

Adaption of the Traditional Coffee Pulping Machine to Soybean Dehulling

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Abstract

Processing of soybean for human consumption requires wet heat treatment of the beans in order to inactivate anti-nutritional factors. After hot water treatment or steaming, dehulling of the bean has always been an uphill task for household processors in Tanzania. Dehulling is done by hand rubbing, which is tedious and time consuming. The traditional coffee pulping machine was adapted to dehull boiled soybean. Seven soybean varieties namely TGX-1876-2E, Bossier, Kaleya, TGX 1805-8E, Sable, Songea and Duicker were tried. This was a development process whereby three consecutively improved versions of dehulling machines were tested. The machines were branded M₁, M₂ and M₃, implying first, second and third generation, respectively. Bean recovery as a measure of performance was 74.3, 77.4 and 91.8% for M₁, M₂ and M₃, respectively compared with 89.7% for manual dehulling/rubbing. The respective throughput was 8, 10 and 28.2 kg/h compared with 0.43 kg/h for manual dehulling. The mean dehulling efficiency of the M₃ dehuller was 82.4% which was the highest. The M₃ dehuller's best performance was due to use of ball bearings to support the rasping roller axle instead of sleeves and its ergonomically suitable height. The M₃ dehuller could be adopted for soybean dehulling under rural livelihood conditions but the economics for owning and running it needs to be explored. Its improvement to make it motorised is recommended to increase throughput and increase chances for adoption in medium scale soybean processing.

Keywords: Varieties, dehullers, efficiency, recovery, throughput

Introduction

Soybean seed constitutes of 8-10% of hull by weight, the rest being the endosperm (Sessa and Wolf, 2001). The benefits of consuming soy foods include good nutrition profile, reduction in heart diseases through reducing blood cholesterol, reduced risk of cancer, control of menopausal symptoms, control of weight gain and longevity (Messina, 1999). The valuable nutrients leading to these benefits are in the endosperm. The soybean hull has the highest concentration of crude

fibre content (5%) compared with the rest of legumes (Makasa *et al.*, 2002). Also ground soybean hull increases protein emulsification effect at pH>4.5 (Martin and William, 1994), but has negative effects too.

Although consuming high fibre content foods such as soybean has several health advantages there are also some inherent disadvantages such as lowering efficiency of swallowed medicines, restriction of absorption of essential nutrients and minerals and gastrointestinal disorders including

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