

## Lemongrass rust - an unusual find in west Wales

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Lemongrass (*Cymbopogon citratus*) is one of over 50 species belonging to the genus *Cymbopogon* in the family *Poaceae*. It is a perennial grass native to India and Sri Lanka that has been intentionally introduced into the tropical and sub-tropical parts of the world. The name Lemongrass is derived from the lemon-like odour of the essential oils present in the shoots. Commercially, Lemongrass oil is known as Cochin because at one time more than 90% of the oil was shipped from the Port of Cochin in Kerala State, India. Kerala had the monopoly in the production and export of Cochin oil where the annual production was around 1000t produced from an area of ca.16,000 ha. The oil is mainly used in the cosmetics, pharmaceutical and perfumery industry but is also used in culinary flavourings, beverages, meat & fish products and is also used to flavour wines and sauces. However, it is recently becoming increasingly used in Asian cooking, mostly in the USA but now is increasing used across the globe (Joy *et al* 2006)

*Cymbopogon citratus* is known as American Lemongrass and is becoming more popular in the UK for its culinary use in Thai cooking. Live plants are commercially grown in Africa and Asia and the leading exporter is Guatemala (CABI 2020). Plants can now be bought in the UK from Garden Centres, DIY stores and from specialist nurseries advertising on the Internet.

In July 2019 RNS received an email from KM informing him of Lemongrass plants being sold in the garden section of a store in Llanelli which looked as if they were infected by a fungal pathogen, possibly a rust fungus.



Fig. 1

RNS visited the following day and purchased all of the plants which were brought home in sealed plastic bags for further inspection. All plants exhibited dark longitudinal striations up to 10 cm in length on both sides of the leaves (Fig. 1). When viewed under a low-power microscope these linear striations were composed of contiguous areas of the leaf surface where the epidermis had split from which masses of brown-black spherical spore-like objects were emerging (Fig. 2).



Fig. 2

MC was able to take transverse sections of the leaves using his home-made microtome and from the photograph (Fig. 3) it can be seen that the infection zone is localised (white tissue on lower surface of the leaf) with the spores being produced from this layer. These spores, when viewed under a high-power microscope were globoid to oval (Fig. 4) measuring 23-29µm x 19-24µm with a thick cell wall (3-5µm) and within the wall 3-4 pale areas called pores can be seen. Microscopic examination of the spores indicated that the organism infecting the host was in fact a rust fungus.

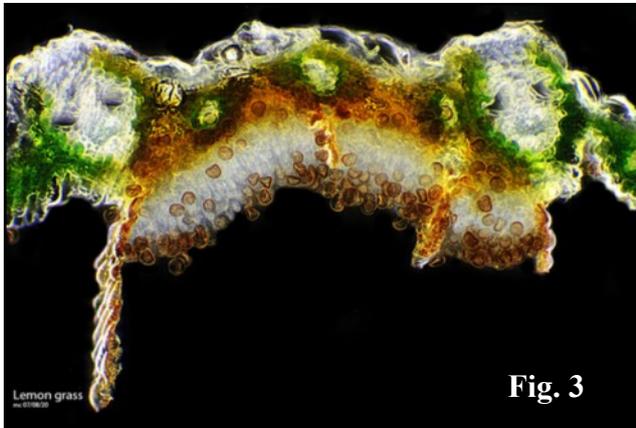


Fig. 3

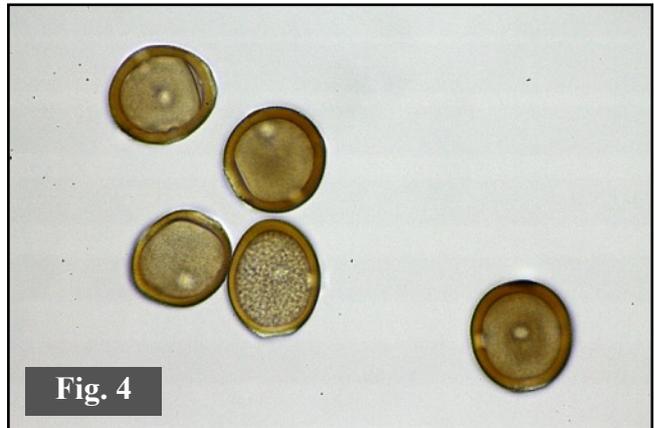
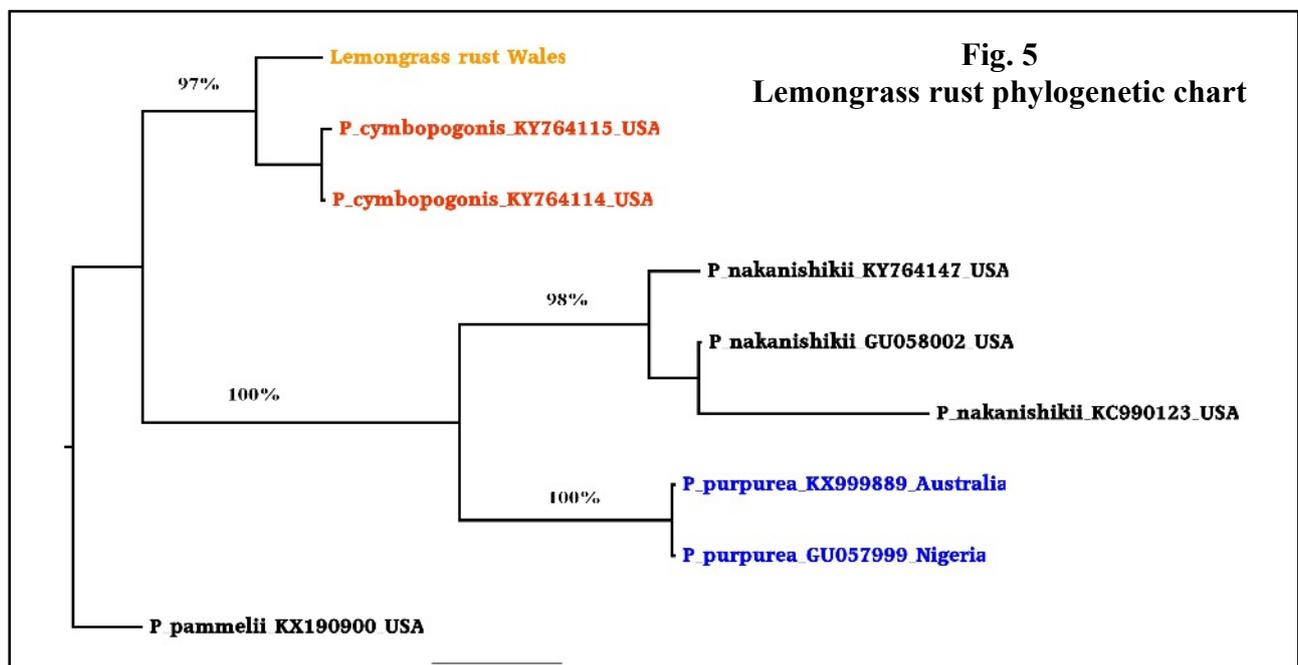


Fig. 4

Lemongrass is susceptible to many fungal diseases including leaf blotch fungi (*Curvularia* and *Helminthosporium* species) and several species of rusts. The most commonly occurring rust on Lemongrass in other parts of the world is *Puccinia nakanishika* Dietel. This is now spreading into areas wherever the host plant is grown. Our specimen did not match the description of *P. nakanishika* using microscopy. There are a possible seven species of rust that can infect Lemongrass (Cummins 1971) and our specimen closely resembled *Puccinia cymbopogonis* Mass.

To confirm our tentative identification DJH took a small sample of the spores and extracted DNA using the CTAB method (Doyle, 1987). The internal transcribed spacer (ITS) barcode region was amplified by a polymerase chain reaction (PCR) using a Bentolab thermal cycler. The resulting DNA amplicon was sequenced at the Aberystwyth University (IBERS) Sanger sequencing laboratory.

A phylogenetic chart (Figure 5) was constructed using our sequence together with publicly available sequences for Lemongrass rusts held on the Genbank database ([www.ncbi.nlm.nih.gov/nucleotide](http://www.ncbi.nlm.nih.gov/nucleotide)).



The resulting tree showed our example nesting with two other sequences for *P. cymbopogonis*. (The bootstrap % values provide a measure of confidence in the result of the analysis with values >70 usually regarded as acceptable).

DNA analysis supported the microscopic determination and confirmed that the rust was *P. cymbopogonis*. This is the first record of this rust in Wales. Coincidentally, in May 2019 there had been a report of this rust on Lemongrass from England (KM pers. comm). The only other record is a specimen of this rust held in the Kew Fungarium which was collected from Entebbe, Uganda and identified and described by Masee in 1911.

Author's Note: All plants were disposed of following examination. The rust is confined to *C. citratus* and will not pose a threat to our native species. The host is not grown commercially in Wales.

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