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# COAGULANT ACTIVITY OF PLANT EXTRACTS AS AN ALTERNATIVE IN THE MANUFACTURING OF DAIRY PRODUCTS

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Cheese production has been a practice carried out since ancient times, and with the advancement of biochemistry, the cheese-making process began to incorporate a variety of alternative enzymes, including the use of enzymes extracted from microorganisms and, more recently, enzymes extracted from plant. Aiming at the challenges found in existing studies on coagulants extracted from vegetable raw materials, in addition to meeting the demands of consumers who have dietary requirements, such as Halal, it is necessary to find other enzyme sources and explore the action in relation to casein micelle. Therefore, a study was carried out on different alternative sources of casein coagulation. Initially, a bibliographical survey of plant sources already used in the coagulation of casein micelles was carried out and unexplored fruits and plants were selected for carrying out coagulation tests in milk, namely: blackberry (Morus nigra), jabuticaba (Plinia cauliflora), pequi (Caryocar brasiliense), cagaita (Stenocalyx dysentericus), pitaya (Hylocereus polyrhizus), umbu (Spondias tuberosa), ora-pro-nóbis (Pereskia aculeata), serralha (Sonchus oleraceus) and Cambuci (Campomanesia phaea). Fruit and plant extracts were obtained with specific methodologies, with blackberry, jabuticaba, cagaita, pitaya, umbu and cambuci subjected to peeling and pulping by pressing, centrifugation (4500 rpm for 30 min at 4°C), filtration and use of the supernatant as crude extract. The pequi fiber was grated and the other extraction procedures mentioned were followed. The ora-pro-nóbis was macerated in 0.1M sodium phosphate buffer solution pH 6.9, obtaining extracts in proportions 1:2, 1:3, 1:4. The milkweed was subjected to drying at 47°C for 5 days, crushed and using extractive solutions: 0.1M sodium citrate pH 5.9, 0.1M sodium phosphate pH 7.0, 0.1M citric acid pH 5, 0, 0.1M sodium acetate pH 5.0 and 1M acetate buffer pH 5.5, all at a concentration of 1:10. Furthermore, for milkweed, the freezing step was carried out before incorporating the extracting solution. Milk coagulation activity was determined using aliquots of 0.5, 1.0 and 1.5 mL of extracts in 10 mL of pasteurized milk and coagulation was observed at temperatures of 30, 35, 40, 45, 50 and 55°C for 40 min. For cambuci, an experimental block was also carried out applying different milk pH ranges (6.0, 6.5 and 7.0). Under the conditions stipulated in this study, no coagulation responses were obtained for blackberry, jabuticaba, pequi, cagaita, pitaya. The umbu resulted in a coagulation process for concentrations of 1.0 and 1.5 mL of crude extract at a temperature of 35 and 40°C and a concentration of 1.5 mL at a temperature of 45°C, exceeding the time of 40 min for the cases. Ora-pro-nóbis obtained coagulation responses at 50°C, also exceeding the time of 40 min. In the different methodologies, the milkweed extract used was capable of carrying out coagulation in a time exceeding 40 min, requiring refinement in studies, as it could be a promising source of application, as it is considered as PANC. The cambuci showed satisfactory results at 50 and 55°C, with milk pH 6.0, 6.5 and 7.0, in 40 min. When considering the need to use enzymes in cheese making, cambuci showed good results, as it fits within the standard time for the milk gelation process and is equivalent to the gel formed by kiwi extract. Toxicological tests will still be carried out to

enable the use of these extracts in the manufacture of cheese.

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