

Hypericum irazuense Kuntze ex N. Robson in the
Buenavista and Chirripó páramos of Costa Rica:
Photographs of Stem Cross Sections,
Plants, and Study Sites

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Hypericum irazuense Kuntze ex N. Robson (Robson, 1987) is a common shrub in the high-elevation páramos that occur above treeline on the high peaks of the Cordillera de Talamanca in Costa Rica and westernmost Panama (Figure 1). In this report and accompanying high-resolution images we make available photographs of stem cross sections, plants, and habitats of *H. irazuense* in support of a recent study of the dendrochronological potential of the species (Kerr et al., forthcoming) and other research on this plant and the páramo vegetation in which it occurs. We also include images from the Google EarthTM map server and portions of topographic maps showing locations of study sites.

The *Hypericum irazuense* stems shown in Figures 5–7 of this report and the accompanying high-resolution images were collected by Sally Horn in 1984–85 during her dissertation research on postfire vegetation dynamics in the Costa Rican páramos (Horn, 1989, 1991) supported by the U.S. Fulbright Commission. Her plan was to use counts of growth rings in living and dead stems to estimate the time since the last fire and between the last and penultimate fire at study sites with unknown fire histories, following Williamson et al. (1986). However, she had difficulty discerning the rings on unprepared samples and the collection was archived until 2014, when Matthew Kerr prepared them for laboratory analysis. Details on methods and results are in Kerr et al. (forthcoming). The figures in this report and the appended high-resolution scans supplement figures in that publication. These high-resolution images were prepared by Kerr in the Laboratory of Tree-Ring Science at the University of Tennessee, directed by Henri Grissino-Mayer.

Most of the photographs of *Hypericum irazuense* plants and study sites that follow were taken by Sally Horn on field visits between 1982 and 2014 that were supported by the National Science Foundation, The A.W. Mellon Foundation, The National Geographic Society, the University of Tennessee, the University of California, Berkeley, the U.S. Fulbright Commission, and the University of Costa Rica. She thanks Roger Horn, Ken Orvis, Maureen Sánchez, and past and current University of Tennessee students for their assistance and camaraderie in the field.

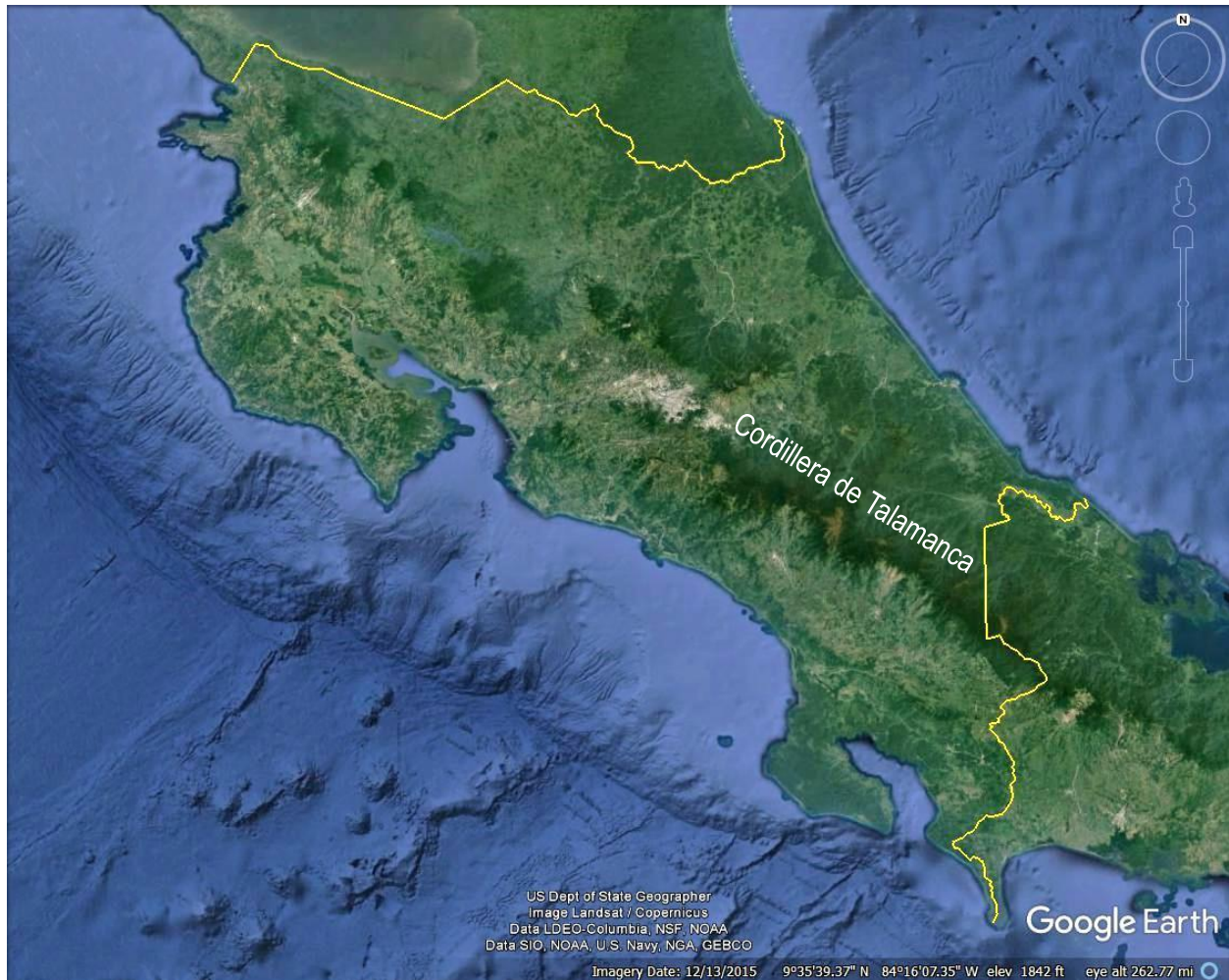


Figure 1. Image from Google Earth™ mapping service showing the location of the Cordillera de Talamanca in southern Costa Rica. The range extends into westernmost Panama.



Figure 2. Image from Google EarthTM mapping service showing the Buenavista massif, Cerro Cuericí, and the Chirripó massif in the Cordillera de Talamanca. All three areas support páramo vegetation in which *Hypericum irazuense* occurs. The Inter-American highway crosses the Buenavista massif, also known as the Cerro de la Muerte. This image covers roughly the same area as Figure 2 in Kerr et al. (forthcoming).

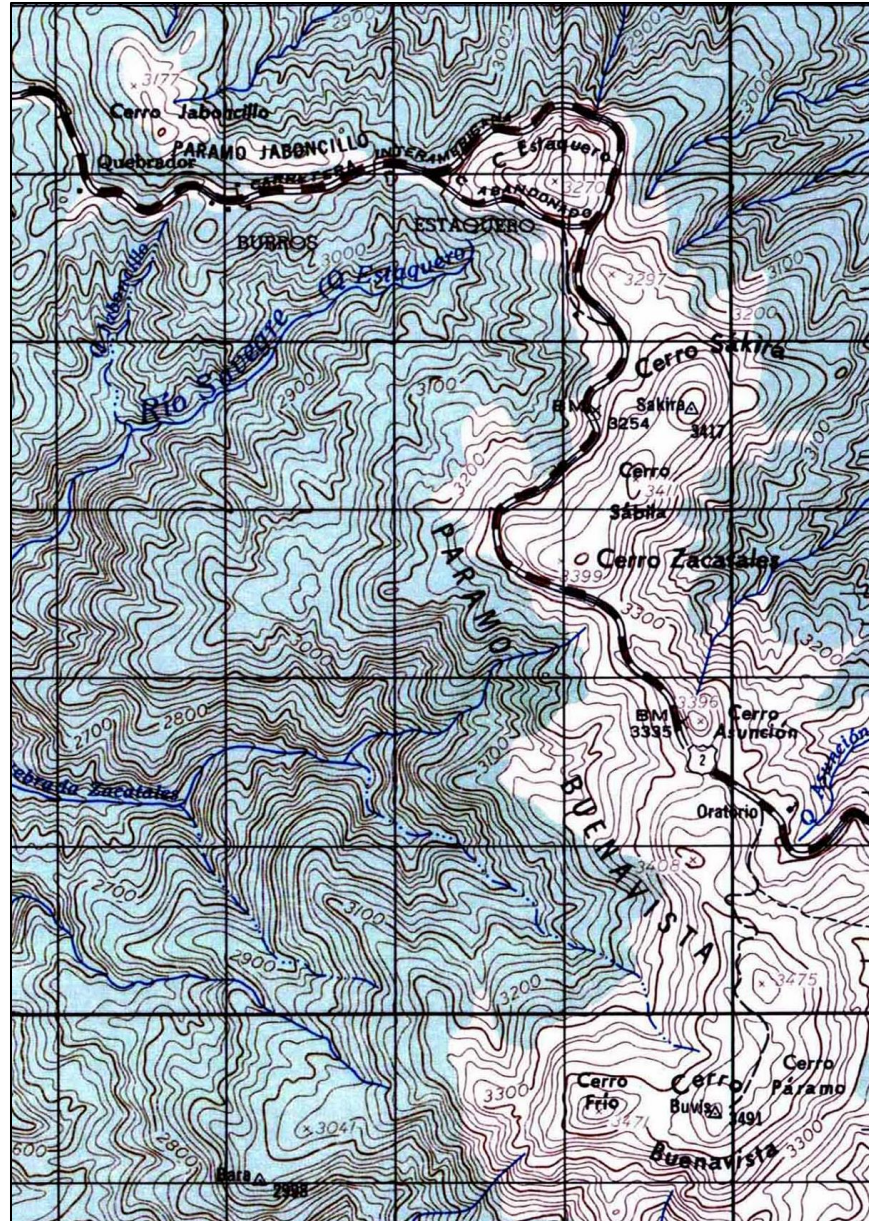


Figure 3. A portion of the 1:50,000-scale Vueltas topographic quadrangle published by the Instituto Geográfico Nacional, showing the Buenavista páramo. Squares are 1 km on a side and elevations are in meters. Janzen (1973) examined the regeneration of *Hypericum irazuense* and other shrubs following a 1969 fire on the south slope of Cerro Asunción. Williamson et al. (1986) and Horn (1989) examined *H. irazuense* and associated shrubs and bamboo on the south slope of Cerro Zacatales following a fire in 1973. Horn (1989) also studied postfire regeneration following a fire on the southeastern slope of Cerro Sábila, to the northeast. Horn (1997) examined *H. irazuense* plants following a 1992 fire that reburned the south slopes of Cerro Zacatales and Cerro Asunción. Kerr et al. (forthcoming) examined resprouting and fire-killed *H. irazuense* stems collected by Horn in 1984–85 on both of these peaks, and from a site across the Inter-American highway from Cerro Asunción, on the saddle between this peak and Cerro Siruska, the unnamed peak with a marked elevation of 3408 m (peak name from Weber, 1959).

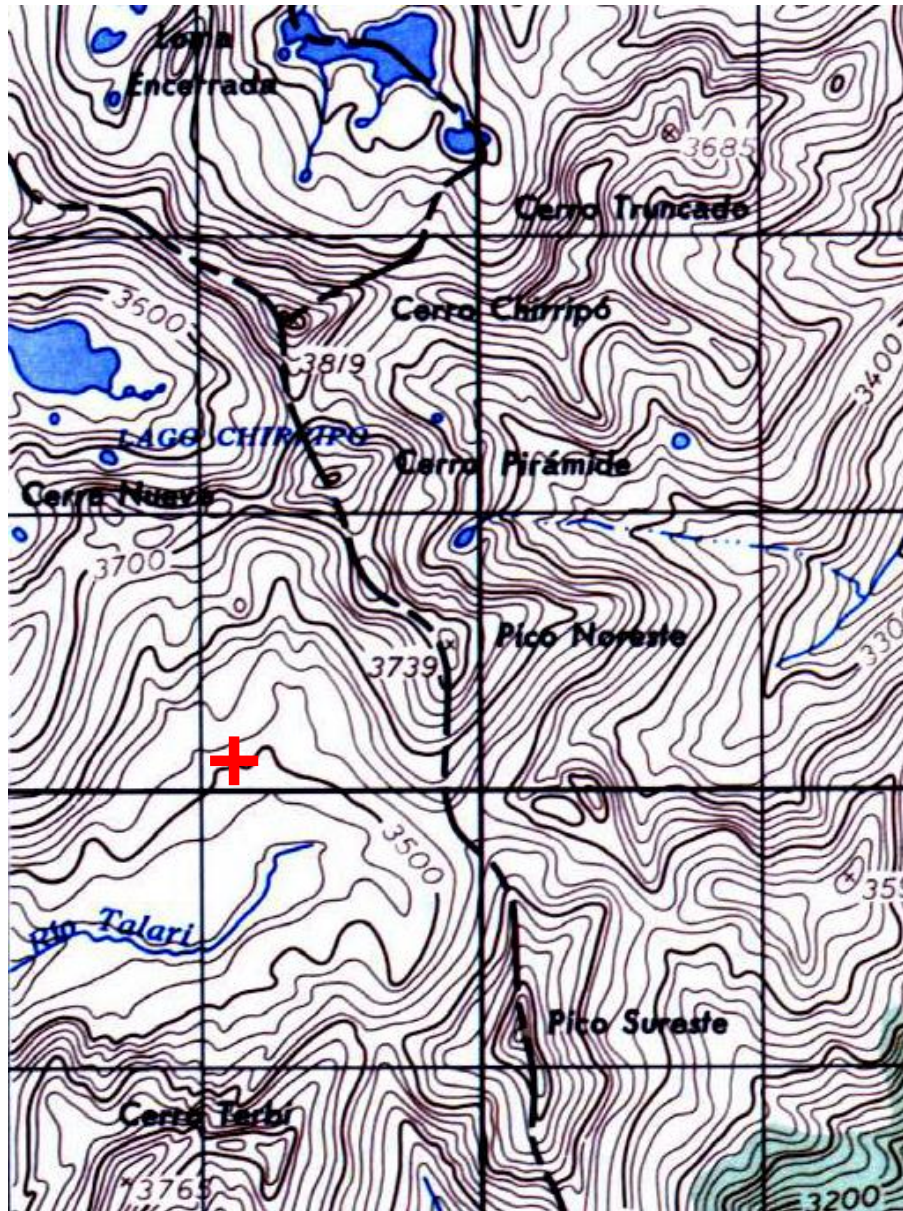


Figure 4. A portion of the 1:50,000-scale Dúrika topographic quadrangle published by the Instituto Geográfico Nacional showing the upper Río Talari valley in the Chirripó páramo, also known as the Valle de los Conejos. Squares are 1 km on a side and elevations are in meters. Horn (1989) examined the recovery of *Hypericum irazuense* and associated shrubs and bamboo following a 1976 fire that burned most of the Chirripó páramo and some surrounding montane forest (Chaverri et al., 1976); the red cross indicates the approximate location of her study site. Kerr et al. (forthcoming) examined *H. irazuense* stems collected at the Conejos site 9 years after the 1976 fire.



Figure 5. Cross sections of *Hypericum irazuense* stems collected from the Buenavista páramo in Costa Rica in March 1985. Asunción *Hypericum* #2 (a) and #3 (b) were both collected on the south slope of Cerro Asunción, within an area that had burned in 1969 (Janzen, 1973). Asunción *Hypericum* #4 (c) was collected across the Inter-American highway from the burn area, on the lower slope of Cerro Siruska (Weber, 1959), on the saddle between Cerro Asunción and Cerro Siruska that the highway crosses. Horn collected only one sample at this site, and we grouped it with samples from the nearby Asunción samples for the Kerr et al. (forthcoming) study.

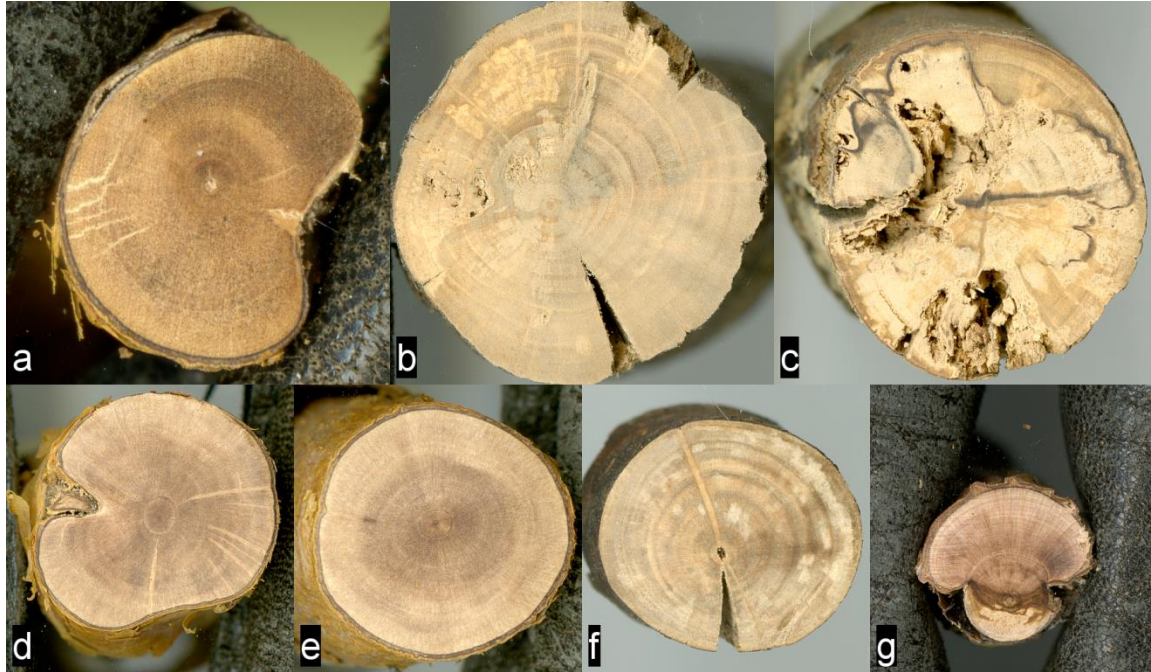


Figure 6. Cross sections of *H. irazuense* samples collected from the south face of Cerro Zacatales in the Buenavista páramo of Costa Rica in December 1984 (a–f) and April 1985 (g). All samples were collected within the area that burned in 1973 (Williamson et al., 1986). Zacatales *Hypericum* #1 35 cm (a) and dead stem (b); Zacatales *Hypericum* #2 (c); Zacatales *Hypericum* #3 0 cm (d), 5 cm (e), and dead stem (f); Zacatales *Hypericum* #4 (g).



Figure 7. Cross sections of *H. irazuense* samples collected from the upper Río Talari Valley (Valle de los Conejos) in Chirripó National Park in February 1985. This valley and much of the adjacent páramo burned during a 5000 ha fire in March 1976 (Chaverri et al., 1976). The samples were collected within and adjacent to the Conejos study site in which Horn (1989) investigated vegetation recovery after the 1976 fire. Conejos *Hypericum* #1 (a), Conejos *Hypericum* #2 (b), and Conejos *Hypericum* #3 (c).



Figure 8. *Hypericum irazuense* shrub ca. 2 m tall on the south slope of Cerro Páramo in the Buenavista páramo, near the access road to the transmission towers on Cerro Páramo and Cerro Buenavista. (Cerro Páramo is the peak with a labelled summit elevation of 3475 m in Figure 3 of this document). Photograph taken 23 March 2014.



Figure 7. Flowers on *H. irazuense*. Same location as Figure 6, also taken 23 March 2014.



Figure 8. Distinctive orange stems of *H. irazuense*, here supporting growth of lichens and bryophytes. Same location as Figure 6, also taken 23 March 2014.



Figure 9. The south slope of Cerro Asunción following the March 1992 fire. Photograph taken in June 1992.



Figure 10. Approximately the same view, taken 4 March 2004.



Figure 11. The south slope of Cerro Zacatales following the March 1992 fire, with the Inter-American highway in the foreground. Photograph taken in June 1992.



Figure 12. Looking toward the south face of Cerro Zacatales (indicated by arrow) from the summit of Cerro Asunción. Photograph taken 3 March 2004, 12 years after the 1992 fire.



Figure 13. Páramo vegetation on the south slope of Cerro Zacatales, 12 years after the 1992 fire. *Hypericum irazuense* is the dominant shrub in the middle and foreground; lighter clumps are the bamboo *Chusquea subtessellata*. Photograph taken 3 March 2004.



Figure 14. Regenerating páramo shrubs and bamboo on the south slope of Cerro Asunción in March 1994, 2 years after the 1992 fire. In the foreground are resprouting individuals of *Vaccinium consanguineum* and *Chusquea subtessellata*. Red arrow points to a shrub of *Hypericum irazuense* that did not resprout.



Figure 15. *Hypericum irazuense* and other páramo plants on the south slope of Cerro Asunción in March 2004, 12 years after the last fire. Large burned snag to left of the center of the image dates from an earlier fire, perhaps the 1969 fire at the site. Photograph taken 3 March 2004.



Figure 16. Horn measuring shrubs in a belt transect on the south slope of Cerro Sábila in March 1985. The large shrub she is measuring is *Escallonia poasana*. Small *H. irazuense* shrubs are in the foreground of the photo. The stems on the rocks in the foreground are shrub stems burned in the last fire at the site, which had occurred at least twelve years earlier (i.e., 1973 or earlier), based on growth rings in stems of *Vaccinium consanguineum* (Horn, 1989). Photograph by Roger Horn.



Figure 18. Photograph of the upper Río Talari valley, or Valle de los Conejos, in June 2008, 32 years after the 1976 fire. The vegetation is dominated by the bamboo *Chusquea subtessellata*. The arrow indicates position of the Conejos study site (Horn, 1989) from which Kerr et al. (forthcoming) examined *Hypericum irazuense* stems. Photograph taken 30 June 2008 by Brian Watson.

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