



# Environmental Thresholds of Phosphorus Saturation in Rambutan Cultivation area Dompe in Gampaha District

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V. Kavinga Peiris  
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## ABSTRACT

The deteriorating water quality with its attendant environmental, social and economic implications has been a major issue in recent times; and agricultural activities have been identified as one of the most significant causes. Thus, there is a pressing need for efficient management and monitoring of P in agricultural soils.

The degree of phosphorus saturation (DPS) is the percent ratio of phosphorus (P) retained by soil to the total capacity of soil to retain P. It is a risk indicator that requires a threshold for determining the P loss risk potential.

The objective of this study is to find a suitable analytical protocol for determining DPS and examine the possibility of defining a threshold DPS value for soils in Dompe Rambutan Cultivation area which is very important agriculturally and economically, taking the various soil properties affecting P retention capacity of the soil in the area into consideration.

In the process of determination of DPS, the chemical & physical properties of the soil were determined by routine laboratory analysis. Mehlich-3 extractable P, iron (Fe), aluminum (Al), calcium (Ca) and magnesium (Mg) were determined as described by Mehlich (1984) while the method of Self-Devis et al. (2000) was used to determine the water soluble P. Mehlich-3 and water extractable P was analyzed using the ascorbic acid-molybdate blue method. Mehlich-3 extractable Fe, Ca and Mg were determined by atomic absorption spectrometry. Mehlich-3 extractable Al was determined by inductively coupled plasma optical emission spectrometry.

Thirty representative surface soil samples were collected from Rambutan cultivation lands in Dompe Agrarian Service Area of Gampaha District. The soils were incubated with six rates of P for 4 weeks after which water extractable P were measured. The DPS was calculated as the percent ratio of Mehlich-3 extractable P to P sorption indices estimated as the single point sorption index ( $P_{150}$ ) or the sum of Mehlich-3 extractable Al and Fe  $\{(Al_{M3}+Fe_{M3})\}$ . or the sum of Mehlich-3 extractable Ca and Mg  $\{(Ca_{M3}+Mg_{M3})\}$ . The DPS thresholds of the soils were estimated as the change point of the split-line regression plot of DPS against water extractable P.

Based on this laboratory study, the mean DPS threshold for Rambutan cultivation lands in Dompe Agrarian Service Area, Gampaha District using  $P_{150}$ ,  $(Al_{M3}+Fe_{M3})$  and  $(Ca_{M3}+Mg_{M3})$  as capacity factors ( $DPS_{150}$ ,  $DPS_{(Al_{M3}+Fe_{M3})}$  and  $DPS_{(Ca_{M3}+Mg_{M3})}$ ) were 35.7, 24.5 and 16.5%, respectively. So it is advised not to exceed above DPS values, in the addition of P to the cultivation land, when the fertilization of the land.