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大豆糖蜜上清液中胰蛋白酶抑制剂的去除

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摘要: 胰蛋白酶抑制剂是广泛存在于大豆及大豆制品中的抗营养因子, 主要有Kuntiz型和Bowman-Birk型两种, 为了得到高品质的产品, 需要在加工过程中将其灭活或去除。通过研究大豆糖蜜上清液中胰蛋白酶抑制剂的活性、鉴定抑制剂的种类, 采用超滤法将其去除。经测定, 固形物含量约10%的大豆糖蜜上清液中胰蛋白酶抑制剂活性约为 $5.05 \times 10^5 \text{ TIA} \cdot \text{g}^{-1}$ 蛋白, 约为鲜豆奶的5倍。用截留分子量3 kDa的超滤膜将大豆糖蜜上清液中的大分子蛋白富集, 通过还原Tricine-SDS-PAGE分析, 截留部分在图谱上显示为分子量约10 kDa的模糊的条带。通过用2%巯基乙醇还原再用NEM封闭游离巯基的方式处理样品, 使得截留部分在电泳图上显示为分子量约7.8 kDa的两条清晰的条带。综合判断, 大豆糖蜜上清液中主要含有Bowman-Birk型胰蛋白酶抑制剂。通过对比超滤效果, 选择用截留分子量10 kDa的超滤膜截留胰蛋白酶抑制剂, 能够得到无抑制活性的透过液。

Abstract: Trypsin inhibitor is one kind of antinutrition factor widely spread in soybean and soybean products, which mainly consist of Kuntiz type and Bowman-Birk type. In order to get high-quality products, soybean trypsin inhibitor is better to be inactivated or removed. Through analyzing the activity and identifying the type of trypsin inhibitor in soy molasses supernatant, it was removed using ultrafiltration. The results showed that the trypsin inhibitor activity for soy molasses supernatant with about 10% solids content was approximately $5.05 \times 10^5 \text{ TIA} \cdot \text{g}^{-1}$ protein, which was nearly 5 times of fresh soy milk whose trypsin inhibitor activity was about $1.026 \times 10^5 \text{ TIA} \cdot \text{g}^{-1}$ protein. Protein with high molecular weight in soy molasses supernatant was concentrated by ultrafiltration using a membrane with a molecular weight cut-off of 3 kDa. The retentates showed one, unclear band with a molecular weight of about 10 kDa on the chromatogram of reduced Tricine-SDS-PAGE. After reduced by 2% mercaptoethanol and blocked thiol by NEM, the retentates of soy molasses supernatant showed two, clear bands with molecular weights of about 7.8 kDa. Combined the facts, it was reasonable to consider that there was mainly Bowman-Birk trypsin inhibitor in soy molasses supernatant. Finally, ultrafiltration membrane with a molecular weight cut-off of 10 kDa was chosen to retain the trypsin inhibitor in soy molasses supernatant, and therefore permeates without inhibitor activity could be obtained.

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