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Bibliography. Figures. Tables.

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MANUFACTURE OF LEBANESE MEDIUM AND LIGHT CIGARETTES TO DECREASE HEALTH PROBLEMS

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ABSTRACT

Smokers are facing health problems due to the inhalation of tar and nicotine. Our aim is to reduce smoking, in the meantime cigarette content of tar and nicotine. This aim can be done through producing a national light cigarette that will hopefully help all smokers to quit this bad habit.

Mixtures were prepared in the Régie Libanaise des Tabacs et Tombacs (RLTT), wrapped, weighed in the university laboratory and were tested in Tannpapier and Borgwaldt German Laboratories and at the Syrian Regie Laboratories. The first experiment was based on the use of perforated tipping papers that permit higher degree of ventilation while conserving the same tobacco harshness. Results showed that a perforation degree of 540 Coresta Unit gave the lower tar content of 13.8 mg/cigarette and nicotine content of 1.45 mg/cig.

A second experiment was conducted on the 80 mm cigarettes where blend mixture was made from oriental, burley and virginian tobacco. The most convenient mixture was composed respectively of 80%, 10% and 10% resulting in tar and nicotine respectively of 12 and 0.8 mg/cig.

A third experiment on 100 mm cigarettes showed decreased results for tar and nicotine respectively 11.31 and 0.96 mg /cigarette for a mixture composed by 50% virginian tobacco, 35% oriental tobacco and 15% expanded stems tobacco.

Key words: *Smoke, cigarette, tar, nicotine, health diseases.*

RÉSUMÉ

Les fumeurs dans le monde et au Liban souffrent de problèmes de santé dus à l'inhalation du goudron et de la nicotine. Notre but est de réduire le contenu en goudron et en nicotine et ceci en produisant de légères cigarettes nationales. Ceci contribue, heureusement, à long terme à arrêter cette mauvaise habitude. Les mélanges ont été préparés à la Régie Libanaise de Tabacs et Tombacs, pesés au laboratoire de l'université Saint Esprit à Kaslik et testés aux laboratoires allemands de Borgwaldt, ceux de Tannpapier et au laboratoire syrien. La première expérience s'est basée sur l'utilisation de papiers perforés qui permettent un plus haut degré de ventilation donc une inhalation diminuée du goudron et de la nicotine, tout en conservant le même goût âpre des cigarettes. Les résultats ont démontré que la perforation de 540 Coresta Unit donne un taux de goudron de 13.8% et de 1.45mg/cigarette de nicotine, tout en conservant le goût demandé. Une seconde expérience a été faite sur les cigarettes de 80 mm ou les mélanges ont été faits de tabac oriental, virginien et burley. Le meilleur mélange qui a été choisi fut respectivement de 80%, 10%,10% de tabac oriental, virginien et burley. Les résultats étaient de 12 mg/ cig. en goudron et de 0.8 mg/ cig. en nicotine.

La troisième expérience faite sur les cigarettes de 100 mm a démontré une diminution dans les teneurs de goudron jusqu'à 13.31mg/cigarette et de nicotine jusqu'à 0.96 mg/cigarette. Le mélange est composé de 50 % de tabac virginien, 35% de tabac oriental et 15% de tabac aux tiges expansées.

Mots clés : *Fumer, cigarette, goudron, nicotine, problèmes de santé.*

INTRODUCTION

Tobacco use is widespread throughout the world and million of people men and women, children and adults are subjected to environmental tobacco smoke. Smoking causes a range of diseases and is considered as a serious health hazard

and a major contributing factor to deaths (Fielding, 1985). The “Régie Libanaise des Tabacs et Tombacs” is the one licensing for tobacco cultivation since the 20th century. In 1999, the total Lebanese production of tobacco was 95 billion L.L. (RLTT, 1999).

In 1995, the number of farmers cultivating tobacco was around 21 thousand and in 1999, the number was still on increase and reached 28 thousand. Tobacco cultivation in Lebanon is therefore on increase. The oriental tobacco is exported to the United States of America and some other countries in Europe. The total cost for the cultivation of one hectare of tobacco is \$5713. After analyzing the Lebanese market, it was concluded that cigarettes constitute a good market share and Lebanese light cigarettes are not available on our market. A pack of cedars cigarette is sold at 750 L.L., a cedars light pack would cost 1500 L.L., which still at lower price than any international brand (RLTT, communication).

Cedars cigarettes are the only Lebanese cigarettes found on the market, there were more than 12 brands: Bafra, Number 2, Yenigeh, Tatli etc. The main blend used is a mixture of virginian, burley and oriental tobacco. When combining the less harmful tobacco known as low in tar and nicotine, to our industrial facilities provided by the RLTT, we possess the tools to produce our new national cigarette with the minimum health hazard.

In this study, the tobacco was not chosen hazardously but relatively to our needs (that is a blend with a high percentage of tobacco but low in nicotine content) in reducing tar and nicotine. The three experiments done can be joined in order to get the most valuable brand, which consists of low nicotine and tar content at a fair price.

MATERIALS AND METHODS

Three different experiments were done using same way concerning blend preparation and same equipment in order to produce a national light cigarette. All tobacco blends were calculated relatively to tar and nicotine content of each tobacco type and accomplishing it by using a special wrapping paper. Tobacco strips were taken from 1998-1999 crops for oriental, burley and virginian tobacco. Casing materials used were the same for a normal Cedars cigarette: licorice, cacao, casing burley, sugar, molasses, propylene glycol, glycerin, sorbitol and lactic acid. Flavoring materials at a rate between 0.5 and 1% are used to improve smoke quality and impart a pleasant pack aroma. Equipments used are

cigarette maker: "Decoufle machine", packing machines as G.D., Schmermundt, Sasib, Molins for both 80 and 100 mm cigarettes. Raw materials used were cigarette paper, plugwrap, tipping paper, filter, labels, stamps, aluminum paper, carton and cellophane paper.

In the first experiment, we worked on 100 mm cigarettes using tipping paper porosity of 100, 250, 350, 540 and 800 CU and were tested with the blend of a normal cigarette in Tannpapier labs under the conditions of 60% relative humidity, 21°C atmospheric pressure at ISO 3402 and 3308 standards (ISO, 1991). Tar content or nicotine free-dry particulate matter (NFDPM) was 22.04 mg/cigarette and nicotine content was 1.97 mg/cigarette (RLTT, 1996).

In the second experiment, we prepared four different mixtures of oriental, burley and virginian tobacco, packed in 80 mm cigarettes to be tested in the Syrian Regie. Relative humidity was between 12 and 13%; casing used was used at 10% and flavor at 1% as in table 1.

Table 1: Blend composition for four different mixtures of oriental, burley and virginian tobacco.

	A	B	C	D
	%	%	%	%
Oriental	50	60	70	80
Burley	20	15	10	10
Virginien	30	25	20	10

In the third experiment, virginian, oriental and expanded tobacco stems were mixed to make 13 different mixtures to find the most suitable blend. Fifteen samples from each blend were sent to Borgwaldt and tested on a RM 20 smoke trap machine at 21.5°C temperature, relative humidity at 58.8% and 100 kPa pressure. Tar is the smoke particulate fraction minus the water and nicotine content. Nicotine determination is done by spectrophotometry; the concentration of nicotine in smoke condensate is divided by the number of cigarette smoked to know the nicotine content in mg/cigarette.



RESULTS AND DISCUSSION

Porosity of tipping paper used in cigarette manufacture increase the ventilation degree but at a certain degree might influence the taste but the results were as follow. Our choice was the 540 Coresta Units because it keeps the harshness of the new cigarette as the normal Cedars cigarette (Tab. 2).

Table 2: Percentages reduction of ‘tar’ and nicotine according to the perforation.

Perforation permeability E (CU)	% reduction of NFDPM	% reduction of nicotine
100	10	5
220	20	11
350	30	18
540	40	27
800	60	37

Cigarette designers must balance the use of the combined elements to produce cigarette with the desired smoke yields, smoking quality and economy of manufacture. Therefore we chose the 540 CU perforation degree in order to keep the same cigarette harshness. The figure 1 shows tar and nicotine variation according to the perforation degree.

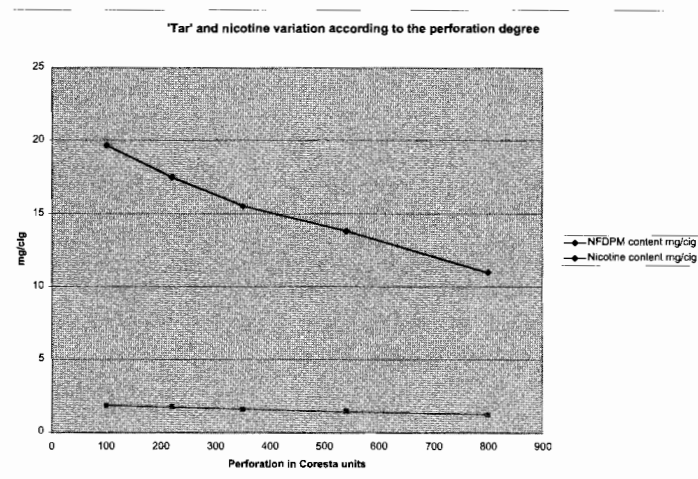


Figure 1. Tar and nicotine variation according to the perforation degree.

The oriental tobacco is low in nicotine content around 1 to 4%. In the second experiment, different blends of oriental, burley and virginian were tested on 80 mm cigarettes. The best mixture was respectively for the 80%, 10% and 10% for oriental, burley and Virginian tobacco with a tar content that reached 12 mg/cigarette and a nicotine content of 0.8 mg/cig when it was 17mg/cig and 1.7mg/cig for tar and nicotine respectively, this cigarette contents equals those of a medium international cigarette.

Table 3: Tar and nicotine content for different mixtures.

	'TAR' mg/cig (NFDPM)	Nicotine mg/cig (TPM)
A Oriental 50% Burley 20% Virginian 30%	14	1.15
B Oriental 60% Burley 15% Virginian 25%	14.50	1.15
C Oriental 70% Burley 10% Virginian 20%	14.00	0.92
D Oriental 80% Burley 10% Virginian 10%	12	0.8

In the third experiment, we changed to a treated tobacco mixed with virginian and tobacco as shown in the table 4.

Table 4: Nicotine and tar content of various blends used in the third experiment.

	Nicotine mg/cig.	'Tar' mg/cig.
A (60% VT*, 30%OT ^a , 10%ES ^b)	1.16	12.55
B (50%VT, 40% OT, 10%ES)	1.05	11.64
C (40 %VT, 50% OT, 10% ES)	0.89	10.16
D (55%VT, 30% OT, 15% ES)	1.094	12.42
E (45% VT, 40% OT, 15% ES)	1.3	12.50
F (35%VT, 50% OT, 15% ES)	1.11	13.81
G (40% VT, 45% OT, 15% ES)	1.03	10.87
H (50%VT, 35% OT, 15% ES)	0.96	11.31
I (60%VT, 25% OT, 15% ES)	1.25	14.27
J (50% VT, 30% OT, 20% ES)	0.96	11.41
K (40% VT, 40% OT, 20% ES)	1.09	12.93
L (30% VT, 50% OT, 20% ES)	1.17	12.63
M (60% VT, 20% OT, 20% ES)	1.11	14.32

Figure 2 shows a big variation for every change in the mixture. The oriental tobacco is low in nicotine content, the expanded tobacco stems is treated in order to decrease nicotine content and increase his filling capacity. The virginian tobacco (50%) balanced with two other components (oriental 35 % and expanded tobacco 15%) low in nicotine gives a nicotine content of 0.96 mg/cig and 11.31 mg/cig of tar. The preceding results are those of a light cigarette if done on a blend basis.

The relation between tar and nicotine is given in the following equation:

$$Y (\text{tar})=4.733+7.05X (\text{Nicotine}) (R^2=0.486) (\text{Ogg}, 1962)$$

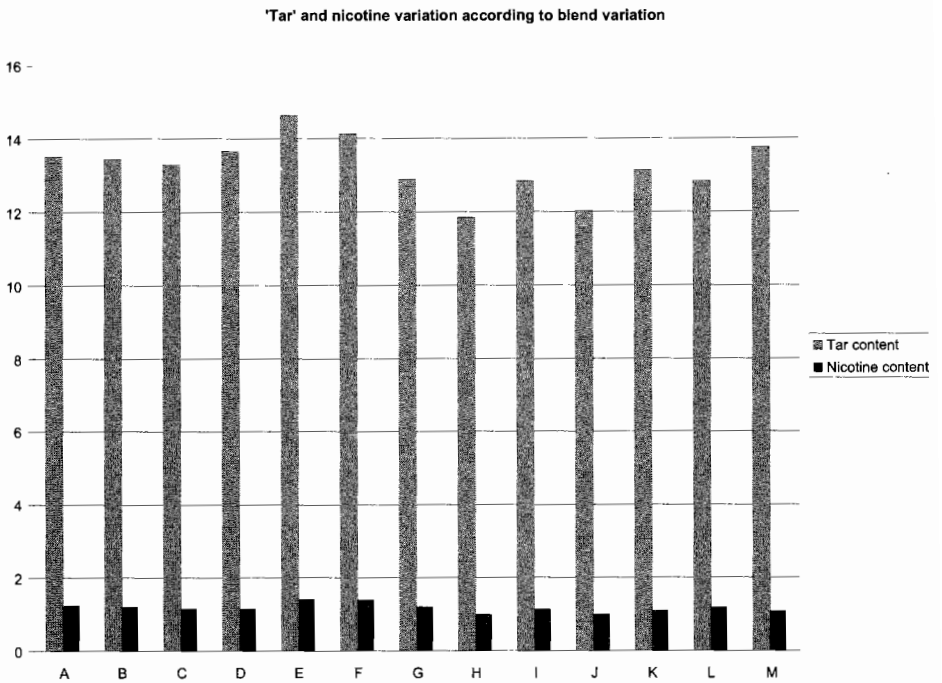


Figure 2. Variation of tar and nicotine according to blend variation.

Despite all the health problems that could tobacco cause, tobacco would never disappear because it has other good effects that could be used in drugs and in the restitution of human cells for the fabrication of human blood. The experiments done in this study have a principle aim of reducing health damages, and not especially encouraging smoking, this is what for we tried to find new brands.

Changing the tipping paper in the first experiment increases the ventilation level and helps in better burning; this means a lower nicotine rate inhaled. But if we smoke a cigarette and we feel a lack in the taste, we are not going to try it anymore and it is not what we desired our product to be. This is why we choose the 540 CU to keep the same taste of our cigarette meanwhile reducing nicotine content, which is less harmful for smokers.

In the second experiment, the mixing of 80 % oriental tobacco, 10% burley and 10% virginian gave convenient results for tar and nicotine as well as it helps our national economy using oriental tobacco planted in very huge quantities in Lebanon.

Oriental, virginian and expanded tobacco stems are known for their low nicotine content, well taste and aroma and high filling capacity. A nicotine content of 0.96 mg/cig and a tar content of 11.31 mg/cig are the results required for a light cigarette at the international level. This is why it is convenient to mix 50% Virginian tobacco with 35 % oriental and 15 % expanded tobacco stems

When we need a low tar and nicotine content cigarettes, it is essential to work on all cigarette raw materials including blend composition, cigarette papers, filters, plug wrap, tipping paper etc. It is convenient to use high technology of expanded tobacco stems as well as the perforation technologies. Smoking light and ultra-light cigarettes is less harmful. A light cigarette can be produced in Lebanon in using oriental tobacco plus expanded tobacco stems regarding the blend. Tipping paper with high porosity decreases the nicotine content. We care for the smoker's health. We are looking to use our industry for this purpose.

CONCLUSION

Oriental tobacco and expanded tobacco stems are the best tobacco to be used in manufacturing light cigarette, with the use of perforated tipping paper that has an influence on ventilation.

Tobacco industry is on continuous increase, therefore more researches are needed.

Smoking and passive smoking are very dangerous public health hazard, production of a local light cigarette might be a first step on our way to reduce this bad habit and encourage our local industry to develop (Report of the scientific committee on tobacco and health).

We recommend as a future study: the influence of burn additives on tar and nicotine content in light cigarettes.

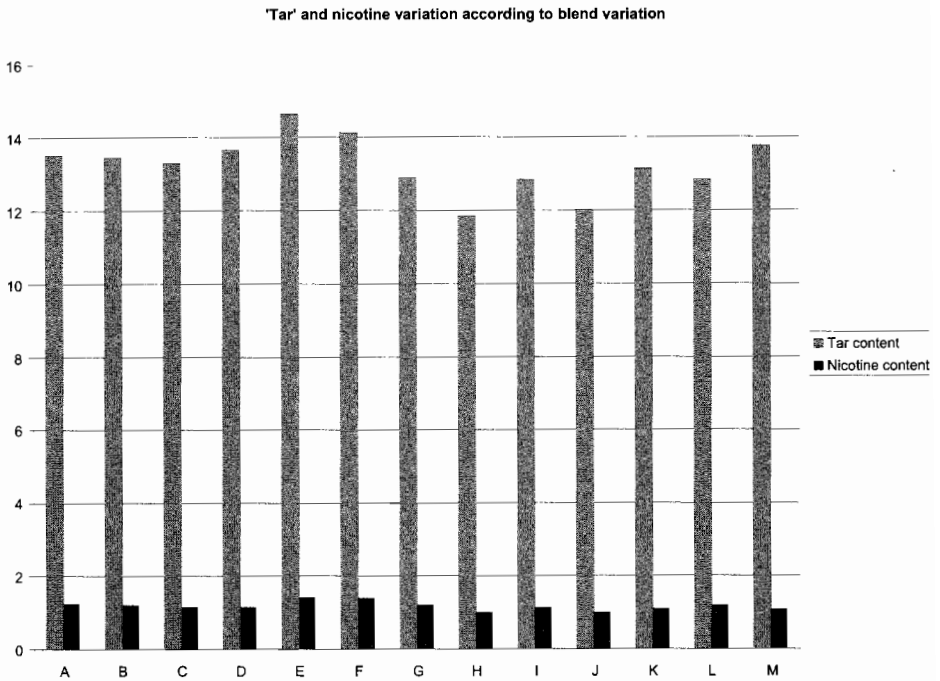


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