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SEASONAL VARIATIONS IN PHYSIOLOGICAL PROCESSES AND LICHEN SUBSTANCES IN *RELICINA ABSTRUSA* IN THE TROPICAL FORESTS OF THAILAND

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Lichens produce secondary metabolic products for protection against adverse environmental conditions. As such, there are a variety of potential uses of lichen products. Accordingly, the objectives of this study were to investigate seasonal variations in the physiological processes and the quantities of secondary metabolites produced in tropical lichens. The current investigation was conducted using the lichen *Relicina abstrusa* whose habitation is in the canopy of the tropical rain forest (TRF) and in the dry evergreen forest (DEF) at Khao Yai National Park, Thailand as a model. Photosynthesis, chlorophyll fluorescence and quantities of lichen products were analyzed during the cool, hot and rainy seasons. The photosynthetic rates of the lichen in DEF were higher than those in TRF in all three seasons. However, photosynthetic rates were at their highest during the rainy season and comparatively lower in the cool and hot seasons. Values for the photosystem II (PSII) quantum yield and the Fv/Fm coincided with carbon assimilation rates. Norstictic and usnic acids which were major products of this lichen varied between sites and among seasons. Norstictic acid was produced in larger quantities than usnic acid in both TRF and DEF in all three seasons. Both lichen substances were synthesized in the highest quantity during the rainy season, and subsequently at lower quantities in the hot and cool seasons in TRF and DEF with the exception of norstictic acid in DEF. These results demonstrated that the production of lichen secondary metabolites was not always correlated with photosynthetic capacity. *R. abtrus*a in DEF produced the highest amount of norstictic acid in the hot season when photosynthetic capacity was at its lowest. This implies that lichens primarily allocate carbohydrates so as to produce lichen substances that are protective against adverse environmental conditions even when carbon dioxide assimilation is low. However, it is necessary to conduct long term and extensive investigations in order to elucidate how external stimuli affect the synthesis of secondary metabolites of other lichens in various kinds of forests in the tropics.