

*Forestry for Sustainable Development: Towards the 21st Century*

# **Productive functions of forests**

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**Proceedings of the  
XI World Forestry Congress**

**13-22 October 1997**

**ANTALYA**



# **Volume 3**

## COMPARISON OF COMPOSITION ELEMENTS ON DIFFERENT SUBSTRATES OF OYSTER MUSHROOMS (*PLEUROTUS* SPP.) GROWING UNDER PLASTIC SHEET

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The paper describes changes in the yield, dry matter percentage, crude protein percentage, pileus diameter, stipe diameter and stipe length of *Pleurotus pulmonarius* (PP), *P.sajor-caju* (PSC), *P.sp.cfr.Florida* (PF), *P.columbinus* (PC), *P.ostretus* (Origin of England-POE) and *P.ostretus* (Origin of Anatolia-POA) inoculated and grown in different substrates composed of mixtures of wheat straw (W), paddy straw (P), corn straw (C), wheat+paddy straw (WP), wheat+corn straw (WC) and wheat+paddy+corn straw (WPC). During the experiment it was also found that substrates of WPC (437.90 g), WP (377.90 g) and WC (375.90 g) have proven to be the best growing media, providing highest yields. Yield of the P (249.90 g) are lower than the others. According to the comparison of quality factors at different media, the levels of dry matter in C (8,32 %), crude protein in W (25.32 %), pileus diameter in P (70.77 mm) stipe diameter in WC (15.06 mmj.and stipe length in WPC (30.96 mm) were found to be important.

Keywords: *Pleurotus*, waste matters, plastic sheet, composition elements.

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## PRODUCTION AND EXPORT OF BASIC SECONDARY FOREST PRODUCTS OF TURKEY

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Turkey is very rich country in terms of secondary forest products. Many of these plant species are present in the forest areas and are named as secondary forest products (SFPs). The paper outlines the production and export of these products. These products are mainly the balsamic secretions of the living trees, parts of trees excluding timber and some woody or herbaceous plants having medical and industrial importance or consumed as food. Such products of Türkiye are composed of styrax oil, naval stores, root of licorice plant and their pure extract, valonia acron, pine nut, carob fruit, lavrel leaves and oil, linden flowers, thyme, sage, etc.

Keywords: Turkey, Secondary Products, Styrax oil, naval stores, licorice, valonia acron, pine nut, carob fruit, lavrel, linden, thyme, sage.

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# **PRODUCTION AND EXPORT OF BASIC SECONDARY FOREST**

## **PRODUCTS OF TURKEY**

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## **INTRODUCTION**

Turkey is very rich country in terms of secondary forest products. Determinations of more than 9000 endemic plant species proved this phenomenon. Many of these plant species are present in the forest areas and their named as secondary forest products (SFPs).

SFPs of Turkey which have been subjected so far, grown through were given (OGM, 1987) as follow:

- Garden sage (*Salvia* spp.)
- Juniper fruit (*Juniperus* spp.)
- Alder Buck thorn (*Frangula* spp.)
- Yellow berry (*Rhamnus* spp.)
- Gentian, yellow gentiana (*Gentiana lutea* L.)
- Pine nut (*Pinus pinea* L.)
- Soapworth (*Gypsophila* L.)
- Sweet By, Lavrel, Roman Lavrel (*Laurus nobilis* L.)
- Bracken, fern, make fern root (*Dryopteris filix-mas* (L.) Schott.)

- Heather (*Erica arborea* L. and *E. manipulifera* Salisb.)
- Milk-vetch (gum-tragacanth) (*Astragalus* L.)
- Snowball, guelderrosa (*vibirum opulus* L.)
- Deadly nightshade, belladonna (*Atropa belladonna* L.)
- Marsh mallow (*A. rosa-hollyhock*) (*Althaea officinalis* L.)
- Chaste tree (*Ricinus communis* L.)
- Birch (*Betula pendula* Roth.)
- Linden tree (*Tilia* spp.)
- *Simmondsia chinensis* (Link) Schneid
- Snowdrop (*Galanthus* L.)
- Carob (bean) fruit (*cretonia siliqua* L.)
- Valerian, Creton, Spikenard (*Valeriana officinalis* L.)
- Garden thyme (*Thymus* spp.)
- Rosemary (*Rosmarinus officinalis* L.)
- Lavander (*Lavandula* spp.)
- Mahaleb, European cherry (*Creasus mahaleb* (L.) Mill. var. mahaleb)
- Daisy, Comomlie (*Matricaria chamomilla* L.)
- Terebinth tree (*Pistacia terebinthus* L.)
- Sweet marjoram (*Organum* spp.)
- Nut gall (*Quercus infectoria* Oliver subsp. *infectoria*)
- Valonia acron (*Quercus ithaburensis* Decne subsp. *macrolepis* (katschy) Hedge-Yalt.)
- Root and pure extract of licorice plant (*Glycyrrhiza glabra* L.)
- Redgum (*Eucalyptus* spp.)
- Common fennel (*Foeniculum vulgare* Mill. subsp. *vulgare*)
- Mastic tree, lentisc (*Pistacia lentiscus* L. var. *latifolius* Coss.)
- Sumac (*Rhus* spp.)
- Cherry laurel (*Laurocerasus officinalis* Roemar)
- Foxglove (*Digitalis* spp.)
- Edible forest mushrooms (*Morchella* spp., *Agaricus* spp., *Pleurotus* spp., *Lactarius* spp. etc. (Yalınkılıç, 1985)).

Some of these products are for export while the remained consumed for domestic purposes. They were individual standardised by Turkish Standard Organisation (TSE) when their production and export rates reach to remarkable level.

Turkey hold monopoly some of the world's SFP production such as styrax oil (*Styrax Liquidus* T.K.) which were picked from the traumatic wounds made on the stem of *Liquidambar orientalis* Mill. Styrax oil were utilised in pharmacy, perfume and chemical industry. Licorice plant is another example of Turkey's famous SFP, which is used in cola, bear production as well as pharmacy and cigarette making as reducing agent of nicotine (Gavcar, 1989).

Turkish native tanning sources got importance in tanner industry since the azo-type paints were considered as carcinogen by German leading importing countries. Production and tanning with azo-type paints were prohibited in leather industry of Turkey since beginning of January 1995 by an associated decision will open the new future for Turkish native tannin industry sources such as bark of trees which have high tannin content, nut gall, valonia acron, sumac, etc.

## PRODUCTION QUANTITIES OF SFPs OF TURKEY

SFPs were produced by public and private sector particularly for pharmacy and cosmetic industry in Turkey. Production rate and quantities of major-products were given in Table 1.

Table 1. Production Quantities of Some Major SFPs of Turkey (DIE).

Item	Production amount for per year as kg						
	1989	1990	1991	1992	1993	1994	1995
Styrax oil	4246	2590	3231	1589	1042	2000	3000
Naval store	184392	132772	87051	201713	206446	—	—
Root and pure extract of licorice plant *	—	—	—	—	—	—	—
Valonia acron	—	—	—	—	159116	—	—
Pine nut	27276	10240	220684	271052	143773	267000	426000
Carob fruit						674000	530000
Lavrel and lavrel oil	1294841	851293	2017173	2395765	2852654	2393000	3126000
Linden flowers	19733	17264	26813	6646	3281	3000	5000
Garden thyme	1034770	984563	1575534	2609842	2700500	4814000	2740000
Garden sage	280769	194927	252486	243404	261741	403000	411000

\* Production by private factor (Data could not be given because of difficulties of obtaining recorded data).

Same statistical data of private sector was not included in the Table because of the difficulties of obtaining the data out of record.

Lavrel and garden thyme were the most produced items among other SFPs as seen in Table 1. Production amounts of Garden sage, pine nut **and** naval stores follow them, respectively. Production rate of garden thyme boosted from 1991 to 1993.

## RATES AND TOTAL INCOME OF SFPs' EXPORT

After having consumed for domestic purposes, the remained parts of SFPs of Turkey are exported to various countries. Export and total income of export of SFPs were given in Table 2.

Table 2. Export rates and Total Income of Export Sales of SFPs of Turkey (DIE).

Item	YEARS								
	Data (kg/S)	1980	1989	1990	1991	1992	1993	1994	1995
Styrax oil	Quantity	20100	9516	13861	11299	14471	19000	19690	5734
	Income	205200	249754	375601	381825	577993	877000	450647	423013
Naval store	Quantity			10	600	17152	24016	21232	10598
	Income			21	600	10468	180595	136492	105689
Root and pure extract of licorice plant	Quantity	1048100	1284979	1744541	3040517	1684676	1352603	1140205	1557358
	Income	2157600	1068050	1506426	2258820	1346150	998938	853982	1072274
Valonia acron	Quantity	954000	125540	58710	80310	90060			
	Income	340000	32449	19432	27031	23852			
Pine nut (with shell)	Quantity	4700	11214	8400	239691	17368	150	15415	4202
	Income	28800	119862	83385	128708	97360	1088	24260	31418
Pine nut (without shell)	Quantity	499000	500255	500677	767030	428806	277545	246642	199055
	Income	3323600	5402962	6494511	10303761	8334670	4697975	2534214	1585769
Carob fruit	Quantity	3379000	1489038	954893	2133554	7477188	11416964	7450100	8467061
	Income	630900	380361	188929	474563	1706344	4181470	2905975	3569386
Lavrel and lavrel oil	Quantity	2106700	2662554	2287881	3881471	4618021	2452997	3349929	2870418
	Income	3376400	3848786	4204717	7471057	8437642	5685517	5921016	6024833
Linden flowers	Quantity	61000	267246	374268	287450	128538	75319	348611	469599
	Income	235800	1414375	2106047	1490548	595719	298813	1632697	1737490
Garden thyme	Quantity	962500	4425907	3815044	3980055	4748858	4744120	6335386	5600730
	Income	1644800	6513078	6381072	8220640	10979180	10766479	16103623	13686112
Garden sage	Quantity	488000	712727	560771	508646	563863	576257	400220	564241
	Income	550500	1132501	1344636	1096144	1118743	1367658	837551	1143230

Values on Table 2 denotes the high export potential of SFPs of Turkey. For instance, garden thyme export were two fold increased from 1980 to 1992. Similarly, export rate of garden sage were increased from 550 tons to 1100 tons within same years. As, export rates of carob fruit, pine nut and linden flowers increased, whereas some reduction were recorded on those of styrax oil and valonia acron. Reduction in the production and export rate of styrax oil, as a monopoly SFP of Turkey were taken under consideration by General Directorate of Forest of Turkey. Liquidambar trees which are the sources of styrax oil are getting old as time proceeds and tired by consecutive production by traumatic wounds. To get more stabilised production rate and quality level of styrax oil, some precautions were taken, such as establishment the new Liquidambar plantations and also taken under protective control of old trees.

SFPs of Turkey are exported to the following countries in major.

Item	Country
Styrax oil	Germany, France
Root and pure extract of licorice plant	USA, Italy, Germany, Israel
Valonia acron	England, Germany
Pine nut	Saudi Arabia, Italy, Dubai, USA
Carob fruit	Italy, Portugal, Spain
Lavrel and lavrel oil	USA, Germany, Japan, France, England, Netherlands
Linden flowers	Germany, France, Spain
Garden thyme	USA, Germany, Canada, England, Greece
Garden sage	USA, England, Italy

## CONCLUSION

SFPs of Turkey were considerably increased as amount and yield in the whole forest products of country. It has also very high development potential by a good management and by taking necessary regulatory precautions which some of them have already being applied. Nevertheless, there are lack of information on producing, picking, drying, storing and utilisation techniques of these products. Therefore, considerable losses on quality and quantity have been growing danger which require much more effort on informative basis about above mentioned subjects in order to obtain valuable products to be consumed domestically and export.

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