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Estimation of the Exchangeable Sodium Percentage from the Sodium Adsorption Ratio for salt-affected soils in the High Valley (Bolivia)

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In order to obtain a more cost-time efficient way to predict the Exchangeable Sodium Percentage (ESP) function to Sodium Adsorption Ratio (SAR_e) of salt-affected soils in the High Valley of Cochabamba (Bolivia), two regression models were generated: $ESP = 0.972 SAR_e + 1.576$ ($R^2=0.85$, $P < 0.0005$) and $ESP = 6.522 SAR_e^{0.5} - 5.723$ ($R^2=0.78$, $P < 0.0005$), based on 84 soil samples. The efficiency of the models was evaluated through an independent test set with 18 samples. The predicted ESP values showed a significant relationship with the measured ESP values: ($R^2=0.69$, $P < 0.0001$) and ($R^2=0.68$, $P < 0.0001$), respectively, and according to T-test of paired samples were not significantly different ($P > 0.05$). Both models are relatively similar in terms of performance and could be recommended to predict ESP from SAR_e in the High Valley. To improve the prediction, additional samples for modelling and data stratification in terms of sodicity might be necessary.