

ABSTRACT

Present work is an attempt to address the issues pertaining to cinnamon processing technology by investigating and assessing the existing technology to understand the merits and demerits of the adopted technologies to design and test suitable device for appropriated mechanizations, to meet with the present market demands associated with GAP, GMP and HACCAP etc. This is also a continuation of the research program commenced by the Dept of Agric Engineering in 1998 under the leadership of Prof. K.D.N. Weerasinghe, by developing an initial machine (RUWEKA-CG) to ease the rubbing process.

The study was conducted during 2002-2006 in the Dept. of Agric. Engineering, faculty of Agriculture, University of Ruhuna with objectives to study the technical parameters of cinnamon bush and sticks, presently adopted technologies for further mechanization.

In order to achieve the objectives seven experiments were conducted under two themes (1) to study the traditional processing technology and technical parameters needed to introduce technologies, and (2) to design and testing of appropriate mechanisms.

It was revealed that technical parameters of the bushes and harvested sticks were highly varied in the same plantation even under the same management conditions. Canopy height, productive length, number of shoots and stick yield were 343.65cm, 272.8cm, 7.67 and 2.61, respectively. As per the peelers conception mean values of convenient length for processing was 159cm with the lesser variation (standard deviation 17.6). Average sticks weight and number of knots per stick were 2.1kg and 7.0 respectively.

Studies were conducted in the selected peeling sheds distributed in Matara and Galle districts to understand the details of the processing tacks adopted by the peelers. Time taken for individual tacks for removing knots, scraping, rubbing and peeling was monitored as 16.11, 89.56, 54.2 and 188.38 seconds, respectively. It was evident that highest time consumption among four steps lies on the peeling, which consumes 54.1% of total time requirement of the whole operation except for quills making.

Efficiency of different processing steps depends on the physical characters of the sticks (dimensions, evenness, texture and thickness of the bark, and other abnormalities), human factors (skillness, shoulder power, gender, physical rhythm...etc) and highly varied in time and the space.

Field survey conducted to assess the adaptability of RUWEKA-CG with 21 peelers, helped to identify and rank the problems associated with it. Inadequacy of scale of the machine to peel the higher diameter ranges of sticks (>4cm) and difficulties associated with initial insertion of sticks were the major drawbacks of the device.

According to the results of the survey, 90% of the sticks coming to the peeling sheds in Galle and Matara districts fall on the <5.1cm diameter classes. Therefore, the machine RUWEKA-CG was scaled by 50% to rub sticks of 1 to 5.5cm range. This helps to enhance the acceptability up to 93.85% in Galle and Matara districts.

For the design features of the new machine RUWEKA-PG, diameter of the inner and outer cylinders were increased from 70mm to 85mm and 166mm to 218mm. In the coil operated spindles mechanism same coil gauge was adopted by increasing the number of turns from 10 to 15. Spindle length and displacement of the spindles was increased from 124 to 150mm and 15mm to 22.5mm respectively.

Based on the adaptability test conducted for both machines, RUWEKA-CG is recommended to process the diameter class <4cm and RUWEKA-PG for higher diameter class 4-5.5cm was recommended.

Introduction of a stick feeding mechanism with a polycam mechanism helped to reduce the feeding time of sticks to the machine from 6.20S to 2.8S.

It was revealed that time consumption for manual and machine rubbing were 69.2S and 28.56 respectively