

SEASONAL VARIATION OF NATURAL PRODUCTS AND PHOTOSYNTHESIS OF THE LICHEN *Usnea undulata* STRIT IN LOWER MONTANE FOREST AT KHAO YAI NATIONAL PARK

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Abstract: The lichen *Usnea undulata* Strit produces usnic acid, stictic acid, constictic acid and norstictic acid for protection against adverse environment. The objectives of this study were to study the seasonal effect on photosynthesis and synthesis of secondary metabolic products of this lichen. The lichen from lower mountain forest at Khao Yai National Park was used in this study. The results showed that net photosynthetic rate and quantities of secondary products of this lichen varied among seasons. Net photosynthesis rate was highest in summer and subsequently lowered in cool and rainy seasons which accounted for 10.15, 8.12 and 7.78 $\mu\text{mol CO}_2 \text{ g}^{-1} \text{ air dwt}$, respectively. The highest amount of stictic acid, constictic acid and usnic acid were produced in rainy season, whereas norstictic acid had the maximum amount in summer. The results enhanced our understanding of the seasonal effect on production of natural products of the lichen, which can then be applied for determining an appropriate time for harvesting lichen with the highest yield. Nevertheless, this is relevant to lower montane forest; other ecosystems with different climatic factors may not produce same results. In addition, the effects of natural herbivory on lichen secondary metabolic products are not known, further studies are essential.

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