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Processes and technologies applicable to the exploitation of non-wood forest products in the Republic of Moldova

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Abstract. The aim of this research is to analyze the organization of the collection and processing of non-wood forest products in the Republic of Moldova. In order to achieve the goal, the following objectives were set: characterization of NWFPs harvesters, to establish and describe the technological processes applicable to the valorization of non-wood forest products; to analyze the organization of the collection and processing of non-wood forest products. The objectives were achieved through direct observations with NWFPs harvesters by conducting the questionnaire survey. The non-probability sampling technique used is called snowball sampling.
Keywords: non-wood forest products, colect, processing, technological processes.

Procedee și tehnologii aplicabile la valorificarea produselor forestiere nelemnoase din Republica Moldova

Rezumat. Scopul acestei cercetări constă în analiza modului de organizare a colectării și procesării produselor forestiere nelemnoase din Republica Moldova. Pentru îndeplinirea scopului s-au stabilit următoarele obiective: caracterizarea culegătorilor de PFNL, stabilirea și descrierea procedeelor tehnologice aplicabile la valorificarea produselor forestiere nelemnoase; analiza modului de organizare a colectării și procesării produselor forestiere nelemnoase. Îndeplinirea obiectivelor a fost efectuată prin observații directe cu culegătorii de PFNL, prin realizarea anchetei cu ajutorul chestionarului. Tehnica de eșantionare non-probabilistică utilizată, se numește eșantionarea în bulgăre de zăpadă.
Cuvinte cheie: produse forestiere nelemnoase, colectare, prelucrare, procese tehnologice.

1. Introduction

The forestry fund offers great opportunities for collecting, harvesting and processing non-wood forest products (NWFPs). The NWFPs exploitation process aims to supply consumers with good quality products throughout the year. In order to be satisfied with the work done and the income obtained from NWFPs exploitation, several steps have to be completed: harvesting, sorting, grading, packing, transporting, storing and selling. The application of efficient exploitation methods is also conditioned by the choice of

technological operations that ensure the shortest route to the consumer, thus ensuring that the quality of NWFPs is maintained.

A production-consumption system is defined as a whole set of goods, activities and entities involved in the processes of growing, harvesting, adding value and selling finished products. The system includes the technologies used, the production and processing activities, the social, economic and institutional environment in which the system operates [1].

Although the potential of the NWFP sector to reduce poverty and improve people's livelihoods is great, knowledge about the NWFP technology chain is insufficient. This process is individual, unorganized, dispersed and the participants lack sufficient knowledge to perform.

The proponents of promoting non-wood forest resources argue that harvesting and processing these products is a promising activity that can be undertaken without large investments [2].

For each species and plant organ, the following conditions are important when harvesting: the optimal time (time of year, time of day) for harvesting (which for most plants is the flowering period, or when the plant material contains the maximum amount of extracts with active substances) and the harvesting method (manual or mechanical, which aims to ensure that the material retains the maximum amount of extracts containing active principles) [3].

Although non-wood forest products are harvested in large quantities, up to 50% of the total volume is harvested, a situation caused by a shortage of labor, unsatisfactory remuneration, the long distance from the locality to the collection point, the lack of access roads [4]. In order to solve these problems, which also exist in the Republic of Moldova, it is proposed to develop schemes at the level of the forestry enterprise for determining the existing non-wood forest resources, forecasting the harvest, controlling and recording the quantities collected, applying an efficient technology, applying preferences to small business credit in the sector concerned.

NWFP processing significantly increases income and employment for low-income people around forests. The technical-material base necessary for the valorization of these products, in the Republic of Moldova, has experienced a degradation after the 1990.

In the process of organizing NWFP harvesting and processing, there are two closely interlinked and mutually dependent sides, the labor process and the technological process. The work process concerns the activity of harvesting and processing the products in question, and the technological process involves the quantitative and qualitative transformation of the harvested products. The quality of the product depends to a large extent on the

quality of the raw material, which in turn depends on how it is harvested and processed. Today, the organization of NWFP collection and processing is taking on new dimensions in the context of sustainable forest development. To this end, it is necessary to improve operating technology and compliance with legislation.

The NWFP value chain in the Republic of Moldova is a supply chain, represented by individuals and 13 legal entities [5].

The aim of this research is to analyze the organization of the collection and processing of non-wood forest products in the Republic of Moldova. In addition, there was carried out documentation and synthesis of knowledge on processes and technologies applicable to NWFP exploitation. This was fueled by the lack of scientific literature in Romanian on the subject

In order to achieve the goal, the following objectives were set: characterization of NWFP harvesters, establishment and description of technological processes applicable to the valorization of non-wood forest products; analysis of the organization of the collection and processing of non-wood forest products. The achievement of the objectives was carried out through direct observations with NWFP harvesters by conducting the questionnaire survey.

2. Methods and materials used

In the research process, depending on the stage of the investigation, several methods were used to collect, process data and organize information. According to the criteria for classifying research methods, in order to discover the relationships between different sides in the research carried out, there were used the cross-sectional method (survey), the quasi-experimental and observational method (survey, document study), statistical methods (opinion survey, mathematical-statistical analysis), methods of collecting information (statistical recording, survey), methods of processing information (quantitative and qualitative), methods of interpreting research data (comparative, interpretative).

For the practical study and further research, the main research method was the survey. The necessary primary data were obtained as a result of the field survey on a sample of 510 people. To this end, visits were made to 164 localities in 16 districts of the Republic of Moldova.

The research technique used was the questionnaire, the application procedure was individual-face-to-face, and the research instrument was the actual questions in the questionnaire.

NWFP harvesters in the study are represented by the rural population. Respondents answered an identical number of questions (31 questions) arranged on paper.

The questionnaire, being an investigative tool, included questions that elicited various responses from individuals. The response scales were based on a hierarchy of response variants, with choice answers, binary scales with dichotomous answers, scales with multiple answers; whenever necessary, the "I don't know" variant was also proposed.

Through coding, the responses from the questionnaires were converted into numbers and recorded electronically in Excel to facilitate further processing.

The sample size was calculated according to the formula [6, 7]:

$$n = \frac{t^2 * p\,(1-p) * N}{\Delta^2 * N - t^2 * p(1-p)};$$

where:

n – representative sample size;

t – coefficient associated with the probability of guaranteeing research results (value taken from statistical tables, usually $t = 1.96$ for $P = 95\%$);

p – incidence of the phenomenon ($p = 0.5$);

N – rural population size (1650300 persons, over 16 years old);

Δ - maximum permissible error ($\Delta \leq 0.05$);

$1 - p$ – probability of absence of the phenomenon.

$$n = \frac{1.96^2 * 0.5\,(1-0.5) * 1650300}{0.05^2 * 1650300 - 1.96^2 * 0.5\,(1-0.5)} = \frac{3.8416 * 0.5 * 0.5 * 1650300}{0.0025 * 1650300 - 3.8416 * 0.5 * 0.5} =$$

$$= \frac{1584948.12}{4125.75 - 0.9604} = \frac{1584948.12}{4124.7896} = 384.24 \approx 384\, persons.$$

The statistical processing of the primary information in the database was carried out using the application SPSS(R) („Statistical Package for the Social Sciences"), which takes into account that some variables are nominal and others are numeric.

The non-probability sampling technique used has been described in [8] and is called snowball sampling.

3. Results and discussions

The gender and marital status of respondents are basic characteristics in a survey. They describe women and men in terms of social status. Because of these particularities, people have different experiences, perceptions and attitudes towards the importance of NWFPs. These relationships between gender, marital status and NWFPs are determined by roles and responsibilities in family and society. The social particularities of NWFPs harvesters play an important role in the collection, use and distribution of NWFPs products. In the

result of the survey, 77% of the respondents were men and 23% were women. Of those interviewed 85% are married and 15% unmarried.

People's age influences attitude and interest in NWFPs. The age distribution of the surveyed harvesters is normal (Gaussian) according to the Kolmogorov-Smirnov test D=0.054. The arithmetic mean age of the sampled harvesters is m=45.8 years, with a root mean square deviation of SE=12.8. The age range of NWFPs harvesters is between 16 years (for the youngest) and 80 years (for the oldest). Estimates show that the majority of harvesters are between 25 and 62 years of age, and this is evidence of the importance of NWFPs to the population.

Interpreting the data on respondents' education, it was found that they graduated from different educational institutions (general education-36%, technical vocational-48% and higher education-16%). Regarding the occupation of harvesters, employees represent 57% and unemployed represent 32% of the sample. Retired harvesters are less numerous and represent 11%.

Before NWFPs harvesting begins, the areas with the given resources, potential and physiological maturity of the products to be harvested must be identified. It also prepares the inventory and storage location, identifies the workforce. Within a reasonable time, the harvesting plan and schedule for each species in each sector is drawn up, taking into account the overall production and the ripening period. An important aspect in the rational use of NWFPs is forecasting fruiting, which can be short or long term. Depending on the specifics and destination of the non-wood forest products, there are chosen the method of harvesting, inventory, loading/unloading and transport.

The methodology according to which the harvest is estimated is regulated by regulations and literature [9].

The determination of the optimum harvesting period depends on the method of harvesting, following assessment of the physical, biochemical or physiological changes occurring [10]. This avoids quantitative and qualitative losses [11].

The majority of harvesters (54%) rate NWFPs abundance as medium and 23% rate it as low. A smaller percentage of harvesters (17%) mentioned that the abundance of these products is high.

In the analysis carried out by the Institute of Forest Research and Management of the Republic of Moldova with reference to the area and the possibility of provisional harvesting of rosehip (Rosa canina L.) and hawthorn (Crataegus monogyna L.) from the forest fund, it is presented that the area of rosehip is 289921.3 ha, of hawthorn 77701.9 ha, and the quantity recommended for harvesting is 1283250 kg of rosehip and 22550 kg of hawthorn [12]. Comparing the existing areas of rosehip with those before the declaration

of Moldova's Independence, there has been a substantial increase, more than 100 times, while the commercial potential has increased only 17 times. For hawthorn, the same report is as follows: the area has increased 7 times and the commercial potential has remained practically the same.

The main non-wood forest products harvested by the population are: mushrooms, rosehip, lime blossom, walnuts, elderflower, St. John's wort, fruits of Cornus mas L., acacia flower, sloes, chamomile and wild garlic. The results obtained demonstrate that the most popular fruits harvested from the forest fund of the Republic of Moldova are the rosehip (Rosa canina L.), the forest horns (Cornus mas L.), the hawthorn (Crataegus monogyna L.), the aronia (Aronia melanocarpa Michx.-Elliott), the pigeon (Prunus spinosa L.). The main fruit and berry plantations in the forest background are aronia, the forest horns, less currant.

For the sustainable use of NWFPs, an important role is played by the way of collection. Harvesting by breaking is practiced by 65% of respondents. People who harvest non-wood forest products by felling represent 30% of the sample and 5% use other harvesting methods (e.g., shaking). These products must be ripe, clean, free of impurities, dry, fresh. An exception may be made for products which are intended for transport over longer distances, which can be collected and semi-collected. Green fruit and berries should not be picked, but stored and stored in cellars for ripening. It is also necessary to consider the collection period, which is important for their subsequent use. On hot days, it is recommended to harvest in the morning, after dew has been removed, and in the evening. Those picked at midday are not juicy enough and deteriorate quickly. Fruit and berries collected in wet weather deteriorate easily and rot, requiring urgent processing. In cold, gloomy weather, fruit and berries can be picked all day long. Harvesting is done every day or one day later, depending on weather conditions and market demand. The number of harvesters depends on the area and productivity of the plants, under the supervision of forestry staff, so as not to damage the fruit or plants.

Nut crops comprise two groups of species: coniferous and deciduous. For the forest fund of the Republic of Moldova, there are important those of the deciduous group (walnuts and hazelnuts). They have very low perishability, high dry matter content and can be stored for a long period of time without special rooms. Harvesting of walnuts begins in the first decade of September by shaking or falling by itself. It is not acceptable to break branches and green walnuts, because the kernel loses its qualitative and quantitative properties and cleaning is difficult. The ripening of walnuts coincides with the cracking of the mesocarp, when the kernel is fully developed. The ripening period of walnuts is gradual, therefore, in order not to harvest them in several rounds, they are shaken and

picked from the ground. Before harvesting walnuts, it is good to mow the grass to facilitate harvesting. Cleaning of mesocarp nuts is carried out at harvest time or at storage places. Cleaning can be done manually for small quantities or mechanically for larger quantities. If the mesocarp is not cleaned, the nuts are placed in dark, damp rooms (cellars) for several days and the mesocarp cracks. Walnuts should not be left for a long time in cellars for the mesocarp to crack, because it blackens and softens, then the walnuts wash harder and do not have an aesthetic appearance. After cleaning the mesocarp nuts, wash and dry in the sun. Walnuts should not be kept in water for a long time, as they soften the kernel and are difficult to dry out, creating conditions for mould to grow. Hazelnuts are harvested at the fully ripe stage, which can be visually established by the external changes that appear on the fruit. They are cleaned of impurities, spread in thin layers in the sun and dried.

Before starting to collect medicinal plants, it is necessary to distinguish them from the rest of the flora. There are several groups of medicinal plants, depending on the organ used: root, rhizome, tuber, bud, bark, leaf, flower, fruit, seed. Collection of the underground part is carried out in autumn after the end of the growing season or in spring until the beginning of the growing season. To help promote the species, it is advisable not to extract the entire root or, where it has been extracted, to sow seeds. The buds as raw material for medicinal products are collected from pine (Pinus sp.), spruce (Picea sp.), birch (Betula pendula Roth.), poplar (Populus sp.), blackcurrant (Ribes nigrum L.). The best time to harvest is in spring, when the buds are fully swollen and the leaves have not yet appeared. Buds are harvested only from trees to be removed in the logging process. Bark is harvested in spring, when sap circulation starts and is not affected by lichens. The vegetative part of medicinal plants is harvested in spring or summer, until flowering or during flowering. It can be cut with a knife, scissors, scythe or mechanical devices at the level of the last leaves. It is forbidden to extract the plant from the soil, as this affects the regeneration of the species and reduces its biological potential. Harvesting is recommended in dry weather, on cloudy days after the dew has evaporated. Leaves, depending on the species, are harvested at different stages of growth and development: during budding, flowering, fruiting. This process is carried out in dry weather. The leaves are broken from top to bottom. In some species, cut the shoots with scissors or a knife. The collected raw material is cleaned of impurities, leaves attacked by pests are removed, yellow leaves. Leaves can be harvested fresh directly from the plant or together with the plant after which they are dried and then harvested. The flowers or inflorescences of medicinal plants are harvested according to their flowering period. They are harvested by hand, or using various cutting tools or appliances. Flower picking is recommended at the beginning of flowering to avoid shaking. Before drying, the flowers are cleaned of any

impurities and unnecessary parts of the plant. Harvesting is done in alternating bands to ensure regeneration and perpetuation of the species. Ripe seeds and fruits are rich in therapeutic substances. Harvesting therefore takes place as they ripen. In some species, in order not to shake, cut the branches with partially ripe fruit, tie them in sheaves and hang them in a dry space. They are then shaken on a clean surface, where they are cleaned of impurities and placed in pots.

The best time to collect mushrooms is in the morning, when they are best seen due to the glow of dew drops. At this time of day, mushrooms are hardier, fresher and deteriorate less. The most practical and convenient method of picking mushrooms is by breaking them up, then cutting them with a knife and cleaning them of impurities on the spot or at the place of destination. It is better to harvest by cutting, so as not to destroy the mycelium and disturb the litter. Harvest only young mushrooms, leave old ones to reproduce mycelium. Although they fruit abundantly, wild mushrooms are not sufficient biological resources to be collected and processed in industrial quantities.

The researcher [13] mentions that the way of harvesting edible mushrooms does not influence the regeneration capacity.

At the same time as harvesting, presorting is carried out, which includes the removal of products and bodies which do not meet the storage conditions. Those destined for fresh processing should be harvested with stalks, in order to extend the shelf life, and those destined for processing can be harvested without stalks. In order to have a uniform rhythm in the harvesting process and to carry out quality control, it is recommended to harvest them in smaller areas, depending on the number of workers. Depending on the intensity of NWFPs ripening, harvesting can be total or selective, manual, mechanized or mixed.

Extensive research on NWFPs collection and consumption at European level was carried out in [14].

The distance travelled to NWFPs resources is an indicator that demonstrates the importance of the products for the population. The distance most harvesters (42%) travelled was 3 km, 30% travelled 5 km and 19% travelled 1 km. The fewest harvesters (7%) travelled up to 10 km to harvest NWFPs and 2% travelled more than 10 km.

After harvesting NWFPs are prepared for transport according to destination. Transport and handling of NWFPs account for a large share of total expenditure. During transport and handling the quality of the NWFP and packaging must be maintained. For this purpose, suitable means of transport and appropriate packaging must be used. The great diversity of NWFPs also imposes different requirements for transport and handling.

Perishable products require more special transport conditions, regarding temperature, humidity, while less perishable products can be transported by ordinary means of transport. NWFPs can be transported by land (road, rail, animal transport), sea and air, using the shortest and most appropriate routes, without stops.

Transport gives people more opportunities for mobility and development. This indicator measures the accessibility of the population to non-wood forest products for harvesting. When it comes to means of travel to harvest NWFPs, half of the harvesters interviewed (50%) went to harvest on foot, 21% went by car, 25% by wagon and only 4% went by bicycle. Harvested fruit and berries are transported to their destination unprocessed. It is not recommended to turn them over from one vessel to another as they deteriorate.

For transport, peanuts are packed in 50 kg bags. Each package shall be marked with labels indicating the name of the product, quality, year of harvest, weight, quality certificate number. After cleaning and drying, walnuts are sorted by size and colour, which are intended for sale, and those for the kernel need not be graded.

During transport of mushrooms, sun, dust and moisture should be avoided.

Given the climatic conditions of the area in which Moldova is located, with four seasons and a single harvest, the most common method used to preserve NWFPs was drying. The rudimentary (solar energy) and more sophisticated (temperature controlled) processes have been used. The results showed that 62% of the sample preferred to store NWFPs in dry form, clearly superior to canned (24%) or frozen (14%).

Fruits and berries can be canned, dried, frozen. From berries and wild berries, compotes, jams and syrups are prepared, which have a pleasant aromatic taste and are in demand on the market. The technological scheme for the preservation of fruit and berries includes the following operations: sorting, grading, washing, preparation of containers and lids, packing, filling, sterilization, sealing, completion, storage, sale.

Nut drying can be natural or artificial. After drying, walnuts are graded by size, divided into three categories: large, medium, small. Contaminated, empty, green nuts are not allowed. Nuts and hazelnuts should be kept in dry, ventilated and rodent-free containers.

Harvested medicinal plants shall be kept in dry, clean, dark and permanently ventilated rooms. Packed in sacks, paper boxes, cloth bags. Poisonous plants, containing essential oils, are kept separately, packed in hermetically sealed glass containers. The type of product, species, time and place of collection shall be indicated on each package.

According to current standards, mushrooms can be processed in different ways: dried, preserved, marinated and salted.

Processing of NWFPs is carried out to resist biodegradable factors, to extend shelf life and consumption. Several preservation processes are known: refrigeration, freezing,

drying, blanching, boiling [15], which are also applicable to NWFPs. Dried NWFPs have a low weight and volume and are easier to transport. They are packed in paper bags and kept in dry rooms. Drying of non-wood forest products can be artificial or natural. Direct sun-drying of the vegetative parts is not recommended, as chlorophyll is destroyed, the leaves turn brown and the nutrient content is greatly reduced. Fruits and underground parts of the plant can be dried directly in the sun. Smelly plants are separated from odourless ones so that the smell is not absorbed. If the drying temperature is not respected, the biological content of the products is destroyed. Proper processing of NWFPs increases their profitability, adds value to them, and improving and expanding knowledge in this area can increase production and facilitate the marketing of these products. Processing NWFPs helps preserve products, reduces losses and makes it easier for them to penetrate more distant markets.

Primary processing involves several operations: conditioning, harvesting, drying, shredding, transport, sorting, carried out with specialized machinery, through which the raw material is successively transformed, quantitatively and qualitatively, from its initial state into a finished product [3]. Regarding the prospect of using non-wood forest products the researcher [16] mentions that after processing their value increases by 4-20 times. This situation can also be seen on the market in the Republic of Moldova, where, for example, there are large price differences in the sale of medicinal plants [17].

According to the researcher [18] drying products is the healthiest solution for shelf life compared to frozen or canned products. This is also the opinion of NWFP harvesters in the Republic of Moldova, according to survey responses.

Purchasing points are also an important link in the production process, as this is where the quality of NWFPs is determined and where the aim is to collect/receive and produce as large quantities as possible. The author [19] demonstrates that the activity of purchasing non-wood forest products in the Tomsk region of the Russian Federation is a method of developing entrepreneurship in villages. The research carried out by [20] argues, from an economic point of view, the need to organize procurement networks in order to increase the involvement of NWFPs in the production of goods.

The creation or existence of NWFPs collection centres have a strategic role, as they guarantee the harvesters a safe place of realization and rhythmic supply for the internal or external market. The above activities may be subject to specialized or multi-functional stand-alone production capacity. At the same time, NWFPs traders will be able to buy various products from these centres. Regarding the information whether there is a collection point for non-wood forest products in the locality, it can be mentioned that 61%

of the respondents said that there is not, 18% of the sample answered that there is, and 21% said that they did not know.

Based on our own experience and making an analogy with the purchase of agricultural fruit, we have found that the successful organization of the activity of a purchasing point is determined by a series of technical-organizational measures, which are interdependent:

- Locate procurement points as close as possible to the source of NWFPs;
- Fitting out and equipping the purchasing points with the necessary items;
- Announcement in the area about the purchase of NWFPs;
- Accommodation and food for people coming to harvest from other areas;
- Daily or weekly remuneration of harvesters;
- Rapid dispatch of collected NWFPs to large purchasing points or directly to processors. Usually, in the Republic of Moldova, the points of purchase of non-wood forest products are forest cantons, through foresters or intermediaries.

The packaging technological operation is carried out in the packaging premises of the exploitation centres. Packing is the operation by which NWFPs are placed in containers, either haphazardly or arranged. The purpose of packaging is to maintain the integrity and quality of non-wood forest products during handling, transport, storage and to maintain an attractive appearance at the time of exploitation. Depending on the physical-chemical properties, quality and destination of non-wood forest products, several packaging methods are used: in bulk, by arrangement and semi-arrangement. Packing method is chosen according to species, perishability, destination and transport distance. Packaging involves choosing the most appropriate type of packaging, depending on the specific characteristics of the products. In order to identify the origin of the products, a label shall be affixed to the packaging giving information on the species, the producing unit, the quality and the date of packaging. Depending on the technological stage, packaging can be divided into: packaging for harvesting, packaging for transport, packaging for storage, packaging for internal and external fulfilment. They can be made of wood, cardboard, plastic, textiles, in order to ensure product quality. For perishable NWFPs it is recommended to use packaging without a lid. Harvesting in metal pots is not allowed as they oxidize and are no longer suitable for use. If the raw material contains ethereal oils, then it must be packed in tightly closed glass or metal containers with lids. The bark, root, leaves in the packaging process can be pressed, which guarantees better storage conditions and increases the packaging capacity. After packing, a label is placed in the pots, on which data on the name of the raw material, collection period, weight, place of harvesting, packing date and registration number are entered.

Packaging means the totality of the constituent elements in a functional complex, intended to contain or wrap a product or an assembly of products in order to ensure their quality and integrity during handling, transport, unpacking and consumption [21].

Storage consists of placing NWFPs for storage in various premises, called warehouses. The purpose of the stores is to ensure the preservation and maintenance of the quality of non-wood forest products. The choice of storage and storage method depends on the physical-chemical and physiological properties of the NWFPs. Storage can be in bulk or in packages. Prior to storage of NWFPs, storage facilities are cleaned, repaired, dried and disinfected. The packaged raw material is placed on shelves, grouped by category and stored according to product type. Rodents, which degrade the appearance of the raw material, must not enter the warehouses.

The majority of respondents (47%) go NWFPs picking with family and collect from the same places. As for solitary harvesters, they represent 35% of respondents and go alone to harvest NWFPs when abundance is low. Pickers who go picking with friends (12%) pick from the same place for recreational purposes. Those who go harvesting with people they know are a minority in the sample (6%) and non-wood forest products are mostly sold.

Previous studies [22, 23] have shown that value chains are sensitive to many factors: the nature of the product, the market in which it is sold, demand and supply factors. Studies on the stages of the NWFPs value chain have also been conducted by [24-26]. Although, the NWFPs sector is considered forward-looking, no one is contributing to the development of cultivation technology, this problem was also mentioned in [27].

A prerequisite for successful marketing of NWFPs is to market them in uniform batches, which must meet certain quality requirements. NWFP conditioning consists of a multitude of processes, used to prepare as required, depending on the final destination. Conditioning operations depend on the species, the technical and material equipment of the buying-in or sales centres and are provided for in various regulations. Conditioning can be mandatory, optional or excluded. The technological operations carried out in packaging are the following: loading, unloading, quantitative and qualitative reception, cleaning, sorting, grading, quality control.

4. Conclusions

The spread of NWFPs throughout the territory of the Republic of Moldova demonstrates the great potential of providing and solving the multiple requirements. Research and development of the NWFP technology chain is particularly important to enhance quality and bring them up to quality standards. The exploitation of NWFPs differs according to

species, location, processing and preservation of products. Technological process development contributes to sustainable supply of NWFPs by conserving resources, improving market value, increasing sales opportunities.

Due to the many-faceted technological process, the non-wood forest products sector in the Republic of Moldova involves a large number of people (about 23,000 people/year), of different ages, gender, education, as well as being a source of income, conclusions supported by the literature. Most people are involved in the collection of rosehips (around 15000) and linden blossom (around 2000).

NWFPs harvesting and processing technologies are relatively simple and readily available, and are known to people in resource areas. The main methods used to harvest non-wood forest products are by harvesting (65%) and felling (30%). This indicates that the population knows and respects the harvesting rules, with a positive effect on the protection and perpetuation of the species.

Primary processing by drying of NWFPs is preferred by most harvesters, direct buyers or exploitation centres. NWFPs consumed fresh have a lower number of technological elements compared to those processed dried, frozen or preserved.

Distance between NWFPs resources and harvesters influences the number of people, quantity harvested, effort expended and their performance.

The existence of collection points in the locality positively stimulates collectors to sell NWFPs.

The exploitation of NWFPs is also important because they are usually environmentally friendly, an important export commodity, and their cultivation can use some less productive land for tree plantations.

Due to increased interest in NWFPs, the amount harvested by the population increases and the biological potential of the plants decreases. This demonstrates that the haphazard harvesting of non-wood forest products has negative ecological consequences.

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