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Polymers from Natural Starch for
Agricultural Use**

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Study of Highly Water - Absorbing Polymers from Natural Starch for Agricultural Use

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Abstract

The highly water-absorbing polymers were prepared by the reaction of acrylic acid as a graft monomer and natural starch (eg. rice starch, sticky rice starch or corn starch) as the backbone using water hydrogen peroxide and vitamin C as solvent, initiator and catalyst, respectively. The reaction was carried out by mixing of starch in distilling water and stirring at 60-70 °C for 3 hours and then cooled to 30 °C. Acrylic acid was added and the pH was adjusted to 6-9 by the addition of limestone powder. To the stirred mixture were then added hydrogen peroxide (30% v/v) and vitamin C and continued stirring for 3 hours until the solution became viscous. The viscous solution was neutralized with potassium hydroxide (30%v/v) to give the pH for 6.5-7 and allowed to cool to room temperature overnight. The resulting solution was spread on winnowing baskets and allowed to dry under the sun to yield a continuous absorbent polymer film. The absorbent polymer film was ground and yield of white powder. The above procedure was repeated by using another types of starch. The ability of starch slurry to swell on heating, by absorption of water, is its most important practical property. Rice starch has very low swelling capacity in aqueous media compare with sticky rice starch and corn starch. The capacities of water-absorbing polymer were tested by placing polymer powder in the beaker and adding of water until it swell and cannot absorb more water. The polymers were found to be an excellent water absorbent, which absorbed water about 248, 245 and 167 times in weight of polymer for corn starch, sticky rice starch and rice starch, respectively. The water retention was calculated by measuring the amount of water releasing after every week for 10 weeks. They have also good water retention capacity. The swollen polymers were mixed with soil in ratio 1:3 and the increasing water holding capacity of soils which promotes more efficient plant growth in pot were test. It was found that the soil could be absorbed water for 10 weeks. It is possible to use highly water-absorbing polymers from natural starch in agriculture because they are low in cost and the polysaccharide main portion of the product is biodegradable.