

ABSTRACT

The large amount of sago pith waste (SPW) produced by the growing sago industry has become an environmental concern. Instead of being disposed of, SPW could be converted to hydrogel and used for water hydration. In this study, the hydrogel was prepared from SPW cellulose fibers via crosslinking with epichlorohydrin (ECH). FTIR characterization showed that pure cellulose fibers extracted from the SPW were successfully crosslinked with ECH to form the hydrogel. SEM micrograph of hydrogel showed porous microstructure. The optimum swelling ratio of the hydrogel at $19.9 \text{ g} \cdot \text{g}^{-1}$ was obtained with 5% SPW cellulose content and 5 mL ECH. In this study, the hydration property of the hydrogel was demonstrated by using it as a medium for maize seed germination. The germination rate (GR) was above 70% when tested in SPW cellulose hydrogel as the medium for the treatment which consisted of 5 g of water and 0.05g of dried hydrogel had shown GR exceeded the control to 100%. The ammonium nitrate release profile of the SPW cellulose hydrogel has demonstrated the intensive release for the first 10 minutes and wavered until the end of the experiment time. Overall, it is concluded that cellulose obtained from local SPW can be synthesized into hydrogel which can be used as growing medium for germinating seeds.

Keywords: Sago pith waste, cellulose, hydrogel, swelling ratio, seed germination rate

Sintesis dan Pencirian Hydrogel Superabsorben untuk Aplikasi Pertanian

ABSTRAK

Jumlah besar sisa empulur hampas sagu (SPW) dihasilkan oleh industri sagu yang semakin meningkat telah menjadi kebimbangan alam sekitar. SPW boleh ditukar kepada hidrogel dan digunakan sebagai medium untuk percambahan benih. Dalam kajian ini, hidrogel telah disediakan daripada gentian selulosa SPW melalui silang dengan epichlorohydrin (ECH). Pencirian FTIR menunjukkan bahawa serat selulosa tulen diekstrak daripada SPW telah berjaya dipaut silang dengan ECH untuk membentuk hidrogel. Mikrograf SEM hidrogel telah menunjukkan mikrostruktur berliang. Nisbah pembengkakan optimum hidrogel di 19.9 g.g⁻¹ telah diperolehi pada 5 (wt /v%) kandungan selulosa SPW dan 5 mL ECH. Dalam kajian ini, sifat penghidratan hydrogel telah ditunjukkan dengan menggunakannya sebagai medium untuk percambahan benih jagung. Kadar percambahan (GR) adalah melebihi 70% apabila SPW selulosa hidrogel diuji sebagai medium. Rawatan yang terdiri daripada 5 g air dan 0.05 g hidrogel kering telah menunjukkan GR melebihi kawalan sebanyak 100%. Profil pelepasan ammonium nitrat hidrogel selulosa SPW telah menunjukkan pelepasan intensif selama 10 minit pertama dan tidak stabil hingga akhir masa percubaan.

Kata kunci: *Hampas sagu, hydrogel, nisbah pembengkakan, selulosa, ujian percambahan benih*