

## ***ABSTRACT***

This research aims to develop an NPK-based slow release fertilizer (SRF) system by analyzing the effect of glutamic acid as a crosslinking agent on the physical and chemical properties of PVA/chitosan membranes, evaluating their physicochemical and morphological characteristics, and determining the nutrient release rate effectiveness. Synthesis was conducted using the blending method of PVA and chitosan, where chitosan was crosslinked with glutamic acid at molar ratios of 1:1, 1:1,5, and 1:2 resulting in five membrane variations: PVA/NPK, PCN, PCGN 1:1, PCGN 1:1,5, and PCGN 1:2. The resulting membranes were characterized through physical testing, functional group analysis using FTIR, and morphological observation via optical microscopy and SEM. The results showed that increasing the molar ratio between chitosan and glutamic acid enhanced the crosslinking density and membrane hydrophobicity (up to 91,30°), while creating a dense matrix structure that limited swelling. The effectiveness of the SRF system was demonstrated by the membrane's ability to sustain nutrient diffusion rate over a period of 3, 7, 10, 14, 17, 21, 24, and 28 days. This confirms that the chitosan/glutamic acid modification successfully established a robust diffusion barrier. Based on AAPFCO and ISO 18644:2016 regulations, these PVA/chitosan-glutamic acid membranes meet the criteria for slow release fertilizer systems, with a cumulative nutrient release percentage below 75% over 28 days, which is effective for maintaining the availability of potassium and phosphate for plants.

**Keywords:** slow release fertilizer, PVA, chitosan, glutamic acid