Evaluation of yeast extract and phosphate salts concentration in a pineapple waste medium to produce L-(+) lactic acid by *Lactobacillus casei* subspecies *rhamnosus* using a response surface methodology assessment

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Production of lactic acid by fermentation process has been studied from glucose solutions and other sources because of many important reasons: biotechnological production is cheaper than chemical synthesis; production of biodegradable materials from L (+) lactic acid and, the use of nutrient-rich agro-industrial wastes as raw material, which helps to reduce the environmental impact. Lactic acid productivity by *Lactobacillus* sp. has shown to be directly proportional to yeast extract (YE) and phosphate salts (PO4) supplementation. The main inconvenient of these nutrients as nitrogen and minerals sources, respectively, for lactic acid fermentations is that they are a costly supplement, especially YE. A central composite design ($2^2$) was used to analyze the effect of yeast extract and phosphate salts concentration ($KH_2PO_4$ and $K_2HPO_4$) on the lactic acid production, grown on a pineapple waste medium (80% v/v). Response surface analysis was done to obtain mathematical models that relate YE and PO4, and optimize them for lactic acid production. The YE and PO4 concentration influenced positively total lactic acid productivity, volumetric productivity and lag phase obtaining a fit model for each response. The maximum lactic acid productivity, 6.53g/h, and the maximum volumetric productivity, 4.0g/Lh, were achieved with 19.9g/L of YE and 3.9g/L of PO4. The minimum lag phase predicted by the model obtained was 4.0h with a supplementation of 12.7g/L and 0.88g/L of YE and PO4, respectively. The models obtained can help to decide the level of supplementation in order to lower the cost of lactic acid production, and achieve a good bacterial performance.