BARK THICKNESS, DENSITY, AND MOISTURE CONTENT INDICATE FIRE RESISTANCE IN CERRADO PLANTS

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Bark comprises all tissues outside the vascular cambium, including periderm, secondary phloem, and in some cases primary tissues (cortex and primary phloem), and tissues isolated by periderm. In Cerrado species, bark has a protective function providing thermal insulation from natural fire, among other functions. Increased fire resistance in fire-prone forests species seems to be associated with increasing periderm thickness, decreasing bark density and decreasing bark moisture content, a hypothesis we test here for Cerrado species. We sampled aerial and underground barks of three individuals from each of 15 species from cerrado sensu stricto. We calculated relative thickness (ratio of absolute bark thickness to stem radius) of bark (periderm + secondary phloem), periderm and secondary phloem; and both basic density (ratio of oven-dry weight to green volume) and moisture content (percentage of ratio of weight of water lost to green weight) of bark, and of aerial periderm and secondary phloem. Underground periderm was too thin to be separated from secondary phloem. Using a paired Student's t-test at 5% level of significance, we compared aerial and underground thickness (bark, periderm and secondary phloem), density (bark and secondary phloem) and moisture content (bark and secondary phloem). For density and moisture content, we considered the thin underground periderm insignificant and compared total underground bark made up of mostly secondary phloem with the aerial secondary phloem. Althought bark thickness was similar in both aerial and underground barks (p=0.07), aerial bark had a thicker periderm (p<0.01), and underground bark had a thicker secondary phloem (p<0.01). Aerial bark had lower density (p<0.01) and lower moisture content (p<0.01) than underground bark. However, aerial and underground secondary phloem had similar density (p=0.294) and moisture content (p=0.288). Thicker periderm, lower bark density and lower bark moisture content might be associated with higher fire resistance in aerial bark. Moreover, similar density and moisture content in aerial and underground secondary phloem indicate that the decrease in these values observed in total bark in aerial stem is the result of the periderm traits, the plant protector tissue. These similarities also indicate that aerial and underground secondary phloem are similar in structure and chemical composition. Structural and chemical bark studies are necessary to confirm these assertions. (CAPES, FAPESP)

Keywords: fire resistance, aerial bark, underground bark