THE STUDING OF THE INFLUENCE OF THE ULTRA HIGH FREQUENCY (UHF) FIELD ON THE PROCESSES OF THE DRYING AND FERMENTATION OF THE TOBACCO LEAVES

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The influence of the UHF field on the processes of the drying and fermentation of the tobacco leaves has been studied. The changes, accompanying these processes were controlled by the spectrophotometric and derivatographic methods. It is shown, that the qualitatively ecological pure product with the given color and afterhumidity can be obtained by the changing of the UHF field, powers of UHF generator and prolonged treatment.

Introduction

The photo- and thermochemical reactions play very important role in the processes of the drying and fermentation of the tobacco leaves [1]. The progression of these processes under the standard conditions, which are characterized for the usual fermentation factories, connects with the some difficulties, that negatively influence on the product quality.

That's why we begin the search of the new methods of the drying and fermentation, deprived of these disadvantages. One of these methods is the dielectric heating of the tobacco, because the advantage of the dielectric heating reveals strongly on the materials with the low heat conduction and heat-resistant properties, as the tobacco is [2].

The influence on the tobacco leaves as the dielectric of the electromagnetic (HF and UHF) fields would allowed the progression of the photo- and thermochemical reactions not only on surface, but in the full volume. However, the method of the dielectric heating of the kiptongo in the aim of the intensification fermentation process doesn't give the welcome effect, as the fermentation progresses only in the think subsurface levels [3].

The welcome high effectiveness and accelerations of the fermentation process were achieved by the UHF field treatment of the tobacco leaves. One of the advantages of the UHF method is that UHF field besides local thermal influence initiates also the probability of the uniform progression of the photochemical reactions of the separate ferments, which gives the opportunity to obtain the qualitative products with the minimal ecological pollutions. [4,5].

As well known, the chemical composition of the tobacco leaves, changes the color and becomes uniform and approaches to the one-color, the green disappears at the fermentation. The one of the main reasons of the most counts of green in the tobacco leaves is the residual chlorophyll. The high residual content of the chlorophyll leads to the significant storage of the substances, with the negative properties, which limit the action of the 'positive' components in the tobacco [2]. That's why it is possible to follow the process of the fermentation and tobacco quality on the changing of the dark-green color in the tobacco leaves and on the chlorophyll decomposition correspondingly.

In the given paper the influence of the high-frequency electric field on the processes of the drying and fermentation of the tobacco leaves has been studied. The changes, accompanying these processes were controlled by the spectrophotometric and derivatographic methods.

The experiment part

The UHF drying and fermentation of the tobacco green leaves were carried out on the laboratory installation "UHF tobacco" on the method, written in [5] in details. The parameters of the treatment (the frequency of the UHF field, the power of UHF generator, the length of the light of the ultraviolet (UV) rays, treatment time) change in the such manner that it is possible to obtained the dry tobacco leaves with the yellow shadows. The choosing of the spectral range 400-700nm is caused that the absorption band of the residual chlorophyll states at λ=665nm. As the control experiments show, the photoradiation of the tobacco leaves in this spectral region doesn't worse the quality of the ready product and the quantity of the resin doesn't increase.

By the way of the investigation object were choosen about 100 samples of the tobacco green leaves of the different types (Samsun, Trapezond, Ostralis and Imun), grown in Azerbaijan.

The UV absorption spectrums of the alcoholic drawing of the tobacco have been obtained by the method [5] in the spectrophotometre Specord UV VIS. The derivatographic analysis was carried out on the devatograph MOM-4 (the heating velocity 5K min^{-1}.

The results and their discussion

The alcohol extract of the tobacco leaves gives the absorption in the visual spectral region at the wave length λ=665nm this band is connected with the residual chlorophyll [6]. The intensity of this band characterises the quantity of the residual chlorophyll in the dark-green tobacco leaves and its change can be used as the coefficient of the acceleration of the chlorophyll's decomposition at the high-frequency electric field action.

The absorption spectrums of the alcohol extract unfermented (green) and the tobacco leaves of Trapezond type, tormented by the UHF field are given on the fig. 1. It is clear, that if the tobacco quality is worse (the big content of chlorophyll, the fermentation of the low level), so it absorbs more at λ=665nm.

The observable dependence between spectral characteristics (intensity, optical density) and the residual chlorophyll of the dark-green color, and the taste parameters (taste-B and aroma-A) also has the line character and allows

to define and control the change of the qualities of the tobacco leaves, tormented by the UHF field with the help of the express-method [6].

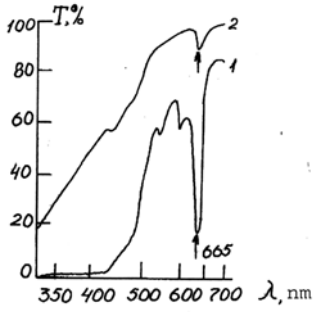

Fig.1. The absorption spectrums of alcohol extracts from tobacco by Trapezond type in the visual region:
1. initial (green, unfermented)
2 . UHF tormented (fermented)

The objective criterion for the fact establishment and fermentation level of tobacco can serve exothermic effect, characterising the intensity of the heat transfer at the different processes, and the burning process also [7]. As the DT investigations showed the exoeffect is observed at the temperature *T*~340K (fig.2). As it is shown from the fig 2 (curve 1) the given exoeffect is observed weakly in the green, unfermented tobacco samples. The deep of the exopeak increases (curves 2, 3) with the increase of the fermentation degree, that connects with the tobacco heat transfer. The comparison of the dates on the tobacco heat transfer, fermented under the isothermic conditions and the constant humidity of the material shows that the deep of this exoeffect gives the possibility to establish the tobacco fermentation degree.

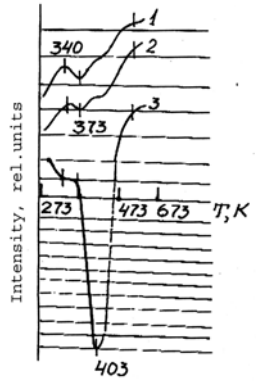

Fig.2. Thermogramms of tobacco leaves, UHF tormented, dried (1), unfermented, dried (2), green (3)

The humidity of the tobacco leaves is the one of the main parameters, which strongly influences on the fermentation process and the quality of the ready product accordingly [2]. The tobacco fermentation is usually carried out at the optimal humidity and temperature. The humidity deflection from the optimal value (~14%) leads to the undesirable circumstances. The dry tobacco loses elasticity, becomes brittle, and the excess by moist raw material goes mouldy easily.

Among wide spread methods of the regulation of the tobacco humidity is the method of the standartization of the humidity by the way of the standartization in the drying board [1].

The UHF drying allows to obtain the dry tobacco leaves with the given humidity, moreover the needed time for this process decreases till the minimum.

As the DT- investigations show the green untormented tobacco leaves at *T*~403K are characterised by the strong exoeffect, which is caused by the presence of the big amoubt of humidity. As a result of the UHF drying the endopeak intensity decreases and its maximum shifts to the low temperatures (on ΔT~30K) till *T*~373K. The humidity of the tobacco leaves after UHF drying can be controlled by the endopeak intensity (fig2).

The taste qualities of the tobacco leaves, tormented by the UHF field become better, and it is shown by the spectrophotometric and taste of the aroma (A) and taste (B). The values of these estimates and the values of the residual humidity after the UHF drying are given in the table.

№	Sample	Rating in points to 20 ball system				Afterhu-midity %
		$A_{deg.}$	A_{spectr}	$B_{deg.}$	B_{spectr}	
1	Initial unfermented tobacco of Samsun type	13.2	13.0	13.4	13.2	18.2
2	UHF tormented tobacco of Samsun type					
	a) third kind	17.0	17.2	16.9	17.0	16.4
	b)second kind	19.0	18.9	19.1	19.0	15.2
	c)first kind	19.2	19.1	18.8	18.7	14.5

So, changing the frequency of the UHF field, power of the UHF generator and the duration we can obtain the dry tobacco leaves with the given color and the afterhumidity and later choose the optimal mode of the UHF drying and fermentatio

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İFRATYÜKSƏKTEZLİKLİ (İYT) SAHƏNİN TÜTÜN YARPAQLARININ QURUDULMASI VƏ FERMENTLƏŞDİRİLMƏSİ PROSESLƏRİNƏ TƏSİRİRİ TƏDQİQİ

İYT sahənin tütün yarpaqlarının qurudulması və fermentləşdirilməsi proseslərinə təsiri öyrənilmişdir. Bu proseslər zamanı yaranan dəyişikliklərə spektrometrik və derivatoqrafik metodlarla nəzarət edilmişdir. İYT sahənin tezliüini, İYT – generatorunun gücünü və emal müddətini dəyişməklə verilmiş çalarlı və qalıq rütubətə malik ekoloji cəhətdən təmiz və keyfiyyətli məhsul olmağın mümkünlüyü göstərilmişdir.

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ИЗУЧЕНИЕ ВЛИЯНИЯ СВЕРХВЫСОКОЧАСТОТНОГО (СВЧ) ПОЛЯ НА ПРОЦЕССЫ СУШКИ И ФЕРМЕНТАЦИИ ЛИСТЬЕВ ТАБАКА

Изучено влияние СВЧ – поля на процессы сушки и ферментации листьев табака. Изменения, сопровождающие эти процессы контролировались спектрографическим и деривафотрографическим методами. Показано, что варьируя частоты СВЧ – поля, мощности СВЧ – генератора и продолжительности обработки можно получить качественный экологически чистый продукт с заданной окраской и остаточной влажностью.

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