In 2013 and 2014, white rust disease of chrysanthemum caused by *Puccinia horiana* Henn. was noticed in chrysanthemum crops grown in fields in and around Bengaluru, Karnataka state, India. Conversations with chrysanthemum growers revealed that such occurrences had also been noticed in Udagamandalam district of Tamil Nadu state since 2012, with a renewed occurrence there in 2014. The severity of occurrence of this disease coincides with the post-monsoon season followed by the winter spell (October to December). In Bengaluru the total rainfall during September and October in 2013 was 291.3mm and 85.7mm respectively. The mean minimum and maximum temperatures recorded during November 2013, December 2013 and January 2014 were 27.8/17.8°C, 26.7/15.7°C and 27.7/15.5°C respectively. The disease incidence was 100% in certain germplasm accessions while it ranged from 20-60%. However, in a few germplasm accessions the disease was not noticed under field conditions during the same period. The first symptom was the appearance of yellow spots on the upper surface of the leaves (generally 2-5 mm diameter) with white to yellow rust pustules (telia) on the corresponding places on the lower side of the leaves (Fig. 1). The teliospores were typically two celled (Fig. 2). Telia are mostly erupted on the leaf surface, sometimes sunken, compact, yellowish, white or yellowish white, rarely pinkish, 0.5-4 mm in diameter. Teliospores are typically two celled, oblong, with a pedicel of 20-40 µm in length with dimensions of teliospores ranging from 27-41 x 11-18 µm. Teliospores germinate in water in five hours when incubated at 17°C and 90% RH. Basidiospores are hyaline and elliptical in shape.

Generally brown rust caused by *Puccinia chrysanthemi*, and characterised by uredospores, used to occur to a minor degree in southern India, especially in Coimbatore, Tamil Nadu and Bengaluru, Karnataka. But the new rust exhibited telia and two celled teliospores. The chrysanthemum cultivars in which the white rust was observed were progenies or cultivars of *Chrysanthemum morifolium*. The identification of the species of the rust pathogen was made by amplification of *P. horiana* species specific primers: forward Ph F2 (5’- CCCCCCTTTTTATTATATAACAAACAG – 3’) and reverse Ph R1 (5’- CAAAAATATTGGTAGAGGG -3’) as described by Pedley (2009). The amplified product of 240 bp size (Fig. 3) was sequenced and the sequence has been deposited in GenBank (Accession No. KP267823). The phylogenetic analysis of the sequence data revealed that the Indian isolate is closer to European isolates than other Asian isolates for which sequences have been deposited in GenBank (Fig. 4). A specimen of the disease has been deposited at Herbarium Cyptogamme Indiae Orientalis (HCIO) located at Division of Plant Pathology, New Delhi, India (HCIO 51831).

**Acknowledgements**

The authors acknowledge the infrastructure facilities provided by the Director, ICAR-Indian Institute of Horticultural Research, Bengaluru.

**References**

http://dx.doi.org/10.1111/j.1365-3059.1967.tb00398.x

EFSA Panel on Plant Health (PLH), 2013. Scientific opinion on the risk to plant health posed by *Puccinia horiana* Hennings for the EU territory, with the identification and evaluation of risk reduction options. *EFSA Journal* 11, 3069.  
http://dx.doi.org/10.2903/j.efsa.2013.3069.


http://dx.doi.org/10.1094/PDIS-93-12-1252

http://dx.doi.org/10.1071/APP9950065


©2015 The Authors

This report was published on-line at www.ndrs.org.uk where high quality versions of the figures can be found.