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Phytochemical composition of coagulants used in west african soft cheese processing

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Abstract

The role of milk coagulants cannot be downplayed in cheese-making, as they influence the cheese yield and quality. In West Africa, plant-sourced materials such as *Calotropis procera* leaves and stems, *Carica papaya* leaves, and *Citrus limon* fruit juice are commonly used as coagulants for traditional soft cheese processing. However, information about these coagulants' phytochemical composition is hardly available. This study aimed to investigate the phytochemical composition of *Calotropis procera* leaves and stems, *Carica papaya* leaves, and *Citrus limon* fruit, as well as their potential safety implications. Duplicates of fresh samples of *C. procera* leaves, *C. procera* stems, *C. papaya* leaves, and *C. limon* fruits were sourced and analysed for vitamin C, total phenolic compounds, total flavonoids, total antioxidant activity, phytate, tannin, saponin, oxalate and alkaloid content. The findings showed compositions range on fresh matter basis: 40.4–105.0 mg/100 g (vitamin C), 6.4–43.3 mg/100 g (phenol), 1.0–305.7 mg/100 g (flavonoid), 38.0–51.8 % (antioxidant activity), 0.4–2.6 % (phytate), 0.7–2.7 mg/g (tannin), 0.1–1.9 % (saponin), 0.3–2.8 % (oxalate), and 0.7–2.3 % (alkaloid). *C. papaya* recorded the highest values in all the phytochemicals. *C. limon* registered the lowest in vitamin C, flavonoid, phytate, oxalate and alkaloid, and *C. procera* stems had the lowest in antioxidant activity, phenol and tannin. *C. procera* leaves ranked second in vitamin C (M=58.7 mg/100 g, SD=0.29), phenol (M=43.3 mg/100 g, SD=2.4), antioxidant activity (M=50.1 %, SD=0.6), phytate (M=1.3 %, SD=0.0), tannin (M=1.2 mg/g, SD=0.00), saponin (M=1.7 %, SD=0.03) and oxalate (M=0.50 %, SD=0.00), but third highest in phenol (M=15.5 mg/100 g, SD=2.0), flavonoid (M=26.9 mg/100 g, SD=0.1), and alkaloid (M=1.0 %, SD=0.00). The compositions of phytochemicals such as phytates, tannins, saponins, oxalates and alkaloids, known to inhibit mineral bioavailability, were within permissible limits (< 5 g/100 g) for human intake as reported in the literature. It is worth highlighting that the coagulants are not directly consumed as food. Moreover, the presence of vitamin C enhances mineral bioavailability. However, more research is required to know the extent of phytochemical transfer from the coagulants to the milk and the resulting cheese and to determine whether phytochemical variability in the coagulants explains variability in cheese yield.

Keywords: Antinutrients, coagulants, indigenous cheese, West Africa