Inventory of Alchemilla Species as Non-wood Forest Product in Trabzon Region, Turkey

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Abstract. The paper deals with a production schedule for Alchemilla species that has an economic value in Hamsikoy Region (Trabzon, Turkey). Suitable method was selected according to plant characteristics and distributions in putting forward one of the major deficiencies. Systematic sampling was used to determine the potential of Alchemilla. Ten-year production plan, considering the conservation-use balance, was composed. Production area was parceled to ten blocks. Essential plan was made to get a harvest from each block.

The study area (4 577 ha) is part of Hamsikoy village. It was classified as conservation and production sub-areas. Conservation sub-area is equal to 1 311 ha, and production one – (3 266 ha). The study area consists of meadows and outside forest. Buffer zone of 100 m across was composed between timber lines with meadow areas. Besides, 5 % of production sub-area was excluded from harvesting. These areas have been separated as conservation. Buffer zone and conservation sub-areas are needed to reduce the negative influences of habitat disintegrates, which are destructive for biodiversity. This way, about 29 % of the total area was separated for conservation.

In the study area, we collected Alchemilla samples from 256 different points and determined 20 Alchemilla species. *Alchemilla oriturcica* is the only endemic species among these. Schedule took into account this situation.

Key words: forest ecosystem, non-wood forest product, non-wood forest product, sustainable use.

INTRODUCTION

Alchemilla genus takes place in Rosaceae family, Rosoideae subfamily (Hevwood. 1993). It is made of perennial herbs with woody rhizome (Davis, 1972). It is known that many species of this genus existing in Europe are apomictically reproduced. It is accepted that many of Alchemilla species, which propagate in Turkey, are also done so. 73 species exist in Turkey of which most propagate in Northern Anatolian Region and it is said that these species are close relatives of those taking place in Crimea, Caucasia and Iran (Davis, 1972; Hayirlioglu-Ayaz, 1997; Guner et al., 2000; Menemen et al., 2002; Hayirlioglu-Ayaz et al., 2002; Hayirlioglu et al., 2002; Ozhatay et al., 2006). According to Pawlus et al. (1989), Alchemilla species have wide range of ecological and geographical propagation on hard rocks, sandy soils, different humid soils, grass and within bushes and forest vegetation (Hayirlioglu-Ayaz, 1997).

These plants, which mostly propagate in northern Anatolian region, are called as Dokuztepe, Findik Otu, Sahten, and Sehduran (Baytop, 1994). This plant, which is grown on meadows, open fields within forests, and wet roadsides, has a significant share among non-wood forest products (Fig. 1).

Demand for non-wood forest products and especially vegetative products has been increasing day by day, and people have been seeking ways to how

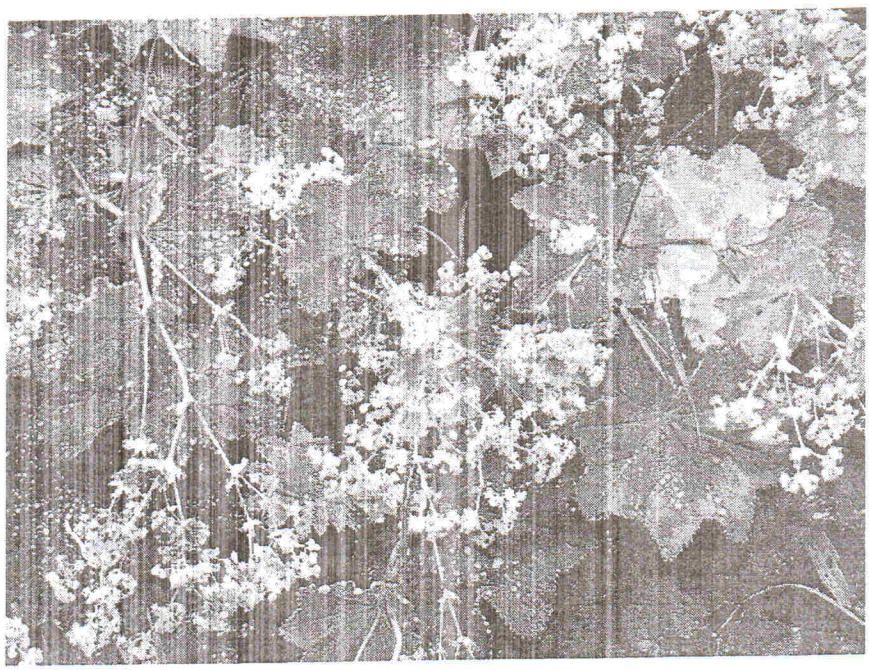

Fig. 1. *Alchemilla pseudocartalinica*

to benefit more from them. However, in our nation, any formal inventorial study has not been conducted yet and opportunities have not been researched sufficiently for benefiting from them in domestic and foreign markets. The objective of this study was to conduct an inventory for Alchemilla taxon, which are non-wood vegetative products (NW VP) having economical value and potential, around the location of Hamsiköy and to establish a production program.

Alchemilla species, whose aerial parts are used, is a medical plant. It has been sold in domestic and foreign markets from eastern Black sea region in previous years. It is one of interesting plants with an annual production volume exceeding 25 tons and with an income exceeding $ 36 000. The plant takes second place according to the income and comes third according to the production mass among the medical aromatic natural or cultured bulbous and tuberous plants, which have been sold in the country or abroad (K u c u k et al., 2000).

The useful parts of Alchemilla species, which is one of the plants being exported from the region for medical or other purposes. The plant is used as follows:

• Food. Its fresh leaves having a slight bitter taste are cut into small parts and added to the useful green vegetative salad.

• Cosmetics. Its dried leaves are used in shrinking and curing acnes by steam after they are soaked like tea. The extract may be used for burning eyes just like it is used in case of pore and acne treatment by cold compress. Furthermore, it is added to creams for softening dry skins.

• Medicine. Green parts of the plant are soaked like tea as a mouthwash after tooth extraction operation and treat-

ment of diarrhea. Its leaves are boiled and the resulted extract is used in curing injuries, compressing and mitigating inflammations (B r e m n e s s, 1999).

• Landscape architecture. Some species of this genus (*Alchemilla caucasica, Alchemilla rizensis,* etc) are listed among plants that may be used in establishing rock and roof gardens (A c a r et al., 2006).

• Furthermore, lady's mantle is an ideal plant for bleedings and digestive system troubles, and also, it is well stomach-friend. Moreover, it is used as diuretic and tonic. Especially, women use this plant for their certain disorders. For example, it is frequently used in effluence, pains in womb, and dizziness during pregnancy as well as ruptures caused by childbirth. It prevents water deposition in the body as soaked while it may bring some other effects, especially for women, like eliminating and preventing obesity. In addition, it prevents increase in sucrose ratio in case of diabetes. It may be used externally by bathing through the way of boiling. It has certain effects curing injuries, and eliminating inflammations and eye diseases (M e s s e g u e, 1998).

MATERIAL AND METHODS

Systematic sampling was conducted for the plants of Alchemilla species within an area covering 4 577 ha in total. Circular sample areas of 50 m^2 were distributed with interval distance of 690 m across this area according to the conducted calculations.

To make a sustainable protection-usage plan, division borders in the stand types were made according to the data collected in the areas and efficiency of the products for each division. If any sample area did not fall in a division, the data for the closest sample area were used. Annual product mass to be obtained for a 10-year planning period was tabled. Buffer zones and protection zones between grazing lands and forestlands' borders on the stand types' map were established, using ArcGIS 9.2 program. A 100 m buffer zone was established between grazing lands and forestlands' borders to make the natural structure survive around forestlands and on their borders. This buffer zone was made wider at certain locations to protect broken habitats (B a s k e n t et al, 2004; K a y a, 2005). To protect biodiversity and establish ecological transmission zones in the fields in which production occurs, a portion accounting for 5 % of the field was allocated for protection considering the recommended and worldwide subscale (B a y e r, 1993; P a r v i a i n e n et al., 2003; B a s k e n t et al, 2007). The product mass in this area was not included in the estimation.

Sampling was conducted at 96 points located in the field under study. Sample areas for this plant were distributed systematically across the meadows. Forestlands and open fields inside them were excluded.

We collected 256 samples across the 96 sample points and their surroundings. We identified 20 Alchemilla species.

Alchemilla oriturcica is the only endemic species among Alchemilla taxon existing in the area under study. *A. oriturcica* takes place in the VU class (Vulnerable) according to IUCN (International Union for Conservation of Nature) danger categories. Rare Alchemilla species, which are not endemic but taking place in IUCN danger category except this species, are: *A. daghestanica* (VU), *A. epipsila* (VU), *A. holotricha* (VU), *A. orthotricha* (DD), *A. plicatissima* (VU), *A. speciosa* (VU).

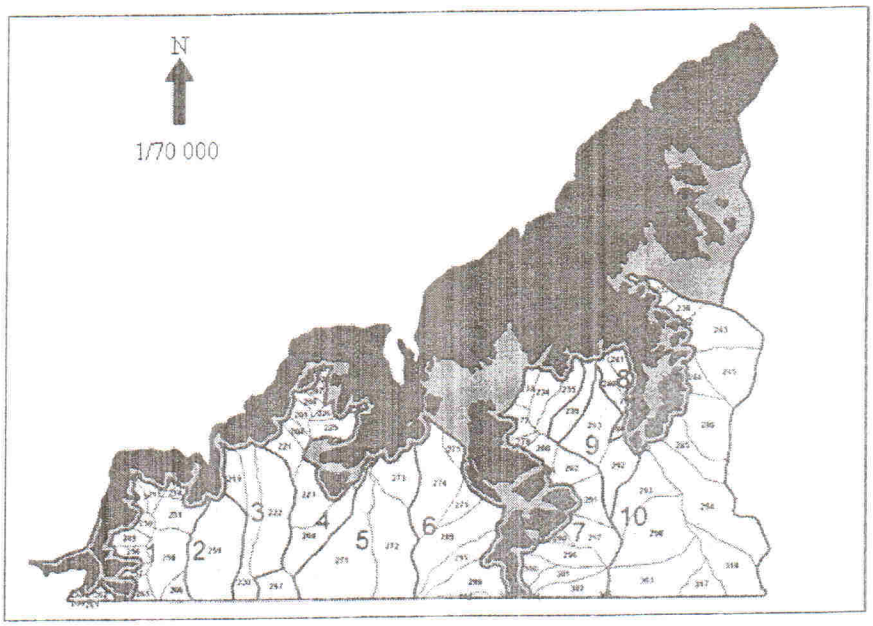

Fig. 2. Alchemilla species harvest plan map
(■ forest lands, ▒ buffer zone, production field)

Circular sample areas of 50 m^2 were specified at 96 points. Aerial parts of all Alchemilla individuals taking place in sample areas were harvested by cutting. Fresh mass of the plants collected from each sample area were determined. Then, they were dried under shadow and weighed again. Plants of Alchemilla were not observed in 31 of the selected 96 points. They were recorded as empty. 230 kg fresh mass, corresponding to 76 kg dry mass, was obtained from the rest 65 points. The areas, which were recorded as empty, were rocky lands, cliffs and the places having an inclination preventing investigation.

The buffer zone was made wider at certain locations to surround broken forestlands. Divided into small parcels of land operated by government forestlands and grazing lands in Turkey. To separate parcels of land are taken into account the structure and size. These sections are called "division" and numbered sequentially (Fig. 2). Endemic *Alchemilla oriturcica* species was seen in 169 and 123 numbered divisions. These divisions and 119, 166, 167, 168 and 170 numbered divisions, which were neighbour to these divisions surrounding them, were also included in the protection zone. Thus, size of the buffer zone reached 1 139 ha. A portion accounting for 5 % of the area after the buffer zone was excluded out of grazing lands with a size of 4 577 ha was made out of the production and these areas were also taken under production. Total size of the protection-operation class reached at 1 311 ha including this area with a size of 172 ha.

10-year production plan was prepared for Alchemilla. Production field was divided into 10 parcels in a way allowing that approximately equal production would be obtained each year (Fig. 2).

RESULTS AND DISCUSSION

Alchemilla species were established in 65 points. Total fresh plant mass obtained in areas of 50 m^2 is 230 kg, corresponding to dry mass of 76 kg. Fresh plant loses 64 % of its original mass after harvesting. In other words, the coefficient for converting fresh mass into dry one is 0.36. We established an endemic *Alchemilla oriturcica* species in 169 and 123 numbered divisions. We determined that a share of 29 % of the area should be protected and made out of the production.

We develop a 10-year plan, which is aimed at obtaining equal production each year provided that one parcel is harvested. Total fresh plant production to be obtained 10 years will be 1 279 390 kg, corresponding to 460 580 kg dry mass. Average annual production mass will be 127 940 kg fresh mass and 46 058 kg dry mass.

The buffer zone increased in places including settlements to establish habitat aisles between these settlements and big stands neighbouring to broken forest habitats. Kaya (2005) suggests that the distances of 100-500 m protect, without making silvicultural interventions to make the natural structure around forestlands survive. However, this varies depending on type of the relevant area. The zones, which had been allocated in the study conducted in Turkey, are 70 m (two-tree length) towards inside forestland, 100 m (three-tree length) towards rivers having high base width (more than 25 m), 70 m (two-tree length) towards main creeks, which are vital for aquatic life to protect water resources, and 35 m (one-tree length) towards creeks having lower flow rates and roadways. Dry creeks were made out of the zoning (OGM, 2007). In other study, it was highlighted that buffer zone width should be 30-60 m around dry creeks and small water pools, 80-120 m around other types of creeks and approximately 500 m around creeks while this is 30 m secondary roadsides and 60 m main roadsides for practical purposes (Baskent et al, 2007).

Alchemilla daghestanica, A. epipsila, A. holotricha, A. plicatissima and *A. speciosa* species, which are species of VU category, were included in the production because rare species existing in IUCN's red list for plants in Turkey considers their propagation only in Turkey and their status across the world is unclear (Ekim et al., 2000). However, if their status is made clear, protective precautions should be taken or moderate silviculcural interventions should be done for them just like it was made for the endemic species *A. oriturcica*.

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