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Statistically forecasting of some market variables of florists on usage of wild plant species in Istanbul, Turkey

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The importance of non-timber forest products increases in forestry. Forests are not generating only timber; they also produce different materials used for medical, ornamental or food purposes. To generate knowledge to be used in modeling of wild species demanded for ornamental purposes, a research project was formulated. The principle aim of the study is to share the findings of market research component of the project. The secondary purpose is to explain the place of market research to design a management model for the species in forests. Demand structure and market relations of the 655 florists in Istanbul province, which is the biggest city and main market of Turkey, were investigated. The demand levels for some wild species and the characteristics demanded by the industrial buyers were determined using questionnaire forms. According to estimations, demand level of Strawberry tree (*Arbutus unedo*) was approximately 175 000 bales per year. The consumption level of boxwood (*Buxus sempenvirens*) has been estimated as 166 000 bales per year in Istanbul. Florists procurement cost for all wild species was found to be within the range of 3 540 085 and 20 903 231 TL per year by using different calculation approaches.

Key words: Non-wood forest product, sustainability, ornamental species, supply and demand, Istanbul, florist, wild plant species, market analysis.

INTRODUCTION

Forest area in Turkey is 21.2 million hectares constituting 27.2% of the total land area. Forests in Turkey are composed of several coniferous species such as *Pinus* sp., *Abies* sp., *Picea* sp., *Cedrus* and *Juniperus* sp. and broad-leafed species such as *Fagus* sp., *Quercus* sp., and others. Forests and trees do not only provide wood and non-timber products, but also provide numerous services. Turkey also possesses a rich biodiversity. Turkey has 75% of the 12 000 plant species that occur in Europe (GDF, 2006). One third of this flora occurs only in Turkey as autochthonous species. The Turkish flora also includes many commercially important timber species, and medicinal, aromatic, industrial and ornamental plants. Turkey's floristic situation is an advantage for production of non-wood or non-timber forest products (NTFP).

Various terms have been used to describe NTFP, including secondary, minor, special or specialty non-wood, and non-traditional (Chamberlain et al., 1998, 2000). The term NTFP refers to resources in the forest other than timber, and which are harvested for commercial, personal and traditional purposes (Tedder et al., 2002). NTFPs are plants and parts of plants that are harvested from within and on the edges of natural and disturbed forests. NTFP can be classified into four major product categories: culinary, wood based, floral and decorative, medicinal and dietary supplements (Chamberlain et al., 1998, 2002). Von Hagen et al. (1996) proved that NTFP have different aspects and effects on social and economic life in USA.

The importance of NTFP is increasing in forestry literature in the world. Two international meetings on it were realized in Turkey during last decade (Ministry of Forestry, 2001; Bilgili, 2006). Papers in the recent meetings were investigated and it is seen that most of them reported

general statistics, knowledge or focused on the aware-ness of public. Medicinal plants are mostly preferred for investigations in these papers. The priority of the research on NTFP is also increasing. As a result, the first subject of forest utilization research area in the Research Programme of the Turkey on Environment and Forest sponsored by Scientific and Technological Research Council of Turkey (TUBİTAK) is the non-wood forest products.

Sustainable management of forests will directly benefit poor rural communities by stimulating local economies within and around the sites through environmentally responsible income generating activities, including eco-tourism, non-wood forest products marketing, etc. For that reason, researchers must produce the needed knowledge to design models for the management of NTFP.

Forests, owned by the state and private, have been managed since early 1960s under traditional forest management plans which were prepared according to regulations on forest management. The Regulation has been recently renewed by regarding functions of the forests in 2008. State forest resources in Turkey are planned by General Directorate of Forest (GDF) according to the Regulation. While plans produced regarding the rules of the regulation are called as functional forest plans. Indeed, they produce a first step decision on allocation of forested lands to any forest function. For that reason, management plans of forests in Turkey are not suitable to manage for all forest resources including NTFP according to multiple use and economic efficiency principles in all levels. Forest planners have been searching new planning models suitable for different forest functions such as water production, biodiversity management etc. Planners need new knowl-edge and models especially in tactical level for specific functions of forest resources.

Although, Regulation of 2008 has some articles about NTFP, articles did not explain how it can be planned. Furthermore, there is insufficient regulation on harvesting and marketing of NTFP. Recent trends of NTFP in the world can be accepted as opportunities for rural people for alleviation of poverty in or near the forests and solving the problems between people and sustainable forest management. However, Turkish forestry has weakness for sustainable management of NTFP. Threats to NTFP include rural poverty, rapidly increasing population and poor management models.

This study is the part of a research project. The overall aim of the research project is to define market chara-cteristics of goods produced from wild forest species and used by florists in Istanbul, to determine the forest areas served by florists as supply reserves, to test some invent-tory approaches and growth models for some species mostly demanded in market, to observe vegetation structures regarding silvicultural purposes and finally to offer sustainable management plans for the species which have priority in sustainability. The objective of this study prepared as a part of the research project was to share the results of market analysis in the research and to explain the role of it in management planning process for species used by florists.

MATERIALS AND METHODS

Research area of the study is Istanbul province of Turkey. Istanbul has been the capital city of different states in history. Although, it lost capital city status at the beginning of the Turkish Republic, it continues to be the center of economic, social, and cultural activities in Turkey. The population of Istanbul is 13.2 million. 18% of the total population of Turkey lives in Istanbul (TUIK, 2011). Istanbul's population growth rate has been higher than that for Turkey as a whole. For that reason, Istanbul is most important market for florists in Turkey.

The main material of the study is questionnaire forms prepared for the research. The forms were firstly tested in the market by applying 30 firms. Ultimate questionnaire forms contain fourteen different questions such as names of the species, consumption levels, times and price of them, number of goods and services produced by florists by using the wild plants, expectation on the markets, quality standards of the materials obtained from forests, distribution channels. Only two questions were structured as open ended.

Population of the study (N) contains 655 florists, members of the Chamber of Commerce in Istanbul. Sampling size (n) was computed as 56.2 by using the formula (Daniel and Terrell, 1995) below. Survey units were selected randomly from population. Number of the visited florists was 60.

$$n = \frac{Z^2 NPQ}{(ND^2) + (Z^2 PQ)}$$

Where n = Sampling size, N = Population size (655), Z = confidence coefficient (1.96 for % 95), P = probability of measurement in population (0.8), Q = 1- P (0.2) and D = sampling error (0.1).

Because of lack of the suitable data, time series or regression analysis could not be preferred in the study to estimate some variable such as the consumption, prices or income levels. The consumption levels of the species used for ornamental purposes in Istanbul were computed by using two different approaches. In the first approach, demand or consumption levels of the species enumerated in questionnaire form were directly asked to florists. By using their answers (x_i) on consumption, arithmetic mean ($\overline{x}$) of the sample and standard error ($s\overline{x}$) of consumption levels for samples were computed firstly. Then, confidence interval as the mean of population (μ) was estimated by using ($\overline{x}$) and ($s\overline{x}$) regarding formula in below.

$$\mu = \overline{x} \pm t_{0.0p} s_{\overline{x}}$$

Where, t = Student's t coefficient value, p = confidence level. Finally, average market demand was estimated by multiply N with $\overline{x}$ for each species.

In second approach, computations based on the data deal with number of goods, such as flower arrangement, bouquet, wreath, basket and number of materials needed to arrange these goods. This approach consists of two steps. In first step, number of goods
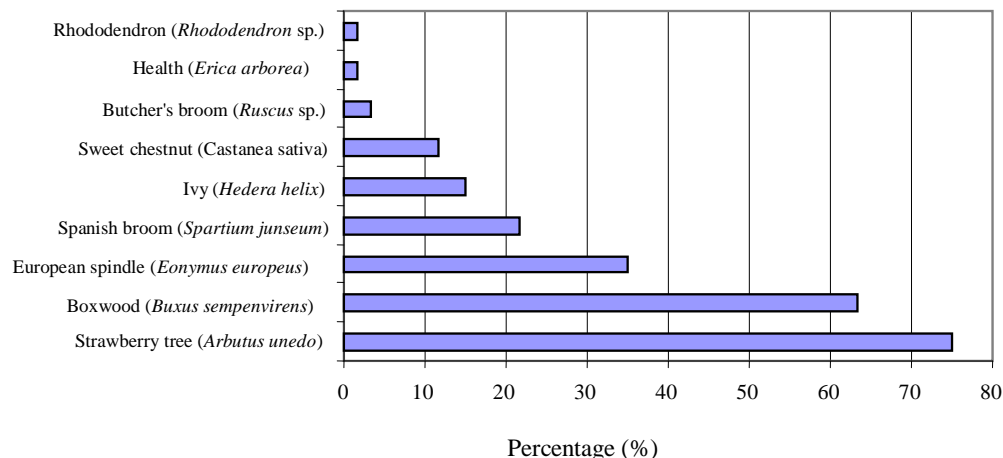
Figure 1. First three species preferred by florists in Istanbul.

produced by florists was estimated by using data (x_i) on production levels in a year. Arithmetic mean ($\bar{x}$)of the sample and standard error ($s\bar{x}$) of production levels for sampling were computed and then confidence interval as the mean (μ) of population for production was estimated by using ($\bar{x}$) and ($s\bar{x}$) regarding formula in above. In second step, number of materials was estimated by using same statistical process applied in first step regarding data on consumption levels for each goods. In deed, if somebody produces a good and one unit of good requires x unit material usage, total material consumption for all production may be found by multiplying number of goods and material used. Details on computations may be seen when results listed in the related tables. Second computation approach may be called as supply approach and was used for testing the answers of the florists on demand levels or results obtained in first approach. Results were obtained from statistical estimations in first or second approaches based on data of samplings in 95% confidence levels.

RESULTS

According to florists, 55% of them may be defined as medium size enterprises. The share of big enterprises is only 18.33%. While 45% of the florists works in a region which has middle level income in Istanbul, 26.7 of the samplings serves in a rich region of the city.

Preferred wild species by the florists to use for ornamental purposes have been illustrated in Figure 1. The Figure 1 was prepared regarding the numbers of the florists which were declaring any names of the species. For that reason, it cannot define consumption level, but shows only frequencies. The strawberry tree and boxwood have been used by the florists generally. Beneficial parts of these species are branches including leaves mostly. However, flowers on the branches are important for Spanish broom. According to the florists, quality indicators of strawberry tree are long and symmetric branches, healthy and clean leaves. Boxwood branches must be long and include clear, green leaves

without yellow parts. While boxwood produced timber material in history, at present, its leaves are more important than its timber for florists.

While florists have demand Spanish broom during the period between May and July, their demand for Strawberry tree, Boxwood and Cherry laurel *(Laurocerasus officinalis)* is all year round. In a different question, quantities of the species bought in a specific time such as a day, a week or month were asked to florists to compute the demand levels. Computed demand level is shown in Table 1.

The rhododendron has the biggest demand level in Table 1. The strawberry tree has the second biggest level on consumption. All of the florists in Istanbul buy approximately 175 000 bales of Strawberry branches in a year. Boxwood follows the Strawberry tree with quantity of 165 000 bales. The market structure of the florists in Turkey was not studied in detail before. For that reason, results or answers of the participants are open to discussion. If Figure 1 is compared with Table 1, there is a disagreement on the place of Cherry laurel. While florists did not mention the intensity of usage of Cherry laurel, computations based on their answers prove that there is a big usage of it.

Because of this kind of disagreements and doubts, second approach explained in method title was used. As seen Table 2, florists generally produce bouquets and flower arrangements from the species. Approximately, 1.8 million bouquets and 1.2 million flower arrangements are produced and sold by all the florists in Istanbul.

Number of the materials needed to prepare goods and services is shown in Table 3. Columns on Table 3 show the numbers of the goods and services that can be produced by only one bale or bunch of any species. For example, if florists buy a bale of Filix mas, he/she can produce 12 flower arrangements, 13.5 bouquets, 5 wreath and 3.33 baskets from it. It means that each flower arrangement needs 1/12 bale of Filix mas.

Table 1. Demand levels of the florists for some species in Istanbul.

Species	Units	For sampling (n = 60)		Confidence interval as the mean (μ) of population (p = 5%)	Estimated average market demand (N = 655)
		Arithmetic mean ($\bar{x}$)	Std dev. (s)		
Rhododendron	Bale	336	295.69	336.0 ± 681.86	**220 080.0**
Strawberry tree	Bale	267.5	29.4	267.5 ± 58.95	**175 238.7**
Boxwood	Bale	251.9	28.6	251.9 ± 57.27	**164 968.3**
Cherry Laurel	Bale	220.3	114.4	220.3 ± 249.38	144 303.1
Ivy	Bale	191.7	49.7	191.7 ± 100.29	125 557.0
European spindle	Bale	171.7	25.6	171.7 ± 51.36	112 437.3
Spanish broom	Bale	142.5	24.2	142.5 ±48.55	93 331.0
Butcher's broom	Bunch	139.2	40.2	139.2 ± 81.8	91 143.3
Filix mas *(Pteridium aquilinum)*	Bunch	128.8	46.5	128.8 ± 97.35	84 364.0
Sweet chestnut	Bale	111.6	33.0	111.6 ± 67.93	73 078.4
Heather *(Calluna vulgaris)*	Bunch	102.5	28.3	102.5 ± 72.63	67 137.5
Health	Bunch	55.7	9.3	55.7 ± 19.61	36 463.9
Moss *(Bryophyta)*	Package	21.4	5.6	21.4 ± 12.57	13 990.8
Smilax *(Smilax sp.)*	Bunch	17.5	13.4	17.5 ± 26.96	11 475.6

Table 2. Number of goods and services produced by florists per year.

Goods and services	For sampling			Confidence interval on mean (μ) of population (p = 5%)	Estimated average production of florists (N = 655)
	Arithmetic mean ($\bar{x}$)	Std dev. (s)	n*		
Flower arrangement	1 906.21	221.91	53	1 906.21 ± 445.24	1 248 567.6
Bouquet	2 774.64	244.01	56	2 774.64 ± 489.0	1 817 389.2
Wreath	229.02	36.48	56	229.02 ± 73.11	150 008.1
Basket	315.91	52.04	56	315.91 ± 104.29	206 921.1
Interior decoration	76.92	20.26	31	76.92 ± 41.37	50 382.6
Landscape arrangement	19	8.695	31	19.0 ± 17.76	12 445.0

*Some of the florist may not produce some goods and services, for that reason n may be different total sampling size.

By using the data seen in Tables 2 and 3, the number of materials used to prepare these goods and services can be calculated. Consumption levels of the florists for wild species are listed in Table 4. Data in Table 4 have been computed by multiplying levels estimated for average production of the florists in column 6 of Table 2 with numbers of each goods and services in Table 3.

Actors in distribution channels are shown in Figure 2.

Florists buy materials from intermediary sellers generally. Secondly, they prefer to buy from auctions which are arranged by flower experts. There are three different auction halls which serve regularly in Istanbul.

Table 3. Number of the goods and services which can be produced by using one unit of the species.

Species*	Number goods and services					
	Flower arrangement	Bouquet	Wreath	Basket	Interior decoration	Landscape arrangement
Filix mas	12.00	13.50	5.00	3.33	0.00	0.00
Health	21.25	25.00	4.00	4.00	0.00	0.00
Cherry laurel	26.25	25.00	4.67	4.50	0.00	0.00
Spanish broom	20.97	24.56	6.32	6.32	10.00	1.00
Sweet chestnut	10.50	12.50	5.79	5.79	0.00	0.00
Strawberry tree	19.78	23.34	5.94	6.06	10.00	0.00
Butcher's broom	7.71	6.67	0.00	0.00	50.00	0.00
Rhododendron	10.00	10.67	4.50	0.00	0.00	0.00
Ivy	19.06	23.75	7.50	7.50	11.25	2.00
Smilax	0.00	0.00	0.00	0.00	0.00	0.00
Heather	20.00	20.00	7.50	7.50	5.00	0.00
Boxwood	20.86	24.61	5.85	5.88	12.50	0.00
European spindle	12.14	12.14	5.80	5.87	0.00	0.00
Moss	0.00	0.00	10.00	10.00	0.00	0.00

*Units were listed in Table 1.

Table 4. Consumptions of the florists to produce some goods and services in Istanbul.

Species	Consumption for						Total consumption*
	Flower arrangement	Bouquet	Wreath	Basket	Interior decoration	Landscape arrangement	
Butcher broom	161851.3	272608.4	0.0	0.0	248.9	0.0	434708.6
Spanish broom	59539.0	74001.5	23751.3	7977.2	1244.5	206921.1	373434.5
Rhododendron	124856.8	170380.2	33335.1	0.0	0.0	0.0	328572.1
Sweet chestnut	118911.2	145391.1	25910.5	8702.4	0.0	0.0	298915.3
European spindle	102823.2	149667.3	25863.5	8587.9	0.0	0.0	286942.0
Filix mas	104047.3	134621.4	30001.6	15114.8	0.0	0.0	283785.1
Ivy	65498.6	76521.7	20001.1	6717.7	1106.2	103460.5	273305.8
Heather	62428.4	90869.5	20001.1	6717.7	2489.0	0.0	182505.6
Health	58756.1	72695.6	37502.0	12595.7	0.0	0.0	181549.4
Strawberry tree	63118.7	77856.3	25235.0	8315.6	1244.5	0.0	175770.2
Boxwood	59840.7	73844.3	25659.3	8561.7	995.6	0.0	168901.6
Cherry laurel	47564.5	72695.6	32144.6	11196.1	0.0	0.0	163600.8
Moss	0.0	0.0	15000.8	5038.3	0.0	0.0	20039.1
Smilax	0.0	0.0	0.0	0.0	0.0	0.0	0.0

*Units were listed in Table 1.

Comparisons of the results obtained from different approaches were enumerated in Table 5. Average buying prices of the species were listed in Table 6. When the demand or consumption levels are multiplied with the buying prices, total cost of the procurement can be found regarding different assumptions. If average prices (Table 6) and average demand levels used to compute the total costs of the florists, market volume in monetary terms may be found as 9 632 121,7 TL* per year.

On the other hand, total cost may be computed regarding optimistic or pessimistic approaches by using maximum or minimum findings of statistics. According to findings on demand levels in Table 1 and prices in Table 6, total expenditures of the florists to buy wild species may change between 3 540 085 TL and 20 903 231 TL. If findings obtained from supply approach used to compute, lower and upper limits of the market differ from 17 390 834 TL to 24 476 883 TL.

Other results obtained from surveys may be summarized summarized regarding expectations and factors affecting
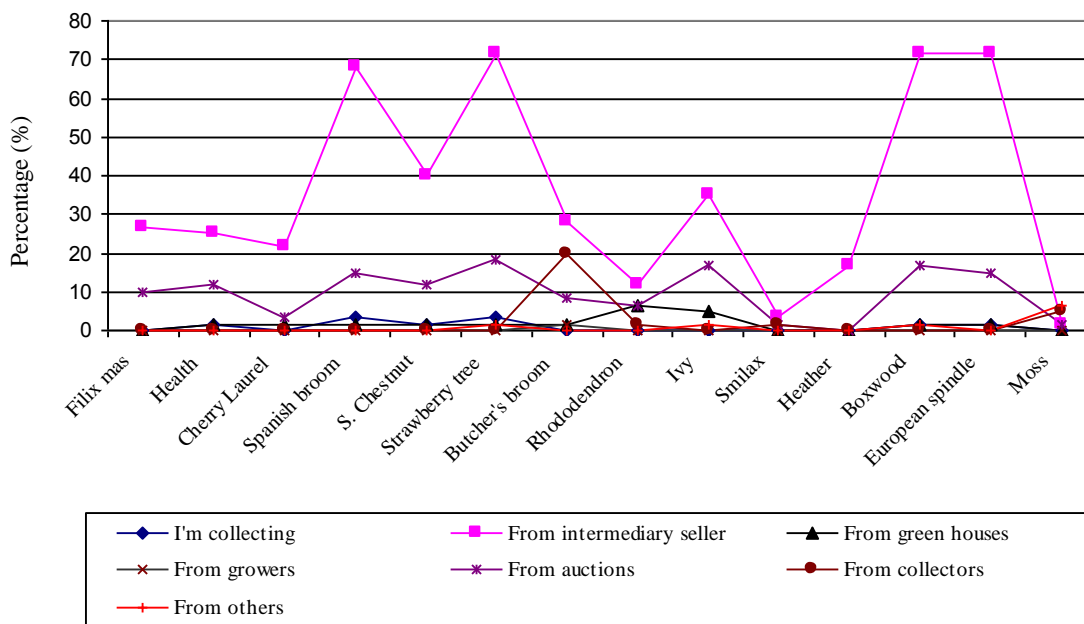

Figure 2. Supply sources of the florists in Istanbul.

Table 5. Comparison of the results obtained from different approaches.

Species*	Estimated average market demand computed in first approach	Species	Estimated average market consumption computed in second approach
Boxwood	**164.968,3**	Boxwood	**168.901,6**
Butcher's broom	91.143,3	Butcher's broom	434.708,6
Cherry Laurel	**144.303,1**	Cherry laurel	**163.600,8**
European spindle	112.437,3	European spindle	286.942,0
Filix mas	84.364,0	Filix mas	283.785,1
Health	36.463,9	Health	181.549,4
Heather	67.137,5	Heather	182.505,6
Ivy	125.557,0	Ivy	273.305,8
Moss	13.990,8	Moss	20.039,1
Rhododendron	220.080,0	Rhododendron	328.572,1
Smilax	11.475,6	Smilax	0,0
Spanish broom	93.331,0	Spanish broom	373.434,5
Strawberry tree	**175.238,7**	Strawberry tree	**175.770,2**
Sweet chestnut	73.078,4	Sweet chestnut	298.915,3

*Units were listed in Table 1.

the market. According to florists, 73.3% of the florists believe that the main actors, rules and trends in the market will not change. However, 16% of the florists are expecting a decrease on the usage of Boxwood in the market. The most important variable which can affect the usage of wild species is pricing and distribution approaches of middleman. Second variable is willingness to pay of consumers for ornamental products. Prices of the materials and possibility to obtain in time are other variables important for florists.

DISCUSSION

The ornamental species used by florists in Istanbul also have important economic affect. While Chamberlain et al. (1998) mentioned 52 different species used for ornamental purposes in USA; the study proved that 14 different wild species have been preferred by florist for the same aim in Istanbul. Boxwood, smilax, rhododendron species have been used in USA and Turkey.

To sustain the species, forests managers must discover

Table 6. Procurement prices and costs of the florists for the species.

Specie	Unit	Prices in sampling (n = 60)		Confidence interval on mean (μ) of population (p=5%)	Demand level of the florists (TL/year)	Total cost of the florists (TL/year)
		Arithmetic mean ($\bar{x}$) (TL)	Std dev. (s$\bar{x}$)			
Rhododendron	Bale	7.75	1.29	7.75 ± 3.06	220.080,00	1.705.620,0
Strawberry tree	Bale	6.81	0.29	6.81 ± 0.57	175.238,70	1.193.375,5
Boxwood	Bale	6.66	0.27	6.66 ± 0.55	164.968,30	1.098.688,9
Cherry Laurel	Bale	6.43	0.25	6.43 ± 0.54	144.303,10	927.868,9
Ivy	Bale	8.08	0.91	8.08 ± 1.88	125.557,00	1.014.500,6
European spindle	Bale	6.51	0.26	6.51 ± 0.53	112.437,30	731.966,8
Spanish broom	Bale	6.81	0.34	6.81 ± 0.68	93.331,00	635.584,1
Butcher's broom	Bunch	4.95	0.45	4.95 ± 0.93	91.143,30	451.159,3
Filix mas	Bunch	6.24	0.37	6.24 ± 0.78	84.364,00	526.431,4
Sweet chestnut	Bale	6.66	0.35	6.66 ± 0.71	73.078,40	486.702,1
Heather	Bunch	6.33	0.49	6.63 ± 1.27	67.137,50	424.980,4
Health	Bunch	6.15	0.45	6.15 ± 0.98	36.463,90	224.253,0
Moss	Package	10.43	1.81	10.43 ± 4.43	13.990,80	145.924,0
Smilax	Bunch	5.67	1.33	5.67 ± 5.74	11.475,60	65.066,7
Total						9.632.121,7

discover their consumption levels in first step of the planning process. If management plans cannot produce the quantities consumed in the market, somebody try to supply them illegally. For that reason market studies is important for sustainable management.

On the other hand, a management plan for each species may not be required regarding some chara-cteristics of the species. For example, Rhododendron has been used by the florists but it is invasive species in Turkish forests. Although Rhododendron is used inten-sively, unplanned utility is not problem for it in Turkey. But Boxwood and Strawberry trees have different chara-cteristics.

The boxwoods grow slowly have sustainability problem related with traditional and new usages. Boxwood performs many functions in forest ecosystems. Due to its shade tolerance, it constitutes continuing intermediate under storey strata, which is very important in terms of structured stand establishment and as a habitat for a variety of wildlife, especially birds. However, in many parts of its native ranges, boxwoods have been destroyed because of its value of woods and leaves. For that reason, boxwood is classified as a K-strategic species or in the list of endangered species (Çolak, 2005).

Boxwood nurseries are sizable industries in the mountains of northern Georgia, western North Carolina, and western Virginia. Prior to the holiday season, the trees are pruned and the clippings sold through floral and nursery trade journals. Boxwood clippings are used in some of the best and most expensive wreaths (Nelson and Williamson, 1970). However, firms have not been allocating nurseries to boxwood for similar purposes in Turkey because of its slow growth. Because of

characteristics explained above, Boxwood in forests must be managed regarding sustainable plans.

On the other hand, Strawberry tree is a widespread shrub in the Mediterranean basin. According to the IUCN criteria, it is not a threatened species (Benhouhou, 2005). In spite of abundance range area of it in Turkey, pruning and clipping of Strawberry trees are changing its forms and the fruit production capacity is affecting negatively. Decreasing number of fruits may cause changes on wildlife and biodiversity. For that reason, strawberry trees may be considered as second important species need a planned utility regarding others.

Conclusion

Market survey proves that there is big market of NTFP generated by florists in Istanbul. Species suitable for cultivation were obtained from agricultural sources in the market. However, florists have been demanding different wild species. Distribution channel for NTFP consists of florists, middlemen, harvester or collector and forest enterprises.

Forest enterprises permit the local villagers for collecting of the plants from forests. But the enterprises have not a specific management plans for these species. While some of them such as Spanish broom, Rhodo-dendron may not need specific management plans, some species such as Boxwood and Strawberry tree must be subject of specific plans. The production plan or plans must produce approximately 175 000 bales of Strawberry trees and 166 000 bales of Boxwoods each year. If forest enterprises cannot supply them, illegal production will

continue around Istanbul and sustainability of the species will be uncertain.

The study shows that the monetary value of the market is also important. Upper and lower limits of the florists procurement costs for all wild species were computed as 3 540 085 and 20 903 231 TL per year. To understand the importance of the value, current timber price may be used. To generate 3 540 085 TL (or 20 903 231 TL), the General Directorate of the Forestry, the responsible organization to manage forests in Turkey, has to produce approximately 40 690 m^3 (or 240 267 m^3) timber material.

Procurement cost of the florists is incomes of the middlemen. In this study, although the shares of harvesters and forest enterprises in the market were not computed, findings on the role of the middlemen prove that they will be important group in all stakeholders taken into account while design a model on the governance of the species.

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