

## **Effects of Liming on Soil Properties and Its Roles in Increasing the Productivity and Profitability of the Oil Palm Industry in Malaysia**

### **ABSTRACT**

As global demand for edible oil increases, palm oil-producing countries in Southeast Asia are experiencing a rapid expansion of agricultural land for industrial oil palm cultivation by converting existing agricultural lands and some tropical rainforests; however, soil acidity and nutrient depletion are two major constraints in oil palm cultivation in the tropics. Several factors may cause soil acidification, including natural processes, industrial pollutants and extensive agricultural production. Soil acidity increases the leaching of many essential plant nutrient elements and the availability of toxic elements by modifying various geochemical and biological reactions in the soil. Even though acidic soil is less fertile, the productivity of tropical soil is among the highest in the world once the chemical constraints are removed by applying a sufficient quantity of lime and fertilizers. Lime is a widely used alkali to improve soil fertility by retaining nutrients, increasing soil biota, decreasing heavy-metal availability and potentially achieving resistance against Ganoderma disease at oil palm estates. Liming materials are not simple compounds with consistent chemical properties; thus, selecting the appropriate lime must be based on soil type and price compared to the products neutralizing value, composition, and fineness. Since the primary aim of liming is to improve soil pH, numerous reviews have been reported on the impacts of soil acidification, nutrient deficiencies and heavy-metal toxicity; however, no extensive review has been published that discusses the effects of liming on oil palm growth and yield. It is not enough to emphasize just soil impacts alone, and a thorough assessment must also be given on crops (oil palm) and soil biodiversity. This review synthesizes current understanding and introduces a holistic approach to provide insights into the far-reaching effects liming has on the biogeochemical properties of tropical soil and oil palm crops.