향끽미종 잎담배 성분조성에 관한 연구
Ⅲ. 정유성분의 특성조사

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Composition Studies on the Aromatic Tobacco Varieties (Nicotiana tabacum L.): Ⅲ. Characteristics of Essential Oils

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(Received March 20, 1981)

초 록

새로이 고안된 distillation/solvent extraction 방법을 이용하여 오리엔트산 향끽미종과 한국산 향끽미종 잎담배의 정유성분을 분리하였다.

정유성분들을 고성능 가스 크로마토그라피로 분석한 결과 각 잎담배로 부터 특징적인 GC 프로파일을 얻을수 있었다. 얻어진 GC분석자료를 정량적으로 비교함으로써 품종간의 상이점이 확인되었다.

Abstract

Essential oil components were isolated both from Oriental and Korean aromatic tobaccos using a modified distillation/solvent extraction method.

The essential oils were then analyzed by high-resolution glass capillary gas chromatography, to give characteristic GC profile from each tobacco.

Varietal differences were detected from the quantitative comparison of the GC data.

Introduction

Tobacco essential oils impart characteristic flavors and aromas to tobacco leaves. They also distill into the mainstream smoke, thus contributing to flavor during smoking.

Essential oils are complex mixtures of components with a wide range of functional groups and volatilities.

The chemical composition of the tobacco essential oils has been investigated by several authors(1, 2, 3, 4, 8, 9, 10).

The essential oils from the dried tobacco leaves have been isolated mainly by direct solvent extraction or steam ditillation.

Our laboratory developed a modified distillation/solvent extraction method(6) which can isolate volatile oils from complex food matrices, without contamination and artifacts, but with high reproducibility.

Following the study on the headspace vapors of the aromatic tobacco leaves(7), we applied the technique for the analyses of the tobacco essential oils.

This paper presents the results of the comparison of essential oil compositions among the aromatic varieties.

Materials and Methods

Tobacco leaves: Sun-cured aromatic tobacco varieties (Nicotiana tabacum L.) used for this study were the same as for the previous investigation(7).

Reagents : Dichloromethane (GR grade, E. Merck, Darmstadt, Germany) was distilled from phosphorous pentoxide using a Vigurex column. Sodium sulfate, anhydrous, (EP grade, Katayama Chemical, Osaka, Japan) was baked at 300℃ under reduced pressure. Freshly distilled water was used.

Gas co-distillation and solvent extraction : 5 g of tobacco powder and 40 ml of distilled water were placed in a 250ml round bottomed flask equipped with the distillation apparatus. The flask was placed in an oil bath at 120℃ as shown in Figure 1.

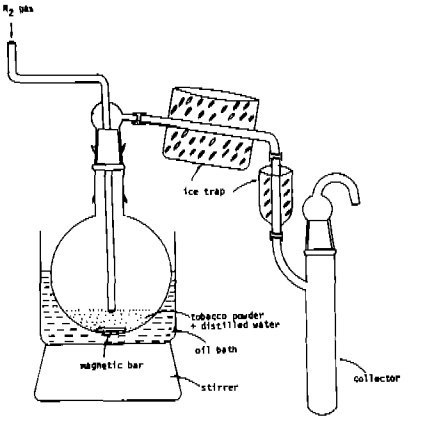

Figure 1. Distillation apparatus.

The stream of nitrogen gas was passed through the tobacco mixture at a rate of 50 ml/min for 45minutes. The distillate was collected and a single extraction with a 2ml portion of dichloromethane was made. An excess amount of anhydrous sodium sulfate was added to the extract to remove the moisture. The extract was then directly anayzed by GC.

Gas chromatography : A Hewlett-Packard Model 5840A gas chromatograph equipped with a Model 5840A GC terminal, a Model 18835 B capillary inlet system, and a flame ionization detector. Glass capillary column (40m x 0.25mm I.D.) coated with SE-30 was employed for this study. A 3 μl aliquot of each extract was injected to GC system in the splitless injection mode. N_2 flow-rate was 0.75ml /min and column temperature was maintained at 30℃ for 0.5minute, programmed to 150℃ at 10℃/min, and then to 240℃ at 5℃/min.

Temperature of injector port and detector were 250°C and 280°C, respectively. The peak areas were integrated for the quantitative analysis.

Results and Discussion

The technique used for the isolation of essential oils from tobaccos has been proven to be reproducible without causing artifacts formation(6). The contamination of the overall sampling procedure was minimal as evidenced by GC pattern in Figure 2.

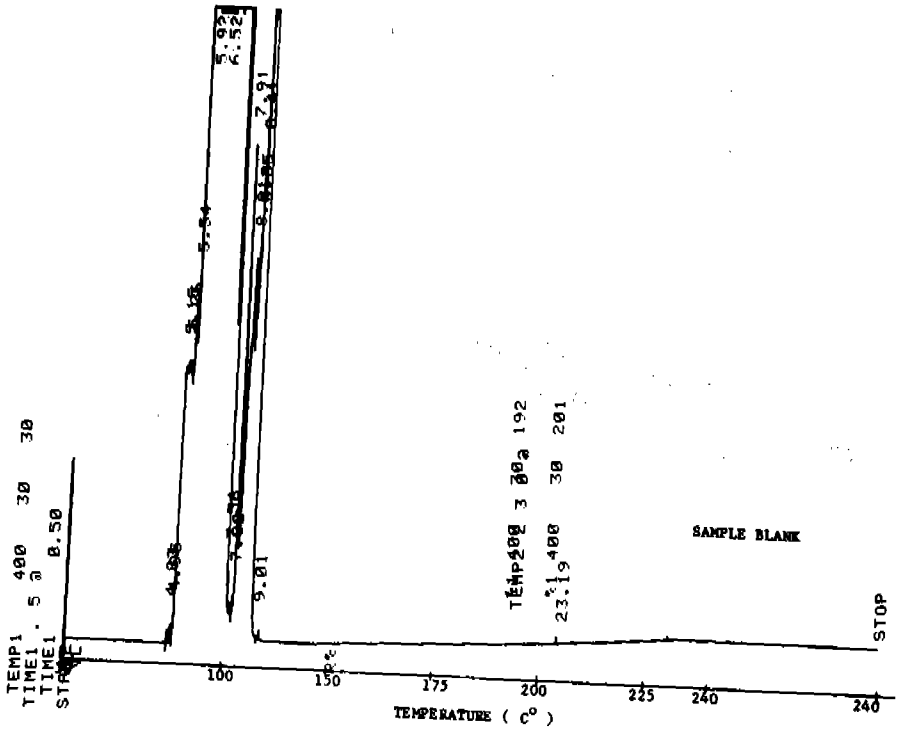

Figure 2. GC profile of sample blank.
Column, glass capillary column (40mx0.25 mm I. D.) coated with SE-30; N_2 carrier, 0.75ml/min; oven temperature, isothermally at 30°C for 0.5 minutes, programmed to 150°C at 10°C/min, and then to 240°C at 5°C/min; temperatures of injector port and detector, 250°C and 280°C; injection of 3 μl in splitless mode.

Essential oil composition of four tobaccos were compared with that of Greek Basma, as is subsequently shown in Figures 3 to 6.

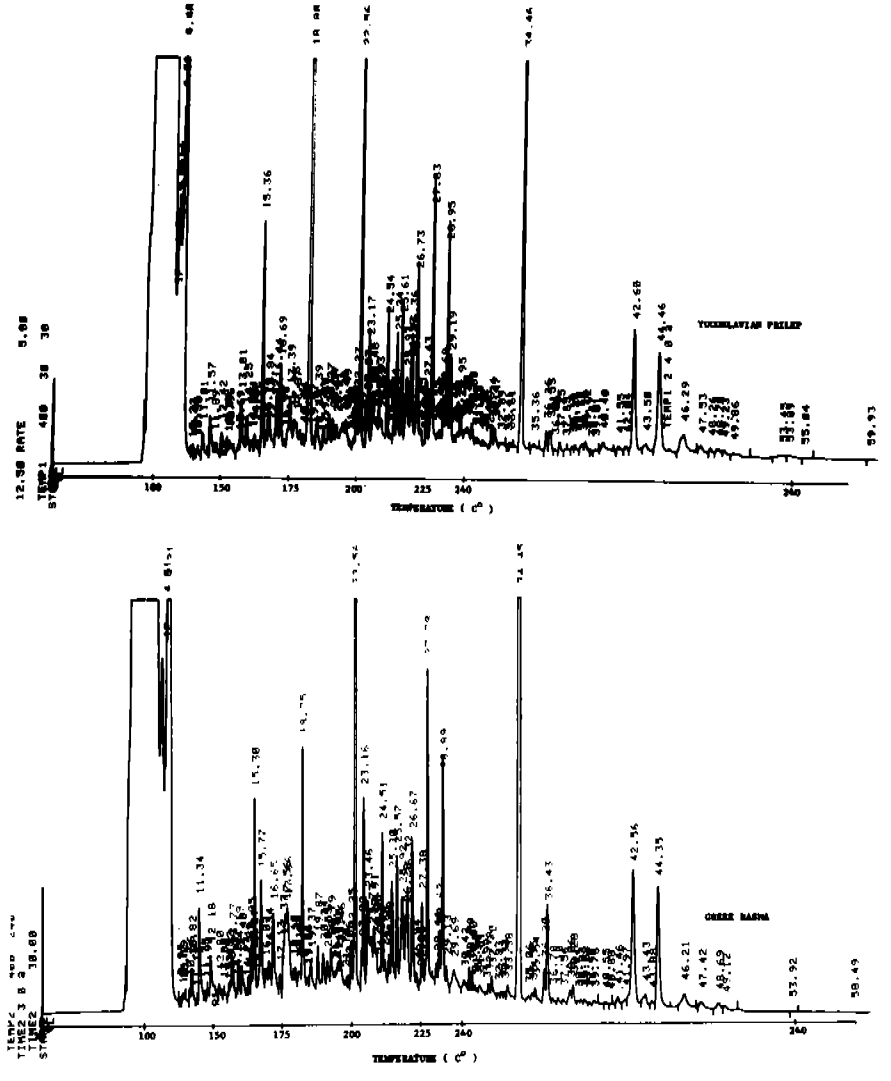

Figure 3. GC profiles of Greek Basma vs.
Yugoslavian Basma. Conditons in Figure 2.

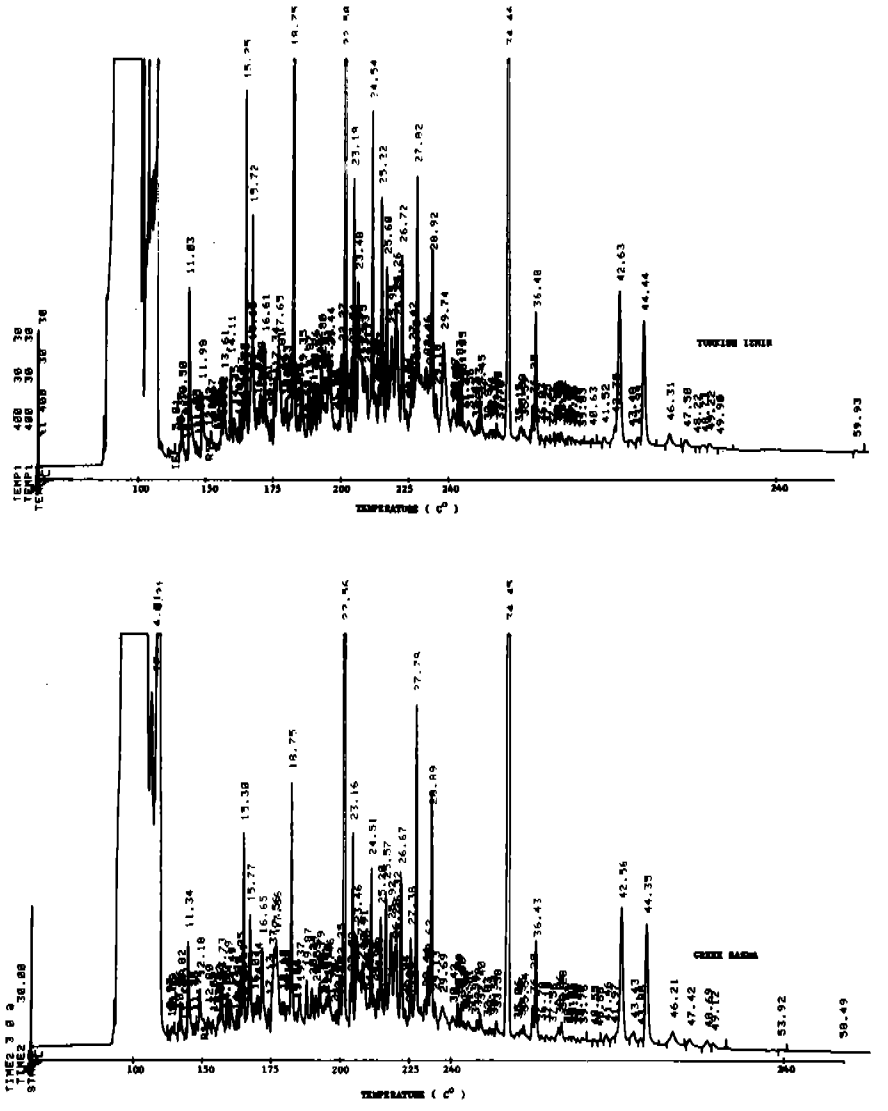

Figure 4. GC profiles of Greek Basma vs. Turkish Izmir. Conditions in Figure 2.

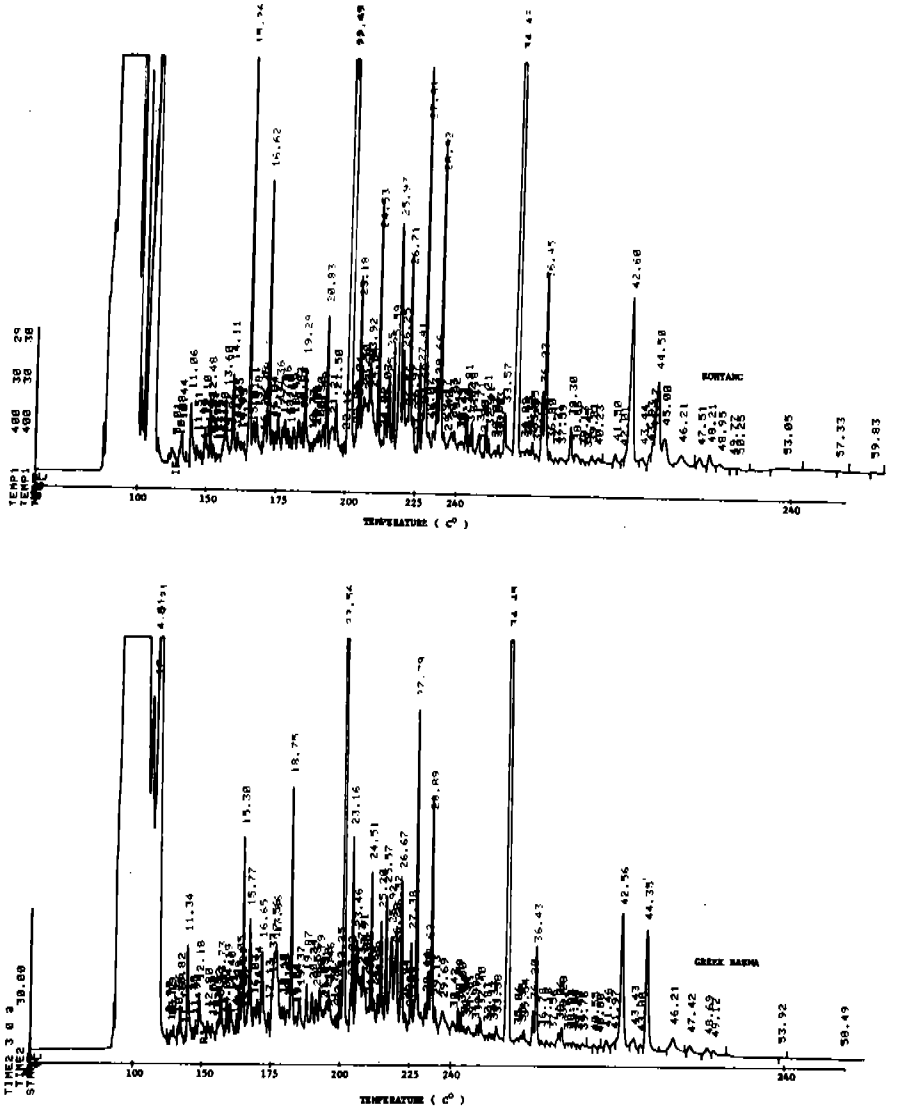

Figure 5. GC profiles of Greek Basma vs. Sohyang.
Conditions in Figure 2.

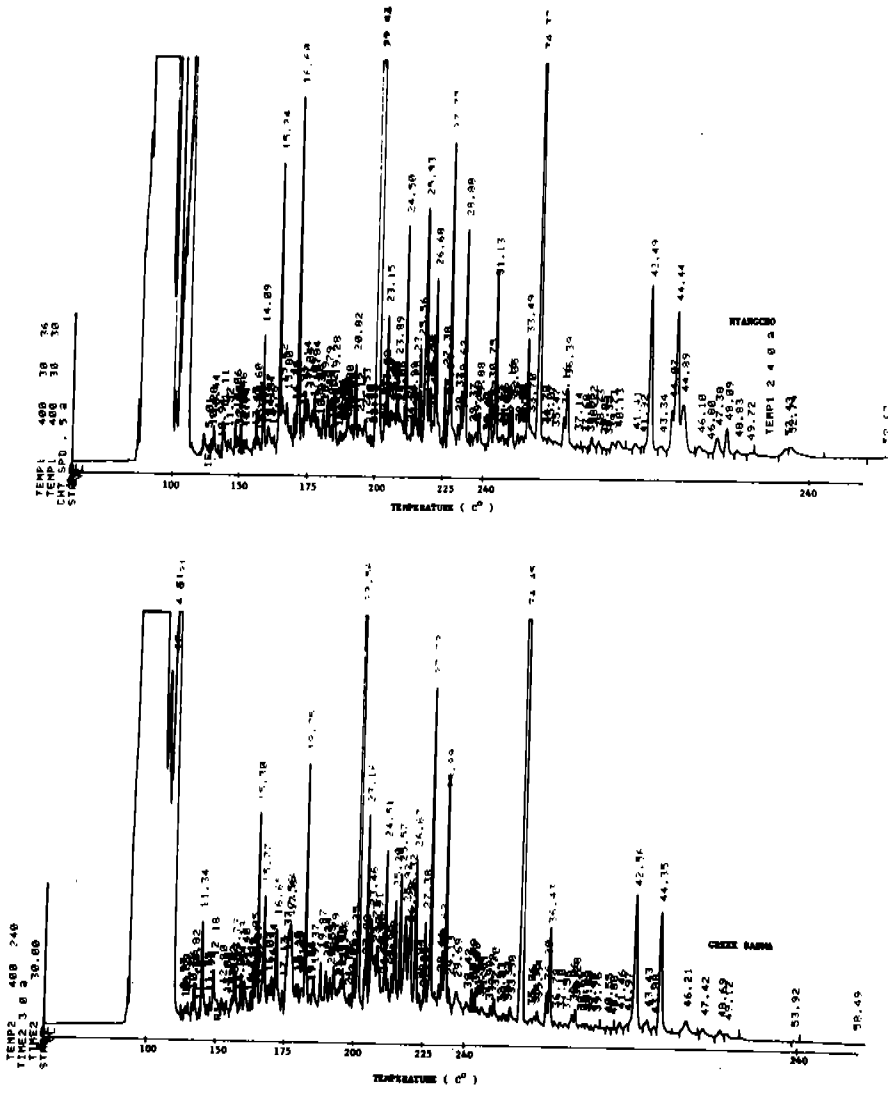

Figure 6. GC profiles of Greek Basma vs. Hyangcho. Conditions in Figure 2.

Significant differences between varieties could be detected from the GC profiles.

Profiles of Yugoslavian Prilep and Sohyang showed remarkably similar to those given by Turkish Izmir and Hyangcho, respectively, even though some large variations in the concentrations of several peaks existed

Table 1. Comparison of the major peaks among five varieties.

Peaks		Peak Area %				
No.	Retention time (in minutes)	Basma (Greek)	Prilep (Yugo.)	Izmir (Turkish)	Sohyang (Korean)	Hyangcho (Korean)
1	11.34	0.002	0.002	0.005	0.002	trace
2	14.19	trace	trace	0.002	0.003	0.003
3	15.30	0.003	0.007	0.006	0.010	0.006
4	15.77	0.003	0.003	0.006	0.001	0.001
5	16.65	0.002	0.003	0.003	0.007	0.008
6	18.75	0.005	0.131	0.037	trace	0.002
7	22.25	trace	0.002	0.002	0.135	0.249
8	22.56	0.036	0.026	0.038	0.015	0.016
9	24.51	0.003	0.004	0.009	0.006	0.005
10	25.92	0.004	0.005	0.007	0.011	0.010
11	26.67	0.004	0.007	0.006	0.006	0.006
12	27.78	0.007	0.010	0.004	0.010	0.009
13	28.89	0.005	0.008	0.004	0.009	0.006
14	31.22	trace	trace	0.001	trace	0.005
15	33.58	trace	trace	trace	0.002	0.003
16	34.45	0.067	0.021	0.028	0.086	0.031
17	36.43	0.003	trace	0.003	0.007	0.003
18	42.56	0.007	0.008	0.007	0.012	0.009
19	44.35	0.005	0.009	0.005	0.007	0.009
20	44.85	–	–	–	0.003	0.005

* The retention times were those from Greek Basma.

Table 1 demonstrates the details of the quantitative differences by comparing 20 major peaks for the five varieties on a basis of peak area percentage. Yugoslavian Prilep and Greek Basma contain higher amounts of peaks 6 and 16, respectively, than other Oriental varieties. The peak 7, which exists in extremely high amount in Shoyang and Hyangcho, is only barely detectable in Greek Basma.

Although the identification of the major components were not made, the results indicate that the differences in essential oil profiles among tobaccos are due to the differences in the quantitation of their various components.

Conclusion

The principal differences between the Oriental and the Korean aromatic tobaccos are observed to be due to the concentrations of some major components rather than the compositions of their essential oils. This is in accordance with the previous findings (5, 7).

Korean tobaccos could be easily distinguished from Greek Basma by the amount of peak 7, which appears to be the substance associated with the varietal differences.

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