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Application of SA-Loaded PAMPS Polymer Material Enhances Drought Resistance in Tobacco Seeds

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Abstract

Drought is one of the most important stressors limiting the seed industry and agricultural production. The present study was carried out to generate new drought tolerant pellet seeds using a combination material with a super absorbent polymer, poly 2-acrylamide-2-methyl propane sulfonic acid hydrogel and a drought retardant. , salicylic acid. The optimized PAMPS hydrogel is obtained because the molar ratio of 2-acrylamido-2-methyl-propanesulfonic acid to potassium peroxydisulfate and N,N'-methylene-bis-acrylamide is 1:0.00046: 0.00134. The weight of the hydrogel after swelling in deionized water for 24 h reached 4306 times its own dry weight. The water retention rate of PAMPS was signifcantly higher than that of the control. It can retain up to 85.3% of its original weight after 30 minutes at 110°C; even at 25°C for 40 days, PAMPS maintained the RR at 33.67%. The decomposition rate of PAMPS gradually increased and reached about 30 ter when buried in soil or activated sludge for 60 days. Furthermore, the seed germination performance and seedling growth were better in the pellet treatments with the SA-containing PAMPS hydrogel under water pressure compared with the control. He suggested that the PAMPS hydrogel containing SA, a non-toxic super absorbent polymer, could be used as an efective drought resistant material applied to granular tobacco granules.

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Citation:

Materials

"Honghua Dajinyuan" and "MSk326" tobacco beads, talc and bentonite polish, and binder were provided by Yunnan Provincial Academy of Tobacco Agricultural Sciences, China. 2-Acrylamido-2-methylpropane sulfonic acid and salicylic acid were purchased from Shanghai Wing Science and Technology Co., Ltd., Shanghai, China [12]. Potassium persulfate, N, N -methylene-bi, NaCl and NaOH were obtained from Shanghai Dingguo Biotechnology Co., Ltd., Shanghai, China. All chemicals were used as received and experiments were performed with double distilled water.

Water retention determination

First, two grams of tobacco seeds were coated with purified water and the above granulators in a cyclically alternating pattern until the particle size reached 1.00 ~ 1.25 mm in diameter. Total 5~8ml of water per gram of pulverized bare tobacco seeds; then a second layer of granulator and binder solution is provided cyclically until the particle size is 1.60~1.80mm in diameter [13-15]. All seeds were pelletized using a minitype coating machine "BY300A" and air-dried for 2 days at room temperature.

Discussion

In this study, the super absorbent PAMPS hydrogel was best according to 1: 0.00046: A ratio of 0.00134 of AMPS monomer to KPS and MBA was prepared. It should be noted that when applying a suitable transformer, the liquid absorption rate of PAMPS can be improved by increasing KPS; however, it will be inhibited after using an inappropriate amount of BMA. The results show that the MBA plays an important role in the preparation of the PAMPS hydrogel having a more or less important density network, which is responsible for the swelling degree of the resulting hydrogel. Also found a significant effect of crosslinking density on the water content of AMPS-based hydrogels. The main FTIR absorption peaks of PAMPS are in agreement with the related reports and there are no other impurity peaks. It is reasonable to conclude that PAMPS was successfully polymerized by the synthetic route. The water absorption rate can reach 4306 times of its own dry weight, which is much higher than other materials such as keratin hydrogel, polyacrylic acid sodium salt and starch based super absorbent. This may be because linear polymers with sulfonate groups derived from AMPS exhibit significant coil expansion in aqueous solution, even in 5 M NaCl solution. AMPS dissociates completely over the range. Overall pH and AMPS-derived hydrogels exhibit pH-independent swelling behavior. There3[illegible] liq[illegible]idh[illegible] hs[illegible]paptene pi[illegible]w T[illegible]12[illegible]dv[illegible]m[illegible]liq[illegible] s[illegible] w[illegible]