

RATIONALE OF AGRO-TECHNICAL PERIOD HARVESTING WALNUT

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Abstract: Reveals the scientific and methodological principles of definition agro-technical period for harvesting of walnuts depending on intensity fall fruit and the quality nut kernel.

KEYWORDS: WALNUT, PARAMETERS, QUALITY, PERFORMANCE, AGRO-TECHNICAL PERIOD, HARVESTING

1. Introduction

One of the problems with the production of walnuts is precisely indefinite agro-technical harvesting period. It known that delayed harvesting walnuts reduces the quality and yield losses, because there is a direct relationship between the period of harvesting walnut and quality [1]. Today timing of harvest in the agricultural sector engaged a number of scientists [2-4, 7, 9-11]. In relation to harvesting of walnuts, research study related to early ripening of fruits and signs of maturity, but clear boundaries defined harvest season was not. According to research results, can be argued that there is a direct relationship between the period of harvesting walnut and its quality [1].

2. Preconditions and means for resolving the problem

To substantiate the agro-technical period of harvesting walnuts and the choice of the method of harvesting, it is necessary to determine the beginning ripening and fallow of nuts, the distribution of the intensity of precipitation during the harvesting season, and as well as its duration, depending on the natural and climatic conditions.

The reason for beginning harvesting season of walnut is complete maturation of fruits, to achieve their better storage [2]. To date, research done features of the maturation of walnut [5]:

- 1) the flowering period (if flowering occurs in spring, then ripening occurs in late August and mid-September, when they bloom in June, then begin to ripen from the third decade of September);
- 2) the cracking of the green pericarp around the fruits;
- 3) the beginning of yellowing of leaves on a tree;
- 4) formed outer pericarp layer hard shell that protects the core of halves.

3. Results and Discussion

To determine the beginning of the onset and following of nuts, a research was carried out in the conditions of the western region of Ukraine on basis of the Department of horticulture and vegetable growing of Lviv National Agrarian University.

To study the agrotechnical-harvesting season, were selected trees aged from 20 to 40 years old in the middle varieties. The start of observation began on September 15th (on basis of flowering of walnut) before the start of the forecast season. Every day, until 10:00 am, the fruits of nuts were harvested, with a crown area of 15m², counted the number, weight, and determined the quality of the fruit. At the beginning of September experiment, cracking outer pericarp layer was not observed. The first cracking outer pericarp layer was recorded on September 18, but nuts from trees did not fall (Fig. 1).



Fig. 1. Cracking outer pericarp layer at the beginning of the harvest season

To test the ripeness and quality halves that hung on the tree, with auxiliary equipment shaken several fruits in dark green outer pericarp layer that hard separated.



Fig. 2. Fruit and halves of walnut at the beginning of the harvesting season

In Figure 2 shows the state of walnuts at the beginning of the harvest season. The outer pericarp layer was hardly separated, halves of nut is ripe.

The first fallen of nuts were recorded on September 22, which accounted for 6.3-9.2% of the total number of walnuts. On the skeletal branches of walnut trees (Fig. 3), fruits of varying degrees of ripeness were recorded:

- fruits of full ripeness in fully exposed outer pericarp layer;
- fruits at different stages of cracking outer pericarp layer;
- the fruits of outer pericarp layer whose color varied from light green to dark shade.



Fig. 3 Skeletal branches of walnut tree and nuts of different degree of ripeness

The outer pericarp layer of light green color was easily removed from all nuts. The outer pericarp layer of dark green color are removed by applying considerable effort and need specialized cleaning equipment.

In the period from September 21 to 24, there was dampness and rainy weather, which prompted, outer pericarp layer until the intensive opening and falling of nuts. During this period, about 40% to 55% of the harvested harvest was obtained from the trees under study. On September 23, windy and humid weather was observed, which increased the intensity of falling fruit and amounted to 18-23% of the total harvest.

September 25 was a dry and warm weather. The intensity of cracking of outer pericarp layer and falling nuts stopped. The harvesting period ended on October 15th.

In Figure 4 shows the dependence of the intensity of fall nuts per day. The first day corresponds to September 22.

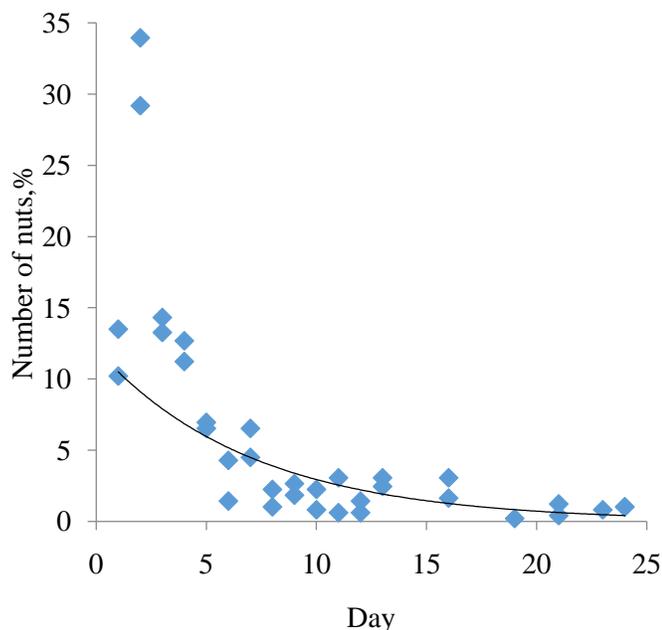


Fig. 4 Intensity of fall walnut

After processing the obtained research data, the regression equation, which is described by the exponential law, is derived:

$$I = 12.09e^{-0.142n},$$

where I - intensity of fall of the fruits during the harvest season, %/day;

n - number of days relative to the beginning of the harvesting season.

Also, for the establishment of the agrotechnical term, the quality of the collected nuts was analyzed (Fig. 5). In accordance with GOST-16833-71, the quality of core halves a walnut is divided into four groups [6] (Fig. 6).



A)

B)

C)

Fig.5 Quality of core halves a walnut

A) September 15;

B) September 25;

C) September 26th.



Fig. 6 Standardization of the quality of the nuts

A) higher grade;

B) first grade;

C) second grade;

D) third grade.

As can be seen from the figure, nuts according to standardized requirements can be attributed to a higher grade that corresponds to the beginning of harvesting season.

Observation of the fallen walnuts showed that the length of stay on the inter-row surface negatively affects their quality. On the 25th of September the quality of their of halves was already in line with the first grade, and on September 26, the darkening of core halves to the second and third varieties was recorded. After September 26, due to contact with the intermediate row, nuts lose qualitative characteristics (Fig. 7). As of October 5, 25% of halves that falling in earth during the period from 15 to 22 September were spoiled (Fig. 7).



Fig. 6 Quality of halves walnut as of October 5

Having analyzed the obtained results, it was determined that the agro-technical harvesting period of walnut is 10 days for the conditions of the western region of Ukraine.

4. Conclusions

The beginning of harvesting season and its duration depend on the agro-technical terms of achievement, which is characterized by the formation of shells and core of halves.

The falling of nuts begins a week after discovering the first signs of maturation.

Throughout the harvesting season, the intensity of falling nuts decreases, on average, from 10 to 20% in the beginning to 0.4 - 0.8% at its completion.

The core halves nuts from contact with the intermediate row surface lose their quality and after ten days they begin to spoil.

From the observations made it was determined that the agro-technical term for walnut harvesting is 10 days.

5. Literature

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