

Author: [ADVANCED](#)

Volume Page

Keyword: [TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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[\[PDF \(680K\)\]](#) [\[References\]](#)

Identification of Casparian Bands in the Mesocotyl and Lower Internodes of Rice (*Oryza sativa* L.) Seedlings Using Fluorescence Microscopy

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Abstract: The mesocotyl and lower internodes of seedlings are underground organs that play a possible role in water absorption and transport. The aim of this study is to reexamine and understand further the anatomy and morphology of mesocotyls and lower internodes in rice, especially in terms of the existence of Casparian bands. Anatomical structures of mesocotyl and lower internodes tissue of rice seedlings were observed by light and fluorescence microscopy. The rice mesocotyl had two central cylinders, one is large and the other small, in the cross section. Casparian bands were observed in both the endodermis and exodermis of the mesocotyl, and also in the endodermis of the first internode. Furthermore, some bundles with intermediate xylem differentiation were observed between the exarch and endarch arrangement in the first internodes. Casparian bands were identified in the radial walls of cells surrounding each of these bundles. The second internode is quite similar to that of upper internodes in adult plants with respect to internal structure; scattered vascular bundles were seen as in monocotyledons. In the second internode, Casparian bands were seen in the radial cell walls of the bundle sheaths in each vascular bundle. Unlike the mesocotyl, Casparian bands were not observed in the hypodermis of the first or second internodes. The results show that the histological features of the mesocotyl and lower internodes of rice seedlings widely differed. In addition, the present study provides anatomical evidence for the existence of Casparian bands in both the mesocotyl and lower internodes of rice seedlings.

Keywords: [Casparian bands](#), [Endodermis](#), [Exodermis](#), [Internode](#), [Mesocotyl](#), [Rice \(*Oryza sativa* L.\)](#), [Seedling](#), [Vascular bundle](#)

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