Peat soil was renowned for its low nutrient availability which limits its potential for extensive agriculture use. Continuous shifting of aerobic and anaerobic condition due to fluctuating water table could lead to biogeochemical changes of the soil that could affect the cycling of nutrients in the peat system. Understanding such changes on the nutrient dynamics will help in the management and the agronomic practices of pineapple plantation on peat soil. This study assess the dynamics of N, P and K in peat soil under fluctuating water table using laboratory simulation and nutrient balance estimation approach. The effect of rainfall, fate of applied fertilizer and lime and the nature of peat were studied in relation to changes in N, P and K. In the study, Nitrogen continue to decrease together with available P and the exchangeable bases (K, Ca, Mg and Na) in pineapple-cultivated peat compared to undisturbed peat despite the application of fertilizer. This could indicate that the nutrients are heavily leached by the alternating water table or they are readily taken up by the growing pineapple crops or they are readily fixed by the acidic peat soil. Fertilizer requirement in this system is therefore high in order to cope with leaching, potential fixation and uptake activity. Very little NO₃-N was detected in the NPK fertilized aerobic peat while the application of urea resulted in significant amount of NH₄-N found in both aerobic and anaerobic peat soil. The fluctuating water table in the peat profile which was significantly related with the amount of precipitation could have speed up the leaching of NO₃-N as it was highly soluble and unlikely to be adsorbed by the peat. The NH₄⁺-N ions is better retained by the peat due to its positively charged nature and those that are leached can still be trapped by the underlying mineral. The ability of the mineral soil to adsorb and release nutrient ions in particular the cations could allow for nutrient recharging of the upper layers of peat when water table is high. The simulation study in the laboratory using a designated soil column showed that the concentration of total N and mineral-N (NO₃-N and NH₄-N) was maximized when the water table was maintained at 40 cm. When the water table was fluctuated between 0-40 cm depth (representing the water table during wet season), soil available P reached its highest concentration in the soil. The fluctuation of water table between 40 - 80 cm depth (representing the water table during dry season) allows the gradual release of exchangeable K, Ca, Mg and Na. Without crops uptake, all of the treatments display a positive soil nutrient balance. In the presence of uptake by pineapple, a negative nutrient balance was observed for all treatments where the treatment with fluctuating water table between 0-40 cm recorded the highest nutrient deficiency. The study indicated that the fluctuating water table affects the different nutrients differently. Wet season tend to increase available P in peat soil while dry season encourage more decomposition and reduce leaching of major cations. Intermediate season tend to improve nitrate and ammonium availability in the peat system. Thus agronomic practices especially fertilizer application may have to take the rainfall factors into consideration.

Phaleria macrocarpa, or also known as Mahkota Dewa, is popular medicinal plant in Indonesia and has recently been introduced in Malaysia in view of its commercial potential as health supplements. Many studies have focused on the active compounds in fruit, which is primarily used in medicinal products, but postharvest handling of the fruits has not been well documented. Studies were, hence, carried out to determine the relationship between fruit ripeness, morphological and chemical properties, and changes during fruit storage prior to product development for safety and optimum health benefits. Besides, the seeds within them are also primary means of propagation as vegetative multiplication of this plant species is of low success. Results showed that fruit of drupe of this medicinal plant had respiration rate, size and weight increased while become more juicy as ripening progressed from full size unripe to fully ripe stage. It is probably a climacteric fruit. Antioxidant contents in terms of ascorbic acid and total phenolic contents were, however, lower with fully ripe fruits as compared to half ripe and unripe fruits. Most fully ripe fruits also had insect pest and microbial damages in pericarp and mesocarp, making them unsuitable for product development. Subsequent studies on fruit storage for medicinal products were, hence, only conducted with unripe and half ripe fruits. These results were short lived with refrigeration storage at 8±2°C. Fruits packed in perforated polythene bags could be stored for only two weeks while vacuum packaging could keep the fruits for longer period of four weeks with acceptable 5% damage. Fruits exhibited lower titratable acidity and ascorbic acid content but soluble solids increased following storage in the refrigerator. There was greater loss of antioxidants in the unripe fruits as compared to half ripe fruits with cold storage. Frozen storage at -20°C enabled the fruits of unripe and half ripe stages to be stored for up to six months, with both perforated and vacuum packaging, without deleterious changes in fruit moisture and size but fruits turned duller in colour indicating freezing injuries and also became softer after thawing from sub-zero temperature storage. Antioxidants of ascorbic acid also dropped drastically while phenolics decreased gradually in both unripe and half ripe fruits with increasing freezer storage duration. For medicinal product development purposes, Phaleria macrocarpa fruits are best harvested at half ripe stage with consideration in terms of fruit damage, weight, size and antioxidant contents. Fruits should be processed at the soonest pace for high antioxidant content or cold stored for less than four weeks. Fruits can be preserved for longer periods of a few months at -20°C prior to product development but the antioxidants in them lost gradually with increasing storage time. Fully ripe Phaleria macrocarpa fruits were best for planting purposes as the embryonic axes in seeds of both unripe and half ripe fruits were not fully developed for germination purposes. The fruits should be planted in media fast or within four weeks with cold storage at 8±2 °C. With seed desiccation tolerance trial as normally applied for seed handling, seed germination dropped to 63% with moisture content of 16%. The seed can be said to have desiccation tolerance between recalcitrant and intermediate seeds. The embryonic axes could, however, tolerate further desiccation and retain 77% in vitro proliferation at lower tissue moisture content of 13.6%. In vitro conservation efforts can be planned with the embryonic axes for this medicinal plant.