Evaluasi biodegradabilitas plastik berbahan dasar campuran pati dan polietilen menggunakan metode enzimatik, konsorsia mikroba dan pengomposan

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Abstrak

Studi ini membahas pendegradasian plastik biodegradableberbahan dasar campuran pati dan polietilen selama pengujian dengan metode uji reaksi enzimatik, konsorsia mikroba dan pengomposan. Oleh karena polimer plastik konvensional sulit untuk diuraikan oleh mikroorganisme lingkungan maka diperlukan evaluasi biodegradabilitas ketika merancang polimer plastik baru untuk pemakaian plastik biodegradable. Biodegradabilitas plastik berbahan dasar pati tersebut diukur melalui bentuk fisik dan penurunan berat plastik tersebut yang direpresentasikan oleh hasil pengamatan secara kasat mata dan persentase degradasi. Pengujian dengan metode uji reaksi enzimatik menggunakan enzim αamilase dan konsorsia mikroba dilakukan dalam skala laboratorium. Proses pengomposan diikutsertakan dalam pengujian untuk mengetahui proses degradasi/dekomposisi plastik biodegradableberbahan dasar pati di lingkungan pengomposan. Hasil pengujian menunjukkan enzim αamilase mendegradasikan pati di dalam plastik berbahan dasar pati sebesar 18,74% untuk inkubasi selama 18 jam pada suhu 60°C. Hasil uji media cairan menggunakan konsorsia mikroba menunjukkan persentase degradasi plastik berbahan dasar pati tertinggi sebesar 34,43% pada minggu uji ke8 menggunakan konsorsia mikroba BioSAFERO. Sedangkan pada pengujian pengomposan persentasi degradasi tertinggi sebesar 26,14% pada minggu uji ke6.
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This study discusses about the degradation of biodegradable plastics made from a mixture of starch and polyethylene during the test with the test methods of enzymatic reactions, microbial consortia and composting. Because of the conventional plastic polymers are difficult to be degraded by environment microorganisms it is necessary to evaluate biodegradability of plastic when designing new polymers for the use of biodegradable plastics. Biodegradability of plastic made from starch was measured through physical shape and weight decreasing of plastic which is represented by the observation by naked eyes and the percentage of degradation. Testing method with enzymatic reaction using αamylase enzyme and microbial consortia conducted in laboratory scale. The composting process is included in the testing to find out the process of degradation/decomposition of starchbased biodegradable plastics in composting environments. The test results showed the αamylase enzyme in degrading starch in starchbased plastics by 18.74% to inbucation for 18 hours at 60°C. The results of liquid media using microbial consortia shows the degradation percentage of starchbased plastic high of 34.43% for eight weeks test using BioSAFERO microbial consortium. While the testing of composting highest degradation percentage of 26.14% on the test to six weeks.