

IDENTIFICATION AND COMPARISON OF CHEMICAL COMPONENTS IN WOOD AND BARK OF PLANTED ELДАР PINE TREE BY GC/MS METHODS

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Abstracts:

Eldar pine tree is one of the species that planted in city parks, garden and forests region of Tehran and another city of Iran. In this study, three trees from species of planted eldar pine tree were randomly cut down in planted forest region of Tehran city. Then from each tree were separated three disks. At first wood flour and then extractive measured by TAPPI standards. The results showed that the average of extractives in wood and bark of planted eldar pine tree were 3.6 and 17 percent respectively. Then wood flour was washed by acetone and extractives residue was added BSTFA reactor and samples kept in Ben Marry Bath in 70°C for an hour, and they were analyzed by GC/MS. For the Identification of compounds were used GC diagram which shows abundance and retention time of each compound, and calculation of quartz index and Adams table. So that, Specified 56 compounds in wood and 43 compounds were in bark of planted eldar pine tree. That 1 - Phenanthrenecarboxylic acid, Rosin acids, Gama-Sitosterol, 9-Octadecanoic acid, n-Hexadecanoic acid, Octadecanoic acid, 9, 12 - Octadecanoic acid, Dodecan, Tetradecan, Styrene and Hexadecan were as 11 common compounds in wood and bark of planted eldar pine tree so much and these compounds are very important in durability and consumption its.

Key words: organically compounds; planted Eldar pine tree; retention time; GC-MS.

INTRODUCTION

Eldar pine tree is one of the species that planted in city parks, garden and forests region of Tehran and another city of Iran. Eldar pine tree imported to Iran from Tiflis (Georgia) about 800 years ago, it can be can very effective in ever-green and beautiful of city region. The leaves and bark of this species are important in ions adsorption of air pollutions (Ager and Marshall 2011, Andrady and Searle 1995, Balaban 2001). Eldar pine is soft wood with certain heartwood and gum ducts. The growth-ring boundary is certain. The tracheids walls are thick in end of growth-ring. The rays have across-tracheid and sometimes with gum duct. Identification extractives chemical compounds in wood and bark of planted eldar pine tree by GC-MS methods is important for best applications (Henry 1996).

Hosseini (2009) reported that exhaustive ethanol-toluene of the bark and heartwood of *Juglans regia* L afforded pale red-colored extractives 10 and 12% yields, respectively. Detailed chemical evaluation of these extracts using GC/MS revealed the major components in the bark and heartwood extractives to be the 3,7-dioxa-2,8-disilanonane, 2,2,8,8-tetramethyl (25.17%), while the major heartwood extractives constituent was benzoic acid, 3,4,5-tri(hydroxyl)/Gallic acid (44.57%). The same components of the bark and the heartwood also contained amounts of the gallic acid, 3,7-dioxa-2,8-disilanonane, 2,2,8,8-tetramethyl, and d-glucose, 2,3,4,5,6-pentakis-o-(hydroxyl). The most toxic components in the heartwood, were juglone (5.15%) and 2, 7-dimethylphenantheren (5.81%). Gupta *et al.* (1972) reported that the 2 durability of walnut has been related to the presence of phenolic compounds such as flavenoides, naphthoquinones, and hydrolysable tannins. The wood and the bark of black walnut have not been found to contain tannins. However, the wood contains appreciable amounts of gallic acid as well as ellagic acid, glucose, and a dark violet polymer. Vaysi^[10] by using GC/MS reported that extractive variation of cypress tree decrease in the longitudinal direction. The average of extractives in natural and planted cypress tree are 7.52 and 2.57 percent respectively. There are Specified 14 compounds in natural and 12 compounds in planted cypress tree. That isophyllocladene, 9-octadecenamamide, cinnamaldehyde-2-hexyle, bourbonanone and 1h-naphtho [2, 3-c] pyran-3-acetic acid there were in either species so much and these compounds are very important in durability. Vaysi^[11] reported that 58 compounds definite in newsprint. The Benzaldehyde (32.56%), Silan, trimethyl(12.65%), Bis(2-ethylhexyl) phthalate (6.98%), Gamma-Sitosterol (4.84%), n-Hexadecanoic acid(4.56%), Bibenzyl (3.82%) were the most compounds and the Dodecanoic acid (0.14%), Decan(0.18%), Xylene (0.19%), Benzen, 1-methyl-4-phenylmethyl (0.2%) were lowest compounds respectively, too. These compounds are very important in yellowing and brightness stability of newsprint.

In this research, determination and comparison of the extractives chemical compounds in wood and bark of planted eldar pine by GC-MS methods was investigated.

Table 1

Analysis of important extractives chemical compounds in eldar pine wood by GC-MS method

Chemical Component	Retention time (min)	Area (%)	KI
Styrene	6.774	0.15	852
α -Pinene	8.21	0.09	916
Decan	10.623	0.16	991
Dodecane	17.124	0.33	1200
Tetradecane	29.642	0.27	1401
n-Hexandecane	25.333	1.05	1976
9,12-Octadecanoic acid	38.458	0.31	2146
9-Octadecanoic acid	38.568	1.1	2153
Heptadecan	38.684	0.21	2159
Octadecanoic acid	38.943	0.61	2174
Benzoyl Isocyanate	41.608	0.41	2329
E-2-Hydroxy-4-methoxystilbene	41.757	0.36	2339
Pimaric acid	42.365	2.61	2373
Rosin acids	43.393	27.12	2439
1-Phenanthrerecarboxylic acid	44.247	31.53	2497
2,7-Dihydroxy-3,4,6-trimethoxy	44.913	17.5	2561
Bis (2-ethylhexyl) phthalate	25.243	0.95	2664
3-Butoxy	45.593	6.01	2601
Gamma-Sitosterol	50.082	1.01	2993

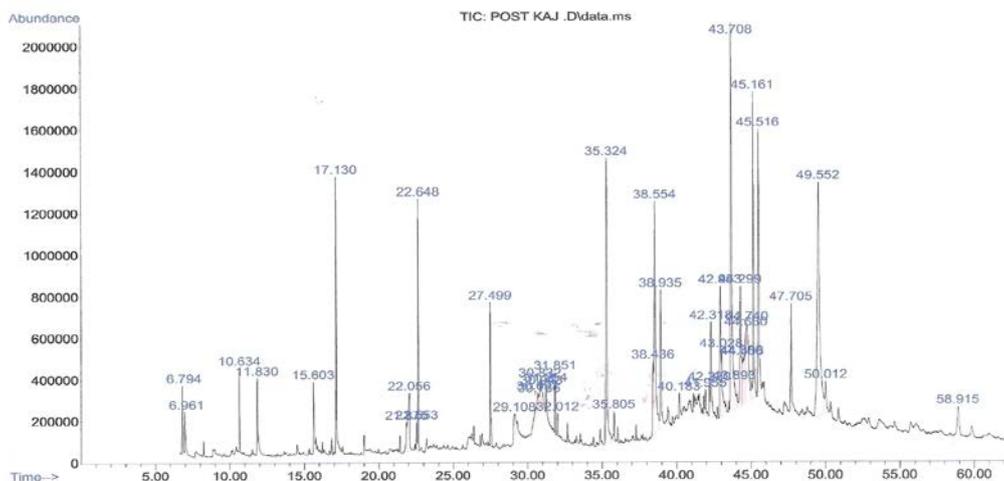


Fig. 2.

Gas chromatograph of extractives chemical compounds in bark of eldar pine.

Table 2

Analysis of important extractives chemical compounds in eldar pine bark by GC-MS method

Chemical Component	Retention time (min)	Area %	KI
Styrene	6.794	1.07	853
Cyclohexanone	6.962	0.82	862
Decan	10.636	0.99	992
1-Hexanol	11.833	1.58	1029
Dodecane	17.131	3.81	1200
Tetradecane	22.648	2.91	1401
Hexadecane	27.500	2.05	1601
4-Ethoxymethyl-2-methoxyphenol	29.111	0.83	1673
n-Hexandecane	35.321	7.75	1976

9,12-Octadecanoic acid	38.438	1.55	2145
9-Octadecanoic acid	38.55	7	2155
Benzamine	40.185	0.53	2246
Eicosanoic acid	42.320	2.39	2371
Dioxyquinone A dimethyl	42.954	2.58	24.09
Rosin acids	43.025	1.7	2413
1-Phenanthrenecarboxylic acid	43.71	11.57	2460
2,7-Dihydroxy-3,4,6-trimethoxy	44.292	3.41	2499
Abietic acid	44.681	2.78	2525
Gamma-Sitosterol	44.739	5.6	2529
1,2-Benzenedicarboxylic acid	45.159	4.8	2556
Octadecanoic acid	45.552	15.87	2782
3-Cyclohexyl	50.011	1.09	50.01

CONCLUSIONS

Identification and comparison of chemical components in wood and bark of planted eldar pine tree by GC/MS methods were studied in this research. The following conclusions can be drawn from the results of this work.

1 - The results showed that the average of extractives in wood and bark of planted eldar pine tree were 3.6 and 17 percent respectively.

2 - Identified 56 compounds in wood and 43 compounds were in bark of planted eldar pine tree so much and these compounds are very important in durability and consumption its (Fig. 3).

3 - 1-Phenanthrenecarboxylic acid, Rosin acids, Gama-Sitosterol, 9-Octadecanoic acid, n-Hexadecanoic acid, Octadecanoic acid, 9, 12-Octadecanoic acid, Dodecan, Tetradecan, Styrene and Hexadecan were as 11 common compounds in wood and bark of planted eldar pine tree.

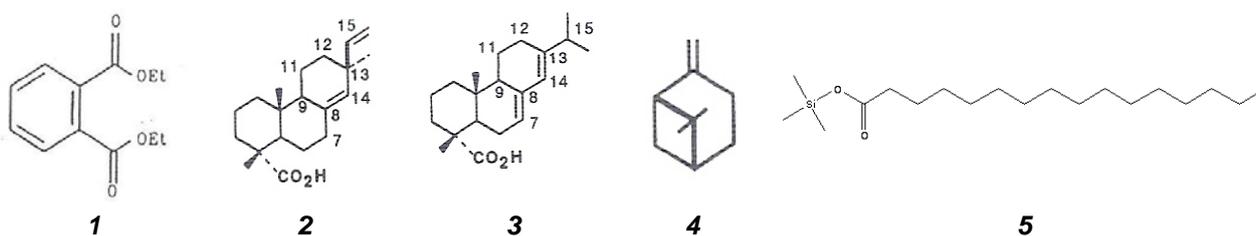


Fig. 3.

**Some of important component in Elder pine:
1 - α -Pinene; 2 - Abietic acid; 3 - Pimaric acid; 4 - 1,2-Benzenedicarboxylic acid;
5 - Hexadecanoic acid.**

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