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Condensed tannins and nutritional quality of Bornean orangutan (*Pongo pygmaeus wurmbii*) foods in Gunung Palung National Park, West Kalimantan, Indonesia

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Orangutan habitats are characterized by fluctuations in the availability of ripe fruits. During non-fruiting periods orangutans typically incorporate more lower-quality foods such as pith and bark in their diet. Condensed tannins (CT) are secondary plant compounds that bind to proteins, thus impeding the digestibility of proteins, and tending to make foods bitter or unpalatable. We analyzed condensed tannin content in 129 plant samples collected from Gunung Palung National Park in Borneo, Indonesia between 1994 and 2001. We predicted that CT concentrations would be highest in bark, and that there would be a correlation between protein and condensed tannin content. We used ANOVA with Bonferroni's method for post-hoc comparisons to test for differences in tannin content between plant parts, and Pearson's correlation to test for relationships between tannin concentrations and other nutrients. There were significant differences in condensed tannin content ($F(4)=2.70$, $p=0.03$) but no differences after adjusting the alpha-level for post-hoc comparisons. Whole fruit (including the skin) tended to have the highest CT concentration. However, we found no correlation between CT and concentration of nutrients including crude protein ($R=0.12$, $p=0.19$, $N=127$), free simple sugars ($R=-0.09$, $p=0.40$, $N=100$), or fiber ($R=-0.38$, $p=0.67$, $N=128$). This underscores that plants rich in desirable nutrients may also be rich in antifeedants, posing challenges for orangutan consumption and digestion even as they provide a source of high-quality energy. Additionally, for some food categories where high tannin content is predicted, such as bark, orangutans may be choosing to eat species that are lower in these compounds.

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