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Factors Influencing Rubber Latex Extraction in the Wet and Intermediate Zones of Sri Lanka

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Abstract

Rubber (*Hevea brasilliensis*) is one of the main foreign income-generating crops in Sri Lanka. However, rubber latex extraction can be influenced by various factors. Therefore, this study aimed to analyze the spatio-temporal variation of latex extraction in the wet and intermediate zones of Sri Lanka to identify the factors influencing rubber latex extraction. First, secondary data on rainfall, number of tappable and immature rubber trees, uprooted trees, fertilizer application, use of latex stimulants, presence of pests and diseases, labour turnover, number of holidays, and trade union actions were collected for the past 10 years from four rubber estates, viz. Halpe, Pelmadulla, Udapolla, and Keppetigala, are managed by two regional plantation companies. Then the annual and monthly fluctuations of latex extraction were visualized using R software. Spatio-temporal visualization using static, dynamic, and interactive graphics was also used in R software to examine the relationships between the selected factors. Finally, the variable importance analysis under the Random Forest machine learning algorithm was employed to examine the hierarchy of various factors under climatic zonal wise. The results revealed both positive and negative relationships between latex extraction and the selected factors. Factors including the number of tappable trees, stimulation (Ethephone) applications, and labour turnover-related factors demonstrated a positive impact on latex extraction, while rainfall, the number of immature trees, uprooted trees, pests, and diseases had a negative influence. Labour turnover-related factors and tappable trees revealed high importance ranking in both wet and intermediate zones. Based on both qualitative and quantitative statistical analysis of the results obtained in the present study, seasonal variations in rubber latex extraction, and similar trends across both climatic zones were unveiled. Results also revealed that latex extraction experiences seasonal fluctuations, particularly during the wintering period from December to February in traditional rubber-growing areas. In the Sri Lankan context, a significant decline in rubber latex extraction was observed during the month of April, which can be attributed to the occurrence of various cultural and religious festivities. These findings highlight the importance of considering seasonal variations and cultural influences with a better understanding of the spatio-temporal dynamics of latex extraction in both climatic zones. Considering the range of factors in conjunction with these variations and implementing effective management practices, can enhance the outcomes of rubber latex extraction, making rubber cultivation more sustainable and profitable.

Keywords: *Hevea brasiliensis*, Spatio-temporal variation, Latex extraction, Factors, Climatic zones