Development and optimization of preliminary sorter for soybean[1]

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Abstract

A preliminary sorter for soybean with a tilted conveyor was developed in this study. The major principle of separation was by different shape and rolling property of soybean. Optimization results showed that the best net sorting efficiency (η_{net}) was 91.1%, occurred on horizontal angle ϕ_H=4º ; vertical angle ϕ_V=3º and speed of conveyor belt = 20 m/min. The inferior sorting efficiency kept over than 99% when yield rate of crop was low, indicated the sorter with optimized condition has high tolerance for mess. The operation capacity of the machine was 55.8 kg/hr with a 91.0% net sorting efficiency and 1.22% loss for damage. The sorter could save sorting times up to 86% compared with hand sorting, corresponded to labor cost of 13,482 NTD/ton. The sorter was able to sort different breeds of soybeans, black soybeans and azuki beans with good sorting performance for beans with aspect ratio larger than 0.79.

Keywords: organic soybeans, sorter, optimization