultivated plants, overlooking pathogens on weeds and wild plants, which can explain why this common powdery mildew has not been reported previously.

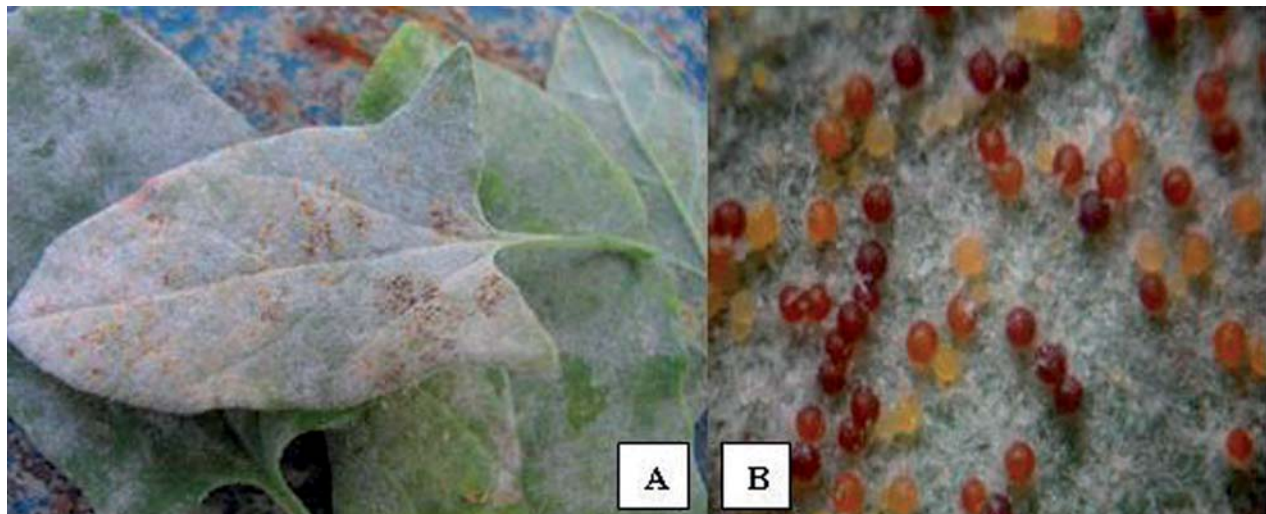


FIGURE 1. A. Mycelia and chasmothecia of *Erysiphe convolvuli* var. *convolvuli* on leaves of *Convolvulus arvensis* L. B. Immature chasmothecia.

FIGURA 1. A. Micelio y casmotecios de *Erysiphe convolvuli* var. *convolvuli* en hoja de *Convolvulus arvensis* L. B. Casmotecios inmaduros.

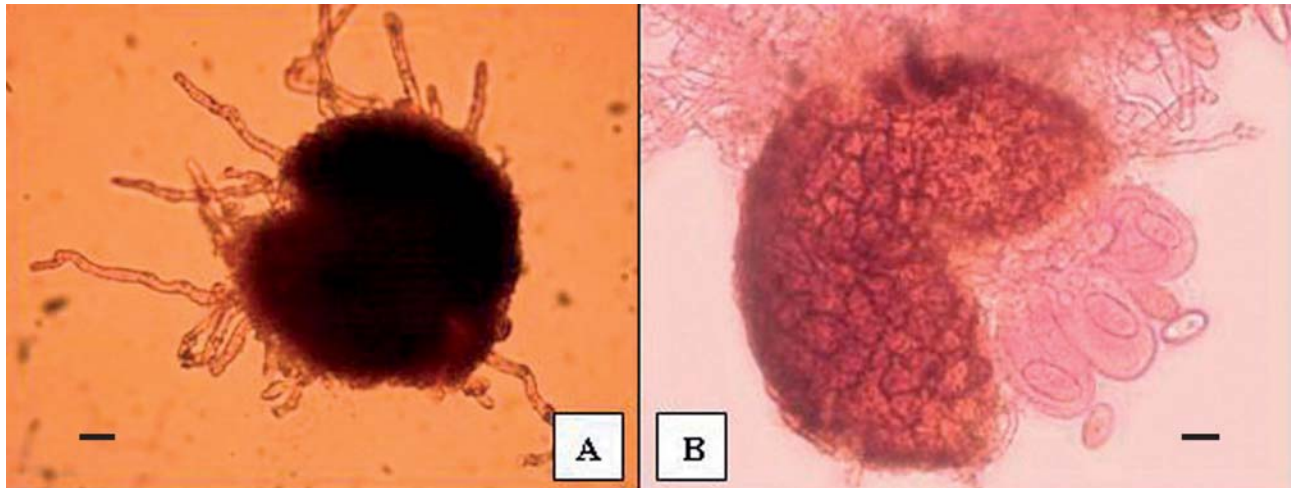


FIGURE 2. Chasmothecium of *Erysiphe convolvuli* var. *convolvuli* showing, A. unbranched appendages (Bar = 20 µm); B. asci with ascospores (Bar = 10 µm).

FIGURA 2. Casmotecio de *Erysiphe convolvuli* var. *convolvuli* mostrando, A. apéndices no ramificados (Barra = 20 µm); B. ascos con ascosporas (Bar = 10 µm).

#### LITERATURE CITED

- BRAUN, U. 1995. The Powdery Mildews of Europe. Gustav Fischer Verlag, Jena. 226 pp.
- GLAWE, D.A., G.E. WINDOM, G.G. GROVE & J.S. FALACY. 2003. First report of powdery mildew of *Convolvulus arvensis* (field bindweed) caused by *Erysiphe convolvuli* var. *convolvuli* in North America. Online. Plant Health Progress doi:10.1094/PHP-2003-1021-01-HN. <http://www.plantmanagementnetwork.org/pub/php/brief/2003/bindweed/> Viewed. May 15<sup>th</sup>, 2010.
- KOGAN, M. 1992. Malezas, ecofisiología y estrategias de control. Facultad de Agronomía, Pontificia Universidad Católica de Chile. 382 pp.
- MATTHEI, O. 1995. Manual de las malezas que crecen en Chile. Alfabet Impresos, Santiago, Chile. 545 pp.
- MUJICA, F. & C. VERGARA. 1980. Flora fungosa chilena. Facultad de Agronomía, Universidad de Chile. 308 pp.
- SERT, H., H. SÜMBÜL & K. STERFLINGER. 2006. Occurrence of powdery mildews on new hosts in Turkey. *Phytoparasitica* 34(5): 474-476.
- SILVA, R. 2005. Identificación de la fase sexual del oídio de la vid (*Uncinula necator* Burr.) en la zona central de Chile. *Aconex (Chile)* 87: 13-17.

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