

# Record of Sugarcane Orange Rust in the Lowland Tropics of Santa Cruz, Bolivia

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## Abstract

Sugarcane is an important crop in the eastern region of Bolivia. Rusts are one of the main diseases that affect this crop. At Latin American level reports are known about the emergence of the new rust known as orange rust. In July 2017, samplings of leaves with apparent symptoms of orange rust were carried out in production fields in the Saavedra and Mineros municipalities of the Santa Cruz department. After analysing in the laboratory, it was recorded that uredinias, urediospores, telias and teliospores correspond to *Puccinia kuehnii* E. J. Butler causal agent of sugarcane orange rust. This is the first record of the orange rust in Bolivia.

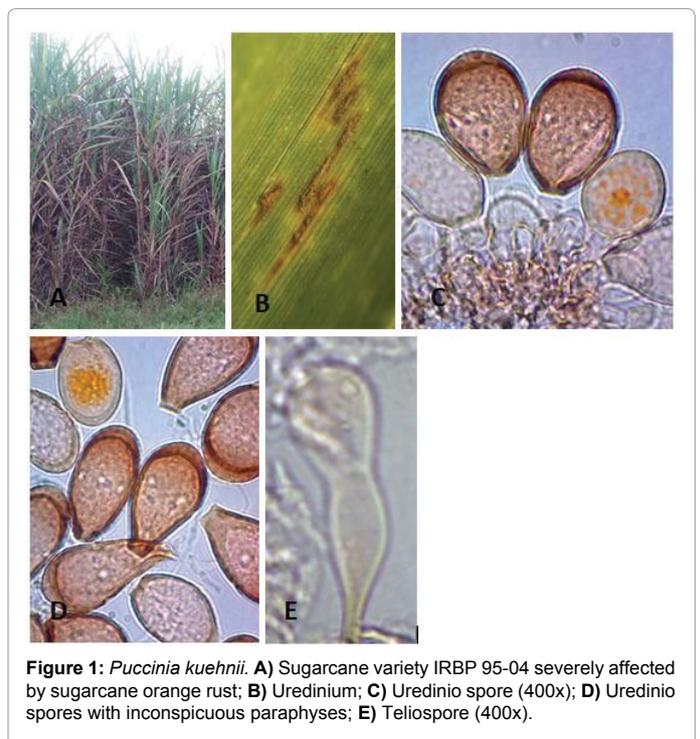
**Keywords:** Rusts; Biotrophic pathogen; Control and management

## Introduction

In Bolivia, sugarcane (*Saccharum officinarum* L.) is mainly cultivated in the north of the Santa Cruz Department, where some 140,000 ha are given over to this crop [1]. Although sugarcane is also grown in other departments (La Paz and Tarija), but, they are less important. Bolivian sugarcane was first reported affected by brown rust (caused by *Puccinia melanocephala* Syd) in 1990, with the varieties CIMCA 77-318 and SP (Sao Paulo, Brazil) showing signs of attack in the locality of “El Meson”, 50 km north of Saavedra (Province of Obispo Santistevan) in the Santa Cruz Department [2]. It was later reported that other varieties, including IRBP 95-01, had become affected [1]. In July 2017, leaf samples were collected with typical symptoms of brown rust, and with apparent accompanying symptoms of orange rust, from sugarcane IRBP 95-04 plantations in the Mineros municipality. Similarly affected leaves of other varieties were also collected in Saavedra (Figure 1A). All samples were observed under a stereo microscope. In the IRBP 95-04 samples, disease was severe (Figure 1A). The rusts were differentiated by the form and type of the pustules they produced: the brown rust pustules elongated and brown and the potential orange rust pustules small and slightly elongated (Figure 1B). Light microscopy revealed the orange rust uredinia to be mainly hypophyllous, variable in size, linear to fusiform, yellow-orange, and erumpent (Figure 1B); no paraphyses were clearly observable (Figure 1C). The urediniospores were mostly obovoid to pyriform and echinulate, and of very variable size (length 38.1  $\mu$ m, width 21.9  $\mu$ m); the walls were orange to brown, uniformly thick, and with pronounced apical thickenings (Figure 1D). The telia were hypophyllous, erumpent, arising from the uredinia. The teliospores were smooth, with a hyaline pedicel (10.5  $\mu$ m), clavate, two-celled, and with a slight constriction at the septum (Figure 1E). These uredinia, urediniospore and teliospores were thus morphologically similar to those described for *Puccinia kuehnii* E. J. Butler, the causal agent of sugarcane orange rust [3]. This fungus has been reported from two of Bolivia’s neighbours, i.e., Brazil in 2009 [4] and Argentina in 2016 [5].

## Discussion and Conclusion

This disease was considered secondary in Australia until the end of the 1990s, when an epidemic affected the sugarcane variety Q124 which was then grown over large areas. The episode caused important economic losses for the sugar/ethanol industries of that country [6]. The possible economic impact of orange rust on sugarcane production in Bolivia remains unknown. This is the first record of *P. kuehnii* on sugarcane in Bolivia.



**Figure 1:** *Puccinia kuehnii*. A) Sugarcane variety IRBP 95-04 severely affected by sugarcane orange rust; B) Uredinium; C) Uredinio spore (400x); D) Uredinio spores with inconspicuous paraphyses; E) Teliospore (400x).

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## References

1. Teran PF (2016) Ecological focus on the productive potential of sugarcane. Ministries of Rural Development and Lands. National Directorate of Technical Assistance, National Institute of Agricultural and Forestry Research. Santa Cruz, Bolivia.
2. Moreno PA (1991) Diseases campaign: In commonities, triennium 1987-88, 88-89 and 89-90. CIMCA, Research and Improvement Center of Sugar Cane, Santa Cruz Aguilera Arredondo. General Saavedra, Santa Cruz, Bolivia pp: 36-39.
3. Virtudazo EV, Hidenobu N, Makoto K (2001) Taxonomy of *Puccinia* species causing rust diseases on sugarcane. Mycoscience 42: 167-175.
4. Barbasso D, Jordao H, Maccheroni W, Bressiani JB, Sanguino A, et al. (2010) First report of *Puccinia kuehnii*, causal agent of orange rust of sugarcane, in Brazil. Plant Dis 94: 1170.
5. Funes C, Gómez PSG, Henriquez DD, Pauli VD, Bertani RP, et al. (2016) First report of orange rust of sugarcane caused by *Puccinia kuehnii* in Argentina. Plant Dis 100: 861.
6. Magarey RC, Willcox T, Croft B, Cordingley A (2001) Orange rust, a major pathogen affecting crops of Q124 in Queensland in 2000. Proceedings of the Aus Society of Sugar Cane Techno 23: 274-280.