Modern State of Technology and Technology for Primary Processing of Cocoons Silkworm

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Abstract

The program for the development of silkworm breeding and processing of cocoons of the silkworm of the Republic of Uzbekistan for the last years, provides conditions for the restoration and development of the silkworm industry, providing silkworm breeders with quality local grains, increasing the production of silkworm cocoons, increasing the silkworm feed base and providing silk processing facilities with high quality raw materials. Today in Uzbekistan, more than 80 million linear plantations and 51,000 hectares of mulberry plantations provide for the fattening of silkworm caterpillars in the volume of 450,000 boxes and the production of about 26,000 tons of silkworm cocoons. To cover the deficit, 230-250 thousand boxes of silkworm mulberries are imported annually - up to 50% of the needs of industry enterprises. A mechanism for generating low-frequency oscillations at the expense of an electromechanical drive to pallets has been developed at the Tashkent State Technical University. The proposed development of technology and technology for carrots and drying cocoons of the silkworm - works with a low-temperature, infrared, vibration installation, using elastic waves and convective heat supply. With the use of this technique and technology, the process of speeding up the carrot and drying, as well as improving the quality of the resulting silk, is provided.

Keywords: Silkworm cocoons; Drying; Processing; Sizing; Temperature; Frequency

Introduction

Morning pupae can be placed cocoons in a container with hot air, steam, gas, etc. The main requirements in this case are the shortness of the process, high productivity, the preservation of the quality of the shell of cocoons (technological indicators), the maintenance of safety instructions and ecology [1-5].

Coconut drier SK-150K. The dryer operates on a decreasing temperature with humid air. The coconut drier is equipped with a fire air heater for heating the air, a sorting conveyor with a hopper, cooling fans and a thermostat. Drying agent-moistened hot air. Productivity on live cocoons 300-350 kg/h [6-7].

Coconut drier "Yamato-Sanko". In foreign cocoon-producing countries of the world, like China and Japan, for the pickling and drying of cocoons, mainly multi-stage conveyor dryers "Nappon-Konsoki", "Yamato-Sanko" and others are used. [8]

The multi-stage drier "Yamato-Sanko" has three drying chambers-upper, middle and lower. Each of the three chambers is equipped with a pressure fan, a fire air heater for air heating, an air duct and an exhaust fan. Depending on the state of drying, in each stage the control is carried out from the control panel. Live cocoons are fed to the uppermost container by means of a conveyor, after which they are subjected to force drying by hot air. Continuously moving along the conveyors from the upper to the lower stage, the dried cocoons are cooled with a cooling device and then weighed and stacked (when completely dried).

Coconut dryer microwave oven. In recent years, drying plants of the microwave type have been developed. These microwave ovens are destined for drying, vegetables, fruits and cocoons of silkworm. Technical and economic indicators are very high and therefore very expensive. The use of such units is economically unprofitable. All the above-mentioned drying units for the primary processing of cocoons for various reasons have not found wide application in production.

From the foregoing it follows that before the scientists and specialists there is a problem, to create coconut-drying plants, simple in design and maintenance, less metal-consuming, and with great productivity.

Cocono Dryers "Simplex". The simplest type is a dryer with a common chamber. The device and its operation are as follows. The cocoons are loaded into the chamber from the top until the entire chamber is completely filled. The heated air is sent from below. The dried cocoons are unloaded through the hole below. This dryer is uneconomical. It has a relatively limited application and Italy.

The duration of complete drying is 12-15 hours. Unloading of cocoons from the lower compartment takes 3-4 hours. When half-dried, cocoons from the lower compartment are unloaded after 1.5-2 hours, and when they are soiled, every 50 minutes, so in the first case, the duration of the cocoons in the dryer is 5-7 hours, and in the second - 3 hours. Both these processes - semi-drying and pickling - are used in the event that the number of cocoons coming into drying exceeds the capacity of the drying plant or if semi-dry cocoons are fed into the unwinding.

The dryer operates round the clock, therefore, before the beginning of the season, it must be brought to full service, equipped with all necessary materials, inverters, and tools tried at idle for several hours (4-5 hours). During operation, it is necessary to closely monitor the temperature of the incoming and outgoing air, since with a strong increase in the temperature of the incoming air, cocoons can be burned, especially when the air is heated hot, and an increase in the temperature of the outgoing air indicates an improper use of heat by the dryer.

The Simplex drier is very simple in design, but not mechanized enough. The heat heater eliminates the need to have a steam boiler, and therefore this dryer can be installed at any procurement station where there is no steam boiler, but when the air is heated hot it can overheat and burn the cocoons. The absence of mechanical transfer of cocoons from one compartment to another complicates the service, increases the need for labor, and puts the entire technological process in dependence on the attention and clarity of the work of the staff.

Cocono dryers "Electronics TKSH-50". Cocono dryers "Electronics TKSH-50" consists of three main parts: a complex source of microwave energy (KIE-2); waveguide path; technological part [9].

The technological part of the cocoon dryer consists of a control panel, a dispenser with a loading hopper and a belt conveyor; a heating chamber with a belt conveyor, a final water load and a system of exhaust and supply ventilation with a calorimeter, cooling chambers - drying with a belt conveyor and an exhaust ventilation system, conveyor drive mechanisms [9].

The chamber for pickling and drying cocoons is a rectangular waveguide with an enlarged section of 800×400 mm, in which a traveling wave of the basic type H10 is excited by means of a pyramidal rotor. The power lines of the electric field of the waveguide pass parallel to the working plane of the conveyor belt, which ensures the uniformity of the energy supply to the cocoon layer along the width of the belt. The reverse branch of the tape is located along the bottom wall of the waveguide, where the electric field strength is close to zero, which prevents the possibility of overheating it with prolonged operation of the coconut drier.

Improved coconut dump SK-150K. In the work of K.A. Avazov, it was considered that the new device with infrared rays was improved with the SK-150K unit. Currently, on the bases for primary processing, live cocoons are pretreated with hot air. The main operating part of the cocoon driers is the SK-150K unit, which is used in the mashing mode (under drying) at a temperature of 110-120°C for 1.5-2.0 hours. As a result of preliminary scientific research, scientists K.R. Avazov, it was found that the appropriate option for coconut carrots is the effect of infrared rays [10-12].

In K. Avezov's work a deep literature review was conducted and the initial experiments conducted by them showed that it is necessary to create a maximum wavelength of 1.1 μm for primary processing of silkworm cocoons. A new device for coconut carrots has been created, using on the basis of the influence of the same wavelength of infrared radiation, which is widely used today [13-15].

Results and Discussion

One of the possible variants of creating vibratory movements for carrots and drying cocoons of silkworm is the development of vibro-mechanism of pallets of a drying cabinet with infrared irradiators for heating products [16-18].

A mechanism for generating low-frequency oscillations at the expense of an electromechanical drive to pallets has been developed at the Tashkent State Technical University.

Figure 1: *The process of IR heat treatment with vibrations of silkworm cocoons.*

Conclusions

The proposed development of technology and technology for the carrot and drying cocoons of the silkworm - works with a low-temperature, infrared, vibration installation, using elastic waves and convective heat supply (Figure 1). With the use of this technique and technology, the process of speeding up the carrot and drying, as well as improving the quality of the resulting silk, is provided.

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