RESEARCH RESULTS ON HARVESTING METHODS FOR SEA BUCKTHORN (HIPPOPHAE RHAMNOIDES L.)

PhD Candidate: Kh. Munkhtuvshin

Academic Supervisor: D. Khandsuren, Ph.D

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INTRODUTION

- Producing fruit and berries requires years of vigorous work, finance, experience, and skills. Mongolia has a vast territory, natural and climatic hazards, and a negative climate. More than 60 types of natural fruits and berries are grown. Researchers have developed agro-technologies for growing, localizing and multiplying various types of fruits and berries.
- The fruit industry in our country is developing in the form of households and enterprises, and although the legal framework for fruit cultivation is in place, there is a lack of field organization and qualified human resources at the professional level. Therefore, simplifying the harvesting of fruit orchards, improving organization, and properly planning human resource management are among the pressing issues, and little has been resolved so far.
- Therefore, in this study, researching the productivity of human labor in fruit orchards will be the basis of the research work.

02

AIMS AND OBJECTIVES

In addition to the production of sea buckthorn fruits and agrotechnological activities, it is estimated that more than 90% of the total manpower spent on harvesting its fruits is spent on harvesting.

Therefore, studying the harvesting of sea buckthorn fruits will be the main objective of the research. In order to realize the above goals, the following goals were put forward. It includes:

1. Determining the productivity of manual picking of sea buckthorn fruits
2. Determining the productivity of the method of harvesting sea buckthorn with forceps
3. Determining the work productivity of the method of vibrating harvesting of sea buckthorn fruits

03

RESEARCH MATERIALS AND METHODS

- The research was carried out in the fruit garden area of "Bayanburd Green Grove" LLC, 21st district, Songinokhairkhan district, Ulaanbaatar city.
- Sea buckthorn harvesting by hand and vibration during freezing was conducted in September, October, and December 2021-2023 with the participation of 10 people over a period of 14 days.
- The research was carried out using the observation method (timing), quantitative and qualitative research methods developed by McAtamney and Corlett.

04

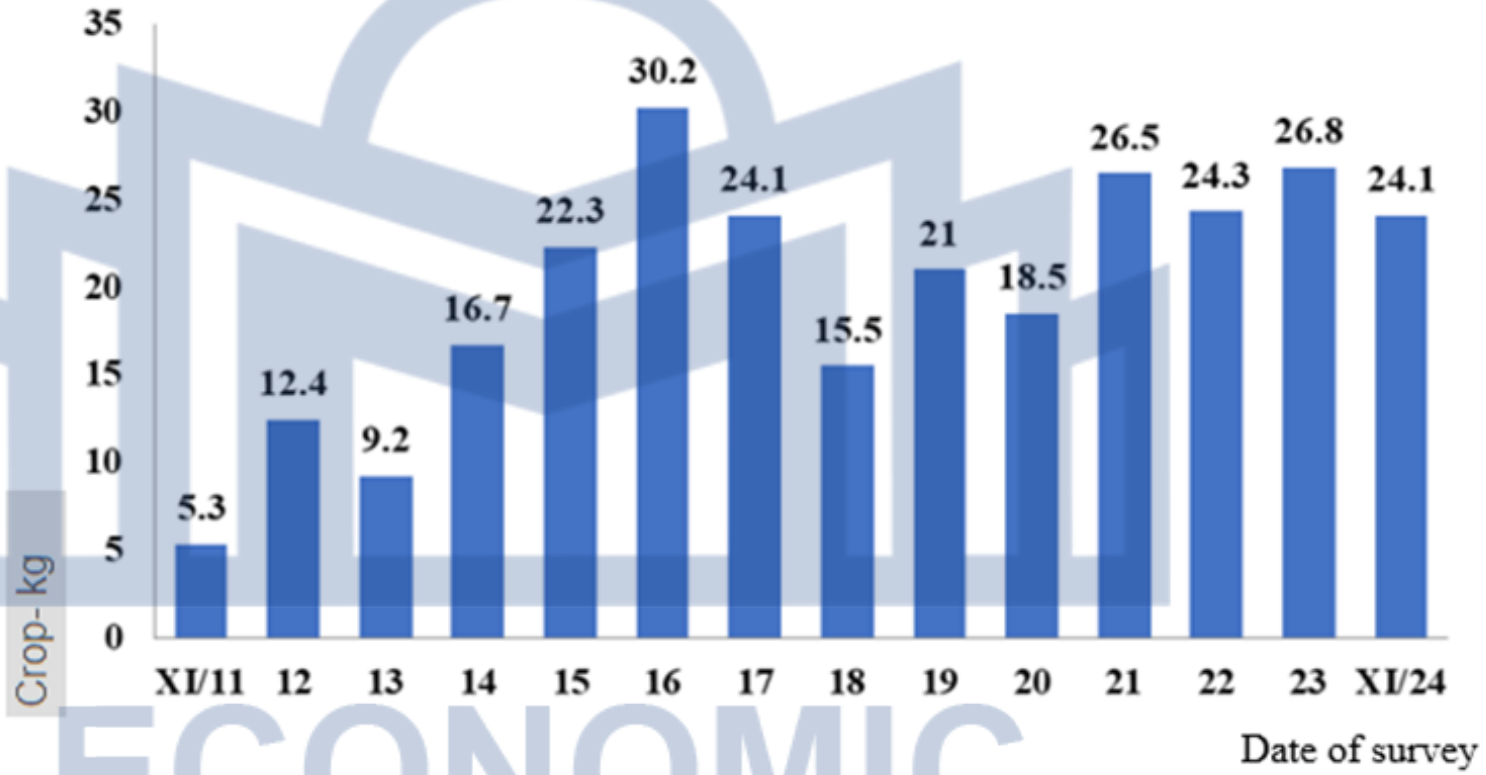
RESULTS

1. Results of research on the productivity of manual picking of sea buckthorn fruits

Harvesting of sea buckthorn is done when the fruit is fully ripe. Fruit ripening can vary depending on the location and climate of the orchard. Manual fruit harvesting is best done at the end of August and beginning of September, and we did it between September 11th and 24th.

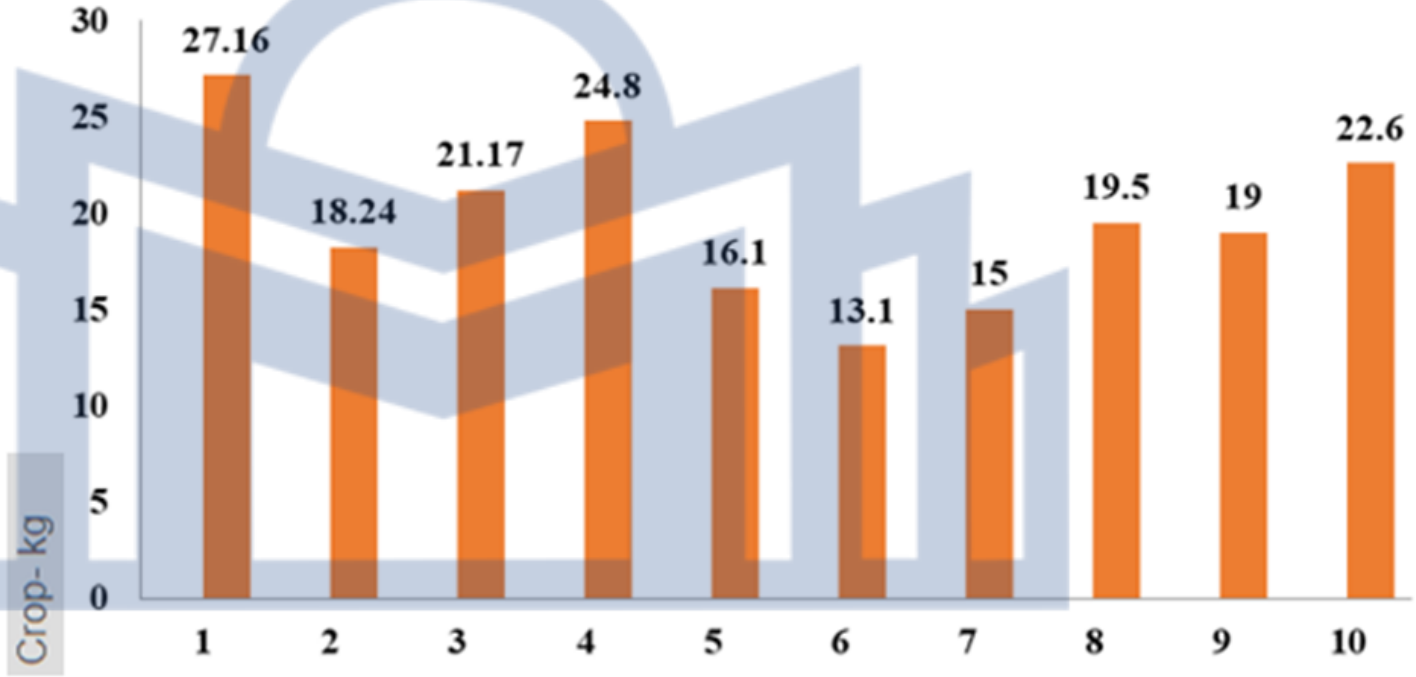
Sea buckthorn berries have sharp thorns, which is one of the reasons hand picking is slow. To protect your hands from thorny branches during the harvest, it is advisable to wear gloves and long-sleeved clothing. The fruit can be picked by moving from the stem to the tip.

Picture 1. Average daily yield of all workers during manual fruit harvesting, kg/ha



A total of 10 workers participated in the study, and the graph shows that the average yield on the first day was 5 kg, but after 5 days, on September 16, it increased to 30 kg, which shows that the working techniques are being acquired.

Figure 2. Manually harvested fruit, kg
(The average of each person's 14 working days)



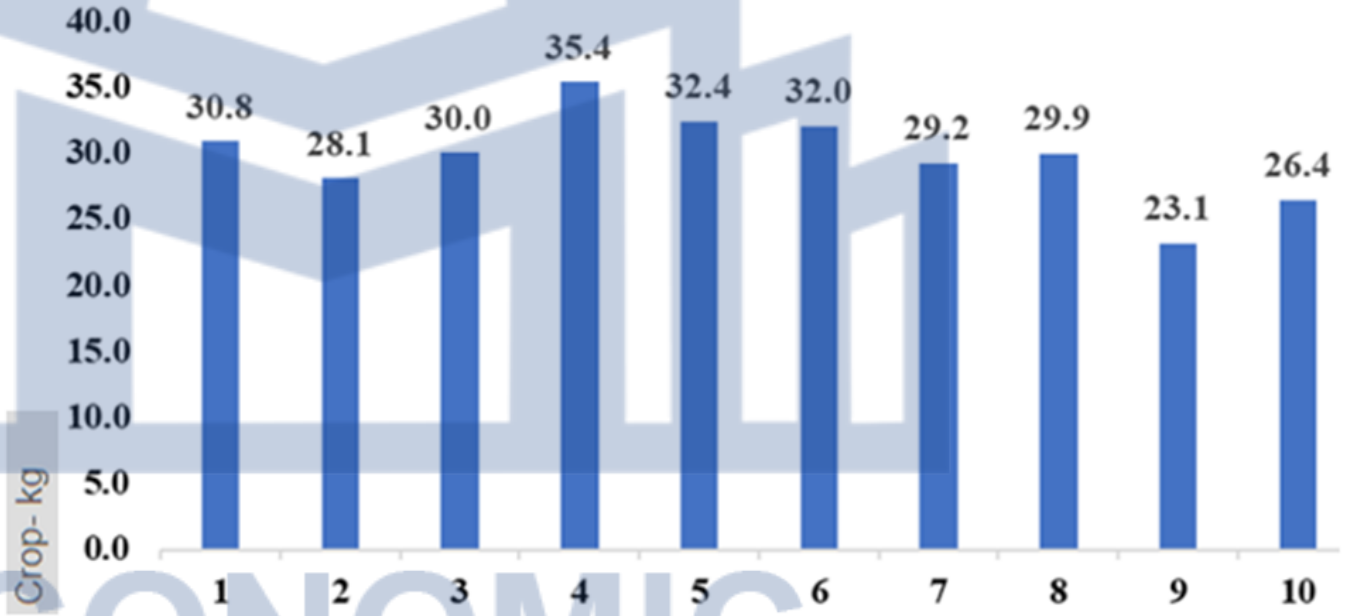
Picture2. Kilograms of Fruit Harvested by Hand
(Shows an average of one person's 14-day daily harvest of fruit)

A total of 10 employees participated in the study, and the average daily harvest of each person for 14 days is shown in the following figure. Fall harvest work is short on time and requires getting more done in less time. As a result, there is a legitimate requirement that harvesting workers be provided with occupational safety guidance and information prior to harvesting.

2. Results of research on the productivity of picking sea buckthorn fruits with forceps

2.1. Harvest fruit with straight hook forceps

Picture 3. (The average of each person's 14 working days)

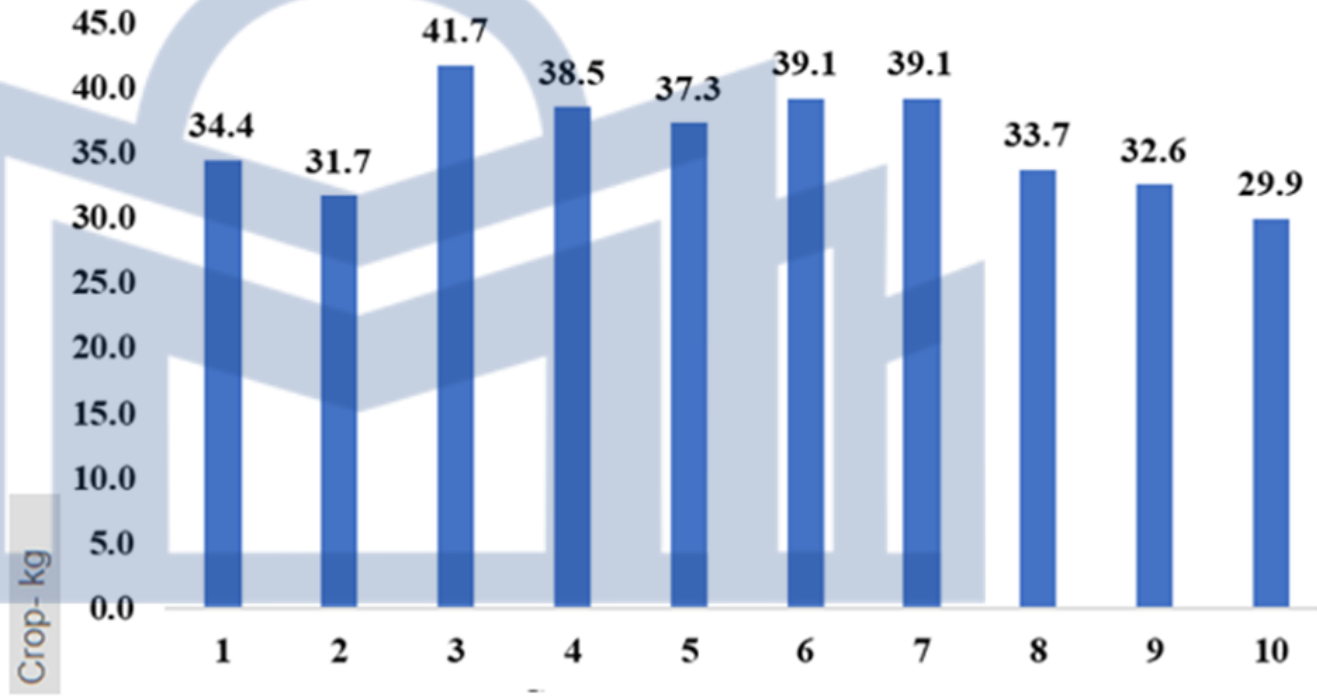


Picture 3. Fruit harvested with straight toothed forceps, kg
(Shows an average of one person's 14-day daily harvest of fruit)

A total of 10 employees participated in the study, and the average daily harvest of each person for 14 days is shown in the following figure. The maximum is 35.4 kg and the minimum is 23.1 kg. Research results show that it improves labor productivity by 1-2 times compared to manual harvesting.

2. Picking fruits with straight and curved combined forceps

Picture 4. (The average of each person's 14 working days)

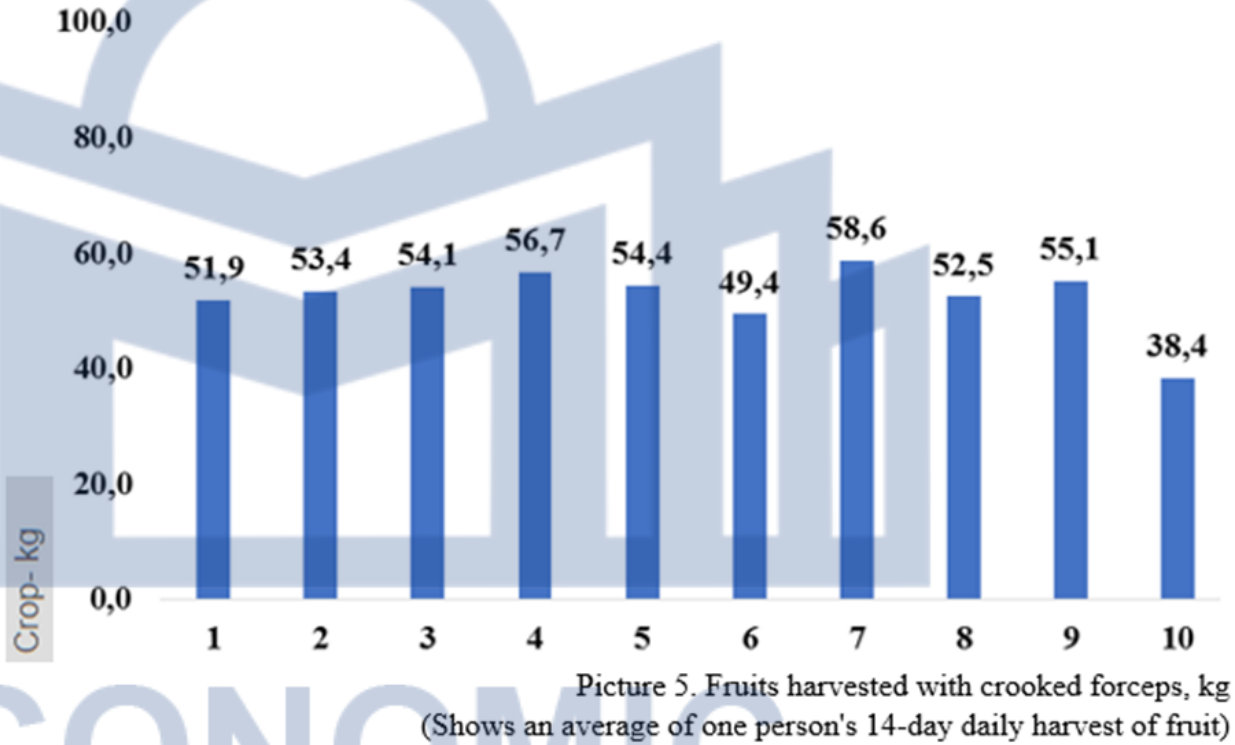


Picture 4. Fruits harvested with straight and curved pair of toothed forceps, kg
(Shows an average of one person's 14-day daily harvest of fruit)

A total of 10 employees participated in the study, and the average daily harvest of each person for 14 days is shown in the following figure. The maximum is 41.7 kg and the minimum is 29.9 kg. Due to the combination of straight and crooked teeth, labor productivity increases by 2-3 times compared to hand picking.

2.3. Harvest fruit with crooked toothed forceps

Picture 5. (The average of each person's 14 working days)

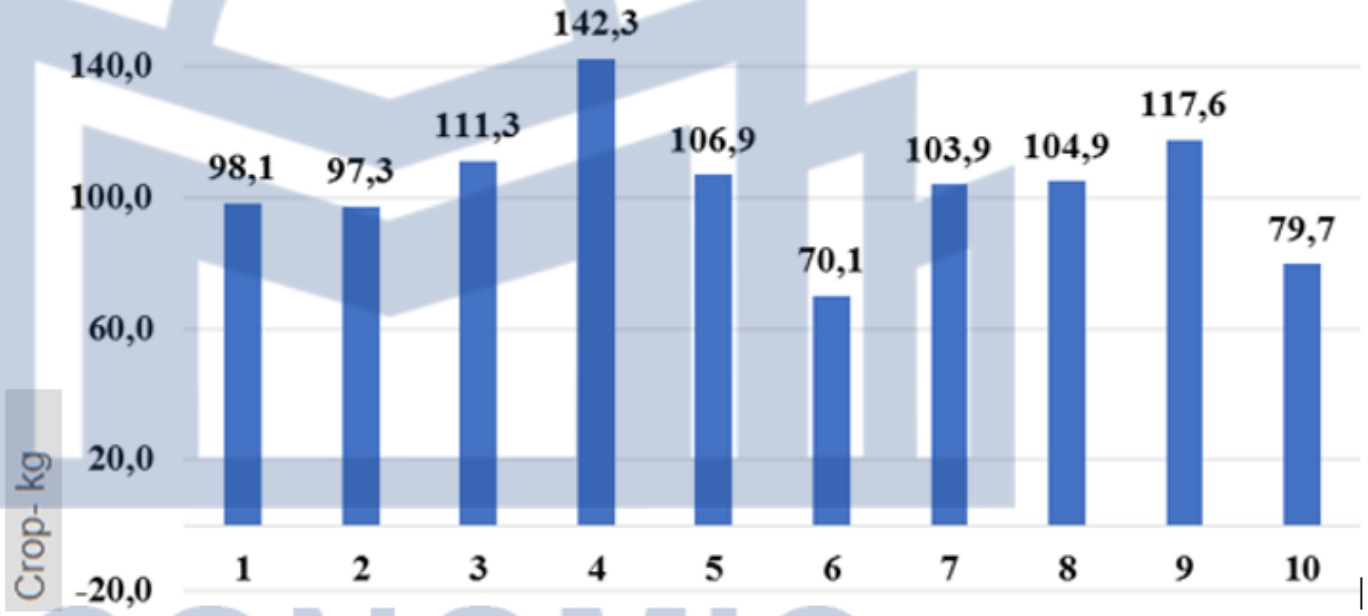


Picture 5. Fruits harvested with crooked forceps, kg
(Shows an average of one person's 14-day daily harvest of fruit)

A total of 10 employees participated in the study, and the average daily harvest of each person for 14 days is shown in the following figure. The maximum is 58.6 kg and the minimum is 38.4 kg. When the fruit is picked with crooked toothed forceps, the damage to the fruit is minimal, and most of the fruit on the branch can be harvested.

3. Доргиож түүх аргын ажлын бүтээмжийг судалсан дүн

Picture 6. (The average of each person's 14 working days)

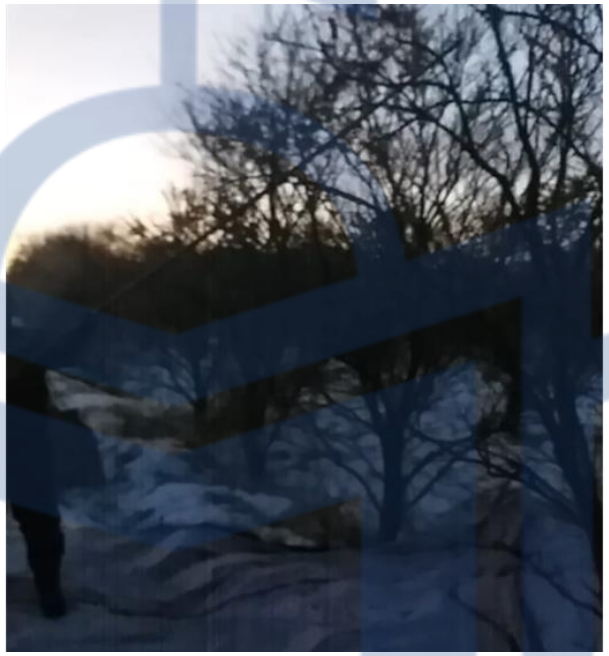


Picture 6. harvested by vibration method, kg
(Shows an average of one person's 14-day daily harvest of fruit)

A total of 10 employees participated in the study, and the average daily harvest of each person for 14 days is shown in the following figure. The maximum is 142 kg and the minimum is 70 kg. This method increases labor productivity by 4-5 times compared to manual harvesting.

04

Harvesting sea buckthorn by shaking



When we carried out our research in December 2021, the air temperature was above -25C at night. When we beat the fruit branches with a 1-2 meter long stick, the fruits fell well on the designated mat.

Then the fruit was harvested in specially prepared sacks. Since the research was conducted at night, visibility was limited during photography and video recording, and the equipment froze and the possibility of normal operation was lost.

Table 1. Fruits harvested by different methods, in kg

№	Fruit harvesting method	Harvested fruit kg		
		Average fruit per working day for 1 person, kg	1 person's 14-day average fruit, kg	Total fruits for 14 working days of 10 people, kg
1.	Manually	19.6	274.4	2750
2.	With straight-toothed forceps	29.7	415.8	4132
3.	With straight and curved toothed forceps	35.8	501.2	5014
4.	With crooked toothed forceps	52.4	733.6	7343
5.	By vibration	103.2	1444	14450

05

CONCLUSION

1. When picking sea buckthorn by hand, the average daily average of one person was 19.6 kg, while the productivity of 10 people in 14 days was 2750 kg.
2. Harvesting fruits with straight-toothed tongs increased labor productivity by 1-2 times compared to manual harvesting, and the average productivity of one person per day was 29.7 kg, and the productivity of 10 people in 14 days was 4132 kg.

- When harvesting fruit with straight and curved toothed tongs, the labor productivity of the combined hook was 2-3 times higher than that of straight toothed tongs, and the average of one person per day was 35.8 kg, while the total of 10 people was 5014 kg in 14 days.
- Harvesting of fruit with curved toothed forceps was more productive than straight, straight and curved forceps. The fruits of the tip part of the shoot with few branches were obtained well, and labor productivity was increased by 3-4 times. When evaluating the work productivity of 10 people for 14 days, a total of 7343 kg of fruit was harvested, and the productivity increased.

3. Harvest sea buckthorn berries by shaking them with a stick when they are frozen. This method increases labor productivity by 4-5 times compared to manual harvesting. Research has shown that one person collects 103.2 kg per day on average. When determining the work productivity of 10 people in 14 days, a total of 14450 kg of harvest was determined.

The amount of harvest depends on many factors such as nature, ecological features of the year, climate change, variety features, flowering biology, fruiting, bird eating and harvesting. When harvesting sea buckthorn by hand, 10 people harvest 1 ha of land in 14 days., 2 hectares of land in 14 days for 10 people with forceps, but it was observed that 10 people can harvest 4 hectares of land in 14 days.

Thank you all for your attention