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ORIGINAL ARTICLE

First report of *Cuscuta* sp. in *Eucalyptus* clonal propagation

Edival Ângelo Valverde Zauza[1], Heitor Scaramussa Dallapiccola[1], Reginaldo Gonçalves Mafia[1], Kevin Brow Hall[1], Clayton Alcarde Alvares[1], Lúcio Mauro da Silva Guimarães[1], Edgard Augusto de Toledo Picoli[2], Luiz Antônio Rocha[1], Luis Carlos Moraes de Abreu[1]

[1]Suzano S.A. Rua Dr. José Lembo, 1010. Bairro Bela Vista; CEP: 18207-780, Itapetininga, SP, Brasil [2]Departamento de Biologia Vegetal, Universidade Federal de Viçosa (UFV); Campus Universitário; CEP: 36.570-900, Viçosa, MG - Brasil
Autor para correspondência: Edival Ângelo Valverde Zauza (edivalzauza@suzano.com.br).
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The genus *Cuscuta* L. consists of parasitic plants, also referred to as holoparasitic plants; the Family Convolvulacae includes 219 species distributed around the world, except in Antarctica and Greenland (7). In Brazil, 26 species are known to occur in all biomes and types of vegetation (4). *Cuscuta* species have been reported to exert a negative effect on the vegetative and reproductive development of *Zornia diphylla*, a native Caatinga plant (2), and to cause economic losses to crops of tomato, pepper, potato, carrot, onion, beet, tobacco, coffee,

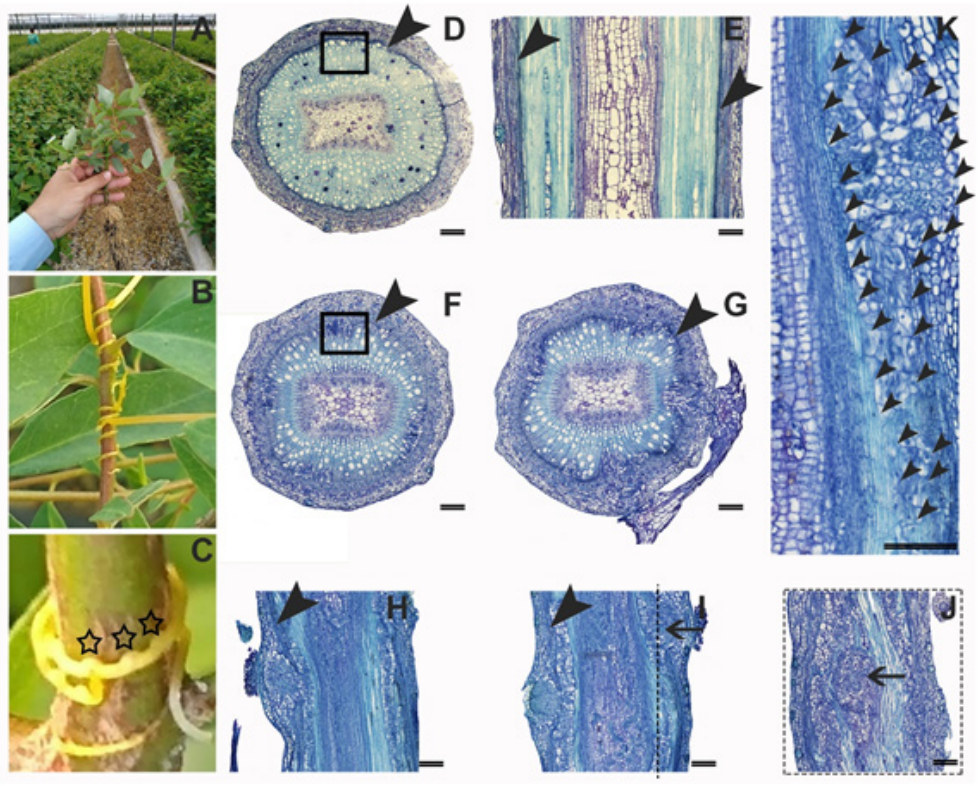

Figure 1. Interaction of *Cuscuta* sp. with *Eucalyptus* mini-stumps in the clonal mini-garden. **A** - *Eucalypt* mini-stumps in a clonal mini-garden planted in raised beds with sand substrate; **B** - Detail of the external morphology of the interaction between *Cuscuta* sp. and the mini-stumps; **C** - Detail of the contact point in the haustoria region of the parasitic plant (stars); **D** - Cross section of a healthy mini-stump; **E** - Longitudinal section of a healthy mini-stump; **F** - Cross section of a parasitized mini-stump between regions of haustoria penetration; **G** - Cross section of a parasitized mini-stump in the haustoria penetration region; **H**, **I** and **J** - Different longitudinal sections of parasitized mini-stumps showing the primordium of endophyte (arrows illustrate the orientation of the same structures in different cutting planes); **K** - Longitudinal section of a parasitized mini-stump indicating the distribution of the parasitic plant tissues in the cortical and phloemic region of the host plant (heads of smaller arrows). Heads of larger arrows indicate cambial region; rectangles show the same region in healthy (D) and parasitized (F) plants. Scale reference bars in subfigures D – K are equivalent to 200 µm.

citrus, and crown of thorns (6). During routine sanitary inspections in 2018, a parasitic plant was found on a eucalypt clone (*Eucalyptus urophylla* var. *platyphylla*) in a clonal seedling nursery in Monsenhor Gil, Piauí State, Brazil, where average annual temperature is 26.6 ºC, annual rainfall is 1400 mm, and Köppen climate type is Aw (1). The parasitic plant was identified as *Cuscuta* sp., based on morphological characteristics. In 2019, eucalypt mini-stumps parasitized with *Cuscuta* sp. were observed in another clonal nursery located in Dom Eliseu, Pará State, Brazil, where average annual temperature is 27.1 ºC, annual rainfall is 1900 mm, and climate type is Am (1). Based on the history of the mini-garden in Dom Eliseu, it had been recently formed with clonal eucalypt seedlings originated from the nursery in Monsenhor Gil. Therefore, it is plausible that there has been an unintentional dissemination of *Cuscuta* sp. between the nurseries (Figure 1 A-C). Preliminary histological analysis of healthy stems and mini-stumps attacked by *Cuscuta* sp. (Figure 1 D-K) allowed a qualitative approach of this interaction. There is a reduction in xylem tissue attributed to colonization by *Cuscuta* sp. endophyte. Additionally, the cambium activity is so much hampered that as soon as the endophyte reaches and colonizes the cambium region, no more vascular cells are produced in the infected stem section (Figure 1 J-K). This preliminary approach leads to the hypothesis that attacked eucalypt mini-stumps will show reduced number and diameter of vessel elements, which may imply decreased productivity in cutting production since the sap movement will be impaired. Furthermore, commercialization or exchange of clonal eucalypt seedlings from contaminated nurseries represents a high risk of spreading the parasitic plant, which was also commented by Ferreira (3) for infected ornamental seedlings. Another potential risk is the spread of diseases, since *Cuscuta* sp. is an important vector, especially of phytoplasms and viruses (3, 5). A single citation of the presence of *Cuscuta* sp. in seminal *E. grandis* seedlings was found for the region of Santa Maria in Rio Grande do Sul State (8). Thus, the present study is the first report of *Cuscuta* sp. in a clonal nursery of eucalypt seedlings in Brazil. Confirmation of this new invasive plant in nurseries implies the need for further studies specifically related to control strategies.

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