

## **EXPLOITATION RESEARCH OF SOUR CHERRY PROCESING MACHINES**

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### **ABSTRACT**

This paper includes the exploitation characteristics of line machines for removing sorou cherry seeds, produced in different plants near Argulica village, the Karbinici municipality. The analysis were made on the sour cherry in which more dominant was the so called „oblacinska“, collected in at least 50 localities altogether, mainly in climate conditions of eastern part of N. Macedonia, in which there were cases where the crops were irrigated with water, but also cases where crops were not irrigated. The orchards with irrigation the yield is 15-20 t/ha, whereas the orchards without irrigation 8-10 t/ha. Diseases comes mostly from monilinia spp, blumerella jappi and stigmia carpophila. Besides the root borer, the economic damage is caused by the cherry fly. The fruits were collected from crops with altitude of 200 to 800 meters, from different climates. There were measured and tested the exploitation characteristics of the lines machines for sour cherry processing and finishing installed in factory in village Argulica and that: machines for manipulation presented with first stand, first tube with all components (barboter), slanting elevator, laundry control, control tape, calibrator, knock-seed and further packaging machine. Working conditions were quite optimal, while the workers involved were seasonal.

**KEYWORDS:** machine, barboter, procesing equipment, sour cherry.

### **INTRODUCTION**

There is a parallel in agricultural production with the development of a certain culture is developing and agricultural machinery, as in primary agricultural production, also and in the handling and processing. Long years of the line of machines, a big number of factories tend to make new more sophisticated and precise machines for work by which this important process

will be easier and more precise to be conducted. The industry on that part imposed the basic standards from which a large number of scientists are engaged with this issue, but also and a large number of factories with their constructive offices on a year level placing new technical knowledge and solutions by which manipulation and processing of fruits is completely mechanized, or to get to the stage of half automation. That is why on the beginning I started my introduction with the word “parallel” where the modern equipment for processing gave the opportunity the areas under the sour cherries continually to increase.

In conditions of N. Macedonia this equipment like any other equipment is slow purchased and slow applied, but still with the change of the agriculture we started to apply it and already have the first results. The aim of examination was the installed line for the removing seed of sour cherry, to be tested with fruits produced on different plantations from which the most represented was „oblacinska“. The purpose was to be tested the way of working, quality, analyzing the organization of the setting as well as to be realized certain advantages and disadvantages which on the whole line are appearing with the purpose that these findings (knowledge) to be used for scientist and applied purposes.

Line machines installed for manipulation presented with first tripod, etc., first bath with all constituents, slanting elevator, machine control, control strip calibrator knock-stoning and further packaging machines. Working conditions were pretty optimal seasonal workers.

## **MATERIALS AND METHODS**

The tests included a two-year commitment line of machines, which has already mentioned fruits coming from different orchards with different quality that previously every truck sampled in their own laboratory confirmed the quality and calibration, determines the number of impurities, commonly leaves which gave rise to sign and additional regulation in the proceedings. All fruits were transported in plastic boxes etc. low Hollandaise weighing 5 to 6 kg. The fruits were harvested mostly without stalk, but there was some stalk and whose percentage was examined. Trucks after the measuring scales are unloaded manually and unloading is performed in the first tripod, full of water in which essentially all impurities in sorou cherry that were less specific gravity float on water, further first tripod associated with the tub washing has repeated the procedure for washing the cherry (Canev, 2012).

The regulation of the fan sloping elevator and the elevator control served through the dashboard. The expenditure of water is measured by measuring device mounted on the main pipe during the transport in relation to the vehicle at the time of unloading, to guide and pour

in the first bath. On both machines removing seed, monitored the entire process of equal distribution of the fruits and mutual alignment of elevator control for smooth supply of fruits and the number of openings to the number of correctly tipped seeds, improperly tipped and those that were partially knocked out.

## **RESULTS AND DISCUSSION**

The results of the tests that were made for production in 2018-2019, indicate that the line machines removing seed, gives very good results, but great caution should be constantly on-time regulation, is necessary and pre-vocational training for workers, because the fruits themselves are very different and even between a vehicle with a vehicle there is a difference that depends a lot on the varieties of the cherry, applying agro-techniques, the method of harvest and even mechanical impurities (leaves, stems, etc.) to obtain quality and productivity, it is essential one expert which all these parameters will follow by taking into account the analysis in the laboratory with the entire line of machines provides the ability to be adapted to the type of fruit. The measurements were performed during the two years vegetation are shown in Table 1, in which the given average values obtained with a greater number of repetitions, and that results can be improved.

Table 1. Results of the measurements of the line for washing, cleaning and calibration of cherry

|                     | Consumed water for 1 h | Capacity t/h | Motor power kw | Number of workers |
|---------------------|------------------------|--------------|----------------|-------------------|
| <i>First tripod</i> | 6 m <sup>3</sup>       | 1.6          | 4 kw fan       | 3+8               |
| <i>tub</i>          | 5m <sup>3</sup>        | 1.2          | 2,5 kw Tub     | 3+8               |

Fruits of the plastic boxes are pouring in first tripod in which the fruits partially were washed by water circulation.

From the examinations is concluded that the consumption of water per hour averaging is 6 m<sup>3</sup>. Leaves and other impurities in this very successful tripod are removed and part of the ground or dust is layered on the bottom. Partially cleaned fruits are transferred to the tub where they were blowing air from the fan when water indicates the state of boiling as the fruits under the influence of the contact force are very well cleansed and washed, additionally removes all

impurities and the fruits undertaken by the sloping elevator are given to the inspection tray (strip).

We have it done by the potentiometer on the control panel, with blowing - bubbles of air should have a movement of water, but it shouldn't happen to transfer it together with the fruits of the tub through the barriers that have a height of 12 centimeters. Such a regulation was made depending on the weight of the fruits, actually their calibration if is less than 17 mm, or greater which depends on the type of the fruits. Other contaminants during the work such as the leaves, stalks or other impurities were stuck sideways sieve set, which cleaning was done by continuously but without a specific time period, because as mentioned it depends on the method of harvesting and the type of the fruits. From the table it can be seen that the number of employees ranges from 10-12 people who serve the entire system of washing, cleaning and handling of line work on the control bar to the preparation of fruit and harmonization the line of unloading, washing, removal of various impurities, calibration, to machines for removing see. From Table 1 it obtained an average capacity per hour is 1.6 tons which value can be improved and increased if mechanical cherry picked and if workers have previously made training. Control machine is set on a sloping elevator when bringing the fruit from the tub which is performed in the chamber for further washing and purification of the fruits. With the help of nozzles placed parallel to the water is performed extensive washing and during the operation we noticed a good purification of the fruits without damaging them. The control tape, served by four workers in two by a role to remove certain mechanical impurities, usually those fruits that have pedicle (stalk). The tape is adjustable in speed of time depending on the condition of the the fruits, regulation is done through the control panel potentiometer that provides an opportunity to increase productivity, but we always had in mind to work in combination with the calibrator and machine for removing seed (Canev, 2012)

After the control bar the fruits prepared can be packed for a different purpose, but in this case would go to calibrator and later to removing seed, because that's what the calibrator was asking for. It carries out taking all the fruit from the control bar wherein the cherry comes to open the rotary sieves when which the first screen pass those in diameter  $\varnothing$  17 mm, the second screen fail the fruits with a dimension of 16 mm, while the third screen with the fruits with 13 mm. The remaining fruit sizes smaller than 13 mm, are falling at the bottom that still go to a further manipulation in the case of the plant are frozen, and some went into the barrels with alcohol. During calibration, it was noticeable that the quality of the product depends on the quality of calibration actually of the cherry which was less and more turbine faster calibration to that

cherry that long waiting period of admission or one to which technological maturity has been passed. An important point in the calibration has been the immediate competence handler occasionally involving brush for constantly releasing sieve and easier rotate around its axis.

For the outbreak of the seeds of the fruits we worked with two machines manufactured in factories Zin and Ferum, with both machines working in parallel in the same conditions and with the same preparation of the fruit, and the results obtained from examinations and also quality of work are presented in Table 2 .

Table 2. Quality of the machines for the outbreak of sour cherry seeds

| No. | Type of machines    | Capacity kg/h    | Number of grains in 1kg | Weight of the fruit of the cherry (g) | Correctly tipped seeds % | Improperly tipped seeds % | At all tipped seeds % |
|-----|---------------------|------------------|-------------------------|---------------------------------------|--------------------------|---------------------------|-----------------------|
| 1.  | <i>FERUM-GERMAN</i> | <i>1500-1800</i> | <i>333-250</i>          | <i>3-5</i>                            | <i>99.99</i>             | <i>0.01</i>               | <i>0</i>              |
| 2.  | <i>Z.I.N-SERBIA</i> | <i>800</i>       | <i>333-250</i>          | <i>3-5</i>                            | <i>99.95</i>             | <i>0.05</i>               | <i>0</i>              |

Analyzing the data presented in the table on the work of two machines for the outbreak of the cherry seeds may be noted that the capacity of the German line of machines is with twice capacity of Serbia while the quality of work is identical. Must not ever be allowed fully emergence of the seed of the fruit of cherry which would contribute to hindering the further manipulation of the fruits. To maintain the quality of the machines needed constant supervision of the work, diagnosing problems if they occur and of course regularly changing set of needles that determine the quality of outbreak of seeds based on their exploitation, actually the quantity of sour cherry that they have reprocessed.

## CONCLUSIONS

Based on two years of testing, measurement and analysis, it can be concluded that the position of the line of processing machinery is in accordance with the capacity of individual machines for processing sour cherry without the emergence of bottlenecks and delays as a result of non compatibility of their capacities.

Exploitation characteristics of the line machines are satisfactory, indicating a better organized structure in the process, and prior training of the operators and participants in the process in order to be minor delays, while productivity increase.

Exploitation characteristics of machinery for obeskostuvanje cherry will be positive of course if servicing, maintaining the same in accordance with the regulations and recommendations of the factories producing the same.

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